### CONTACT DETAILS

<table>
<thead>
<tr>
<th>NAME</th>
<th>ADDRESS</th>
<th>CELL</th>
<th>EMAIL</th>
<th>CAMPUS</th>
<th>RESIDENCE</th>
<th>IN CASE OF EMERGENCY CONTACT</th>
</tr>
</thead>
</table>

You have registered to the Faculty of Engineering. Here are our details, just in case you need them:

**Postal Address**

- **Faculty of Engineering**
  - Cape Peninsula University of Technology
  - Symphony Way,
  - BELLVILLE, 7530

- **Faculty of Engineering**
  - Cape Peninsula University of Technology
  - Engineering Building
  - Corner of Tennant and Keizergracht,
  - CAPE TOWN, 8000

**Physical Address**

- **Faculty of Engineering**
  - Cape Peninsula University of Technology
  - Email: engineer@cput.ac.za
  - Website: www.cput.ac.za/academic/faculties/engineering
Faculty’s vision and mission
Staff Members contact details
Staff Awards
Student Awards
Message from the Vice-Chancellor
Campuses and Service Points
Wellness Centre
General Information
Academic Progressions and Exclusions
Minimum Admission Requirements
Selection Procedure & Recognition of Prior Learning
Procedure for Evaluation of Foreign Qualifications
Transfers from Other Institutions
Faculty of Engineering Qualifications Structure
Faculty Exclusions Rules and Procedures
Department of Chemical Engineering
Department of Civil Engineering and Surveying
Department of Clothing & Textile Technology
Department of Construction Management and Quantity Surveying
Department of Electrical, Electronic and Computer Engineering
Department of Industrial & Systems Engineering
Department of Maritime Studies
Department of Mechanical Engineering

Every effort has been made to ensure the accuracy of the information in this handbook; however the University reserves the right at any time, if circumstances require to make changes to any of the published details.
VISION AND MISSION

Vision
To be the leading centre of technology education and innovation in Africa.

Mission
To be a faculty of engineering excellence responsive to societal needs.

Slogan
The engineering “pulse of Africa”
It is important to know whom you will be dealing with for the duration of your time at the Faculty of Engineering. Here are all the contact details you will need.

**CONTACT DETAILS:** Staff Members

**MANAGEMENT: FACULTY OF ENGINEERING**  
(BV) indicates Bellville Campus / (CT) indicates Cape Town Campus

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Engineering</td>
<td>A Prof M Sheldon (Acting)</td>
<td>021 959 6217</td>
<td><a href="mailto:SheldonM@cput.ac.za">SheldonM@cput.ac.za</a></td>
</tr>
<tr>
<td>Secretary</td>
<td>Ms L Poni</td>
<td>021 959 6612</td>
<td><a href="mailto:PoniL@cput.ac.za">PoniL@cput.ac.za</a></td>
</tr>
<tr>
<td>Assistant Dean: Teaching and Learning</td>
<td>A Prof M Sheldon</td>
<td>021 959 6757</td>
<td><a href="mailto:SheldonM@cput.ac.za">SheldonM@cput.ac.za</a></td>
</tr>
<tr>
<td>Secretary</td>
<td>Ms M Sogiba</td>
<td>021 959 6642</td>
<td><a href="mailto:SogibaM@cput.ac.za">SogibaM@cput.ac.za</a></td>
</tr>
<tr>
<td>Assistant Dean: Research and Innovation</td>
<td>Prof CM Moll</td>
<td>021 953 6897</td>
<td><a href="mailto:MollCM@cput.ac.za">MollCM@cput.ac.za</a></td>
</tr>
<tr>
<td>Faculty Manager</td>
<td>Mr N Cloete</td>
<td>021 959 6632</td>
<td><a href="mailto:CloeteN@cput.ac.za">CloeteN@cput.ac.za</a></td>
</tr>
<tr>
<td>Secretariat</td>
<td>Vacant</td>
<td>021 959 6644</td>
<td></td>
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**HEADS OF DEPARTMENTS & HEADS OF PROGRAMME (HoP)**  
(BV) indicates Bellville Campus / (CT) indicates Cape Town Campus

**Construction Management and Quantity Surveying**

| Head of Department                      | Ms T K Stringer                  | 021 959 6629 | StringerT@cput.ac.za       |
| HoP (Construction Management)          | Mr L Wentzel                     | 021 959 6630 | WentzelL@cput.ac.za        |
| HoP (Quantity Surveying)               | Mr M Laatoe                      | 021 959 6634 | LaatoeM@cput.ac.za         |

**Chemical Engineering**

<p>| Head of Department                        | Prof D Ikhu-Omoregbe          | 021 959 6130 (Tel) 021 959 6083 (Fax) | <a href="mailto:Ikhu-omoregbeD@cput.ac.za">Ikhu-omoregbeD@cput.ac.za</a> |
| HoP (BV):                                   | Mr G Hangone                  | 021 959 6399 | <a href="mailto:HangoneG@cput.ac.za">HangoneG@cput.ac.za</a>        |
| HoP (CT):                                   | AProf T Ojumu                 | 021 460 3162 | <a href="mailto:OjumuT@cput.ac.za">OjumuT@cput.ac.za</a>          |</p>
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<tr>
<th>FACULTY CONTACT INFORMATION</th>
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<th>Civil Engineering and Surveying</th>
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<tr>
<td><strong>Head of Department</strong></td>
<td><strong>Ms A Kamalie</strong></td>
</tr>
<tr>
<td><strong>HoP (Survey &amp; GiSc)</strong></td>
<td><strong>Mr R Raubenheimer</strong></td>
</tr>
<tr>
<td><strong>HoP (ECP)</strong></td>
<td><strong>Mr N Armien</strong></td>
</tr>
<tr>
<td><strong>HoP (Diploma)</strong></td>
<td><strong>Mr M Habets</strong></td>
</tr>
<tr>
<td><strong>HoP (BTech)</strong></td>
<td><strong>Mr M Phillips</strong></td>
</tr>
<tr>
<td><strong>HoP(Post-grad)</strong></td>
<td><strong>Prof R Haldenwang</strong></td>
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<th>Clothing and Textile Technology</th>
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<tbody>
<tr>
<td><strong>Head of Department</strong></td>
<td><strong>Dr E M Hovgaard</strong></td>
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<th>Electrical, Electronic and Computer Engineering</th>
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<tr>
<td><strong>Head of Department</strong></td>
<td><strong>Mr B Groenewald</strong></td>
</tr>
<tr>
<td><strong>HoP</strong></td>
<td><strong>Dr Z T Nkosi</strong></td>
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<table>
<thead>
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<tr>
<td><strong>Head of Department</strong></td>
<td><strong>Mr A Bester</strong></td>
</tr>
<tr>
<td><strong>HoP (Industrial Engineering)</strong></td>
<td><strong>Mr B Morar</strong></td>
</tr>
<tr>
<td><strong>HoP (Quality)</strong></td>
<td><strong>Ms L Valentine</strong></td>
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<td><strong>AProd ED Snyders</strong></td>
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<tr>
<td><strong>Head of Department</strong></td>
<td><strong>Prof MA Kaunda</strong></td>
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<td><strong>HoP (ECP)</strong></td>
<td><strong>Mr L Meyers</strong></td>
</tr>
<tr>
<td><strong>HoP (Diploma)</strong></td>
<td><strong>Mr S Nqabisa</strong></td>
</tr>
<tr>
<td><strong>HoP (BTech)</strong></td>
<td><strong>Mr W Kohlhofer</strong></td>
</tr>
<tr>
<td><strong>HoP (Mechatronics)</strong></td>
<td><strong>Mr O Ayodele</strong></td>
</tr>
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### FACULTY CO-ORDINATORS AND SUPPORT STAFF

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>Email</th>
</tr>
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<tbody>
<tr>
<td>Extended Curriculum Programme (ECP) Co-ordinator</td>
<td>Dr M Jacobs</td>
<td>021 959 5856</td>
<td><a href="mailto:JacobsMS@cput.ac.za">JacobsMS@cput.ac.za</a></td>
</tr>
<tr>
<td>Community Engagement and Work Integrated Learning Co-ordinator</td>
<td>Mr M Mabogo</td>
<td>021 959 6591</td>
<td><a href="mailto:MabogoM@cput.ac.za">MabogoM@cput.ac.za</a></td>
</tr>
<tr>
<td>I.T. Co-ordinator</td>
<td>Mr D Evans</td>
<td>021 959 6713</td>
<td><a href="mailto:EvansD@cput.ac.za">EvansD@cput.ac.za</a></td>
</tr>
<tr>
<td>Language Co-ordinator</td>
<td>A Prof K Barris</td>
<td>021 953 8727</td>
<td><a href="mailto:BarrisK@cput.ac.za">BarrisK@cput.ac.za</a></td>
</tr>
<tr>
<td>Student Engagement Co-ordinator</td>
<td>Mr L Kakaza</td>
<td>021 959 6814</td>
<td><a href="mailto:KakazaL@cput.ac.za">KakazaL@cput.ac.za</a></td>
</tr>
<tr>
<td>Teaching and Learning Co-ordinator</td>
<td>Dr T Joseph</td>
<td>021 953 8720</td>
<td><a href="mailto:JosephT@cput.ac.za">JosephT@cput.ac.za</a></td>
</tr>
<tr>
<td>Human Resources Business Partner</td>
<td>Mr S Moyo</td>
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<td><a href="mailto:MoyoS@cput.ac.za">MoyoS@cput.ac.za</a></td>
</tr>
<tr>
<td>HR &amp; Finance</td>
<td>Ms N Ncoko</td>
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<td><a href="mailto:NcokoN@cput.ac.za">NcokoN@cput.ac.za</a></td>
</tr>
<tr>
<td>Postgraduate Administration</td>
<td>Ms T Green</td>
<td>021 959 6666</td>
<td><a href="mailto:GreenT@cput.ac.za">GreenT@cput.ac.za</a></td>
</tr>
<tr>
<td>Research Development</td>
<td>Ms N Barnes</td>
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<td><a href="mailto:BarnesN@cput.ac.za">BarnesN@cput.ac.za</a></td>
</tr>
<tr>
<td>Strategic Partnerships</td>
<td>Mr B Cassiem</td>
<td>021 953 8668</td>
<td><a href="mailto:CassiemB@cput.ac.za">CassiemB@cput.ac.za</a></td>
</tr>
<tr>
<td>Teaching Development Grant (TDG) Administrator</td>
<td>Ms R Jarley</td>
<td>021 953 8485</td>
<td><a href="mailto:JarleyR@cput.ac.za">JarleyR@cput.ac.za</a></td>
</tr>
</tbody>
</table>

### DEPARTMENT WORK INTEGRATED LEARNING CO-ORDINATORS

(BV) indicates Bellville Campus / (CT) indicates Cape Town Campus

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Management and Quantity Surveying</td>
<td>Ms A Fisher</td>
<td>021 959 6648</td>
<td><a href="mailto:FisherA@cput.ac.za">FisherA@cput.ac.za</a></td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>Ms N Mti</td>
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<td><a href="mailto:MtiN@cput.ac.za">MtiN@cput.ac.za</a></td>
</tr>
<tr>
<td>Civil Engineering and Surveying</td>
<td>Ms P Overmeyer</td>
<td>021 953 8656</td>
<td><a href="mailto:OvermeyerP@cput.ac.za">OvermeyerP@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Mr B Fortuin</td>
<td>021 953 8454</td>
<td><a href="mailto:FortuinB@cput.ac.za">FortuinB@cput.ac.za</a></td>
</tr>
<tr>
<td>Clothing and Textile Technology</td>
<td>Ms N Drotskie</td>
<td>021 959 6476</td>
<td><a href="mailto:DrotskieN@cput.ac.za">DrotskieN@cput.ac.za</a></td>
</tr>
<tr>
<td>Electrical, Electronic and Computer Engineering</td>
<td>Mr R Tjale</td>
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<td><a href="mailto:TjalePR@cput.ac.za">TjalePR@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Mr D Callaghan</td>
<td>021 460 3041 (CT)</td>
<td><a href="mailto:CallaghanD@cput.ac.za">CallaghanD@cput.ac.za</a></td>
</tr>
<tr>
<td>Industrial and Systems Engineering</td>
<td>Ms D Jaftha</td>
<td>021 959 6472</td>
<td><a href="mailto:JafthaD@cput.ac.za">JafthaD@cput.ac.za</a></td>
</tr>
<tr>
<td>Maritime Studies and Marine Engineering</td>
<td>Mr D Dyers</td>
<td>021 440 5752</td>
<td><a href="mailto:Maritime@cput.ac.za">Maritime@cput.ac.za</a></td>
</tr>
<tr>
<td>Mechanical</td>
<td>Mr G Morris</td>
<td>021 959 6293</td>
<td><a href="mailto:MorrisG@cput.ac.za">MorrisG@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Mr P Tebele</td>
<td>021 959 6732</td>
<td><a href="mailto:TebeleP@cput.ac.za">TebeleP@cput.ac.za</a></td>
</tr>
<tr>
<td>Mechatronics</td>
<td>Dr C Moodley</td>
<td>021 953 8663</td>
<td><a href="mailto:MoodleyC@cput.ac.za">MoodleyC@cput.ac.za</a></td>
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</table>
**FACULTY OFFICE STAFF**

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty Officer</td>
<td>Ms K Buckle</td>
<td>021 959 5819</td>
<td><a href="mailto:BuckleK@cput.ac.za">BuckleK@cput.ac.za</a></td>
</tr>
<tr>
<td>Assistant Faculty Officer</td>
<td>Ms D Marcus</td>
<td>021 959 6653</td>
<td><a href="mailto:MarcusD@cput.ac.za">MarcusD@cput.ac.za</a></td>
</tr>
<tr>
<td>Assistant Faculty Officer</td>
<td>Mr V Mtshikana</td>
<td>021 959 6572</td>
<td><a href="mailto:MtshikanaV@cput.ac.za">MtshikanaV@cput.ac.za</a></td>
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</table>

**FACULTY ASSISTANTS**

<table>
<thead>
<tr>
<th>Construction Management and Quantity Surveying</th>
<th>Mr A Burt</th>
<th>021 953 8484</th>
<th><a href="mailto:BurtA@cput.ac.za">BurtA@cput.ac.za</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Engineering</td>
<td>Ms L van Wyk</td>
<td>021 460 9037</td>
<td><a href="mailto:vanWykLA@cput.ac.za">vanWykLA@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Mr V Mtshikana</td>
<td>021 959 6572</td>
<td><a href="mailto:MtshikanaV@cput.ac.za">MtshikanaV@cput.ac.za</a></td>
</tr>
<tr>
<td>Civil Engineering and Surveying</td>
<td>Ms Z Rawoot</td>
<td>021 953 8729</td>
<td><a href="mailto:RawootZ@cput.ac.za">RawootZ@cput.ac.za</a></td>
</tr>
<tr>
<td>Clothing and Textile Technology</td>
<td>Mr A Burt</td>
<td>021 953 8484</td>
<td><a href="mailto:BurtA@cput.ac.za">BurtA@cput.ac.za</a></td>
</tr>
<tr>
<td>Electrical, Electronic and Computer Engineering</td>
<td>Ms L van Wyk</td>
<td>021 460 9037</td>
<td><a href="mailto:vanWykLA@cput.ac.za">vanWykLA@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Mr V Mtshikana</td>
<td>021 959 6572</td>
<td><a href="mailto:MtshikanaV@cput.ac.za">MtshikanaV@cput.ac.za</a></td>
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<tr>
<td>Industrial and Systems Engineering</td>
<td>Mr A Burt</td>
<td>021 953 8484</td>
<td><a href="mailto:BurtA@cput.ac.za">BurtA@cput.ac.za</a></td>
</tr>
<tr>
<td>Maritime Studies</td>
<td>Ms M Frieslich (nee Graney)</td>
<td>021 440 5771</td>
<td><a href="mailto:Graneym@cput.ac.za">Graneym@cput.ac.za</a></td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Mr N Madonsela</td>
<td>021 959 6207</td>
<td><a href="mailto:MadonselaN@cput.ac.za">MadonselaN@cput.ac.za</a></td>
</tr>
<tr>
<td>Mechatronics</td>
<td>Ms J Soul</td>
<td>021 959 6773</td>
<td><a href="mailto:SoulJ@cput.ac.za">SoulJ@cput.ac.za</a></td>
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# STAFF AWARDS

Awards recognising excellence at the faculty and department level.

## FACULTY TEACHING EXCELLENCE AWARDS

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Department</th>
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</thead>
<tbody>
<tr>
<td>2015</td>
<td>Dr Panagiotis Lazanas</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>2014</td>
<td>Mr Moses Basitere</td>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>2013</td>
<td>Ms Philomina Aziakpono</td>
<td>Electrical Engineering</td>
</tr>
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</table>

## DEPARTMENTAL TEACHING EXCELLENCE AWARDS

<table>
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<th>Year</th>
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<tbody>
<tr>
<td>2015</td>
<td>Clothing Management</td>
<td>Ms Nina Drotskie</td>
</tr>
<tr>
<td></td>
<td>CM &amp; QS</td>
<td>Ms Laura Pinfold</td>
</tr>
<tr>
<td></td>
<td>Maritime Studies</td>
<td>Captain Lauren Lawson</td>
</tr>
<tr>
<td>2014</td>
<td>Chemical Engineering</td>
<td>Dr Joy Alexander</td>
</tr>
<tr>
<td></td>
<td>Clothing and Textiles</td>
<td>Dr Bernadette Millar</td>
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## OUTSTANDING COMMUNITY PROJECT/COMMUNITY OUTREACH AWARDS

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<th>Year</th>
<th>Discipline</th>
<th>Name</th>
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</thead>
<tbody>
<tr>
<td>2015</td>
<td>Mechanical Engineering</td>
<td>Mr Fareed Ismail</td>
</tr>
</tbody>
</table>
STUDENT AWARDS

**VICE CHANCELLOR’S MEDAL**
The Vice Chancellor’s Medal is awarded to the top BTech (or equivalent) graduate, taking all four years of study into account. *The criteria were changed from 2013, from one medal for the university (across all faculties), to one per faculty.*

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Field</th>
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<tbody>
<tr>
<td>2014</td>
<td>Ms Sipiwe Shoko</td>
<td>BTech: Chemical Engineering</td>
</tr>
<tr>
<td>2013*</td>
<td>Mr Alexander Ebben-Esser Christian</td>
<td>BTech: Electrical Engineering</td>
</tr>
<tr>
<td>2012</td>
<td>Ms Marguerite Ester Stoffberg</td>
<td>BTech: Clothing Management</td>
</tr>
</tbody>
</table>

**DEAN’S MEDAL**
The Dean’s Medal is awarded to the top National Diploma (or equivalent) graduate in the Faculty. *The criteria were changed in 2013, from one to two medals for each faculty.*

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Field</th>
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</thead>
<tbody>
<tr>
<td>2014</td>
<td>Mr Anton van der Linde</td>
<td>ND: Maritime Studies</td>
</tr>
<tr>
<td></td>
<td>Mr Albert van Niekerk</td>
<td>ND: Electrical Engineering</td>
</tr>
<tr>
<td>2013*</td>
<td>Ms Sipiwe Shoko</td>
<td>ND: Chemical Engineering</td>
</tr>
<tr>
<td></td>
<td>Capt Zetta Gous</td>
<td>ND: Maritime Studies</td>
</tr>
<tr>
<td>2012</td>
<td>Mr Alexander Ebben-Esser Christian</td>
<td>ND: Electrical Engineering</td>
</tr>
<tr>
<td>2011</td>
<td>Ms Marguerite Ester Stoffberg</td>
<td>ND: Clothing Management</td>
</tr>
<tr>
<td>2010</td>
<td>Mr Vaughan Pillay</td>
<td>ND: Maritime Studies</td>
</tr>
</tbody>
</table>

**THE INSTITUTE OF PROFESSIONAL ENGINEERING TECHNOLOGISTS (IPET) MEDAL**
The IPET Medal is awarded to the best male and female BTech engineering student at each University of Technology as well as the best student country-wide on the basis of academic achievement.

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>Ms Sipiwe Shoko</td>
<td>BTech: Chemical Engineering</td>
</tr>
<tr>
<td></td>
<td>Mr James Stubbs</td>
<td>BTech: Electrical Engineering</td>
</tr>
<tr>
<td>2013</td>
<td>Ms Taimi Nashidengo</td>
<td>BTech: Industrial Engineering</td>
</tr>
<tr>
<td></td>
<td>Mr Alexander Christian</td>
<td>BTech: Electrical Engineering</td>
</tr>
<tr>
<td>2012</td>
<td>Ms Angela Tafadzwa Shumba</td>
<td>BTech: Electrical Engineering</td>
</tr>
<tr>
<td></td>
<td>Mr Yves Tshimanga</td>
<td>BTech: Chemical Engineering</td>
</tr>
<tr>
<td>2011</td>
<td>Ms Dineo Kadi</td>
<td>BTech: Chemical Engineering</td>
</tr>
<tr>
<td></td>
<td>Mr Haltor Mataifa</td>
<td>BTech: Electrical Engineering</td>
</tr>
</tbody>
</table>
Dear Students

Welcome to a very special year at CPUT- our 10th birthday celebration. For a decade we have produced some of the country’s most promising graduates and I am certain that you will also one day walk across the stage in front of me during your graduation and join their ranks as a proud CPUT alumnus.

Each year our Admissions Department is flooded with thousands of applications from across the country by young people, just like you, who recognise that CPUT is a leader in innovation and technology. Whether you are a first year or a returning student, you have fought hard to get a seat at our institution and that determination should follow you through to the end of your studies.

Be determined to say no to negative influences, to give your best to each and every evaluation and to becoming a well-rounded student who fully participates in the multitude of extra-mural activities that are available to you through our Student Affairs Department.

We are also determined to ensuring you are fully supported on your journey to graduation. There are a number of intervention units in place to assist students. These include the Student Learning unit which assists you with attributes like academic literacy, study skills and time management. I urge all of you to make contact with this unit and the many others like Student Counseling, the clinic and HIV/Aids unit who are all dedicated to your future success.

Ultimately however your success lies in your own hands. The journey for 2016 starts right now and I wish you well along your way.

Your Vice-Chancellor

Dr Prins Nevhutalu
ATHLONE SERVICE POINT
Klipfontein Road, Heideveld
PO BOX 1906
Tel +27 21 684 1200
BELLVILLE
7535

BELLVILLE CAMPUS
Symphony Way, Bellville
PO BOX 1906
Tel +27 21 959 6911
BELLVILLE
7535

CAPE TOWN CAMPUS
Keizersgracht, Cape Town
PO BOX 652
Tel +27 21 460 3911
CAPE TOWN
8000

GRANGER BAY CAMPUS
Beach Road, Mouille Point
PO BOX 652
Tel +27 21 440 5700
CAPE TOWN
8000

MOWBRAY CAMPUS
Highbury Road, Mowbray
PO BOX 652
Tel +27 21 680 1500
CAPE TOWN
8000

MEDIA CITY
10th Floor
No 1 Heerengracht
Rua Vasco Da Gama Entrance
FORESHORE
8000

WELLINGTON CAMPUS
Jan van Riebeeck Street, Wellington
PRIVATE BAG X8
Tel +27 21 864 5200
WELLINGTON
7654

Enquiries:
086 123 2788 (086 123 CPUT)

CORE VALUES
integrity excellence accountability
equity ubuntu innovation
democracy respect
Department of Student Affairs

The Department of Student Affairs (DSA) is a fully integrated student support service aimed at developing the holistic potential of all students through excellence and maximum participation in the five main focus areas of its operation, namely:

- Student Development
- Student Governance (including the SRC)
- Arts and Culture
- Sport Development
- Student Media

We currently have offices at the following CPUT Campuses:

**Bellville Campus**

**Student Development and Arts and Culture:** New Library Extension, Ground Floor  
Tel +27 21 959 6261 Fax +27 21 959 6110

**Sport Development:** Major Sport Hall, 1st Floor  
Tel +27 21 959 6319 Fax +27 21 959 6089

**Student Representative Council and Student Structures:**  
Student Centre, 1st Floor
Cape Town Campus

Student Affairs Offices: Student Centre, 4th Level
Tel +27 21 460 3149  Fax +27 21 460 3720

Sport Development: Multipurpose Hall, 2nd Level
Tel +27 21 460 3844  Fax +27 21 460 3845

Student Representative Council and Student Structures:
Student Centre, 1st Floor

Mowbray Campus

Student Representative Council and Student Structures:
New Gymnasium, Room 110

Wellington Campus

Student Governance: E Block, Room E6B
Tel +27 21 864 5519  Fax +27 21 864 2033

Sport Development: F Block, Room F2A and B
Tel +27 21 864 5507  Fax +27 21 864 5508

Student Representative Council and Student Structures:
E Block, Room E6C
WELLNESS CENTRE

Emergency contact details

STATE AMBULANCE SERVICES
State Ambulance Emergencies ...................10177
Police Flying Squad .................................10111
Fire Brigade (Back/Neck Injuries) ....021 535 1100

Poison Information Centre:
Red Cross .....................................021 689 5227
Tygerberg Hospital ...............................021 931 6129

PRIVATE AMBULANCES
Emergencies services after hours ...021 950 8989
Western Cape Paramedics ...............0800 225 599

STATE HOSPITALS
Groote Schuur (Dr Stein FP) ........021 404 9111
Trauma Unit ..................................021 404 4112
Psychiatric Emergency Unit ...........021 404 2175
Medical Emergency Unit ...................021 404 4141

CAMPUS SECURITY
Bellville ........................................021 959 6341
Cape Town .....................................021 460 3122

CAMPUS CLINICS
Bellville Campus .........................021 959 6403
Cape Town Campus ......................021 460 3405
Mowbray Campus ...........................021 680 1555
Wellington Campus .......................021 864 5278

RAPE CRISIS
021 447 9762

POLICE
10111

LIFE LINE
021 461 1111

HIV / AIDS NATIONAL HELP LINE
0800 012 322

GROOTE SCHUUR HOSPITAL
TRAUMA UNIT: - THUTHUZELA
021 404 3031

G.F. JOOSTE HOSPITAL
TRAUMA UNIT: THUTHUZELA
021 690 1011 / 1000

KARL BREMER TRAUMA UNIT
(BELLVILLE)
021 949 0296

SOMERSET HOSPITAL
TRAUMA UNIT (GREEN POINT)
021 402 6000
HIV/AIDS unit: Vision and Mission

VISION
To be the epicentre of excellence in HIV/AIDS Programmes at higher education institutions in Africa.

MISSION
To mitigate the impact of HIV/AIDS/STI and TB by promoting, advocating, facilitating and implementing innovative interventions among students, staff and the community.

We strive to develop, equip, influence and empower individuals in skills and knowledge through educating, teaching, training, learning and research in the prevention of HIV/AIDS/STI and TB. We also render a quality service, to those infected and affected, towards achieving holistic health and sustaining a healthy lifestyle.

CORE OBJECTIVES
- Curricular Integration of HIV/AIDS/STI & TB
- Student and staff training workshops
- Awareness campaigns
- Peer Education
- Community Outreach
- Workplace Programme

- Care and support of HIV negative & positive clients
- Wellness Mobile
- Internship and Volunteer Programme
- Research

CONTACT DETAILS:
CAPE TOWN OFFICE:
Admin Building, 2nd Floor
(Opposite Applications office)
Tel: 021 460 4253/2

BELLVILLE OFFICE:
Opposite Tabeisa Cafe
Tel: 021 959 6898/6828

ONLINE DETAILS:
Website: www.cput.ac.za/hivaids
Facebook: CPUT HIV/AIDS Unit
Twitter: @cputhivaidsunit
Health services

Campus Health Clinics telephone numbers:

**Bellville Campus Clinic**
Tel: 021 959 6403
Fax: 021 959 6123

**Cape Town Campus Clinic**
Tel: 021 460 3405
Fax: 021 460 3638

**Mowbray Campus Clinic**
Tel: 021 680 1555
Fax: 021 680 3952

**Wellington Campus Clinic**
Tel: 021 864 5522
Fax: 021 864 5278

**HIV/AIDS UNIT**

**Cape Town Campus**
Room 2.00a, Level 2, Administration Building, Cape Town
Tel: 021 460 4253
Fax: 021 460 4244
Email: mohammedaa@cput.ac.za

**Bellville Campus**
Temporary office opposite Start Up Café
Tel: 021 959 6807
Email: runeyip@cput.ac.za

**DISABILITY UNIT**

Bellville and Wellington Campuses as well as Athlone and Tygerberg Service Points:
IT Centre, Ground Floor, Room 1.09, Bellville Campus,
Tel: 021 953 8447
Tel: 021 959 6964

**Cape Town, Granger Bay and Mowbray Campuses:**
Ground floor, Level 2, Atrium, Administration Building, Cape Town Campus,
Tel: 021 460 9071

**CONTACT:**
Dr Nina du Toit
Room 1.09 & 1.10, Ground Floor, IT Centre, Bellville Campus
Tel: 021 959 6964
Fax: 021 959 6231
Email: dutoitn@cput.ac.za
Library Services

CPUT Libraries offers you a welcoming and practical study environment; supporting independent and group working facilities; with access to print, digital and multimedia resources; and qualified staff that are dedicated to serve your needs. Library facilities are available at all campuses of CPUT.

MEMBERSHIP
If you are a registered student or staff member at CPUT, you may use any of the CPUT Libraries (by agreeing to abide by the rules and regulations of the CPUT and CPUT Libraries).

BOOK COLLECTIONS
Choose from our growing book collections, books that are focused on your academic subjects and studies. Book collections are arranged according to faculty content which makes it convenient to get all your information from one area in the library.

ELECTRONIC RESOURCES
Gives you access to hundreds of up-to-date journal articles for your studies and research that will not be found in books or on the Internet. These can even be accessed from home, work and places away from the libraries.

LEARNING COMMONS
An area filled with computers for internet access to relevant academic websites, typing of assignments, printing, scanning, CD-burning – particularly geared to your independent learning. Specialised Learning Commons are only in Bellville & Cape Town, but similar facilities are available at most of the other libraries.

STUDY FACILITIES
Choose to use the seminar rooms for working in groups, to hold discussions and make presentations, or use the quiet study areas for independent study.

RESEARCH INFORMATION SUPPORT CENTRES
Separate demarcated areas are available in Bellville and Cape Town for the exclusive use of postgraduate students and staff.

INFORMATION SKILLS TRAINING
Attend free training sessions that will empower you with skills to find information from various information tools and resources needed for your studies. Do not hesitate to contact your faculty or branch librarian for more information. CPUT Libraries cares about your safety and your learning needs, and all the services offered to you are provided within a framework of fair-minded and liberal policies as laid out by the University.

Therefore, you are encouraged to use the libraries to your maximum benefit. For more information, please visit the Libraries’ comprehensive webpage: http://library.cput.ac.za
Financial aid

Bellville Financial Aid Office
Library Extension
Tel: 021 959 6371/6594/6349
Fax: 021 9596108

Cape Town Financial Aid Office
Administration Building, Level 5 (Entrance via Student Centre)
Tel: 021 460 3744/3856/3327
Fax: 021 460 3899

Wellington Campus
Administration Building, Room A19
Tel: 021 864 5218

Student counselling

Bellville Campus
Library Extension Building
Ground Floor
Tel: 021 959 6182 or 6269

Mowbray Campus
Barkley Davies Building
Room 0.03
Tel: 021 680 1501 or 1574

Cape Town Campus
Administration Building
2nd Level, Room 2.700
Tel: 021 460 3237 or 3254

Wellington Campus
Extension to the Administration Building
Tel: 021 864 5201 or 5206
ACADEMIC PROGRESSIONS AND EXCLUSIONS

1. The maximum time allowed to complete a programme shall be double the minimum completion duration, for example, six years for a three-year qualification. In addition, students shall be given a maximum of one chance to repeat a semester, year, subject, course or module. In other words, repeaters are limited to one repeat.

2. Students shall pass at least 50% of their subjects, including at least two of three major subjects that they are registered for in any semester or year of study, in order to proceed to the next level of their studies, unless otherwise prescribed by statutory bodies, such as professional bodies. Students shall carry over repeated subjects to the next level that they are promoted to, pending timetabling. Students shall not be allowed to carry over more than two subjects per semester/year or at any one time.

3. When a student does not fulfil the above requirements for progression, s/he will be notified in writing of his/her exclusion from the programme or from progression.

4. Where a student fails to meet rule 2 above s/he shall be permitted to repeat the repeated level a maximum of one time.

5. These prescribed requirements will be stated in subject requirements and all efforts shall be made by the department concerned to familiarise students with these additional requirements.

6. If a student fails the level or subjects more than once, s/he shall be excluded from the programme.

7. If a student obtains an overall mark of less than 30%, s/he shall be excluded from registering for any programme in the faculty.

8. If a student obtains an overall mark ranging from 30% to 40%, s/he shall be excluded from the programme. Such a student may apply for admission to any other programme within the faculty, subject to meeting the Admission requirements.

9. If a student obtains an overall mark ranging from 40 to 50%, s/he shall be allowed to repeat the level, subject to rule 2 of this section.

10. When a student does not fulfil the above requirements for progression, s/he shall be notified in writing of his/her exclusion from the programme or from progression.

11. Where a student has only one or two subjects remaining before completion and is nearing the maximum number of years for registration, s/he may apply, with appropriate motivation, to the Dean's office for extension of the period of registration for an additional year.
Normal appeal procedures will apply

1. Credits
   Credit transfers require CPUT to validate prior formal learning through evaluation of the quality of an accredited provider.

2. Subject exemptions as practised in the past are regarded as recognition of prior learning (RPL) and are dealt with in the appropriate RPL policy.

3. In the interests of student access, mobility and articulation, and to avoid unnecessary repetition of studies, consideration may be given to extending to the student:
   3.1 Recognition by granting credits for any subjects passed at CPUT, but in another programme, whether complete or incomplete, with a view to studying for a University programme.
   3.2 Recognition by granting credits whereby credits obtained at one institution may be recognised by another as meeting part of the requirements for graduation, and credits for a completed qualification may be recognised as meeting part of the requirements for another qualification.

4. The mark obtained at higher education institutions from which the credit is transferred, shall be confirmed by the Senate Executive SENEX. The purpose of this requirement is to ensure that students who were granted credits can also be considered for cum laude awards by the University.

5. Credits will only be recorded on the student’s academic history by the Assessment and Graduation Centre AGC once approved by SENEX.

6. In all instances the total number of credits awarded shall not exceed 50% of the number of subjects/courses? in the programme.

7. All credits accumulated in respect of incomplete qualifications shall only be valid for a maximum of ten years.
COURSE INFORMATION
MINIMUM ADMISSION REQUIREMENTS

A National Senior Certificate (NSC) as certified by Umalusi with an achievement rating of 3 (Moderate Achievement: 40–49%) or better in four recognised NSC 20-credit subjects, and an achievement rating of 2 for Mathematics or Mathematical Literacy, and an achievement rating of 3 in the required official language at Home Language level, and an achievement rating of 2 in the other required language on at least First Additional Language level; one of these languages shall be English or Afrikaans.

As from January 2013 the following alternative minimum Admission requirements shall apply in respect of Engineering qualifications: NATIONAL CERTIFICATE (VOCATIONAL) (Further Education and Training). Specific minimum requirements of a course (subjects required/recommended, achievement rating, portfolio to be submitted, interview or experience required) are indicated below.

All candidates who comply with the minimum requirements are still subject to selection procedures.

<table>
<thead>
<tr>
<th>Rating Code</th>
<th>Rating</th>
<th>Marks %</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Outstanding achievement</td>
<td>80-100</td>
</tr>
<tr>
<td>6</td>
<td>Meritorious achievement</td>
<td>70-79</td>
</tr>
<tr>
<td>5</td>
<td>Substantial achievement</td>
<td>60-69</td>
</tr>
<tr>
<td>4</td>
<td>Adequate achievement</td>
<td>50-59</td>
</tr>
<tr>
<td>3</td>
<td>Moderate achievement</td>
<td>40-49</td>
</tr>
<tr>
<td>2</td>
<td>Elementary achievement</td>
<td>30-39</td>
</tr>
<tr>
<td>1</td>
<td>Not achieved</td>
<td>0-29</td>
</tr>
</tbody>
</table>

For easy reference, the scale of achievement for the National Curriculum Statement Grades 10–12 (General) is supplied here. For the minimum admission requirements for a senior certificate obtained before 2008, please contact the faculty office.
The following abbreviations of designated National Senior Certificate subjects are used in the following pages (where a rating will be supplied, e.g. M4 for Mathematics rating 4).

**GROUP A: COMPULSORY NSC SUBJECTS**

**Languages (20 credits each)**
Two official languages at Home and First Additional Language level:
- **A** = Afrikaans Home Language OR Afrikaans First Additional Language
- **E** = English Home Language OR English First Additional Language
- **AE** = Afrikaans or English, Home or First additional language
- **FAL** = First additional language AND
- **HL** = Home Language (Any two of: Afrikaans, English, IsiNdebele, IsiXhosa, IsiZulu, Sepedi, Sesotho, Setswana, SiSwati, Tshivenda or Xitsonga)

**Mathematical Sciences (20 credits each)**
- **M** = Mathematics
- **ML** = Mathematical Literacy

**Human and Social studies (10 credits)**
- **LO** = Life Orientation

**GROUP B: RECOGNISED NSC ELECTIVES**

**Agriculture (20 credits each)**
- **AMP** = Agricultural Management Practices
- **AS** = Agricultural Science
- **AT** = Agricultural Technology

**Culture and Arts (20 credits each)**
- **DANCE** = Dance Studies
- **DES** = Design
- **DRAMA** = Dramatic Arts
- **MUS** = Music
- **VA** = Visual Arts

**Business, Commerce and Management Studies (20 credits each)**
- **ACC** = Accounting
- **BUS** = Business Studies
- **ECON** = Economics
Engineering and Technology (20 credits each)
CIVT = Civil Technology
ELECT = Electrical Technology
MECHT = Mechanical Technology
EGD = Engineering Graphics and Design

Human and Social Studies (20 credits each)
GEO = Geography
HIS = History
RELS = Religion Studies

Physical, Mathematical, Computer and Life Sciences (20 credits each)
CAT = Computer Applications Technology
IT = Information Technology
LS = Life Sciences
PS = Physical Sciences

Services (20 credits each)
CS = Consumer Studies
HS = Hospitality Studies
TOUR = Tourism

MINIMUM ADMISSION REQUIREMENTS PER PROGRAMME

Note: The requirements listed here are for entry to the academic year 2016, and are for reference only. For 2017 requirements please consult the Engineering Undergraduate Prospectus.

APS Scores
APS scores are calculated using the NSC scores. Students must meet the APS score, as well as the minimum requirements in certain subjects (see table).

Mathematics Requirements
Mathematical Literacy is not accepted for Engineering-related qualifications unless otherwise indicated.
Language Requirements
A rating of 4 for English (Home or First Additional Language) is required. English with a rating of 3 will be considered where applicants offer another language (Home or First Additional Language) with a rating of 4 or higher.

English with a rating of E4 is compulsory for all qualifications, unless otherwise stated.

Minimum entrance criteria do not guarantee acceptance to a study programme. Only applicants who meet the minimum criteria are eligible for selection based on departmental programme-specific academic criteria and space constraints.

Extended Curriculum
The admission requirements for the extended programmes are the same as that of the Mainstream programmes. Applicants will be considered for wait listing as explained under the “ECP admission requirements to be wait listed” on pg 27. Details regarding the extended curricula for the different programmes are available under the respective departmental qualification information.

### TABLE: Required/recommended subjects and ratings per programme

**Note:** The requirements listed here are for entry to the academic year 2016, and are for reference only. For 2017 requirements please consult the Engineering Undergraduate Prospectus.

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Minimum admission requirements</th>
<th>APS Score</th>
</tr>
</thead>
</table>
| Building, leading to Construction Management or Quantity Surveying | Required: E4, M4  
Recommended: Any of the following: ACC3, BUS3, ECON3, CIVT3, EGD3, CAT3, IT3, PS3 | APS score of 25 is required, made up of unweighted NSC points in accordance with the DHE table. (Scores for Life Orientation cannot be included.) |
| Cartography (GISc)                                  | Required: E4, M4, PS4                                                                |                                                                            |
| Clothing Management                                 | Required: E4, ML4 or M2  
Also required: One of the following: ACC3, BUS3, ECON3 |                                                                            |
| Engineering: Chemical                              | Required: E4, M4, PS4                                                                |                                                                            |
| Engineering: Civil                                 | Required: E4, M4, PS4                                                                |                                                                            |
| Engineering: Computer Systems                       | Required: E4, M4, and either PS4 or ELECT4.  
Recommended: One of the following: IT4, CAT4  |                                                                            |
| Engineering: Electrical                            | Required: E4, M4, and either PS4 or ELECT4.  
Recommended: One of the following: IT4, CAT4  |                                                                            |
<table>
<thead>
<tr>
<th>Qualification</th>
<th>Minimum admission requirements</th>
<th>APS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering: Industrial</td>
<td>Required: E4, M4, PS4. Recommended: MECHT3</td>
<td></td>
</tr>
<tr>
<td>Engineering: Mechanical</td>
<td>Required: E4, M4, PS4. Recommended: MECHT3</td>
<td></td>
</tr>
<tr>
<td>Engineering: Mechanical: Marine Engineering</td>
<td>Required: E4, M4, PS4</td>
<td></td>
</tr>
<tr>
<td>Engineering: Mechatronics</td>
<td>Recommended: One of the following: ELECT3, IT4, MECHT3</td>
<td></td>
</tr>
<tr>
<td>Maritime Studies</td>
<td>Required: E4, M4, PS4</td>
<td></td>
</tr>
<tr>
<td>Surveying</td>
<td>Required: E4, M4, PS4</td>
<td></td>
</tr>
</tbody>
</table>

For the minimum Admission requirements for the Senior Certificate pre-2008 and National Technical Certificate, please contact the Faculty Office.

**ECP admission requirements to be waitlisted:**
The following admission requirements will be considered for wait listing of students for the relevant ECP programmes as indicated. Meeting these admission requirements does not automatically imply acceptance. First option for admission, selection and placement will be given to students who meet the minimum admission requirements. These applications will only be considered for full acceptance after all applicants who meet the minimum requirements have been admitted and registered.

**National Certificate (Vocational)**

**Admissions Requirements**

A National Certificate (Vocational) Level 4 issued by the Council for General and Further Education and Training and compliance with the language requirements of the Cape Peninsula University of Technology. For language requirements, please see specific minimum requirements for Engineering qualifications (subjects required/recommended, achievement rating, portfolio to be submitted, interview in Cape Town, evaluation tests, or experience required) that apply to each qualification. Please check under the relevant faculty. Applicants may be required to write additional proficiency tests as part of the Admission requirements for certificate, diploma and degree programmes.
ABBREVIATIONS

National Certificate (Vocational) (FET): NC(V)(FET)

GROUP A: FUNDAMENTAL COMPONENT

<table>
<thead>
<tr>
<th>Rating Code</th>
<th>Rating</th>
<th>Marks %</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
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</tr>
<tr>
<td>1</td>
<td>Not achieved</td>
<td>0-29</td>
</tr>
</tbody>
</table>

Official Languages at First Additional Language Level 4
Official Languages at First Additional Language Level 4
E(FAL) = English (First Additional Language)–Language of teaching and learning at CPUT
A(FAL) = Afrikaans (First Additional Language)
X(FAL) = Xhosa (First Additional Language)

Mathematical Sciences (20 credits each)
M = Mathematics
ML = Mathematical Literacy

Human and Social studies (10 credits)
LO = Life Orientation

GROUP B: VOCATIONAL COMPONENT (NCV LEVEL 4 SUBJECTS)

Agriculture and Nature Conservation
ABV = Agri-business
APV = Animal Production
APPV = Advanced Plant Production
FPMV = Farm Planning and Mechanisation
## ADMISSION REQUIREMENTS

### Business, Commerce and Management

- AAV = Applied Accounting
- APV = Advertising and Promotions
- BPV = Business Practice
- CBV = Consumer Behaviour
- CCOV = Contact Centre Operations
- EEV = Economic Environment
- FPV = Financial Planning
- MPV = Management Practice
- MARV = Marketing
- MCV = Marketing Communication
- NVCV = New Venture Creation
- OPV = Office Practice
- ODPV = Office Data Processing
- OMV = Operations Management
- PMV = Project Management

### Physical, Mathematical, Computer and Life Sciences

- CPV = Computer Programming
- DCNV = Data Communication and Networking
- PSV = Physical Science
- SADV = Systems Analysis and Design

### Services

- CSHRV = Client Services and Human Relations
- FPV = Food Preparation
- HGV = Hospitality Generics
- HSV = Hospitality Services
- STV = Science of Tourism
- STITV = Sustainable Tourism in SA and International Travel
- TOV = Tourism Operations

### Manufacturing, Engineering and Technology

- AEPV = Applied Engineering Practices
- ARMV = Automotive Repair and Maintenance
- CRWV = Carpentry and Roof Work
- CIMV = Computer-integrated Manufacturing
- CSV = Concrete Structures
- CPLV = Construction Planning
- CSV = Construction Supervision
- ECDEV = Electrical Control and Digital Electronics
<table>
<thead>
<tr>
<th>Code</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPPV</td>
<td>Electrical Principles and Practice</td>
</tr>
<tr>
<td>ESCV</td>
<td>Electrical Systems and Construction</td>
</tr>
<tr>
<td>EWV</td>
<td>Electrical Workmanship</td>
</tr>
<tr>
<td>ETV</td>
<td>Electrotechnology</td>
</tr>
<tr>
<td>EFBV</td>
<td>Engineering Fabrication - Boilermaking</td>
</tr>
<tr>
<td>EFSV</td>
<td>Engineering Fabrication - Sheet Metal Worker</td>
</tr>
<tr>
<td>EPV</td>
<td>Engineering Processes</td>
</tr>
<tr>
<td>FTV</td>
<td>Fitting and Turning</td>
</tr>
<tr>
<td>MASF</td>
<td>Masonry</td>
</tr>
<tr>
<td>MATV</td>
<td>Materials</td>
</tr>
<tr>
<td>MSV</td>
<td>Mechatronic Systems</td>
</tr>
<tr>
<td>PLUV</td>
<td>Plumbing</td>
</tr>
<tr>
<td>PEPV</td>
<td>Professional Engineering Practices</td>
</tr>
<tr>
<td>RCPV</td>
<td>Refrigeration and Air-conditioning Processes</td>
</tr>
<tr>
<td>RAOV</td>
<td>Roads</td>
</tr>
<tr>
<td>SPSV</td>
<td>Stored Programme Systems</td>
</tr>
<tr>
<td>TECV</td>
<td>Technology</td>
</tr>
<tr>
<td>WELV</td>
<td>Welding</td>
</tr>
</tbody>
</table>

### Law, Military Science and Security
- APV = Applied Policing
- CJPV = Criminal Justice Process
- CRIV = Criminology
- GOV = Governance
- LPEV = Law Procedures and Evidence

### Education, Training and Development
- ASTV = Art and Science of Teaching
- ECDV = Early Childhood Development
- HSDV = Human and Social Development
- LPV = Learning Psychology
CURRICULUM INFORMATION

MINIMUM REQUIREMENTS: NCV (FET) SUBJECTS

Mathematics (NCV4) rating of 5 required for engineering qualifications
Mathematical Literacy is not accepted for Engineering-related qualifications unless otherwise indicated. Mathematics (NCV4) with a rating of 5 (60-69%) is an admission requirement for all engineering related qualifications, except Clothing Management.

English (FAL) rating of 5 required for engineering qualifications
English First Additional Language with a rating of 5 (60-69%) is an admission requirement for all programmes in the Faculty of Engineering.

In addition, the following ratings are required for admission to: NCV Level 4 subjects and ratings

TABLE: Required/recommended subjects and ratings per programme
Note: The requirements listed here are for entry to the academic year 2016, and are for reference only. For 2017 requirements please consult the Engineering Undergraduate Prospectus.

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Minimum admission requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building, leading to Construction Management or Quantity Surveying</td>
<td>Required: E(FAL)5, M5</td>
</tr>
<tr>
<td>Cartography (GIsC)</td>
<td>Required: E(FAL)5, M5, PSV3 (candidates must obtain at least 60%)</td>
</tr>
<tr>
<td>Clothing Management</td>
<td>Required: E(FAL)5, ML5 or M2 Recommended: BPV3, or FMV4 and AAV3</td>
</tr>
<tr>
<td>Engineering: Chemical</td>
<td>Required: E(FAL)5, M5, PSV3 (candidates must obtain at least 60%)</td>
</tr>
<tr>
<td>Engineering: Civil</td>
<td>E(FAL)5, M5, PSV3 (candidates must obtain at least 60%)</td>
</tr>
<tr>
<td>Engineering: Computer Systems and Engineering: Electrical</td>
<td>Required: (FAL)5, M5 as well as three of the following: EPPV3 (candidates must obtain at least 60%) PSV3 (candidates must obtain at least 60%) ECDEV3 (candidates must obtain at least 60%) EWV3 (candidates must obtain at least 60%)</td>
</tr>
<tr>
<td>Engineering: Industrial</td>
<td>Required: E(FAL)5, M5, PSV3 (candidates must obtain at least 60%)</td>
</tr>
<tr>
<td>Engineering: Mechanical</td>
<td>Required: E(FAL)5, M5, PSV3 (candidates must obtain at least 60%)</td>
</tr>
<tr>
<td>Qualification</td>
<td>Minimum admission requirements</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Engineering: Mechanical: Marine</td>
<td>Required: E(FAL)5, M5, PSV3 (candidates must obtain at least 60%)</td>
</tr>
<tr>
<td>Engineering</td>
<td>Required: E(FAL)5, M5, PSV3 (candidates must obtain at least 60%)</td>
</tr>
<tr>
<td>Mechatronics</td>
<td>Recommended: ETV3, MSV3</td>
</tr>
<tr>
<td>Maritime Studies</td>
<td>Required: E(FAL)5, M5, PSV3 (candidates must obtain at least 60%)</td>
</tr>
<tr>
<td>Surveying</td>
<td>Required: E(FAL)5, M5, PSV3 (candidates must obtain at least 60%)</td>
</tr>
</tbody>
</table>
SELECTION PROCEDURE

All persons who apply for National Diploma study at CPUT and who satisfy the minimum Admission requirements, may be subjected to a selection procedure. The selection procedure may include:

- Psychometric and aptitude evaluation
- Numeracy and language skills evaluation
- A personal interview
- Portfolio evaluation

Applicants will be notified of the time and date of evaluation sessions and the requirements in respect of the various qualifications.

Recognition of Prior Learning

What is RPL?
Recognition of Prior Learning (RPL) is a process of identifying your knowledge and skills against a qualification or part thereof. The process involves the identification, mediation, assessment and acknowledgement of knowledge and skills obtained through informal, non-formal and/or formal learning. RPL provides an opportunity for you to identify your learning, and to have it assessed and formally acknowledged.

At CPUT, RPL can only be done against qualifications offered by CPUT. As a university of technology, CPUT has two options for RPL, namely: “access” or “advanced standing”, or a combination thereof.

Gaining access
If you have considerable work experience, but you don’t meet the entry requirements of your chosen course, you may want to apply for entry into a qualification. This is referred to as “access”. The RPL application is evaluated against the entry requirements of the qualification. If access is granted, the qualification on the lower level is not awarded.

Advanced standing
As an individual you might have gained knowledge in specific areas, when compared to outcomes against a CPUT qualification, your knowledge might cover some subjects. You may apply for recognition of these subjects and this called “advanced standing”. Once the assessment is done, the University might give recognition for specific subjects, but not for the entire qualification. You will be required to complete the outstanding subjects, before the qualification is awarded. There are guidelines governing the maximum number of subjects for which advanced standing can be granted and you are required to register as a student.
and complete the outstanding subjects in order to be awarded the qualification by CPUT. This is in terms of the “residency clause”; 50% of a programme has to be completed at the qualification awarding Institution. The residency clause requires RPL applicants to complete at least 50% of subjects as a student with CPUT.

**Apply for access into a BTech-programme**
If you want to apply for access into a BTech programme, you will be evaluated against the National Diploma (ND), underpinning the BTech. For example, if you want to do the BTech in Business Administration and you are working as a marketing manager, you can “apply for advanced standing against the ND: Marketing, to obtain access into the BTech: Business Administration or the BTech: Marketing”. Indicate this clearly in your letter of motivation to the University.

**Difference between exemptions and advanced standing**
If you have successfully completed subjects with other Institutions of Higher Education in South Africa, including the former technikons, or professional institutions, you may apply for “exemptions”. This is handled by the Faculty Office. However, especially if you have worked for a number of years, include your academic records from these institutions as part of your RPL application.

**International students**
If you have a qualification from abroad, please have that qualification evaluated by the South African Qualifications Authority (SAQA), Unit for Evaluation of Foreign Qualification before you submit your RPL application (go to www.saqa.org.za). Once your qualification has been evaluated, and you don’t meet the entry requirements of the programme you would like to do, or you want credit for what you already know, contact the RPL Unit.

**More information for international applicants**

**Returning students**
If you studied at Peninsula Technikon or Cape Technikon more than 10 years ago, the validity of your subjects have lapsed (Point 4.1.3, p 10 CPUT Academic Rules and Regulations). You may apply to the University to use the RPL process to complete your qualification. Provide required information to the RPL unit.

**Closing date for applications**
The closing date for RPL is 30 June of every year, except for Design qualifications, in which case the closing date is 31 July every year.

Website: http://www.cput.ac.za/study/rpl/
Contact: E-mail: rpl@cput.ac.za
PROCEDURE FOR EVALUATION OF FOREIGN QUALIFICATIONS

Students following the Cambridge system should note the following requirements:
Passes of at least five different subjects of the IGCSE and HIGCSE study levels, of which at least two are HIGCSE level subjects.

A pass in the language which is the medium of instruction at the University (English)

Specific pass grades: IGCSE: A, B or C; HIGCSE: 1, 2 or 3

In addition, students wishing to apply for MTech or DTech programmes must have their qualifications evaluated by the South African Qualifications Authority (SAQA) prior to submitting their application forms (see below).

From August 2014 SAQA only accepts online applications. The onus is on the student to apply timeously to SAQA, as this may take a bit longer.

Applicants who obtained qualifications from within Commonwealth countries are exempt from SAQA evaluation procedures.

Other senior school qualifications will be reviewed on merit. In some instances, where the format of secondary school education is unfamiliar, students applying for National Diploma programmes may also be asked to apply for SAQA evaluation prior to their acceptance. Applications towards a National Diploma do not require SAQA verification for students from Commonwealth Countries.

Applications for Evaluation of foreign qualifications must be sent to:
The Head of Evaluation of Qualifications
South African Qualifications Authority
Postnet Suite 248
Private Bag X06
Waterkloof 0145
Tel. +27 12 431 5000

Application forms and more information may be accessed from http://www.sqa.org.za

You should include the following with your application:
• All qualification documents, i.e. the highest school certificate issued by the official examining body.
• Complete and legible transcripts of academic records in respect of all degrees or other
higher education qualifications, together with the final certificates preceding qualifications leading to any postgraduate or other advanced qualification when the latter is submitted. (Certificates in foreign languages should be submitted with sworn translations into English by an accredited translator.)

- A cheque made out to SAQA. Information on the relevant evaluation fee can be obtained from the SAQA Helpdesk (086 010 3188; email: saqainfo@saqa.org.za). Please note that cheques and money orders will not be accepted as payment for applications for the evaluation of educational qualifications. A cheque made out to SAQA. Information on the relevant evaluation fee can be obtained from the South African Qualification Authority.

Submission of certificates
A National Senior Certificate or equivalent qualification must be submitted by the student upon enrolment at the beginning of the academic year. If this requirement is not met, the University will be forced to cancel the provisional acceptance.

TRANSFERS FROM OTHER INSTITUTIONS

Students who wish to transfer to CPUT from other institutions should note that priority will be given to the promotion of our own registered students and that transfers will only be considered in the event that there is a place on the qualification, and subject to the following requirements:

An applicant should complete the prescribed “Application for admission” form and return it to CPUT, together with a certified copy of his/her Senior Certificate, identity document and the prescribed application fee.

If the applicant is currently registered for a qualification at another university and wishes to transfer to CPUT, s/he should submit, together with the application form, an academic transcript (issued by the Registrar of the said university) which lists all the subjects passed by the applicant during the mid-year examinations.

As soon as the year-end examination results are available, the applicant should submit a formal statement of these results to CPUT.

All applications must be accompanied by a certificate of good conduct, or a letter of recommendation, from the applicant’s present head of department.

The applicant may be required to attend an interview in Bellville or Cape Town.
If the applicant is accepted, he/she shall be required to complete an “Application for Exemption” form and to pay the prescribed exemption fee per subject when he/she registers in January of the year of study.

NB: Applicants should note that certain rules may apply, e.g. maximum number of subjects, maximum number of years to complete qualification, etc.

FACULTY OF ENGINEERING QUALIFICATION STRUCTURE

National Diploma (ND)
Three years full-time study leads to the award of a National Diploma. National Diploma studies constitute complete study programmes, meet specific business needs and serve as recognised exit levels.

Bachelor of Technology (BTech)
The National Diploma leads to the Bachelor of Technology (BTech). Admission to these one-year programmes (full time) may be subject to additional minimum Admission requirements, which may include a minimum pass mark in the third year of the National Diploma programme. Most BTech programmes are also offered part time over two years.

Master and Doctor of Technology (MTech and DTech)
The Cape Peninsula University of Technology actively promotes research of an applied nature, believing that a strong research activity is a necessary feature of any institution offering higher education. Students are sensitised to the importance of information and library skills during their first three years of study, introduced to research methodologies in the degree year, and provided with guidance and facilities to undertake independent research for further studies.

From 2016 the faculty will be offering a Master of Engineering (MEng) and Doctor of Engineering (DEng) in Chemical and Electrical Engineering, as well as other disciplines in 2017. The new qualifications ensure that the curriculum offered at CPUT can be directly compared to that of other institutions; not only nationally, but also internationally through the benchmarking process that took place during the development of these new qualifications.

The Master of Technology and Doctor of Technology may be obtained through full-time or part-time study.
# List of Programmes

## Undergraduate and Postgraduate Programmes

<table>
<thead>
<tr>
<th>Department</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Management and Quantity Surveying</strong>&lt;br&gt;Bellville Campus</td>
<td>ND: Building (Extended)&lt;br&gt;ND: Building&lt;br&gt;BTech: Construction Management&lt;br&gt;BTech: Construction Management (Facility Management)&lt;br&gt;BTech: Construction Management (Health and Safety)&lt;br&gt;BTech: Quantity Surveying</td>
</tr>
<tr>
<td><strong>Chemical Engineering</strong>&lt;br&gt;Bellville and Cape Town Campuses</td>
<td>ND: Engineering: Chemical (Extended)&lt;br&gt;ND: Engineering: Chemical&lt;br&gt;BTech: Engineering: Chemical&lt;br&gt;MTech: Engineering: Chemical&lt;br&gt;Master of Engineering in Chemical Engineering&lt;br&gt;DTech: Engineering: Chemical&lt;br&gt;Doctor of Engineering in Chemical Engineering</td>
</tr>
<tr>
<td><strong>Civil Engineering and Surveying</strong>&lt;br&gt;Bellville Campus</td>
<td>ND: Engineering: Civil (Extended)&lt;br&gt;ND: Engineering: Civil&lt;br&gt;BTech: Engineering: Civil (Construction Management)&lt;br&gt;BTech: Engineering: Civil (Transport)&lt;br&gt;BTech: Engineering: Civil (Urban Engineering)&lt;br&gt;BTech: Engineering: Civil (Water)&lt;br&gt;MTech: Engineering: Civil&lt;br&gt;D Tech: Engineering: Civil&lt;br&gt;ND: Surveying&lt;br&gt;BTech: Surveying&lt;br&gt;ND: Cartography (GISc)&lt;br&gt;BTech: Cartography</td>
</tr>
<tr>
<td><strong>Clothing and Textiles Technology</strong>&lt;br&gt;Bellville Campus</td>
<td>ND: Clothing Management (Extended)&lt;br&gt;ND: Clothing Management&lt;br&gt;BTech: Clothing Management</td>
</tr>
</tbody>
</table>

Except the following students who will attend classes in Cape Town until June, and move to Bellville in July:<br>- Cape Town Second and Third year students.<br>- Cape Town BTech Industrial Electronics and Computer Systems students.
GENERAL INFORMATION

Admission

Application for admission
It is advisable that applications for admission to study at the Cape Peninsula University of Technology (CPUT) be submitted as early as possible to the campus of choice. For the various campus addresses, see the Application Form and Guide to the Completion of the Application Form.

The Application Form is available on the University’s website at www.cput.ac.za, under the heading “Study at CPUT”.

Closing date for applications
The closing date for application is 30 September.

Applicants will be informed of acceptance/non-acceptance after 31 October.

Residence accommodation
Residence accommodation is subject to availability, in terms of the rules, and will be allocated at the campus where the student will be studying.
Student identity cards
Students are issued with identity cards at the beginning of each academic year. Presentation of these cards when buying materials, booking for theatres, etc. may mean special discount rates. For security purposes these cards must be presented on demand.

Bursaries and Loans
Bursary and financial aid applications must be made to either the Bellville Campus or the Cape Town Campus, depending on where the applicant is admitted.

Class and examination fees
A class fees list is available on request. Examination fees are included in the class fees. After the initial payment in January, the remainder of the fees owing can be paid in monthly instalments from February to November (or over five months for semester subjects). Please note that these fees are subject to change every year and are not refundable.

Prescribed books
The titles and prices of prescribed books that students must purchase are available at the book shops on the Bellville and Cape Town Campuses. Reference books and technical journals are available to students in the library. Students should not buy books until instructed to do so by subject lecturers.

Cooperative education
Co-operative education is an educational model designed to promote individual career development. The basic principle of co-operative education is that personal growth and professional development are best achieved by an educational method that combines classroom learning with experiential learning, i.e. practical experience.

Work-integrated learning is part of co-operative education and is a partnership between the student, the University and the employer. The work-integrated learning programme is planned by the University in co-operation with employers and is jointly monitored by both parties.

Although the University undertakes to assist students in obtaining suitable work integrated learning placements, the onus is on the student to find “employment”. The employer must be accredited by the University for purposes of work-integrated learning. A work-integrated learning agreement creates a separate contract between the “employer” and the student.

Hours of tuition
Full-time classes start at 08:30 and may continue until 18:00.
*Note: Examinations may be set after hours up to 20:30.*
Class attendance
Continued acceptance of a student’s registration for full-time qualifications depends, amongst other things, upon sustained academic progress and regular and punctual attendance. Unsatisfactory progress and attendance may result in the suspension of a student.

Medium of tuition
The medium of tuition is English, except for the Education qualifications at the Wellington Campus which are offered in Afrikaans. Afrikaans and Xhosa speaking students may be offered support, which may be by way of language-specific tutorial groups, the provision of notes and the setting of tests, assignments and examinations in the first language of the student.

Library
The CPUT Libraries are part of the Cape Library Co-operative (Calico), which provides access to four million books and numerous magazines in various libraries in the Peninsula. In addition, the Libraries receive approximately 1 800 periodicals as well as the leading English and Afrikaans newspapers. The Libraries offer excellent facilities for study, and provision is made for students who wish to do research work. All students automatically become members of the Libraries.

Student Counselling
CPUT offers a counselling service by registered psychologists to students, prospective students and their parents. Prospective students are individually interviewed and assisted to make a responsible career choice. Parents are welcome to attend such interviews. Career counselling may also include a complete psychometric evaluation.

Prospective students and students, who have problems regarding career choice, the planning of their qualification or choice of subjects, can make an appointment at:
Bellville Campus: Tel +27 21 959 6911
Cape Town Campus: Tel +27 21 460 3252/3/4

Assessment
Assessment takes place throughout the year with final assessments in June and/or November each year, and a pass mark of 50% must be obtained in all subjects. In each module and subject the various assessments contribute towards the final assessment mark.

The assessment mark for a subject will be determined by his/her performance in tests, assignments and in accordance with the requirements for each qualification.

Indemnity
A student involved in any university-related activity, whether academic, sporting, cultural or
related to experiential or practical training, shall indemnify the Cape Peninsula University of Technology (hereinafter referred to as CPUT) and its staff and/or any co-operative partner and its staff, or their representatives, against any claim of whatsoever nature which such student, his/her executors or assigns may now or in the future have, arising from any injury or the sequelae thereto and which may be instituted against CPUT as a result of such university-related activities; and against any liability that may arise from an action or omission by such student. A student, furthermore, shall undertake not to hold CPUT or any of its employees responsible for any damage of whatsoever nature that such student may sustain during or arising from any university-related activity, irrespective of whether it occurs on or off the premises of CPUT.

International students
International students should consult the International Student Guide (or visit our web site: www.cput.ac.za) for details regarding their application to study at the University, e.g. study permit, fees structure, etc.

Research
The Cape Peninsula University of Technology actively promotes research of an applied nature, believing that strong research activity is a necessary feature of any institution offering higher education. Students are sensitised to the importance of information and library skills during their first three years of study, introduced to research methodologies in the degree year, and provided with guidance and facilities to undertake independent research for further studies.

For details about and the Admission requirements of the advanced degrees, consult Taylia Green, Tel: (021) 959 6666; Email: GreenT@cput.ac.za

The Guide to Postgraduate Studies is available on the CPUT website: http://www.cput.ac.za

PART-TIME STUDY

Hours of tuition
Most of the qualifications described in this brochure are offered on a part-time basis. Lectures are scheduled from Mondays to Thursdays between 17:15 and 21:00. The object of this is to enable persons who do not have the privilege of studying on a full-time basis to acquire tertiary qualifications. The information contained in this brochure generally also applies to part-time students.

Admission requirements
The same as for full-time students. As a rule, accommodation in a university residence is not available to part-time students.
FACULTY EXCLUSION RULES AND PROCEDURES

National Diploma exclusions

A National Diploma candidate shall not be permitted to renew his or her registration except by permission of the Head of Department and/or the Dean if he or she fails to complete the subjects prescribed:

Where applicable, for first semester within two semesters after his/her first registration for the Diploma; and
Where applicable, for first year within two years after his/her first registration for the Diploma;

• Students who fail more than 50% of their subjects/modules in any level of study or who fail any subject twice will not be re-admitted to the qualification. These students shall be referred to a FET college, or will have to work for six months in an engineering company (doing engineering related work) before being eligible for re-admission to the qualification.

• A student may also upon application to the department enrol for an accredited equivalent subject/module at e.g. UNISA and apply for recognition of credits on successful completion of the subject/module.

• Students who fail all the core subjects (where applicable) will not be re-admitted to the qualification.

• Students have to pass specific subjects/modules (pre-requisites) in order to continue with their qualification to the next level. See departmental rules pertaining to the qualification you are registered for.

For the second semester within four semesters after his/her first registration for the Diploma; and For the second year within four years after his/her first registration for the Diploma;

• Students who fail any of the S2 subjects more than once will be excluded from the qualification.

For the third semester within six semesters after his/her first registration for the Diploma; and For the third year within six years after his/her first registration for the Diploma;

• Students will be promoted to the third year or semester provided they have passed all first year subjects/modules, pre-requisites, all core subjects/modules at second year level and where prescribed; the experiential learning should be completed.

For the fourth semester within eight semesters after his/her first registration for the Diploma.

• Students will be promoted to the fourth semester provided they have passed all first and second year subjects, pre-requisites and all core subjects at third semester level.
Notwithstanding the above, departments have an application for re-admission process, which affords excluded candidates an opportunity to submit such an application and present mitigating factors.

Furthermore, each department has a unique set of criteria used to determine re-admission. Such departmental criteria are taken cognisance of at the time of the exclusion of the candidate based on the faculty’s policy.

An excluded student may, after having been unsuccessful in his/her application for re-admission, appeal to the Dean for reconsideration.

A student, who is excluded twice in any programme, or the same programme, will not have recourse to appeal.

**BTech exclusions**

Students at this level will be excluded from the programme if they have not completed the qualification within two years full-time, or four years part-time.

**Extended Curriculum Exclusions**

The Department of Higher Education and Training (DHET) does not recognise repeating students on the Extended Curriculum Programme (ECP) for statistical or funding purposes. The full ECP or significant sections of it cannot be repeated and, where possible, only a limited number of subjects should be repeated. The same exclusion rules as applied to regular subjects cannot be applied to the ECP. Bearing this in mind, each department needs to inform students of their exclusion rules at the start of the programme.

**Process for appeals against exclusions**

- A student who had been excluded must submit an application to the HoD/department applying for re-admission, along with ALL relevant information (and any other supporting documents).
- If the application is approved the student continues with the registration process.
- If the application is not approved, the student may submit an appeal to the Dean. All information (letter of appeal, outcome of application to the department and any other supporting documents) must be submitted to the relevant Faculty Office (Bellville or Cape Town) for the attention of the Faculty Officer.
- The Faculty Officer will list all applications and provide to the Dean for consideration.
- The Dean makes the decision and provides feedback to the Faculty Officer about the outcome of the appeal.

The Faculty Officer will inform the student, department and ARC respectively.
EXCLUSIONS AND READMISSIONS PROCESS

LETTER OF EXCLUSION TO STUDENT

STUDENT APPEALS IN WRITING TO DEPARTMENT

APPEALS COMMITTEE CONSIDERS APPEAL (Students not present)

DECISION

AGREEMENT WITH DEPT

READMIT

EXCLUDE WITH RIGHT TO APPEAL

FORWARDED TO DEAN’S OFFICE

AGREEMENT WITH DEPT

READMIT

EXCLUDE WITH ALTERNATIVES

FACULTY POLICIES AND PROCEDURES
## DEPARTMENT OFFICE-BEARERS

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of Department</td>
<td>Prof D I O Ikhu-Omoregbe</td>
<td>021 959 6130</td>
<td><a href="mailto:Ikhu-omoregbeD@cput.ac.za">Ikhu-omoregbeD@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>PhD (Chemical)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secretary</td>
<td>Ms E Alberts (Cape Town)</td>
<td>021 460 3159</td>
<td><a href="mailto:VanWykE@cput.ac.za">VanWykE@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Ms C Damons (Bellville)</td>
<td>021 959 6083</td>
<td><a href="mailto:DamonsC@cput.ac.za">DamonsC@cput.ac.za</a></td>
</tr>
</tbody>
</table>

## DEPARTMENTAL STAFF

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Qualifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate Professor</td>
<td>AProf T V Ojumu</td>
<td>PhD (Chemical)</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>AProf M S Sheldon</td>
<td>BTech (Business Administration); DTech (Chemical)</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr G E Hangone</td>
<td>MSc (Chemical)</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr U Narsingh</td>
<td>MSc (Chemical)</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Dr O O Oyekola</td>
<td>PhD (Chemical)</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr A M Rabiu</td>
<td>MSc (Chemical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr M Aziz</td>
<td>MTech (Chemical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr D de Jager</td>
<td>DTech (Chemical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr M Basitere</td>
<td>MTech (Chemical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr B Godongwana</td>
<td>MTech (Chemical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr D A Hlongwane</td>
<td>Bachelor of Laws – LLB, Master of Laws</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr J M John</td>
<td>MTech (Chemical), HED (Diploma)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr T F Madzimbamuto</td>
<td>MSc (Chemical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr A Thole</td>
<td>MTech (Chemical)</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Ms A B Marshall</td>
<td>MTech (Chemical)</td>
</tr>
<tr>
<td>Co-op Co-ordinator</td>
<td>Ms N Mti</td>
<td>BTech (Chemical)</td>
</tr>
<tr>
<td>Senior Technician</td>
<td>Mr A Bester</td>
<td>NHD (Electrical)</td>
</tr>
<tr>
<td>Laboratory Technician</td>
<td>Ms H Small</td>
<td>MTech (Chemical)</td>
</tr>
<tr>
<td>Laboratory Technician</td>
<td>Ms M Bingo</td>
<td>BTech (Chemical)</td>
</tr>
<tr>
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<td>N D Ndlamini</td>
<td>BTech (Chemical)</td>
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QUALIFICATIONS OFFERED

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<th>Maximum Duration</th>
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ND: ENGINEERING: CHEMICAL

Course aim
The aim of the course is to provide excellent theoretical as well as practical chemical engineering knowledge and skills, relevant to the needs of the chemical industry and society at large. Graduates of this programme will have the competence to apply engineering skills to chemical engineering problems and plant operations.

Purpose and rationale of the qualification
This qualification is intended for process or chemical engineering technicians working in the process-related industries. Learners achieving this qualification have the competence to apply existing process technology to chemical engineering problems in chemical processes and plant operations.

Career opportunities
Graduates play an important role in process operations, management, research and development, as well as in environmental management. Employment is found in a wide range of industries including food processing, wine production, pharmaceuticals, biotechnology, fertilisers, fuel technology, oil refining, minerals processing, chemical manufacturing, and synthetic fibres. Employment opportunities also exist in government and higher education institutions.
Admission requirements
For the minimum Admission requirements, see Admission requirements.

Professional Registration
The National Diploma in Engineering: Chemical is accredited by the Engineering Council of South Africa. Graduates may apply for registration as Professional Technicians.

Duration of course
Full-time: Three years, including one year experiential learning.

Venues of Offering
Bellville
Cape Town

**ND: ENGINEERING: CHEMICAL (NDCHME)**

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
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</table>
### CURRICULUM INFORMATION

| Period of Study | Year/Sem Subject | Subject Code | Subject Name                          | Compulsory or Elective | Pre-requisite Subject Codes | NQF Exit Level | SAQA Credit | HEIMS Credit | Assessment Type |
|-----------------|------------------|--------------|---------------------------------------|------------------------|-----------------------------|----------------|-------------|--------------|----------------|----------------|
| 1               | S2               | PCH201S      | Physical Chemistry 2                  | C                      | CHE103S, CHE104S            | 5              | 10          | 0.083        | Continuous      |
| 2               | S3               | CET300S      | Chemical Engineering Technology 3 - Units | C                      | CET200S, EPH200S           | 6              | 12          | 0.100        | Continuous      |
| 2               | S3               | CPL300S      | Chemical Plant 3 - Equipment          | C                      | CET200S, EPH200S           | 6              | 10          | 0.083        | Continuous      |
| 2               | S3               | ENM100S      | Management Skills 1 - Structure       | C                      | --                          | 5              | 8           | 0.068        | Continuous      |
| 2               | S3               | ORG201S      | Organic Chemistry 2                   | C                      | CHE103S, CHE104S           | 6              | 10          | 0.083        | Continuous      |
| 2               | S3               | THC300S      | Thermodynamics: Chemical Engineering 3 | C                      | PCH201S, CET200S           | 6              | 10          | 0.083        | Continuous      |
| 2               | S3               | MAT202S      | Mathematics 2                         | C                      | MAT101S                     | 6              | 10          | 0.083        | Continuous      |
| 2               | S4               | APT300S      | Thermodynamics: Applied 3             | C                      | THC300S, MAT202S           | 6              | 10          | 0.083        | Continuous      |
| 2               | S4               | CET301S      | Chemical Engineering Technology 3 - Operations | C                      | CET300S, MAT202S           | 6              | 12          | 0.100        | Continuous      |
| 2               | S4               | CPD300S      | Chemical Process Design Principles 3  | C                      | CET300S                     | 6              | 10          | 0.083        | Continuous      |
| 2               | S4               | CPL301S      | Chemical Plant 3 - Processing         | C                      | CET300S                     | 6              | 10          | 0.083        | Continuous      |
| 2               | S4               | ENM101S      | Management Skills 1 - Application     | C                      | --                          | 6              | 8           | 0.068        | Continuous      |
| 2               | S4               | PRC300S      | Process Control 3                     | C                      | CET300S, MAT202S           | 6              | 10          | 0.083        | Continuous      |
| 3               | S5               | CIP100S      | In-Service Training 1                 | C                      | APT300S, CET300S, CET301S, CPD300S, CPL300S, CPL301S, ENM100S, ENM101S, MAT202S, ORG201S, PRC300S, THC300S | 6              | 60          | 0.5          | Continuous      |
| 3               | S6               | CIP201S      | In-Service Training 2                 | C                      |                             | 6              | 60          | 0.5          | Continuous      |
ND: ENGINEERING: CHEMICAL (EXTENDED)

Course aim
In the Extended Curriculum with Foundational Provision Programme, first-year subjects of the National Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two-year Foundational Programme, students will integrate with the normal programme.

Duration of course
Full-time: The four year programme comprises six academic semesters and two semesters of inservice training.

ND: ENGINEERING: CHEMICAL (EXTENDED) (NDCHMX)

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<th>Period of Study</th>
<th>Year/Sem Subject</th>
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<td>60</td>
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BTECH: ENGINEERING: CHEMICAL

Course aim
The aim of the course is to broaden and deepen the knowledge base acquired at diploma level and to consolidate concepts and theories through substantive experimental and design projects. The projects emphasise the development of students, including knowledge acquisition, presentation and research skills. Graduates can apply their knowledge and skills to chemical engineering problems, chemical process design, process operations management and relevant environmental issues, contributing to the needs of the chemical industry and society at large.

Purpose and rationale of the qualification
This qualification is intended for process or chemical engineering technicians working in the process-related industries. Learners achieving this qualification have the competence to apply existing process technology to chemical engineering related problems and process design, illustrating competence and thus contributing to the needs of the chemical industry.

Career opportunities
Graduates may be involved at any stage of a chemical engineering project, from its conception to sale of the final product. These stages include: research and development, economic evaluation, design, equipment manufacture, plant construction and commissioning, plant operation, product sales and service.

Employment is found in industries such as pharmaceuticals, biotechnology, fertilisers, fuel technology, oil refining, minerals processing, chemical manufacturing, and synthetic fibres. Opportunities also exist in environmental consultancy, and in government and higher education.

Admission requirements
National Diploma in Chemical Engineering (or an equivalent qualification) is required, with 60% in Mathematics 2, as well as an average of 60% in the core Chemical Engineering subjects at Level 3.

Professional registration
National Diploma in Chemical Engineering (or an equivalent qualification) is required, with 60% in Mathematics 2, as well as an average of 60% in the core Chemical Engineering subjects at Level 3.
### Offering type and duration of course

**Full-time:** One year  
**Part-time:** Two years

### Venues of Offering

Bellville  
Cape Town

### BTECH: ENGINEERING: CHEMICAL (BTCHME)

| Period of Study | Year/Sem Subject | Subject Code | Subject Name                                           | Compulsory or Elective | Pre-requisite Subject Codes [Co-requisites listed in brackets] | NQF Exit Level | SAQA Credit | HEMIS Credit | Assessment Type |
|-----------------|------------------|--------------|-------------------------------------------------------|------------------------|-----------------------------------------------------------------|----------------|-------------|--------------|----------------|------------------|
| 4               | Y                | PQD400S      | Chemical Engineering Process Design 4                  | C                      | [CET400S, CET401S, CET402S]                                     | 7              | 24          | 0.200        | Continuous      |
| 4               | Y                | PCE400S      | Project: Chemical Engineering 4                        | C                      | [CET400S, CET401S, CET402S]                                     | 7              | 12          | 0.100        | Continuous      |
| 4               | S1               | CET400S      | Chemical Engineering Technology 4: Fluid Flow          | C                      | --                                                              | 7              | 12          | 0.100        | Continuous      |
| 4               | S1               | CET401S      | Chemical Engineering Technology 4: Transfer Heat & Mass | C                      | --                                                              | 7              | 12          | 0.100        | Continuous      |
| 4               | S1               | CET402S      | Chemical Engineering Technology 4: Unit Operations     | C                      | --                                                              | 7              | 12          | 0.100        | Continuous      |
| 4               | S1               | MAT300S      | Mathematics: Chemical Engineering 3                   | C                      | --                                                              | 7              | 12          | 0.100        | Continuous      |
| 4               | S1               | RTI400S      | Reactor Technology 4                                   | C                      | --                                                              | 7              | 12          | 0.100        | Continuous      |
| 4               | S2               | PRC400S      | Process Control 4                                      | C                      | MAT300S                                                         | 7              | 12          | 0.100        | Continuous      |
| 4               | S2               | PIC400S      | Production Engineering Chemical Industries 4           | C                      | --                                                              | 7              | 12          | 0.100        | Continuous      |
MTECH: ENGINEERING: CHEMICAL

Course aim
Graduates develop the knowledge and skills required to conduct independent research in chemical engineering and environmental problems, and to contribute significantly to knowledge production through the understanding, application and evaluation of existing and new knowledge.

New qualifications for 2016
The new Master of Engineering (MEng) is being offered from 2016. The new qualifications ensure that the curriculum offered at CPUT can be directly compared to that of other institutions; not only nationally, but also internationally through the benchmarking process that took place during the development of these new qualifications.

Pipeline MTech students will be able to continue with their MTech, or convert to the new Master of Engineering (MEng). BTech graduates who want to register for the MEng may be required to complete additional modules as determined by the department.
For more information go to the “New Qualifications” link on the Engineering page.

Purpose and rationale of the qualification
This qualification is intended for chemical engineers or technologists working in process-related industries. Learners achieving this qualification have the competence to conduct independent research in chemical engineering, and contribute significantly to knowledge production through the understanding, application and evaluation of existing knowledge. The research problem – its justification, process and outcome – is reported in a thesis that complies with the generally accepted norms at that level.

Career opportunities
Graduates play an important role in the development of new products, new applications for existing products or raw materials, or cheaper ways of making existing products.

Concern for the environment, the development of cleaner production technologies, waste minimisation and recycling have become major fields of research in chemical engineering. Research relates to the technical methods of assessing environmental impacts, including the preparation of emission inventories, air pollutant dispersion modelling, and ambient air and water monitoring. Graduates are employed in research and development in industry, as well as in teaching positions at higher education institutions.

Admission requirements
A BTech in Engineering: Chemical (or an equivalent qualification), with a pass in Research Methodology, is required.

Research areas
ENVIRONMENTAL ENGINEERING AND CLEANER PRODUCTION TECHNOLOGY (BELVILLE CAMPUS)
Current research projects include the following:

- Chemical process risk assessment.
- Membrane, ion exchange and biological process developments in environmental and process applications.
- All aspects of air quality management, including preparation of emission inventories, pollutant dispersion modelling, assessment of air pollutant health risks.
- Pesticide and heavy metal analysis.
- Phyto remediation.

HYDROMETALLURGY, BIOTECHNOLOGY AND GRAVITY SEPARATION
(CAPE TOWN CAMPUS) Current research projects include the following:

- Sorption of base and heavy metals on porous adsorbents.
- Membrane bio-technology for continuous processes.
- Biosorption technologies for heavy metal removal.
- Modelling of in-line pressure jigs.

Offering type and duration of course

**Full-time:** Minimum one year  
**Part-time:** Two years

Venues of Offering  
Bellville  
Cape Town

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**MTECH: ENGINEERING: CHEMICAL (MTCHLR)**

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<th>Period of Study</th>
<th>Year/Sem</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
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**MASTER OF ENGINEERING IN CHEMICAL ENGINEERING (MGCHMR)**

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DTECH: ENGINEERING: CHEMICAL

Course aim
Graduates can conduct independent research in the field of chemical engineering, and contribute significantly to the body of knowledge through the understanding, application and evaluation of existing knowledge.

New qualifications for 2016
The new Doctor of Engineering (DEng) is being offered from 2016. The new qualifications ensure that the curriculum offered at CPUT can be directly compared to that of other institutions; not only nationally, but also internationally through the benchmarking process that took place during the development of these new qualifications.

Pipeline DTech students will be able to continue with their DTech, or convert to the new Doctor of Engineering (DEng). For more information go to the “New Qualifications” link on the Engineering page.

Purpose and Rationale of the qualification
This qualification is intended for chemical engineers or technologists working in process-related industries. Learners achieving this qualification have the competence to conduct independent research under minimal guidance in the field of chemical engineering, and contribute significantly to knowledge production through the understanding, application and evaluation of existing knowledge. The research problem - its justification, process and outcome – is reported in a dissertation that complies with the generally accepted norms for research at that level.

Career opportunities
Graduates follow a career in research and development in industry and at research institutes. They are also employed in teaching and research positions at higher education institutions.

Admission requirements
An MTech in Engineering: Chemical (or an equivalent qualification) is required.

Offering type and duration of course
**Full-time:** Minimum two years
**Part-time:** Four years

Venues of Offering
Bellville
Cape Town
### DTECH: ENGINEERING: CHEMICAL (DTCHMR)

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### DOCTOR OF ENGINEERING IN CHEMICAL ENGINEERING (DGCHMR)

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PROGRESSION RULES AND CRITERIA

National Diploma

f) In order for a student to proceed from Year 1 to Year 2, the student must obtain at least 80 SAQA credits (0.66 HEMIS credits).

g) First-year students who only have Chemical Engineering Technology 2 outstanding at the end of the year in order to progress to Year 2, may register this subject as a co-requisite subject. In this case a student must have attempted but failed the subject. In such a case this student will be allowed to register for Chemical Engineering Technology 2 on the Extended Programme in the following year, while continuing with second-year subjects where there are no clashes in the timetable.

h) In order for a student to proceed from Year 2 to Year 3, the student must obtain at least 210 SAQA credits (1.75 HEMIS credits).

i) Students may normally proceed to register for In-service Training (P1 and P2) if they have passed all subjects in Year 1 and Year 2.

j) Students may be allowed to register for P1 and P2 if they are not owing more than two subjects and not more than one subject in each semester.

Academic exclusion rules and appeal procedure

The General Exclusion Process

Students’ final assessment results are obtained from the examinations/faculty office at the end of each semester. A committee consisting of lecturers then conducts a marks review. It makes recommendations on final mark adjustments and identifies students for exclusion based on the criteria (Exclusion Rules). Students will be excluded at the end of the year. Students who perform poorly will receive a letter of warning informing them of their poor performance at the end of Semester 1. Students who perform very poorly at the end of Semester 1 will receive a letter advising them to voluntarily withdraw from the programme; such students will be finally excluded from the programme at the end of the year if they perform very poorly in Semester 2.

A general letter from the faculty office informs the student of exclusion from the programme. This letter gives the deadline for appeals and details the steps to be taken for re-admission to the programme (General Letter). Attached to this letter is a separate letter from the Chemical Engineering Department that details the reasons for exclusion and identifies the
exclusion rules that have been contravened. Students that have been excluded are blocked academically by the Faculty Office and cannot register for any subjects in the following year.

Students may appeal against exclusion on the basis of extenuating circumstances (e.g. a death in the family or illness), or other factors that have bearing by writing a letter to the HoD of the Chemical Engineering Department. This letter of appeal must be accompanied by a full academic record and other supporting material and must be submitted to the secretary by Friday of the first week that the University opens for a new year.

An Appeals Committee of the Chemical Engineering Department will evaluate the appeal. It will take into account the overall academic record of the student and the reasons provided for the poor performance. Based on this and input from subject lecturers, a decision is made on whether to re-admit the student into the programme or not. Sometimes certain restrictions will be placed on the student as a condition for re-admission. Furthermore in some cases the Chemical Engineering Department will request certain actions from the student as a condition for readmission, e.g. attendance of counselling sessions.

A written reply to the student’s appeal will be given by the Appeals Committee within five working days after submission and must be collected from the secretary of the Chemical Engineering Department. If the student does not agree with or accept the answer from the Appeals Committee, the student may then appeal to the Dean of the Faculty of Engineering.

Excluded students may only appeal against the exclusion once during the programme. The Department reserves the right to decline an appeal and the student is fully informed of the decision reasoning of the appeal panel. The student may appeal to the Dean of Engineering if not satisfied with the Department’s decision.

Alternative career choices for the student may be discussed with the Bureau for Student Counselling.

General Exclusion Policy
Any National Diploma student who fails to complete the qualification within six years (seven years for the Extended Curriculum Programme) will be excluded from the programme. Any BTech student who fails to complete the qualification in three years will be excluded. The institutional policy is that any student (ND and BTech) who fails more than 50% of the number of his/her registered subjects (in any year that s/he is registered for at CPUT) will be excluded from the programme. Any student who fails any subject more than once may be excluded from the programme.

Exclusion policy for students on the Extended Curriculum Programme
A student who fails two or more subjects at the end of the first semester will be advised
to withdraw from the course. A student who fails four or more subjects in Year 1, will be excluded completely.

**Exclusion policy for Year 1 students**

A student will be advised to withdraw from the programme if s/he fails all of the following subjects in the first semester:

- Mathematics 1 (MAT101S)
- Physics 1 (PHY101S)
- Chemistry 1 (CHE103S, CHE104S)

A student will be excluded completely from the programme if s/he fails one of the three abovementioned subjects twice, notwithstanding section A2.1. If a student fails two of the abovementioned subjects, s/ he will not be permitted to enrol for any second semester subjects until the subjects have been passed. In this event, a student is expected to successfully complete the required subjects in the following semester or following year before continuing with the programme.

A student will not be permitted to enrol for any third-semester subjects if s/he has failed both of the following subjects in Semester 2:

- Chemical Engineering Technology 2 (CET200S)
- Engineering Physics 2 (EPH200S)

In the event of the above, the student must re-enrol for the subjects and complete them successfully before being promoted to the next semester.

If a student fails any of the following subjects more than once, s/he will be excluded from the programme.

- Chemical Engineering Technology 2 (CET200S)
- Chemical Process Industries 2 (CPI201S)
- Engineering Physics 2 (EPH200S)
- Inorganic Chemistry 2 (INC201S)
- Drawings: Chemical Engineering (DCE100S)
- Physical Chemistry 2 (PCH201S)

The student will have to re-apply for acceptance for the following year. Alternatively, the student could enrol for the subject(s) through another institution offering an accredited equivalent course, e.g. UNISA, and on completion re-apply for enrolment and credits for the subjects under consideration.
SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for degree purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.
Note that the details below are summarised – refer to the individual Subject Guides for more detail.

**CHEMICAL ENGINEERING TECHNOLOGY 2**

**Pre-requisites:** Chemistry 1: Theory; Chemistry 1: Practical; Physics 1; Mathematics 1

**Mode of delivery:** Mainstream – Lectures 3 ½ hours / week, 10 tutorials, 6 practicals; ECP – Lectures 4 ½ hours / week, 29 tutorials, 6 practicals

**Subject outline:** Aspects such as the following are discussed: an introduction to chemical engineering calculations; processes and process variables; material balances with and without chemical reactions around: single stage and multi-stage steady state systems, gases, vapours, liquids and solids as applied with material balances. Practicals related to theory are also included.

**Assessment:** All Assessments are compulsory. Class tests; Tutorials; Practicals; Final Integrated Summative Assessment of 3 hours.

**Sub-minimum:** 50% on practicals; 40% in the Final Integrated Summative Assessment; and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject

**CHEMICAL ENGINEERING TECHNOLOGY 3: OPERATIONS**

**Pre-requisites:** Chemical Engineering Technology 3: Units; Mathematics 2

**Mode of delivery:** Lectures 3 ½ hours / week, 10 tutorials, 6 practicals.

**Subject outline:** The following important aspects are concentrated on: fundamentals of mass transfer, basic reactors, ion exchange resins, leaching, distillation, compressible fluid flow, drying; practicals related to the theory.

**Assessment:** All assessments are compulsory. Class tests, tutorials, practicals, Final Integrated Summative Assessment of three hours.

**Sub-minimum:** 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.
CHEMICAL ENGINEERING TECHNOLOGY 3: UNITS

Pre-requisites: Chemical Engineering Technology 2, Engineering Physics 2.

Mode of delivery: Lectures 3 ½ hours / week, 10 tutorials, 6 practicals.

Subject outline: The following important concepts are looked into: energy relationships, energy balances at steady state, combined material and energy balances, heat transfer, single stage evaporation; practical work related to theory.

Assessment: All assessments are compulsory. Class tests, tutorials, practicals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL PLANT 3: EQUIPMENT

Pre-requisites: Chemical Engineering Technology 2, Engineering Physics 2

Mode of delivery: 3 hours / week, 10 tutorials, 6 practicals.

Subject outline: The concepts that will be discussed are: mineralogy particle technology, comminution, classification (hydro cyclone), flotation, filtration, sedimentation, electro winning, environmental considerations of each process; practical work related to theory.

Assessment: All assessments are compulsory. Class tests, practicals, assignments, Final Integrated Summative Assessment of three hours.

Sub-minimum: 50% for practicals; practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMISTRY 1: PRACTICAL

Pre-requisites: None

Mode of delivery: 40 practicals.

Subject outline: Matter, atomic structure, periodic table, chemical bonding, chemical composition, chemical equations and stoichiometry, water and solutions, chemical equilibrium, acids, bases and salts, oxidation and reduction, electrochemistry and redox theory, introduction to inorganic and organic chemistry, introduction to thermochemistry.
Assessment: All Assessments are compulsory. Class tests; Assignments; Final Integrated Summative Assessment of 3 hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment; and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMISTRY 1: THEORY

Pre-requisites: None

Mode of delivery: Mainstream – Lectures 3 1/2 hours / week, 10 tutorials; ECP – Lectures 4 1/2 hours / week, 29 tutorials.

Subject outline: Matter, atomic structure, periodic table, chemical bonding, chemical composition, chemical equations and stoichiometry, water and solutions, chemical equilibrium, acids, bases and salts, oxidation and reduction, electrochemistry and redox theory, introduction to inorganic and organic chemistry, introduction to thermochemistry.

Assessment: All assessments are compulsory. Class tests, assignments, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL PROCESS DESIGN PRINCIPLES 3

Pre-requisites: Chemical Engineering Technology 3: Units

Mode of delivery: Lectures 1 1/2 hours / week, 10 tutorials, 2 practicals.

Subject outline: Concepts discussed in detail are as follows: an introduction to process design principles and codes; design information and data; equipment selection, specification and design; safety and loss prevention; case studies.

Assessment: All assessments are compulsory. Class tests practicals, assignments, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.
CHEMICAL PROCESS INDUSTRIES 2

Pre-requisites: Chemistry 1: Theory; Chemistry 1: Practical

Mode of delivery: Mainstream – Lectures 3 hours / week, 10 tutorials; ECP – 3 hours / week, 29 tutorials.

Subject outline: The processes in the following industries are discussed: coal-processing, petroleum refining, plastics, paper and pulp, heavy chemicals (both chlor alkali and acids), including economic and environmental factors affecting each of the industries; visits to the relevant chemical process industries with an integrated assignment/project on the industries.

Assessment: All assessments are compulsory. Class tests, tutorials, assignments, project, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL PLANT 3: PROCESSING

Pre-requisites: Chemical Engineering Technology 3: Units

Mode of delivery: Lectures 3 hours / week, 10 tutorials, 6 practicals.

Subject outline: Sections that are looked at are as follows: environmental consideration and legislation; incompressible fluid flow; pumps and piping systems; valves; materials of construction, mixing; cooling towers; practicals related to theory.

Assessment: All assessments are compulsory. Class tests, practicals, assignments, Final Integrated Summative Assessment of three hours.

Sub-minimum: 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

COMMUNICATION SKILLS 1

Pre-requisites: None

Mode of delivery: Mainstream – Lectures 2 ½ hours / week, 20 Assignments, ECP – Lectures 3 hours / week, 10 assignments.

Subject outline: Aims, communication theory, technical report writing oral presentation, group communication skills, all of which includes: engaging in active reading, critical
response to reading, referencing, evaluation and effective use of research material, focus on literature review of a research report, preparing and delivering a well-researched formal presentation

Assessment: All assessments are compulsory. Class tests, assignments, projects and presentations.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

**COMPUTER SKILLS 1**

**Pre-requisites:** None

**Mode of delivery:** See faculty office for further information.

**Subject outline:** Computer hardware; operating systems; software: Microsoft Word 2000; spreadsheets, Excel; PowerPoint; e-mail and Internet.

Assessment: All assessments are compulsory. Class tests, assignments, Final Integrated Summative Assessment of three hours.

Sub-minimum: 50% for practicals, 40% in the Final Integrate Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

**DRAWING: CHEMICAL ENGINEERING 1**

**Pre-requisites:** None

**Mode of delivery:** Lectures 3 hours / week, 29 practicals.

**Subject outline:** The following aspects are discussed: an introduction to drawing equipment; construction, projection; drawing aids; penetration and development of geometrical bodies; freehand sketches, isometric projection; sketches of plant and layout and isometric pipe drawings; Microsoft Viso; Solid Edge.

Assessment: All assessments are compulsory. Class tests, assignments, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.
ENGINEERING PHYSICS 2

Pre-requisites: Physics 1; Mathematics 1

Mode of delivery: Mainstream – Lectures 3 hours / week, 10 tutorials, 8 practicals; ECP – Lectures 3 ½ hours / week, 10 tutorials, 11 practicals.

Subject outline: The following concepts are concentrated on: fluid mechanics, transfer of heat including conduction, convection and radiation; electrical principles; nuclear chemistry; hygrometry; alternative energy sources. Practicals related to theory are also included, e.g. fluid flow measurements, heat transfer.

Assessment: All assessments are compulsory. Class tests, tutorials, practicals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

IN-SERVICE TRAINING 1 & 2

Pre-requisites: 22 Subjects, including Chemical Engineering Technology 3 - Operations

Mode of delivery: Work in Industry.

Subject outline: Co-operative education is an integral part of the National Diploma in Chemical Engineering. It is for this reason that a structured approach to in-service training and co-operation with industry is followed.

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<td>Process Plant Evaluation</td>
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<td>4</td>
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Assessment: All assessments are compulsory. Assignments, presentations.

INORGANIC CHEMISTRY 2

Pre-requisites: Chemistry 1: Theory, Chemistry 1: Practical.

Mode of delivery: See faculty office for further information.

Subject outline: Concepts included are: an introduction to chemical bonding and an
advanced study of ionic bonding, chemical reactions in aqueous and non-aqueous solutions, redox chemistry, descriptive inorganic chemistry.

Assessment: All assessments are compulsory. Class tests, practicals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

MANAGEMENT SKILLS 1: APPLICATION

Pre-requisites: None

Mode of delivery: Lectures 2 ½ hours / week, 10 assignments.

Subject outline: The following are discussed in detail: preamble and constitution of RSA, business entities, law of contract, labour law, sexual harassment, Aids and the law, environmental law, intellectual property law.

Assessment: All assessments are compulsory. Class tests, assignments, presentations, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the course.

MANAGEMENT SKILLS 1: STRUCTURE

Pre-requisites: None

Mode of delivery: Lectures 2 ½ hours / week, 10 assignments.

Subject outline: The following aspects are discussed in detail: human relations in organizations (motivation, communication, managing change, diversity and culture); principles and practice of management (planning, organising, leading and controlling); starting your own business; marketing management, financial management and project management concepts.

Assessment: All Assessments are compulsory. Class tests; Assignments; Presentations; Final Integrated Summative Assessment of 3 hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment; and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.
MATHEMATICS 1

Pre-requisites: None

Mode of delivery: Mainstream – Lectures 3 hours / week, 10 tutorials, ECP – Lectures 3 ½ hours / week, 29 tutorials.

Subject outline: A special focus is placed on: basic mathematics and determinants, differentiation, integration with applications, introduction to statistics, graphs, co-ordinate geometry, complex numbers, linear algebra.

Assessment: All assessments are compulsory. Class tests, tutorials, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

MATHEMATICS 2

Pre-requisites: Mathematics 1

Mode of delivery: Lectures 3 hours / week, 10 tutorials, 6 practicals.

Subject outline: Sections discussed in detail include: differentiation 2; integration 2 with applications; matrix algebra and determinants, linear programming; statistics.

Assessment: All assessments are compulsory. Class tests, tutorials, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ORGANIC CHEMISTRY 2

Pre-requisites: Chemistry 1: Theory; Chemistry 1: Practical

Mode of delivery: Lectures 3 ½ hours / week, 11 practicals.

Subject outline: The topics discussed under this subject are: introduction to nature of organic chemistry, aliphatic hydrocarbons, benzene, alkyl and alkyl halides, alkanols and alkoxyalkanes, phenols, alkanals and alkanones, carboxylic acids and derivatives, amines.

Assessment: All assessments are compulsory. Class tests, assignments, practicals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.
PHYSICAL CHEMISTRY 2

Pre-requisites: Chemistry 1: Theory; Chemistry 1: Practical

Mode of delivery: Lectures 3 ½ hours / week, 10 tutorials, 11 practicals.

Subject outline: The following sections are looked at in detail: gases, ideal and non-ideal; chemical equilibrium; electrochemistry; colligative properties of solutions; colloids. Liquids, surface tension, viscosity, additive properties; chemical kinetics. Practicals related to theory are included.

Assessment: All assessments are compulsory. Class tests, practicals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

PHYSICS 1

Pre-requisites: None

Mode of delivery: Mainstream – Lectures 3 ½ hours / week, 10 tutorials, 9 practicals, ECP – Lectures 3 ½ hours / week, 29 tutorials, 9 practicals.

Subject outline: The section includes an introduction to vectors; motion on a straight line; projectile motion; Newton’s laws; work and energy; impulse and momentum; equilibrium-statics; elasticity; static fluids; dynamic fluids; heat, temperature and expansion; heat transfer; electrostatics; electricity; introduction to nuclear physics; circular motion. Practicals related to theory are also included.

Assessment: All assessments are compulsory. Class tests, tutorials, practicals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

PROCESS CONTROL 3

Pre-requisites: Chemical Engineering Technology 3: Units; Mathematics 2

Mode of delivery: Lectures 3 hours / week, 10 tutorials, 6 practicals.

Subject outline: The following sections are discussed under this subject: introduction and terminologies; level measurement; pressure measurement; flow measurements; temperature measurement; other forms of process measurement; control instrumentation; types of control systems, temperature control and heat transfer equipment; mathematical modelling;
introduction to Laplace transforms; application of laplace transforms. The theory is complemented with appropriate laboratory work.

Assessment: All assessments are compulsory. Class tests, tutorials, practicals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

THERMODYNAMICS: APPLIED 3

Pre-requisites: Thermodynamics: Chemical Engineering 3; Mathematics 2

Mode of delivery: Lectures 3 hours / week, 10 tutorials, 6 practicals.

Subject outline: The following concepts are concentrated on: phase equilibrium, calorimetry, compressors, sonic velocities, steam and steam generation, ideal power cycles, steam generation. Practicals related to theory.

Assessment: All assessments are compulsory. Class tests, tutorialspracticals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

THERMODYNAMICS: CHEMICAL ENGINEERING 3

Pre-requisites: Chemical Engineering Technology 2; Physical Chemistry 2

Mode of delivery: Lectures 3 hours / week, 10 tutorials, 6 practicals.

Subject outline: The following aspects are looked at in detail: an introduction of basic concepts and definitions, first law of thermodynamics, second law of thermodynamics, third law of thermodynamics, point and process equations for gases, reaction equilibrium. Practical work related to theory.

Assessment: All Assessments are compulsory. Class tests; Tutorials; Practicals; Final Integrated Summative Assessment of 3 hours.

Sub-minimum: 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.
BTECH SUBJECTS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

CHEMICAL ENGINEERING PROCESS DESIGN 4

Pre-requisites: None

Co-requisites: Chemical Engineering Technology 4: Fluid Flow; Chemical Engineering Technology 4: Heat and Mass Transfer; Chemical Engineering Technology 4: Unit Operations; Reactor Technology 4

Mode of delivery: 59 laboratory practicals.

Subject outline: Equipment design – the following aspects are looked at: heat exchanger design; distillation column design and a choice of either boiler, furnace or cooling tower design. CAD approach is also followed as part of the subject. Plant design – the design of a full-scale plant is concentrated on. Aspects such as mass and energy balance, detailed design approach, plant layout, environmental considerations, process control, cost estimation and profitability will be discussed.

Assessment: All assessments are compulsory. Assignments, presentations.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL ENGINEERING TECHNOLOGY 4: FLUID FLOW

Pre-requisites: None

Mode of delivery: Lectures 3 hours / week, 20 tutorials, 6 practicals.

Subject outline: The following sections are concentrated on: radiation, conductive heat transfer, convective heat transfer, fundamental mass transfer.

Assessment: All assessments are compulsory. Class tests, tutorials, practicals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.
### CHEMICAL ENGINEERING TECHNOLOGY 4: HEAT AND MASS TRANSFER

**Pre-requisites:** None

**Mode of delivery:** Lectures 3 hours / week, 20 tutorials, 6 practicals

**Subject outline:** Radiation, conductive heat transfer, convective heat transfer, fundamental mass transfer.

**Assessment:** All assessments are compulsory. Class tests, tutorials, practicals, Final Integrated Summative Assessment of three hours.

**Sub-minimum:** 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject

### CHEMICAL ENGINEERING TECHNOLOGY 4: UNIT OPERATIONS

**Pre-requisites:** None

**Mode of delivery:** Lectures 3 hours / week, 20 tutorials, 6 practicals.

**Subject outline:** The following sections are concentrated on: distillation (multiple feeds and side streams, multicomponent); absorption; multi-stage evaporation; crystallisation; drying.

**Assessment:** All assessments are compulsory. Class tests, tutorials, practicals, Final Integrated Summative Assessment of three hours.

**Sub-minimum:** 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

### MATHEMATICS: CHEMICAL ENGINEERING 3

**Pre-requisites:** None

**Mode of delivery:** Lectures 3 ½ hours / week, 10 tutorials.

**Subject outline:** The following concepts are studied: applications of differentiation, applications of integration, first order differential equations, higher order differential equations, numerical methods and Laplace transforms.

**Assessment:** All Assessments are compulsory. Class tests; Tutorials; Final Integrated Summative Assessment of 3 hours.

**Sub-minimum:** 40% in the Final Integrated Summative Assessment; and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.
DEPARTMENT OF CHEMICAL ENGINEERING

PROCESS CONTROL 4

Pre-requisites: Mathematics 3

Mode of delivery: Lectures 3 ½ hours / week, 10 tutorials, 6 practicals.

Subject outline: The following concepts are discussed in detail: development of a mathematical model, modelling considerations for control purposes, computer simulation and the linearisation of non-linear systems, Laplace transforms, solution of linear differential equations using Laplace transforms, transfer functions and the input-output models.

Assessment: All assessments are compulsory. Class tests, tutorials, practicals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

PRODUCTION ENGINEERING: CHEMICAL INDUSTRY 4

Pre-requisites: None

Mode of delivery: Lectures 3 ½ hours / week.

Subject outline: Sections discussed in detail are as follows: introductory economics, accounting principles, profit evaluation and cost, statistical management and sampling, prediction and forecasting, optimisation, decision making.

Assessment: All assessments are compulsory. Class tests, assignments, Final Integrated Summative Assessment of three hours.

Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

PROJECT: CHEMICAL ENGINEERING 4

Pre-requisites: None

Mode of delivery: 10 lectures, 59 hours laboratory work and research.

Subject outline: This subject focuses on an independent research project which need to be conducted. Aspects such as literate review, research methodology, experimentation and the ability to present the research findings with confidence are addressed.

Assessment: All assessments are compulsory. Assignments, presentations, Final Report.

Sub-minimum: 40% for the Final Report.
REACTOR TECHNOLOGY 4

Pre-requisites: None

Mode of delivery: Lectures 3 hours / week, 20 tutorials, 6 practicals.

Subject outline: The following sections are studied: kinetics of homogeneous reactions, interpretation of batch reactor data, introduction to reactor design, single ideal reactors, design of single reactions, non-ideal flow, fluid particle reactions.

Assessment: All assessments are compulsory. Class tests, tutorials, practicals, Final Integrated Summative Assessment of three hours.

Sub-minimum: 50% for practicals, 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.
# DEPARTMENT OFFICE-BEARERS

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of Department</td>
<td>Ms A Kamalie, Master of Engineering Management, MSc Sanitary Engineering</td>
<td>021 959 6619</td>
<td><a href="mailto:KamalieA@cput.ac.za">KamalieA@cput.ac.za</a></td>
</tr>
<tr>
<td>Secretary</td>
<td>Ms W Heuvel (Diploma queries) Ms H van Zyl (BTech queries)</td>
<td>021 959 6650, 021 953 8758</td>
<td><a href="mailto:HeuvelW@cput.ac.za">HeuvelW@cput.ac.za</a>, <a href="mailto:vanzylH@cput.ac.za">vanzylH@cput.ac.za</a></td>
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# DEPARTMENTAL STAFF

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Qualifications</th>
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</thead>
<tbody>
<tr>
<td>Professor</td>
<td>Prof I A Masalova</td>
<td>DTech Chemical Engineering</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>AProf. V G Fester</td>
<td>DTech Chemical Engineering</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>AProf. R Haldenwang</td>
<td>DTech Civil Engineering</td>
</tr>
<tr>
<td>Head of Programme:</td>
<td>Mr J H Raubenheimer</td>
<td>Bachelor of Science (Land Surveying), Diploma</td>
</tr>
<tr>
<td>Surveying/Cartography</td>
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<td>(Datametrics), Master of Science (Engineering: Geomatics)</td>
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<tr>
<td>Co-ordinator: Extended</td>
<td>Mr M N Armien</td>
<td>MEd, HDE</td>
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<tr>
<td>Programme</td>
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<tr>
<td>Co-ordinator: Co-Op</td>
<td>Ms O Overmeyer</td>
<td>NHD Civil Engineering</td>
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<tr>
<td>Co-ordinator: Co-Op</td>
<td>Mr B Fortuin</td>
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<td>Senior Lecturer</td>
<td>Mr M Habets</td>
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<tr>
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<td>Mr M J Phillips</td>
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<td>Researcher</td>
<td>Dr R Kotze</td>
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<tr>
<td>Lecturer</td>
<td>Mrs S D Paulse</td>
<td>NHD Civil Engineering</td>
</tr>
</tbody>
</table>
### Position | Name | Qualifications
---|---|---
Lecturer | Mr N Skippers | MTech Civil Engineering
Lecturer | Mr A C Thiart | Diploma Business Studies, BTech Civil Eng, ND Information Technology
Lecturer | Mr H Zaayman | MSc Mathematics
Junior Lecturer | Ms M C Khaledi | MTEch Civil Engineering, HED
Junior Lecturer | Mrs S Manyumwa | BSc Civil Engineering, MBA
Junior Lecturer | Ms K M Rodriguez-Garcia | BSc Civil Engineering, HED
Junior Lecturer | Mr P P Siebritz | NHD Civil Engineering
Junior Lecturer | Ms C Theron | BTech Civil Engineering
Senior Technicians | Mr RJ du Toit | ND Analytical Chemistry
Technician | Mr N George | BSc, HDE
Technician | Ms RR La Cock | BTech (Surveying)
Technician | Mr LD Maduna | ND (Civil)
Technician | Mr L Minnies | BTech (Civil)
Technician | Mr X Nkwanteni | BTech (Civil)
Technician | Mr KM Rwoqua | BTech (Civil)
I.T Technician | Mr O Menong | BTech (Information Technology)

### QUALIFICATIONS OFFERED

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<th>Qualification Type</th>
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<td>ND: Civil Extended</td>
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<td>BTech: Civil (Urban)</td>
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<tr>
<td>BTech: Civil (Construction Management)</td>
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<td>BTech: Civil (Water)</td>
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<td>MTEch: Civil</td>
<td>MTCIVR</td>
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<td>2 years</td>
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<td>DTech: Civil</td>
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<td>ND: Surveying</td>
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<td>3 years</td>
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<td>1 year</td>
<td>2 years</td>
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</table>
Course aim
The graduate at this level functions as a technician who displays competence as a member of the engineering team in the execution of technical tasks. The course will develop the application of knowledge, independent thinking and communication skills, as well as proficiency in the identification and solution of engineering problems.

Purpose and rationale of the qualification
A learner achieving this qualification will be competent to apply theoretical knowledge, practical experience and skills in civil engineering as a civil engineering technician, who is part of the engineering team, by applying proven techniques to engineering activity, within standards and codes under remote supervision, and under close supervision if operating outside standards and codes.

Career opportunities
Graduates are employed by civil engineering contractors, consulting engineers, and government departments at local, provincial, or national level. Broadly speaking civil engineering is divided into two basic activities: planning and design on the one hand, and construction and maintenance on the other. The work will vary considerably according to the field of employment, but in both fields the technician will provide in-depth support, sometimes of a highly specialised nature, to the engineering team. Construction and maintenance projects include bridges, dams, railways, roads, harbours, sewers, pipelines, and other structures. In the planning and design field, the graduate will be engaged in survey, design, costing, estimating, draughting, traffic studies, materials investigation, and testing.

Admission requirements
For the minimum Admission requirements, see admissions pages.

Professional Registration
The ND: Engineering: Civil is accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technicians.

Duration of course
Full-time: Three years, including one year experiential learning.

Venues of Offering
Bellville
### ND: CIVIL ENGINEERING (NDCIVL)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
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<th>Compulsory or Elective</th>
<th>Co-requisites indicated with (co)</th>
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<td>1 S1</td>
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All subjects listed above should be passed before admission to S2 is allowed

<p>| 1 S2            | DRA201S          | Civil Drawing 2: Module 1 | C          | DRA201S(co), DRA202S(co), SUR104S(co), SUR201S(co), SUR202S(co) | 5         | 8           | 0.067       | In-service     |
| 1 S2            | DRA202S          | Civil Drawing 2: Module 2 | C          | DRA201S(co), DRA202S(co), SUR104S(co), SUR201S(co), SUR202S(co) | 5         | 2           | 0.016       | In-service     |
| 1 S2            | CMT100S          | Construction Methods 1   | C          | CCA100S(co)            | CMT100S(co)                      | 5         | 10          | 0.083       | Continuous     |
| 1 S2            | COM104S          | Communication Skills 1   | C          | COM104S(co)            | COM104S(co)                      | 5         | 10          | 0.042       | Continuous     |
| 1 S2            | MCI102S          | Management: Civil 1      | C          | DRA201S(co), DRA202S(co) | MCI102S                          | 5         | 10          | 0.083       | Continuous     |
| 1 S2            | MAT205S          | Mathematics 2            | C          | MAT205S               | MAT205S                           | 5         | 10          | 0.083       | Continuous     |
| 1 S2            | SUR201S          | Surveying Theory (Civil) 2 | C          | SUR103S, SUR104S, DRA201S(co), DRA202S(co), SUR201S(co), SUR202S(co) | 5         | 2.5         | 0.021       | Continuous     |</p>
<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem</th>
<th>Subject Code</th>
<th>Subject Name</th>
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ND: CIVIL ENGINEERING (EXTENDED)

Course aim
In the Extended Curriculum with Foundational Provision Programme, first year subjects of the National Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two year Foundational Programme, students will integrate with the mainstream programme.

Duration of course
Full-time: The four year programme comprises six academic semesters and two semesters of inservice training.

ND: CIVIL ENGINEERING (EXTENDED) (NDCIFX)

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All subjects listed above should be passed before admission to S2 (ECP Year 1) is allowed.
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BTECH: CIVIL ENGINEERING

Course aim
The graduate at this level functions as a technologist who displays competence as a member of the engineering team in the execution of specialist engineering tasks. The course will develop the application of knowledge, independent thinking, and communication skills, as well as proficiency in the identification and solution of complex civil engineering problems.

Students may choose one of five options to complete this BTech in the fields of Urban Engineering, Water Engineering, Transportation Engineering, or Construction Management.

Purpose and Rationale of the qualification
A learner achieving this qualification will be competent to apply theoretical knowledge, practical experience and skills gained in their specialised area of civil engineering at the level of a professional technologist by interpreting, managing and applying current technology to complex specialist engineering activity within codes, or by adapting standards and codes, under minimal supervision.

Career opportunities
Graduates are employed by civil engineering contractors, consulting engineers, and government departments at local, provincial, or national level.

Broadly speaking civil engineering is divided into two basic activities: planning and design on the one hand, and construction and maintenance on the other. The work will vary considerably according to the field of employment, but in both fields the technologist will provide in-depth support, sometimes of a highly specialised nature, to the engineering team.

Construction and maintenance projects include bridges, dams, railways, roads, harbours, sewers, pipelines, and other structures. In the planning and design field, the technologist will be engaged in survey, design, costing, estimating, draughting, traffic studies, materials investigation, and testing.

Professional Registration
The BTech: Engineering: Civil (Construction Management; Transport; Urban and Water) is accredited by the Engineering Council for South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technologists.
Admission requirements for BTech Civil Engineering:
A National Diploma in Civil Engineering (or an equivalent qualification) and at least one year of experience in the industry.
Further specific Admission requirements for:

Urban Engineering
A 60% pass in all of the following subjects:
- Transportation Engineering 2
- Transportation Engineering 3
- Geotechnical Engineering 2
- Geotechnical Engineering 2

Construction Management
A 60% pass in all of the following subjects:
- Management 2
- Documentation 3 (each module)

Water Engineering
A 60% pass in all of the following subjects:
- Water Engineering 2 (each module)
- Water Engineering 3 (each module)

Transportation Engineering
A 60% pass in all of the following subjects:
- Transportation Engineering 2
- Transportation Engineering 3

Admission on merit
Students who have completed more than two continuous years of work experience in the relevant subject matter since qualifying for the National Diploma in Civil Engineering can submit signed proof of this from a registered professional engineer or technologist.

Offering type and duration of course
Full-time: One year
Part-time: Two years

Venues of Offering
Bellville
## BTECH: CIVIL ENGINEERING (BTCIVU)

**Urban Engineering Option:** Select All Compulsory Subjects plus an additional ONE Subject from the electives listed in either the first or second semester.

*Note: Subjects listed alphabetically per semester/year*

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</table>

*Note: New Part-Time students*

### First Part-Time year:
Students are required to register for a maximum of three subjects in Semester 1, and the remaining three subjects in Semester 2.

### Second Part-Time year:
In their second year students must register for Project Management Theory and Dissertation.
### BTECH: CIVIL ENGINEERING (BTCIVC)
#### Construction Management Option: Select All Compulsory Subjects plus an additional TWO Subjects from 4 engineering elective subjects listed below, in either the first or second semester.

*Note: Subjects listed alphabetically per semester/year*

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
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<th>SAQA Credit</th>
<th>HEMIS Credit</th>
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*Note: For the BTech: Civil (Construction Management Option) the department requires that the dissertation project is in the field of study and technical/engineering in nature*

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<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
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*Note: New Part-Time students*

**First Part-Time year:**
Students are required to register for a maximum of three subjects in Semester 1, and the remaining three subjects in Semester 2.

**Second Part-Time year:**
In their second year students must register for Project Management Theory and Dissertation.
**BTECH: CIVIL ENGINEERING (BTCIVT)**

**Transportation Engineering Option:** Select All Compulsory Subjects Plus an Additional One Subject from the electives listed in either the first or second semester.

*Note: Subjects listed alphabetically per semester/year*

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<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
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*Note: New Part-Time students*

**First Part-Time year:**
Students are required to register for a maximum of three subjects in Semester 1, and the remaining three subjects in Semester 2.

**Second Part-Time year:**
In their second year students must register for Project Management Theory and Dissertation.
## BTECH: CIVIL ENGINEERING (BTCIVW)

**Water Engineering Option:** Select All Compulsory Subjects Plus an additional ONE Subject from the electives listed in semester 1.

*Note: Subjects listed alphabetically per semester/year*

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
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<th>HEOM Credit</th>
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</table>

*Note: New Part-Time students*

**First Part-Time year:**
Students are required to register for a maximum of three subjects in Semester 1, and the remaining three subjects in Semester 2.

**Second Part-Time year:**
In their second year students must register for Project Management Theory and Dissertation.
MTECH CIVIL ENGINEERING

Course aim
The graduate at this level functions independently as a technologist who displays competence as a member of the engineering team in the execution of specialist engineering tasks.

Purpose and rationale of the qualification
A learner achieving this qualification will be competent to conduct research under minimal guidance, and contribute to knowledge production in the engineering environment with success.

Career opportunities
Graduates of this programme follow a career in research and development in industry or may be employed at research institutes. They are also employed in teaching and research positions at higher education institutions.

Admission requirements
A BTech degree (or an equivalent qualification), with an aggregate of 60%, a pass in Research Methodology, and with a good mark for the BTech dissertation, is required.

There is limited research supervision capacity in the department therefore the options are also limited. Students are required to have a topic and supervisor before they can enrol.

Offering type and duration of course
**Full-time:** Minimum one year (Full-time students are preferred)  
**Part-time:** Two years

Venues of Offering
Bellville

Contact
Prof Haldenwang  Email: HaldenwangR@cput.ac.za  Tel: 021 460 3512

### MTECH: ENGINEERING: CIVIL (MTCIVR)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
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<td>Full thesis</td>
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</table>
DTECH CIVIL ENGINEERING

Course aim
The purpose of this programme is to develop the competence to conduct independent research under minimal guidance in the field of civil engineering. Such research should contribute significantly to the body of knowledge through the understanding, application and evaluation of existing knowledge. The research problem, including its justification, process and outcome, is reported in a dissertation and in scientific publications that comply with the generally accepted norms for research at this level.

Purpose and Rationale of the qualification
A learner achieving this qualification will be competent to conduct research independently, and contribute to advanced and significant knowledge production in the field of civil engineering.

Career opportunities
Graduates of this programme follow a career in research and development in industry or may be employed at research institutes. They are also employed in teaching and research positions at higher education institutions.

Admission requirements
A Master’s degree or an equivalent qualification.

Offering type and duration of course
Full-time: Minimum of two years

Venues of Offering
Bellville

Contact
Prof Haldenwang Email: HaldenwangR@cput.ac.za Tel: 021 460 3512

DTECH: ENGINEERING: CIVIL (DTCIVR)

<table>
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<th>Year/Sem Subject</th>
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**Course aim**
The course equips students with theoretical and practical geomatics knowledge and skills, relevant to the needs of industry and society at large. Graduates of this programme will have the competence to apply basic surveying skills and to register as surveying technicians.

Surveying (or geomatics) is the science of surveying (measuring) and mapping the face of the earth. Mapping forms the foundation of physical planning and land development. A surveyor is responsible for the collection, representation, analysis, management, retrieval and modelling of spatial data (natural and man-made features on the earth). It involves fieldwork for data capturing and computer data processing.

- Topographical surveying – determines the positions of natural and man-made features on the earth, and is used for planning and land development.
- Engineering surveying – the surveys required to control and monitor the building of roads, bridges, tunnels and structures.
- Photogrammetry – mapping from aerial photographs and compiling three-dimensional digital terrain models of the earth.
- Geographic information systems (GIS) – spatial data acquisition, analysis and management.
- Cadastral surveying – marking property boundaries and relocating them.
- Hydrographic surveying – mapping of the seabed and coastlines.

**Purpose and rationale of the qualification**
To be able to survey, collect and present spatial data in different forms, and set out and control positions of structures on the ground of basic engineering works.

**Career opportunities**
Surveyors can practice privately or may be employed by government departments, land surveying firms or municipalities. A surveyor may specialise in different areas such as engineering surveying, photogrammetry or cadastral surveying.

**Admission requirements**
For the minimum Admission requirements, see admissions pages.

**Professional Registration**
The ND: Surveying is accredited by South African Council for Professional and Technical Surveyors (PLATO). The graduate will comply with the academic requirements for registration and may after completion of a trial survey apply for registration as a Survey Technician. After an additional three years, a person may apply to be registered as a Surveyor.
**Duration of course**

Full-Time: Three years, including one year experiential learning

**Venues of Offering**

Bellville

**ND: SURVEYING (NDSURY) (all subjects compulsory)**

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<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
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BTECH: SURVEYING

Course aim
The course broadens and deepens the theoretical knowledge base acquired in the National Diploma, as well as the technical aspects of surveying, geodesy and management. Graduates have the competence to design surveying networks and projects that will form the basis for land development.

Surveying (or geomatics) is the science of surveying (measuring) and mapping the face of the earth. Mapping forms the foundation of physical planning and land development. A surveyor is responsible for the collection, representation, analysis, management, retrieval and modelling of spatial data (natural and man-made features on the earth). It involves fieldwork for data capturing and computer data processing.

A surveyor may specialise in different areas such as engineering surveying, photogrammetry or cadastral surveying.

Purpose and rationale of the qualification
To manage the collection and presentation of spatial data. To design survey control networks.

Career opportunities
Surveyors can go into private practice or may be employed by state departments, land surveying firms or municipalities.

Admission requirements
A National Diploma in Surveying (or an equivalent qualification) is required, with an average of 60% in the final year of the National Diploma. The subject offering “Adjustment of Errors 3” is a compulsory pre-requisite.

Professional Registration
The BTech: Surveying is accredited by South African Council for Professional and Technical Surveyors (PLATO). The graduate will comply with the academic requirements for registration and may after completion of a prescribed practical training and law exam apply for registration as a Professional Engineering Surveyor.

Offering type and duration of course
Part-time: Two years. Note that subjects are only offered in alternate years. See the website for the programme.

Venues of Offering
Bellville
BTECH: SURVEYING (BTSURV)

Select all compulsory subjects plus an additional ONE Subject from the electives listed.

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ND: CARTOGRAPHY (GISc)

Course aim
The aim of the course is to prepare students for a career in geospatial science where they will work with spatial information. Graduates will be able to manipulate data and provide information about the earth to planners, engineers, environmental managers and commerce.

Applicants should have an aptitude for Mathematics and Drawing, good spatial perception, and an eye for detail. An interest in computers and geography is strongly recommended.

Purpose and rationale of the qualification
To collect, store and present spatial data with maps and in digital format. To design and produce maps.

Career Information
Geographical Information Science (GISc) is the science of capturing, processing, analysing and mapping spatial data (information about the earth). Geographical Information Systems (GIS) technology is used to explore, visualise and analyse data. Computer-based systems bring advanced information management techniques to science, business and governments across the globe.

Prospective students will be interested in geography, computer science, maths, science, physics and information technology, have an aptitude for design, love variety, and working both indoors and outdoors.

Career opportunities
GIS professionals are highly employable in a growing variety of careers using GPS (Global Positioning Systems), geodatabase systems, geo-information technology, satellite imagery and remote sensing – to enable effective decision-making in areas from urban planning, management of natural resources and the environment, health to emergency services.

Admission requirements
For the minimum Admission requirements, see admissions pages.

Competencies of a GISc Technologist
• Ability to use a GIS tool in his professional everyday work.
• A basic understanding of computers, software, database management, data models and a knowledge of the fundamentals of GI Science, concepts and terminology.
• Ability to do spatial analysis and spatial modelling.
• A knowledge of mathematical modelling, simulation and numerical methods.
• An understanding of different application areas: physical, environmental, human/social decision-making processes.
• Understanding of GIS software technology and knowledge of existing source data and data quality.

Professional Registration
The ND Cartography (GIsc) is accredited by South African Council for Professional and Technical Surveyors (PLATO). The graduate will comply with the academic requirements and may apply for registration as a Geographical Information Science Technician leading to Geographical Information Science Technologist.

Programme Structure:
The National Diploma: Cartography (GIsc) is a full-time course. The first two years involve fulltime academic study at the University, followed by one year work-integrated learning. The first semester of the first year is the same as for the ND: Surveying, enabling students to change between programmes in the first semester.

Experiential Learning
One year work-integrated learning, after completing two years of academic study.

Offering type and duration of course
Full-time: Three years, including one year experiential learning.

Venues of Offering
Bellville
## CURRICULUM INFORMATION

### ND: CARTOGRAPHY (GISc) (NDGISC)

All subjects compulsory

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BTECH: CARTOGRAPHY

Course aim
The aim of the course is to provide theoretical and practical cartographical knowledge and skills, relevant to the needs of the industry and society at large. The use of computer technology in map production, geographical information systems, and cartographic workstations is the norm in this environment today. Graduates of this programme will be able to design maps and analyse spatial information.

Purpose and rationale of the qualification
To manage a mapping or GIS office.

Career opportunities
Cartographers work closely with surveyors, geologists and similar professionals and are involved in planning and development. They are responsible for map design and the acquisition and processing of source material for map production. Different types of maps include topographical maps, maritime charts, aeronautical charts, climatic maps, road maps and street plans, tourist maps and town and regional structure plans.

Admission requirements
A National Diploma in Cartography (or an equivalent qualification) is required, with an average of 60% in the final year subjects of the National Diploma. The subject “Adjustment of Errors 3” is a compulsory prerequisite.

Professional registration
The BTech: Cartography is accredited by South African Council for Professional and Technical Surveyors (PLATO). Graduates will comply with the academic requirements and may after completion of the prescribed practical training and law exam apply for registration as professional GISc practitioners.

Offering type and duration of course
Part-Time: Two years. Note that subjects are only offered in alternate years. See the website for the programme.

Venues of offering
Bellville
### BTECH: CARTOGRAPHY (BTCART)

All subjects compulsory

| Period of Study | Year/Sem Subject | Subject Code | Subject Name                                      | Compulsory or Elective | Pre-requisite Subject Codes | NQF Exit Level | SAQA Credit | HEMS Credit | Assessment Type |
|-----------------|------------------|--------------|--------------------------------------------------|------------------------|-----------------------------|----------------|-------------|-------------|----------------|----------------|
| 4               | Y                | PMG402S      | Project Management 4 (Theory)                    | C                      | --                          | 7              | 15          | 0.125       | Continuous     |
| 4               | Y                | PMG403S      | Project Management 4 (Dissertation)              | C                      | --                          | 7              | 15          | 0.125       | Continuous     |
| 4               | S                | CAR400S      | Cartography 4                                    | C                      | --                          | 7              | 20          | 0.167       | Continuous     |
| 4               | S                | IRN201S      | Employment Law And Relations 2                   | C                      | --                          | 7              | 15          | 0.125       | Continuous     |
| 4               | S                | GIS401S      | Geographic Information Systems 4                 | C                      | --                          | 7              | 15          | 0.125       | Continuous     |
| 4               | S                | MPD400S      | Map Design 4                                     | C                      | --                          | 7              | 20          | 0.167       | Continuous     |
| 4               | S                | FMN101S      | Financial Management                             | C                      | --                          | 7              | 15          | 0.125       | Continuous     |
| 4               | S                | TPL401S      | Town Planning 4                                  | C                      | --                          | 7              | 15          | 0.125       | Continuous     |
MTECH: CARTOGRAPHY

Course aim
Graduates develop the knowledge and skills required to conduct independent research in cartography, and to contribute significantly to knowledge production through the understanding, application and evaluation of existing and new knowledge.

Purpose and rationale of the qualification
To make a significant contribution, through research, to the understanding, application and evaluation of existing knowledge in a specialised area of technology, and to demonstrate a high level of overall knowledge in that specialised area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

Career opportunities
Graduates are employed in research and development, as well as by government and in teaching positions in higher education institutions.

Admission requirements
A BTech in Cartography (or an equivalent qualification), with a pass in Research Methodology, is required.

Offering type and duration of course
Part-Time: Two years

Venue of offering
Bellville

MTECH: CARTOGRAPHY (MTCARR)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/SEM Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
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<th>HEMIS Credit</th>
<th>Assessment Type</th>
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<tr>
<td>5 Y</td>
<td>R5CA01R Thesis</td>
<td>C</td>
<td>--</td>
<td>8</td>
<td>120</td>
<td>1.000</td>
<td>Full thesis</td>
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</tbody>
</table>
PROMOTION CRITERIA & EXCLUSION RULES

Diploma (Extended): Civil Engineering and Surveying

First year
Students are expected to pass all of the Extended Programme subjects.

Diploma: Civil Engineering and Surveying

First year
Students will be excluded when they fail more than 50% of the subjects in first year.

Second year
Students are expected to complete 11 of the 13 subjects in first year in order to qualify for Experiential Learning.

Third year
A student will be excluded for six months if s/he fails a subject twice.

A student is expected to complete all requirements for Experiential Learning before being allowed to continue his /her studies in third year.

Btech: Civil Engineering and Surveying

It is recommended that students complete at least two years’ work before registering for BTech. A student will be excluded for six months if s/he fails a subject twice.
SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for degree purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.
**ND: CIVIL ENGINEERING**

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

**APPLIED MECHANICS 1**

**Pre-requisites:** None

**Mode of delivery:** Lectures

**Subject outline:** Revision of formula and definitions; conversion of units; vectors; resultants and equilibrants; solving unknown forces; internal forces (including the method of joints); moments of a force; centroids and centres of gravity; friction; linear motion with uniform acceleration; Newton’s laws, principles of energy conservation. laboratory practicals.

**Assessment:** Continuous assessment of tests, assignments and laboratory work.

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**CIVIL ENGINEERING 1**

**Pre-requisites:** None.

**Mode of delivery:** Lectures and site visits.

**Subject outline:** Earthworks, structures, concrete, road engineering, bridges, dams, tunnels, harbours, drainage, labour-enhanced construction, safety, airports, railways.

**Assessment:** Continuous assessment of tests, assignments and laboratory work.

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**COMMUNICATION SKILLS 1**

**Pre-requisites:** None

**Co-requisites:** Construction Methods 1

**Mode of delivery:** Lectures

**Subject outline:** Written communication, verbal communication, academic literacy, information literacy and communication in the workplace.

**Assessment:** Continuous assessment of tests, assignments and laboratory work.
COMPUTER SKILLS 1
Pre-requisites: None
Mode of delivery: Lectures and practical sessions
Subject outline: Basic computer concepts, Windows Operating System, file management and accessories, word processing, email, Internet, MS PowerPoint and MS Excel.
Assessment: Continuous assessment of tests, assignments and laboratory work.

CONSTRUCTION MATERIALS 1
Pre-requisites: None
Mode of delivery: Lectures
Subject outline: An introduction is given to the civil engineering world and local environment, civil engineering social responsibilities as a professional, civil engineering institutions and identification of the civil engineering fields; soil, concrete, bitumen and other materials; laboratory practicals.
Assessment: Continuous assessment of tests, assignments and laboratory work.

CONSTRUCTION METHODS 1
Pre-requisites: None
Co-requisites: Communication Skills 1
Mode of delivery: Lectures
Subject outline: Earthworks, structures, road engineering, dams, bridges, tunnels, harbours, railways, airports, safety, drainage, labour-enhanced construction (LEC), laboratory practicals (multi-output decision diagrams, MODDS).
Assessment: Continuous assessment of tests, assignments and laboratory work.
DOCUMENTATION 3
(4 modules: Estimating; Civil Engineering Quantities; Specifications; General Conditions of Contract)

Pre-requisites: Management: Civil 2

Mode of delivery: Lectures


Assessment: Continuous assessment of tests, assignments and laboratory work.

DRAwING 1 -
Technical Drawings (Module A) and Topographical Drawings (Module B)

Pre-requisites: None

Mode of delivery: Lectures and practical sessions.

Subject outline: Lettering and figuring, geometric construction, orthographic projection (first and third angle), isometric projection. Module B: Topographical layouts, longitudinal sections.

Assessment: Continuous assessment of tests, assignments and laboratory work.

DRAwING 2 CIVIL DRAwING 2: MODULE 1 AND MODULE 2

Pre-requisites: Module 1 and 2: Technical Drawings (Module A) and Topographical Drawings (Module B).

Co-requisites: Surveying Theory (Civil), 2 Surveying Practical (Civil) 2.

Mode of delivery: Lectures
Subject outline: Students will be trained to produce drawings of: topographical layout, longitudinal sections, cross-sections, mass haul diagrams, structural steel, reinforced concrete.

Assessment: Continuous assessment of tests, assignments and laboratory work.

**GEOTECHNICAL ENGINEERING 2: THEORY AND LAB**

**Pre-requisites:** Construction Methods 1, Mathematics 1.

**Mode of delivery:** Lectures

Subject outline: Engineering soils, engineering geology, laboratory practicals.

Assessment: Continuous assessment of tests, assignments and laboratory work.

**GEOTECHNICAL ENGINEERING 3: THEORY AND LAB**

**Pre-requisites:** Geotechnical Engineering 2: Theory and Lab.

**Mode of delivery:** Lectures

Subject outline: Shear strength, consolidation, foundations, lateral earth pressure and earth retaining structures, drainage, stability of slopes, foundation repair and site construction problems; laboratory practicals

Assessment: Continuous assessment of tests, assignments and laboratory work.

**MANAGEMENT: (CIVIL) 1**

**Pre-requisites:** Drawing 2 Civil Drawing 2: Module 1 and Module 2

**Mode of delivery:** Lectures

Subject outline: Economic principles, types of enterprises, office organisation and methods, contracts and contract documents, taking off of civil engineering quantities, theory of management, work study and work measurement, quality assurance, civil engineering quantities.

Assessment: Continuous assessment of tests, assignments and laboratory work.
MANAGEMENT: (CIVIL) 2

Pre-requisites: Management: Civil 1

Mode of delivery: Lectures

Subject outline: The pre-tender planning phase, the tender phase, the construction phase, labour law and labour legislation.

Assessment: Continuous assessment of tests, assignments and laboratory work.

MATHEMATICS 1

Pre-requisites: None

Mode of delivery: Lectures and tutorials.

Subject outline: Determining the solutions of equations, trig. equations and triangles, determining the areas of sections of a circle, determining the derivatives of functions, applying differentiation principles to practical problems, solving the integral of a function, determining the solution to a system of equations by using matrix algebra.

Assessment: Continuous assessment of tests, assignments and laboratory work.

MATHEMATICS 2

Pre-requisites: Mathematics 1

Mode of delivery: Lectures and tutorials.

Subject outline: Differentiation, hyperbolic functions, parametric equations, partial derivatives, applications, integration, application of integration; matrices and solving a linear system by inverse matrix method.

Assessment: Continuous assessment of tests, assignments and laboratory work.

REINFORCED CONCRETE AND MASONRY DESIGN 3

Pre-requisites: Structural Steel & Timber Design 3

Co-requisites: Structural Analysis 3

Mode of delivery: Lectures

Assessment: Continuous assessment of tests, assignments and laboratory work.

SURVEYING 1: THEORY AND PRACTICAL

Pre-requisites: None

Mode of delivery: Lectures, tutorials and practical sessions.

Subject outline: Introduction and definitions, levelling instrumentation, levelling, long sections, co-ordinate system and calculations, the theodolite, observations, taping, traversing, tacheometry, areas and volumes.

Assessment: Continuous assessment of tests, assignments and laboratory work.

SURVEYING (CIVIL) 2: THEORY AND PRACTICAL

Pre-requisites: Surveying (Civil) 1: Theory and Practical

Co-requisites: Theory module - Civil Drawing 2: Module 1 and 2

Mode of delivery: Lectures, tutorials and practical sessions.

Subject outline: Electronic distance meters, traversing, modern tachometry, long and cross sections, maps and plans, circular curves, setting out, placing and checking points, vertical curves, survey paraphernalia, global positioning systems (basic).

Assessment: Continuous assessment of tests, assignments and laboratory work.

THEORY OF STRUCTURES 2

Pre-requisites: Applied Mechanics 1, Mathematics 1

Co-requisites: Civil Drawing 2: Module 1 and 2

Mode of delivery: Lectures

Subject outline: Truss analysis, sectional properties, shear force and bending moment diagrams, direct stress and strain, elastic theory in beams, deflection in beams, Macaulay, PROKON (truss analysis, sectional properties, shear force and bending moment, deflection).

Assessment: See faculty office for further information.
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Pre-requisites</th>
<th>Mode of delivery</th>
<th>Subject Outline</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Analysis 2</td>
<td>Theory of Structures 2, Mathematics 1</td>
<td>Lectures</td>
<td>The combination of stresses (principle of superposition, combined bending and direct stress, application to column footings, retaining walls, pre-stressed concrete), axially compressed members (Euler and Rankine formulae, effective length, slenderness ratio and end restraints) and analysis of statically determinate structures (pinned portal frames, pinned circular and parabolic arches).</td>
<td>Continuous assessment of tests, assignments and laboratory work.</td>
</tr>
<tr>
<td>Structural Analysis 3</td>
<td>Structural Analysis 2</td>
<td>Lectures</td>
<td>Moment-area theorems; moment distribution; strain energy due to axial force and bending moment; deflection in simply supported beams, frames and trusses using direct energy method and virtual work, Clapeyron’s method of three moments.</td>
<td>Continuous assessment of tests, assignments and laboratory work.</td>
</tr>
</tbody>
</table>
TRANSPORTATION ENGINEERING 2

Pre-requisites: Civil Drawing 2: Module 1 and 2, Construction Methods 1, Mathematics 1, Surveying (Civil) 2: Theory and Practical

Mode of delivery: Lectures

Subject outline: Transportation engineering: A broad background is given to transportation systems and modes. Traffic engineering: The focus is on road transportation where traffic engineering and highway capacity aspects are covered. Road design: This includes the geometric design of roads with the emphasis on the calculation of the design elements, the cross-sectional elements and various standards that are applicable to road design. Rail design: Aspects which are applicable to rail design and rail elements are covered in this section.

Assessment: Continuous assessment of tests, assignments and laboratory work.

TRANSPORTATION ENGINEERING 3

Pre-requisites: Transportation Engineering 2

Co-requisites: Documentation 3 (All modules)

Mode of delivery: Lectures

Subject outline: A theoretical understanding of bituminous materials and a laboratory component reflecting the properties and characteristics of bitumen; introduction to hot mix asphalt; remedial action for road surfacing; stabilisation methods.

Assessment: Continuous assessment of tests, assignments and laboratory work.

WATER ENGINEERING 2: HYDRAULICS

Pre-requisites: Applied Mechanics 1, Communication Skills 1, Construction Materials 1

Mode of delivery: Lectures

Subject outline: Water requirements and prediction of future demand; water sources and quality requirements for potable water; conventional water treatment processes and treatment units; waste water treatment quantities and standards; conventional waste water treatment processes and treatment units; introduction to water and sanitation in rural and peri-urban areas. Hydrostatics, fluid dynamics, pipe flow, open channel flow, pumps. Laboratory practicals.

Assessment: Continuous assessment of tests, assignments and laboratory work.
WATER ENGINEERING 3: RETICULATION DESIGN


Co-requisites: Documentation 3 (All modules)

Mode of delivery: Lectures

Subject outline: Pump design, pipe design (rising main and gravity flow), thrust block design and appurtenances of various types of pipes, reservoir design, water reticulation using the Hardy Cross iteration process, sewerage water and storm water reticulation design.

Assessment: Continuous assessment of tests, assignments and laboratory work.

BTECH: CIVIL ENGINEERING (ALL DISCIPLINES)

Note that the details below are summarised – refer to the individual Subject Guides for more information and sub-minimum criteria for assessments.

CONSTRUCTION MATERIALS TECHNOLOGY 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Professional introduction, technical introduction, naturally occurring materials, manufactured materials.

Assessment: Continuous assessment of tests, assignments and laboratory work.

COMMERCIAL LAW

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: General introduction to the South African legal system and practice, general principles of law of contract, breach of contract and remedies for specific types of contract, corporate law and forms of enterprises.

Assessment: Continuous assessment of tests, assignments and laboratory work.
CONTRACT MANAGEMENT 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Construction Industry Development Board requirements for public sector construction works (CIDB Act 38, 2000); compiling the tender data, contract data, specification data and pricing data as per the CIDB’s Standard for Uniformity; contract administration with General Conditions of Contract for Construction works (first edition, 2004).

Assessment: Continuous assessment of tests, assignments and laboratory work.

CONSTRUCTION MATERIALS TECHNOLOGY 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Professional introduction, technical introduction, naturally occurring materials, manufactured materials.

Assessment: Continuous assessment of tests, assignments and laboratory work.

DISSERTATION 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Introduction to research, how to define a topic and writea proposal, writing a literature review, analysing data, error analysis, compiling a dissertation, presentation skills.

Assessment: Continuous assessment of tests, assignments and laboratory work.
EMPLOYMENT LAW AND RELATIONS

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Introduction to the development of labour relations in South Africa, the individual employment relationship, distinguishing and application of other relevant labour legislation, particular focus on the Labour Relations Act (66/1995), practical guidelines for managing the grievance procedure, the negotiation process and strike management.

Assessment: Continuous assessment of tests, assignments and laboratory work.

FINANCIAL MANAGEMENT

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Time and interest effects on money, discounted cash flow factors, nominal and compound interest rates, tools for evaluating alternatives financially, cost of capital calculations, debt to equity mix, replacement and retention decisions, basics of accounting reports, ratio analysis.

Assessment: Continuous assessment of tests, assignments and laboratory work.

GEOMETRIC DESIGN 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: The road in history, design philosophy, highway location, environmental aspects of transportation air pollution, environmental aspects of transport highway traffic noise, environmental aspects of transport intrusion, environmental aspects of transportation vibration, environmental aspects of transportation environmental impact studies, human and vehicular characteristics, volume studies and characteristics, roadway and intersection capacities, design control and criteria.

Assessment: Continuous assessment of tests, assignments and laboratory work.
HYDRAULICS 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Pumping systems, steady uniform flow in pipes, steady uniform flow in channels, gradually varied flow, flow measurement structures, unsteady flow in pipes, unsteady flow in channels, water hammer control.

Assessment: Continuous assessment of tests, assignments and laboratory work.

HYDROLOGY 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: The hydrological cycle and meteorological data, evaporation and transpiration, infiltration, groundwater occurrence, movement and borehole hydraulics, surface runoff and modelling (unit hydrographs, rational formula, SCS method), flood routing, hydrological forecasting.

Assessment: Continuous assessment of tests, assignments and laboratory work.

PAVEMENT TECHNOLOGY 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Material specifications, empirical design methods, mechanistic design methods for flexible roads, international code of practice for rigid pavement design, bituminous pavement rehabilitation, structural design and maintenance of unpaved roads, pavement management systems, assessments for flexible pavements, South African Mechanistic Design Method, software simulation of mechanistic design (lab practical).

Assessment: Continuous assessment of tests, assignments and laboratory work.
PROJECT MANAGEMENT THEORY 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Project management lifecycle, project management functions, project management tools and techniques, project selection, earned value analysis, professionalism and ethics, teamwork and leadership.

Assessment: Continuous assessment of tests, assignments and laboratory work.

RETICULATION DESIGN & MANAGEMENT 4

Pre-requisites: None

Mode of delivery: Lectures

Subject Outline: Water demand and planning, hydraulic design, waste water collection systems, stormwater systems, network construction, water management.

Assessment: Continuous assessment of tests, assignments and laboratory work.

REINFORCED CONCRETE DESIGN 4

Pre-requisites: None

Mode of delivery: See faculty office for further information.

Subject outline: Revision of reinforcing for tension bending crack width calculations, durability and fire resistance, compression bending and shear, redistribution of bending moments, reinforcing for torsion, stairs, cantilever retaining walls, slender columns, columns and bases, with axial and bending stress, flat slabs; tests and project.

Assessment: Continuous assessment of tests, assignments and laboratory work.

RETICULATION DESIGN & MANAGEMENT 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Water demand and planning, hydraulic design, waste water collection systems, stormwater systems, network construction, management.
Assessment: Continuous assessment of tests, assignments and laboratory work.

**SOLID WASTE MANAGEMENT 4**

**Pre-requisites:** None

**Mode of delivery:** Lectures

**Subject outline:** Characteristics of solid waste, legal aspects, solid waste disposal methods, design, operation and management of landfill sites, operation and management of waste removal systems, Third World applications, waste recycling, emergency waste management.

Assessment: Continuous assessment of tests, assignments and laboratory work.

**STRUCTURAL MASONRY DESIGN 4**

**Pre-requisites:** None

**Mode of delivery:** Lectures

**Subject Outline:** Structural design of: wind load, unreinforced masonry, reinforced masonry, special applications.

Assessment: Continuous assessment of tests, assignments and laboratory work.

**STRUCTURAL ANALYSIS 4**

**Pre-requisites:** None

**Mode of delivery:** Lectures

**Subject outline:** Yield line analysis using virtual work, yield line analysis using equilibrium method, plastic analysis of beams using virtual work, plastic analysis of 2D frames using virtual work, matrix stiffness method of analysis for determining displacements, Internal members’ forces and reactions of 2D frames.

Assessment: Continuous assessment of tests, assignments and laboratory work.
DEPARTMENT OF CIVIL ENGINEERING AND SURVEYING

STRUCTURAL TIMBER DESIGN 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Factors affecting strength and deflection at the ultimate limit state; compression, tension and flexural resistance (including laterally unsupported, curved, tapered, built-up and composite members, of any X-section); members under axial and bending stress; connection resistance; composite action with steel in a built-up member plywood subjected to bending, e.g. shutterboards.

Assessment: Continuous assessment of tests, assignments and laboratory work.

STRUCTURAL STEEL DESIGN 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Laterally unsupported beams (progression from laterally supported, covered in diploma); plate girders (built-up beams, not covered in diploma); cold formed purlins (only hot rolled sections, covered in diploma); beam columns, i.e subjected to moment (not covered in diploma) as well as axial forces; bases subjected to moment (not covered in diploma) and axial loads; beam to column moment connections (only shear connections covered in diploma); composite construction design.

Assessment: Continuous assessment of tests, assignments and laboratory work.

THEORY OF STRUCTURES 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: To determine: deflections, support reactions and rotations of pinned and rigid jointed frames, beams and beam-truss structures, as well as the forces in internal members of trusses that are internally statically indeterminate..

Assessment: Continuous assessment of tests, assignments and laboratory work.
TRAFFIC ENGINEERING 4
Pre-requisites: None
Mode of delivery: Lectures

Subject outline: Evolution of the transport task, introduction to transportation planning, legal framework for transportation planning, impact of urban transportation processes, urban travel characteristics and data collection, economic and environmental appraisal of transport analysis and forecasting, principles of transport analysis and forecasting, sustainability, transportation impact assessment, transportation planning strategies, transportation demand management, land use and urban design, evaluation and prioritisation methods, development of the parking design.

Assessment: Continuous assessment of tests, assignments and laboratory work.

TRAFFIC ENGINEERING 4
Pre-requisites: None
Mode of delivery: Lectures

Subject outline: Elements of traffic engineering, traffic studies, traffic stream characteristics, parking signalised intersections, traffic control and warrants, introduction to capacity, capacity of basic freeway sections, capacity of two-lane rural highways, traffic access and impact studies, transportation system management.

Assessment: Continuous assessment of tests, assignments and laboratory work.

TRANSPORTATION TECHNOLOGY 4
Pre-requisites: None
Mode of delivery: Lectures

Subject outline: Evolution of transport, transport in cities, introduction to public transport, transportation related policies, legislation, plans, authorities, funding, transit systems, vehicle characteristics and motion, nonmotorised transport, NMT safety.

Assessment: Continuous assessment of tests, assignments and laboratory work.
CONSTRUCTION MATERIALS TECHNOLOGY 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Professional introduction, technical introduction, naturally occurring materials, manufactured materials.

Assessment: Continuous assessment of tests, assignments and laboratory work.

URBAN PLANNING AND DESIGN 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Historical perspective, urban land use models, layout planning, policy guidelines, public participation, development control, planning and the natural environment, planning in the developing world.

Assessment: Continuous assessment of tests, assignments and laboratory work.

WATER TREATMENT TECHNOLOGY 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Introduction to water supply; raw water sources; abstraction and storage; pretreatment processes; main-treatment processes; post-treatment processes; advanced water treatment processes; design, operation and maintenance of water treatment plants.

Assessment: Continuous assessment of tests, assignments and laboratory work.
ND: SURVEYING AND ND: CARTOGRAPHY (GISc)

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

**ADJUSTMENT OF ERRORS 3**

**Pre-requisites:** Mathematics 1, Statistics 1

**Mode of delivery:** Lectures

**Subject outline:** Matrix algebra, errors in survey measurements, statistical analysis using the normal distribution (Gaussian distribution), weighting of survey measurements, least squares adjustments, preanalysis of survey measurements, survey network design.

**Assessment:** Continuous assessment of tests and assignments

**CADAstral SURVEYING 3**

**Pre-requisites:** Technical Drawing 1, Topographical Drawing 1

**Mode of delivery:** Lectures

**Subject outline:** The Survey Act and Regulations, practical cadastral procedures and documentation, calculations applied in cadastral surveying, preparation of a survey record.

**Assessment:** Continuous assessment of tests, assignments and laboratory work.

**COMMUNICATION SKILLS 1**

**Pre-requisites:** None

**Mode of delivery:** Lectures

**Subject outline:** Introduction to self-development, communication theory and different communication practices in the workplace; information literacy, plagiarism and referencing; writing skills for research essays and other documents related to surveying; report-writing skills for different types of reports; group skills, reading techniques, interviewing skills, note-taking and summarising; oral presentations and visual aids techniques.

**Assessment:** Continuous assessment of tests, assignments and laboratory work.
COMPUTER SKILLS 1A

Pre-requisites: None

Mode of delivery: Lectures and practical sessions.

Subject outline: Introduction to computers, Internet and email, file handling, word processing; spreadsheets: calculations, functions and graphs, PowerPoint presentations.

Assessment: Continuous assessment of tests, assignments and laboratory work.

COMPUTER SKILLS 1B

Pre-requisites: None

Mode of delivery: Lectures and practical sessions.

Subject outline: Text on CAD (entering, dimensions of test, editing and copy and move functions); line draw (line styles, thicknesses, sloped lines and rectangles); circles (diameters, line styles and positioning); dimensions (default setting, hor. vert, sloped, angular dimensions); hatching (styles, solid hatches and entering of hatchings); arrows (pointers to objects); modification functions (move, scale (changes), divide / extend); geometry (cross, slope lines, parallel lines, switching geometry (on/off); tools (measure – measure area, distances); settings (paper size, scale, drawing units and co-ordinate system); snap modes (free hand, graball, nearest point, perpendicular, geometry intersection, line intersection, circle centre and tangent lines).

Assessment: Continuous assessment of tests, assignments and laboratory work.

CIVIL ENGINEERING 1

Pre-requisites: None

Mode of delivery: Lectures and site visits.

Subject outline: Earthworks, structures, concrete, road engineering, bridges, dams, tunnels, harbours, drainage, labour-enhanced construction, safety, airports, railways.

Assessment: Continuous assessment of tests, assignments and laboratory work.
### CONTROL SURVEYING 3 THEORY & PRACTICAL

**Pre-requisites:** Surveying 2 Theory & Practical  
**Mode of delivery:** Lectures and practical sessions.  
**Subject outline:** Triangulation (mainly resection); traversing (outside orientation) and trilateration; introduction on the theory and practice of global positioning systems; reconnaissance – gathering of survey information; cost estimate for various surveys.  
**Assessment:** Continuous assessment of tests, assignments and laboratory work.

### CARTOGRAPHY 3

**Pre-requisites:** None  
**Mode of delivery:** Lectures  
**Subject outline:** Introduction to cartography; map production procedures (basic steps); map design; cartographic representation; generalisation; computer-assisted cartography / cartometry; map data sources; map librarianship, copyright etc; practical digital mapping / map production cycle.  
**Assessment:** Continuous assessment of tests, assignments and laboratory work.

### COMPUTER APPLICATIONS 3 (DATABASES)

**Pre-requisites:** Computer Skills 1A  
**Mode of delivery:** Lectures and practical sessions.  
**Subject outline:** Introduction to database theory and database management systems; relational and other database models; design and development of databases and applications with Microsoft Access. A group project to develop a fully functional relational database; introduction to computer programming in Python.  
**Assessment:** Continuous assessment of tests, assignments and laboratory work.
COMPUTER APPLICATIONS 3 (CAD)

Pre-requisites: Computer Skills 1B

Mode of delivery: Lectures and practical sessions.

Subject outline: Revision on fundamentals of GIS and spatial datasets; assessing quality of raster data; types of errors in spatial information; standards in spatial data e.g. meta data, formats, data cleaning, migration and manipulation; quality and credibility of volunteered geographic information (VGI).

Assessment: Continuous assessment of tests, assignments and laboratory work.

DATA QUALITY MANAGEMENT 3

Pre-requisites: Geographic Information Systems 3

Mode of delivery: Lectures

Subject outline: Revision on fundamentals of GIS and spatial datasets; assessing quality of raster data; types of errors in spatial information; standards in spatial data, e.g. meta data, formats, data cleaning, migration and manipulation; quality and credibility of volunteered geographic information (VGI).

Assessment: Continuous assessment of tests, assignments and laboratory work.

GEOGRAPHY 1

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Area and spatial analysis: comprises the reading, analysis and interpretation of spatial information; physical and human systems: emphasis falls on geomorphology and climatology, their link with ecology and ecosystems, and the consequent impact on relevant aspects of population geography.

Assessment: Continuous assessment of tests, assignments and laboratory work.
### GEOGRAPHIC INFORMATION SYSTEMS 3

**Pre-requisites:** Computer Skills 1A and Computer Skills 1B  
**Mode of delivery:** Lectures and practical sessions.  
**Subject outline:** GIS fundamentals, spatial and cartographic concepts; spatial data; GIS hardware and software, data input; GIS analysis; practical applications of GIS.  
**Assessment:** Continuous assessment of tests, assignments and laboratory work.

### MAP PROJECTIONS 2

**Pre-requisites:** Surveying 1 (Theory), Surveying (Civil) 1 (Practical)  
**Mode of delivery:** Lectures  
**Subject outline:** The shape of the earth, the process of map projection, spherical trigonometry, calculations of specific projections, examples of maps, the SA co-ordinate system, choice of projections.  
**Assessment:** Continuous assessment of tests, assignments and laboratory work

### MATHEMATICS 1

**Pre-requisites:** None  
**Mode of delivery:** Lectures  
**Subject outline:** Introduction to differentiation and applications such as acceleration, curve sketching and optimisation; binomial theorem; determinants; trigonometric functions and graphs; radian measure; Maclaurin series; an introduction to standard integration techniques.  
**Assessment:** Continuous assessment of tests, assignments and laboratory work.
MATHEMATICS 2

Pre-requisites: Mathematics 1

Mode of delivery: Lectures

Subject outline: Introduction to differentiation, including hyperbolic, trigonometric functions and their inverses; finding solutions through Newton Raphson, use and application of partial derivatives, standard integration techniques and their application to areas and volumes; using matrices for problem solving.

Assessment: Continuous assessment of tests, assignments and laboratory work.

PHYSICS 1

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Kinematics, Newton’s laws of motion, friction, momentum, work, energy and power, density, buoyancy, electrostatics, electrical energy and power, direct current circuits, geometric optics: reflection, refraction, electromagnetic waves

Assessment: Continuous assessment of tests, assignments and laboratory work.

PHOTOGRAMMETRY 2

Pre-requisites: Surveying 1 (Theory), Surveying (Civil) 1 (Practical)

Mode of delivery: Lectures

Subject outline: Introduction to remote sensing; light; lenses and lens errors; film structure and characteristics; the CCD chip and characteristics; the aerial camera construction (analogue); the digital sensor (CCD and digital aerial camera); stereoscopy/the geometry of an aerial photograph; co-ordinate systems used in photogrammetry; flight plans; photo interpretation.

Assessment: Continuous assessment of tests, assignments and laboratory work.
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Pre-requisites</th>
<th>Mode of delivery</th>
<th>Subject Outline</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REMOTE SENSING 3</strong></td>
<td></td>
<td></td>
<td>Introduction to the concepts in remote sensing; sensors/platforms used in remote sensing; the application of electromagnetic radiation in remote sensing; image analysis (pre-processing, enhancement, classification, integration); practical applications of remote sensing.</td>
<td>Continuous assessment of tests, assignments and laboratory work.</td>
</tr>
<tr>
<td><strong>SPATIAL ANALYSIS 3</strong></td>
<td><strong>Pre-requisites: Geographic Information Systems 3</strong></td>
<td>Lectures</td>
<td>Spatial data, spatial statistical analysis, vector-based analysis, raster-based analysis.</td>
<td>Continuous assessment of tests, assignments and laboratory work.</td>
</tr>
<tr>
<td><strong>SPATIAL DATA ACQUISITION 3</strong></td>
<td><strong>Pre-requisites: Photogrammetry 2</strong></td>
<td>Lectures</td>
<td>Photogrammetric business, photogrammetric stereoplotters, stereo compilation procedures, co-ordinate systems, analytical photogrammetry, rectification of tilted photographs, digitising methods, photomaps and orthophotographs, photogrammetric aerial triangulation, terrestrial photogrammetry, close-range photogrammetry, airborne LIDAR topographic surveying, GPS, new developments in data acquisition.</td>
<td>Continuous assessment of tests, assignments and laboratory work.</td>
</tr>
</tbody>
</table>
STATISTICS 1
Pre-requisites: None
Mode of delivery: Lectures and tutorials.
Subject outline: Introduction to frequency distributions and probability, sampling and probability distributions, inferences about the mean (z and t-tests), inferences about standard deviation (chi squared tests), regression and correlation, introduction to non-parametric statistics and Anova.
Assessment: Continuous assessment of tests, assignments and laboratory work.

SURVEYING 1 THEORY AND PRACTICAL
Pre-requisites: None
Mode of delivery: Lectures and practical sessions.
Subject outline: Introduction and definitions, co-ordinate systems and calculations; the theodolite (total station), observations and distance measurement; levelling, instrumentation and levelling glossary; calculations and arithmetic checks.
Assessment: Continuous assessment of tests, assignments and laboratory work.

SURVEYING 2 THEORY AND PRACTICAL
Pre-requisites: Surveying 1 Theory and Practical
Mode of delivery: Lectures and practical sessions.
Subject outline: Electronic distance measurement, triangulation, traversing, height determination, (distances and zenith angles), setting-out, double polars, circular curves, surveying paraphernalia.
Assessment: Continuous assessment of tests, assignments and laboratory work.

SURVEYING 3
Pre-requisites: Surveying 2 Theory and Practical
Mode of delivery: Lectures and practical sessions.
CURRICULUM INFORMATION

Subject outline: Areas from co-ordinates, subdivision using areas; units of measurement, length and angular conversions; co-ordinate conversions, Helmert transformations; horizontal curves: circular and transition; vertical curves; precise levelling.

Assessment: Continuous assessment of tests, assignments and laboratory work.

TECHNICAL DRAWING 1

Pre-requisites: None

Mode of delivery: Lectures and practical sessions.

Subject outline: Basic drafting skills; projections: orthographic, isometric, free-hand sketching.

Assessment: Continuous assessment of tests, assignments and laboratory work.

TOPOGRAPHICAL DRAWING 1

Pre-requisites: None

Mode of delivery: Lectures and practical sessions.

Subject outline: Topographic and map work, scales, grid-lines, cadastral maps/plans, subdivision application, area and consistency calculations, SG. Office and Deeds Office documentation, introduction to cartography, map design: symbolisation and generalisation, reproduction: analogue and digital.

Assessment: Continuous assessment of tests, assignments and laboratory work.

LEGAL PRINCIPLES 1

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: General Introduction to the South African legal system and practice, South African system of government, general principles of the law of contract, introduction to the law of property, land tenure and types of land ownership, rights and restrictions on ownership, corporate law and forms of enterprises, ethics and professional registration.

Assessment: Continuous assessment of tests, assignments and laboratory work.
MANAGEMENT: CIVIL 1

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Economic principles, types of enterprises, office organisation and methods, contracts and contract documents, theory of management, work study and work measurement, quality assurance, entrepreneurship.

Assessment: Continuous assessment of tests, assignments and laboratory work.

BTECH: SURVEYING AND BTECH: CARTOGRAPHY

Note that the details below are summarised – refer to the individual Subject Guide for more detail.

CARTOGRAPHY 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Source and quality of map data; cartographic systems; generalisation; production, planning and control.

Assessment: Continuous assessment of tests, assignments and laboratory work.

DISSEPTION 4

Pre-requisites: None

Mode of delivery: Research

Subject outline: A real life problem must be identified, investigated and solutions developed. The student will research and evaluate possible solutions with the guidance of a supervisor. The research project and dissertation will consist of a literature review, critical analysis and formulation of a solution.

Assessment: Continuous assessment of tests, assignments and laboratory work.
EMPLOYMENT LAW AND RELATIONS 2

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: An introduction to the development of labour relations in South Africa; the individual employment relationship; distinguishing and application of other relevant labour legislation with a particular focus on the Labour Relations Act (66/1995) regarding the collective bargaining process and trade unions, discipline and termination of employment, strikes and lockouts.

Assessment: Continuous assessment of tests, assignments and laboratory work.

FINANCIAL MANAGEMENT

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Time and interest effects on money, discounted cash flow factors, nominal and compound interest rates, tools for evaluating alternatives (financially), present worth analysis, annual worth analysis, rate of return analysis, cost of capital calculations, debt to equity mix, replacement and retention decisions, basics of accounting reports, ratio analysis.

Assessment: Continuous assessment of tests, assignments and laboratory work.

GEODESY 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Introduction, history of geodesy and social organisation of geodesy, twodimensional or plane co-ordinates, three-dimensional Cartesian co-ordinates, co-ordinate systems for the earth, national co-ordinate reference systems, geodetic control networks and datums, gravimetry, theory of the gravity field of the earth, satellite geodesy, Global Geodetic Observing System (GGOS).

Assessment: Continuous assessment of tests, assignments and laboratory work.
### GEOGRAPHIC INFORMATION SYSTEMS 4

**Pre-requisites:** None

**Mode of delivery:** Lectures and practical sessions.

**Subject outline:** GIS data models, GIS databases, GIS analysis, new trends in GIS.

**Assessment:** Continuous assessment of tests, assignments and laboratory work.

### MAP DESIGN 4

**Pre-requisites:** None

**Mode of delivery:** Lectures

**Subject outline:** Objective of cartography and the map user, cartographic communication, symbology; map design; atlas cartography.

**Assessment:** Continuous assessment of tests, assignments and laboratory work.

### PROJECT MANAGEMENT THEORY 4

**Pre-requisites:** None

**Mode of delivery:** Lectures

**Subject outline:** Project management lifecycle, project management functions, project management tools and techniques, project selection, earned value analysis, professionalism and ethics, teamwork and leadership.

**Assessment:** Continuous assessment of tests, assignments and laboratory work.

### SURVEYING 4

**Pre-requisites:** None

**Mode of delivery:** Lectures

**Subject outline:** Theodolite errors and basic statistics in surveying, precise levelling techniques, GPS and trig levelling, deformation survey and modern survey techniques.

**Assessment:** Continuous assessment of tests, assignments and laboratory work.
TOWN PLANNING 4

Pre-requisites: None

Mode of delivery: Lectures


Assessment: Continuous assessment of tests, assignments and laboratory work.
DEPARTMENT OF CLOTHING & TEXTILE TECHNOLOGY

DEPARTMENT OFFICE-BEARERS

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of Department</td>
<td>Dr EM Hovgaard, Doctor Philosophiae in Textile Technology</td>
<td>021 959 6062</td>
<td></td>
<td><a href="mailto:HovgaardE@cput.ac.za">HovgaardE@cput.ac.za</a></td>
</tr>
<tr>
<td>Secretary</td>
<td>Ms C Parenzee, Diploma Secretarial Studies and Public Relations, BTech Marketing</td>
<td>+27 21 959 6466</td>
<td>086 778 0368</td>
<td><a href="mailto:ParenzeeC@cput.ac.za">ParenzeeC@cput.ac.za</a></td>
</tr>
</tbody>
</table>

DEPARTMENTAL STAFF

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Qualifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researcher</td>
<td>Dr CJ Greyling</td>
<td>Doctor Philosophiae Polymer Science</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr S Isaacs</td>
<td>ND Clothing Production, NHD Management Practice</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mrs S Duggan</td>
<td>BTech Fashion, MTech Engineering</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms N Drotskie</td>
<td>BTech Clothing Management</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr D Moyo</td>
<td>Doctor Philosophiae Textile Science</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr E M Hovgaard</td>
<td>Doctor Philosophiae in Textile Technology</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr B T Millar</td>
<td>Doctor Philosophiae in Education, MA Latin, MA Egyptology</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mrs I Norton</td>
<td>ND Work Study, BTech Business Administration Management MTech Business Administration</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Ms L Heugh</td>
<td>BTech Post School Education, BTech Clothing Management</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Mrs S September</td>
<td>BTech Clothing Management</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Ms N Tyalana</td>
<td>BTech Clothing Management</td>
</tr>
<tr>
<td>Technician</td>
<td>Mr S T Mbilini</td>
<td>ND Textile Technology, BTech Quality</td>
</tr>
<tr>
<td>Technician</td>
<td>Mrs N Wagenaar</td>
<td>BTech Fashion</td>
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QUALIFICATIONS OFFERED

<table>
<thead>
<tr>
<th>Qualification Type</th>
<th>Qualification Code</th>
<th>Minimum Duration</th>
<th>Maximum Duration</th>
<th>Work Integrated Learning</th>
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<tbody>
<tr>
<td>ND: Clothing Management (Extended)</td>
<td>NDCLMX</td>
<td>4 years</td>
<td>8 years</td>
<td>6 months</td>
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<tr>
<td>ND: Clothing Management</td>
<td>NDCLMN</td>
<td>3 years</td>
<td>6 years</td>
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<tr>
<td>BTech: Clothing Management</td>
<td>BTCLMT</td>
<td>1 year</td>
<td>2 years</td>
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</tbody>
</table>
ND: CLOTHING MANAGEMENT

Course aim
The course equips students to conduct basic research, analyse and implement systems and policies, and combine a wide range of clothing and textiles-related technological knowledge, skills and experience with a specialised area of clothing and textile technology.

Purpose and rationale of the qualification
Persons achieving this qualification will be able to conduct basic research, analyse and implement systems and policy, and combine a wide range of clothing and textile-related technological knowledge, skills and experience with a specialised area of clothing technology.

Career opportunities
Graduates find employment in the clothing and textile manufacturing industries as well as in the retail industries forging careers in areas such as work study, human resource management and training, CAD pattern making, production organisation, product development, cutting room and quality management, fashion buying and merchandising, marketing, garment and textile technology and general clothing management.

Admission requirements
For the minimum admission requirements, see admissions pages

Offering type and duration of course
Full-time: The three-year programme comprises five academic semesters and one semester of Work Place Based learning in industry.

Venues of Offering:
Bellville
## Qualification Code: ND: Clothing Management (Mainstream) (NDCLMN) All subjects compulsory

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
<th>NQF Exit Level</th>
<th>SAQA Credit</th>
<th>HEMS Credit</th>
<th>Assessment Type</th>
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<tbody>
<tr>
<td>1 Y</td>
<td>BUT100S</td>
<td>BUT100S</td>
<td>Business Studies 1</td>
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<td>1 Y</td>
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<td>Information Literacy 1</td>
<td>C</td>
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<tr>
<td>1 Y</td>
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<td>MAN102S</td>
<td>Management Principles 1</td>
<td>C</td>
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<td>1 Y</td>
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<td>POG101S</td>
<td>Work Organisation 1</td>
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<td>Cutting Room Control 1</td>
<td>C</td>
<td>--</td>
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<td>PTE101S</td>
<td>Pattern Construction 1</td>
<td>C</td>
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<tr>
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<td>Textiles 1</td>
<td>C</td>
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<table>
<thead>
<tr>
<th>Period of Study</th>
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<th>HEMS Credit</th>
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<tbody>
<tr>
<td>2 Y</td>
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<td>Quality Management 2</td>
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<td>2 Y</td>
<td>POG203S</td>
<td>POG203S</td>
<td>Cutting Room Control 2</td>
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</tbody>
</table>

Note: Students must pass ALL 2nd YEAR SUBJECTS before being allowed to register for 3rd year subjects.
### CURRICULUM INFORMATION

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
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<tr>
<td>3</td>
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<td>BUT302S</td>
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<tr>
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<td>Clothing Management Practice (Work Place Based Learning)</td>
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</tr>
</tbody>
</table>

**Note:** Students must pass ALL 1st SEMESTER 3rd YEAR subjects before being allowed to register for In-Service. In the event of a large group of 3rd year students, it might be necessary to divide the group into two semesters due to placement limitations.
ND: CLOTHING MANAGEMENT (EXTENDED)

Course aim
In the Extended Curriculum with Foundational Provision Programme, first-year subjects of the National Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two year Foundational Programme, students will integrate in the second year with the normal programme, provided they pass all the subjects in the Foundation Programme in the minimum time.

Duration of course
**Full-time: The four-year programme** comprises seven academic semesters and one semester of Clothing Management Practice also known as Work Place Based Learning in industry.

Venues of Offering:
Bellville

CLOTHING MANAGEMENT (Extended) (NDCLMX) All subjects compulsory

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
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## CURRICULUM INFORMATION

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<th>Subject Code</th>
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Note: Students must pass ALL 2nd YEAR SUBJECTS before being allowed to register for 3rd year subjects.

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Note: Students must pass ALL 1st SEMESTER 3rd YEAR subjects before being allowed to register for In-Service. In the event of a large group of 3rd year students, it might be necessary to divide the group into two semesters due to placement limitations.
BTECH: CLOTHING MANAGEMENT

Course aim
The course equips graduates to evaluate clothing and textile production processes and product performances under varying conditions, understand the influences of global trends, relate these strategically to the productivity and profitability of the industry, and expand personal interests by conducting research in a specialised area within the clothing and textile industry.

The four themes of production organisation, specialised production technology, business and management of clothing and textiles are the main subjects in the BTech programme and students are required to develop an in-depth understanding of these subject areas.

Students are required to prove analytical skills through the preparation of research projects on selected areas of clothing and textile production management and technology. The programme is conducted in an integrated manner, accommodating the needs of students from both the retail management and manufacturing technology sides.

Purpose and Rationale of the qualification
Persons achieving this qualification will be able to evaluate clothing and textile production processes and product performance under varying operating conditions, understand the influences of global trends, relate these strategically to the productivity and profitability of the industry, and expand personal interests by conducting research in a specialised area within the clothing and textile industries.

Admission requirements
A National Diploma in Clothing Management (or an equivalent qualification), with an average of at least 60% in the final year of the National Diploma, is required.

Applicants may have to attend an interview on campus with a panel of staff members prior to being accepted on the course to assess their experience and suitability to enter the course.

Offering type and duration of course
Full-time: One year
Part-time: Two years

Venues of Offering
Bellville
BTECH: CLOTHING MANAGEMENT (BTCLMT)
All subjects compulsory

<table>
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<tr>
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**PROMOTION CRITERIA**

a) First-year mainstream Clothing Management (CLM) students have to pass 60% of their subjects to be allowed to stay on the programme. If they fail a subject at first-year level they have to repeat it before they can do the corresponding second-year course, though they are allowed do some some second-year subjects at the same time. This might cause a timetable clash, in which case the priority is the first-year subject.

b) ECP CLM students have to pass all their subjects to progress from ECP1 to ECP2 and have to have passed all subjects in ECP2 to progress to CLM second year when they join the mainstream class.

c) Students are not allowed to progress from second year to third year if they have not passed all second-year subjects (there are no exceptions).

d) CLM third-year students have to have passed all their Semester 1 subjects to be eligible for industry placement, which is the Clothing Management Practice (Work Place Based Learning) component of the second semester part of the qualification. They will not be placed until all subjects are passed (there are no exceptions).

e) BTech CLM (fourth-year) students have to obtain 60% average in each subject in CLM to be eligible for the programme.

f) Any recognition of prior learning or subjects passed is dealt with on an individual basis, as per CPUT regulations.
ACADEMIC EXCLUSION RULES AND APPEAL PROCEDURE

If students fail repeated subjects twice, they will be excluded by the department. However, they have the option of appealing to the Dean for re-admission.

If they are re-admitted at the discretion of the Dean, it will be subject to a binding Student Re-admission Agreement Contract between the student and the department.

SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

Subjects ending in an ‘X’ are Extended curriculum subjects
NATIONAL DIPLOMA SUBJECTS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

BUSINESS STUDIES 1

Pre-requisites: None

Mode of delivery: Lectures 4½ hrs per week including tutorial exercises

Subject outline: The subject comprises Finance, Marketing and Economics. Finance provides learners with understanding and an appreciation of financial principles and how these are applied in the business environment. The subject is presented on a theoretical base aimed at providing a foundation for practical application. It underpins the development of a key understanding of the financial process and the important role that this function plays in the world of work. Economics provides learners with an understanding of business in society and the workings of the economy. This gives the learner a theoretical and practical background to marketing and economics in business.

In today’s dynamic environment, businesses and organisations face constant challenges to survive and remain competitive. The marketing element of the course deals with the basic principles of marketing. Business studies foster a better understanding of the factors that will influence the student’s working environment.

Learning outcomes: Provide written evidence of understanding the terminology, the cycle of transactions and source documents (the tutorial exercises showing understanding of subsidiary journals and final accounting statements); present evidence of an understanding of cost accounting concepts; show an understanding of break-even analysis and standard cost measures; show understanding of the financial aspects of a clothing business.

Assessment: All assessments are compulsory. Assignments, Class tests, Quizzes, Projects, Final Summative Assessment.

BUSINESS STUDIES 2

Pre-requisites: Business Studies 1

Mode of delivery: Lectures 4½ hrs per week including tutorial exercises

Subject outline: Financial Principles, Economics and Marketing: The finance part of this subject creates a further opportunity for understanding accounting terminology, the cycle of transactions, source documents, cost accounting concepts, break-even analysis and standard cost measures. It underpins the development of a key understanding of the financial process and the important role that this function plays in the world of work.

Learning outcomes: Provide written evidence of understanding the terminology, the cycle of transactions and source documents (the tutorial exercises showing understanding of
subsidiary journals and final accounting statements); present evidence of an understanding of cost accounting concepts; show understanding of break-even analysis and standard cost measures; show understanding of the financial aspects of a clothing business. The marketing component of this subject will also develop a further understanding of the principles of marketing and the changes marketers are faced with because of economic and political changes; competition is increasing and customers have become the main focus of organisations and businesses.

Show the relation of the clothing and textile industry structure to products, processes and customer needs; use fundamental entrepreneurial skill to identify, analyse and develop entrepreneurial qualities and select various business outcomes; understand the main themes, topics, concepts and skills within the marketing milieu; acquire the ability to apply analytical thinking to marketing challenges that will be encountered in an increasingly dynamic environment; understand and have insight into current and future developments in the South African market settings.

Assessment: All assessments are compulsory. Assignments, Class tests, Project, Final Summative Assessment.

**CLOTHING MANAGEMENT PRACTICE (WORK PLACE BASED LEARNING)**

**Pre-requisites:** Students must pass ALL first-semester third-year subjects before being allowed to register for In-Service. (Retailing 3, Entrepreneurship 3, Management 3, Production Organisation 3, Product Development 3, Textiles 3, Computer Studies 3)

**Mode of delivery:** Full-time placement in industry in semester two under supervision by industry mentors and lecturers.

**Subject outline:** The student is required to investigate a real problem within their work placement, to submit a draft proposal and final technical report, and to present their findings and solutions in a format that meets academic requirements. They are also required to keep a logbook recording their findings and experiences throughout their placement.

**Assessment:** All assessments are compulsory: In the form of a logbook, Oral presentation, Draft proposal and Technical report.

**COMPUTER STUDIES 3**

**Pre-requisites:** Pattern Construction 2; Garment Construction 2; Manufacturing Technology 2; Textiles 2

**Mode of delivery:** CAD patterns lectures in computer laboratory 4½ hrs per week

**Subject outline:** This subject encompasses all aspects of garment construction with an emphasis on tailoring and computer-aided design pattern-making (CAD). Knowledge from first
and second year is required to successfully complete this module.

Learning outcomes: Develop and produce a range of garments; incorporate all the aspects of design, customer specifications, fabric and trim sourcing, sizing, technical drawing, costing, construction, finishing, distribution and technical reports; identify and solve problems; communicate effectively using visual, mathematical and/or written persuasion; work effectively with others as a member of a team; collect, analyse, organise and critically evaluate information obtained on various aspects of garment construction; organise and manage themselves by adhering to deadlines and meeting the academic requirements of the subject; demonstrate the ability to create computer-generated patterns; develop and produce a product range for a business; integrate the various processes to produce a final packaged product that meets industry and customer requirements.

Assessment: All assessments are compulsory. Assignments, Class tests, Practical tests, Final Summative Assessment.

CUTTING ROOM CONTROL 1

Pre-requisites: None

Mode of delivery: Lectures and practicals 1½ hrs per week

Subject outline: The subject aims to provide an introduction to the cutting room and its various processes, and provide an understanding of the integrated nature of the cutting room with other departments and their role-players. Introduction to cutting room – internal and external costs; identify different cutting processes; identify various areas interacting with the cutting room; identify and understand cutting room terminology; identify internal and external customers; understand the checking-in procedure of fabrics; understand the planning function; understand the functions of stockroom and laboratory; identify different types of paper. Introduction to procedure for producing a marker – identify different laying up techniques; identify cutting methods; identify ancillary equipment; understand bundling and sorting processes.

Assessment: All assessments are compulsory. Assignments, Class tests, Oral presentations, Final Summative Assessment.

CUTTING ROOM CONTROL 2

Pre-requisites: Cutting Room Control 1, Work Organisation 1

Mode of delivery: Lectures and practicals 2¼ hrs per week

Subject outline: The following topics are covered: Identify different cutting tools and equipment; identify and explain methods used in cutting; identify and explain alternate cutting methods; identify the purpose of preparation of cut work; identify the purpose of lay planning and pattern matching; understand the benefits of computerised marker planning and
grading; recognise importance of quality cut parts; identify the need for cut order planning; determine the reasons for fabric wastage; identify and calculate labour costs; understand the importance of effective table utilisation; identify the purposes of incentive schemes in the cutting room; identify the effects incentive schemes have on productivity; understand the importance of correct manpower utilisation; identify and understand the use of computerised equipment; understand the parameters and techniques for marker making; demonstrate an understanding for cost-saving in the cutting room; understand the importance of material utilisation; conduct a cutting room layout.

Assessment: All assessments are compulsory. Assignments, Class tests, Projects, Portfolio, Final Summative Assessment.

ENTREPRENEURSHIP 3

Pre-requisites: Business Studies 2

Mode of delivery: Lectures and project work 4½ hrs per week

Subject outline: This subject sets the foundation for developing innovative thinking that would be useful in a business and stimulate small business development. Students will learn to develop and draw up a business plan in practice; develop a culture of entrepreneurship and innovative thinking; understand the implications of various decisions on business; assess the market and economic viability of small enterprises.

Assessment: All assessments are compulsory. Assignments, Class tests, Project, Integrated project.

GARMENT CONSTRUCTION 1

Pre-requisites: None

Mode of delivery: Practicals in sewing room 4½ hrs per week

Subject outline: The following topics will be covered: Theory and practice of sewing; understanding machinery and types of seams used to construct garments; understanding garment construction; sewing techniques, stitch types, seam types; properties of a good seam; ability to create a construction breakdown; understanding figure analysis, body proportion and fit; understanding design details; developing observational and analytical skills to construct garments to a high degree of quality, using suitable tools and equipment for different garment types, styling and customer requirements.

Assessment: All assessments are compulsory. Assignments, Practical tests, Class tests.
GARMENT CONSTRUCTION 2

Pre-requisites: Garment Construction 1

Mode of delivery: Practicals in sewing room 4½ hrs per week

Subject outline: This subject encompasses all aspects of garment construction, styling, reading technical/production drawings and developing new products. Persons achieving this qualification will be able to evaluate season’s styles in terms of fabric, construction methods and styling detail, apply garment engineering techniques to the construction and finish of the garment to specification, and have the knowledge and ability to lay-up, cut and fuse garment parts to a variety of garment types.

Assessment: All assessments are compulsory. Assignments, Class tests, Practical tests, Final Summative Assessment.

INFORMATION LITERACY 1

Pre-requisites: None

Mode of delivery: Lectures and computer work 4½ hrs per week

Subject outline: This subject focuses on the following: Academic literacy – academic writing and reading, language, vocabulary and terminology development; conceptual development; comparing and contrasting; extracting information; summarising and paraphrasing; report-writing. Visual literacy – interpreting graphs, tables, mind maps, concept maps, organograms; flow charts. Information literacy – how to source and evaluate information and sources, especially on the Internet; how to manage information, avoiding plagiarism, referencing in text and creating a bibliography using the Harvard reference system. Communication: theory – verbal and non-verbal communication; business communication; using I-language; intercultural communication; teamwork and conflict resolution in teams; CV and covering letter. Quantitative literacy – numeracy: fractions, percentages, decimals, averages, rounding off, ratio. Computers: software use: MS Office – MS Word, Excel and PowerPoint, email and Internet.

Assessment: All assessments are compulsory. Assignments, Class tests, Tutorials, Final Summative Assessment, Practical tests.

MANAGEMENT 2

Pre-requisites: Management Principles 1, Information Literacy 1

Mode of delivery: Lectures 2¼ hrs per week

Subject outline: Students must learn to identify the elements of human resources management (HRM); understand the theory of employment relations and the important
interdependency between employment relations and HRM; identify and know how to apply the elements of the various labour statutes in South Africa with regard to employment relations and HRM in organisations; manage affirmative action, employment equity and cultural diversity applications in organisations; explain and apply the theory underlying the provisioning of HR in a pragmatic manner to establish the basis for the best selection, maximum utilisation and maintenance of the employees within an organisation; apply the various elements that constitute the behavioural dynamics in an organisation to ensure satisfied and productive employees who can work together in harmony within a diverse environment; debate the rationale underpinning corporate social responsibility, show an understanding of the various concepts related to CSR as well as the concept of sustainable development and demonstrate the process of effective stakeholder engagement.

Assessment: All assessments are compulsory. Assignments, Class tests, Class discussion/participation, Final Summative Assessment.

MANAGEMENT 3

Pre-requisites: Management 2

Mode of delivery: Lectures 2¼ hrs per week

Subject outline: The primary objective of the subject is to provide the learner with a framework for the development and evaluation of the human relations function in the organisation. In order to achieve this, the learner will be introduced to the basic theory and research of human relations management (HRM). It will also be expected of the learner to become proficient in some of the actual procedures. Applied knowledge is a critical aspect of the subject. In today’s dynamic business environment, the focus on human resources management lies in the integration of HRM strategy into the global strategy of the organisation. By the end of this subject learners should have: The ability to conceptually grasp the strategic and functional relevance of human resources in an organisation; the ability to explain performance management, its purposes and challenges with performance management (PM) techniques, the implementation and evaluation of PM; an understanding of the terminology, purposes and problems of training and development; an awareness of how conflict manifests in an organisation and an ability to resolve conflict. The learner should be capable of relating cognitively to the concepts of workforce diversity, change management, effective communication and decision making, and utilising these concepts in an organisational context in order to increase the level of motivation of employees.

Assessment: All assessments are compulsory. Assignments, Class test, Class discussion/participation, Final Summative Assessment.
MANAGEMENT PRINCIPLES 1

Pre-requisites: None

Mode of delivery: Lectures 2¼ hrs per week

Subject outline: Identify the fundamentals of management and its application in the organisation; describe and define the nature of management; identify and explain the four basic management functions in organisations; describe different kinds of management found at different levels and in different areas of the organisation; discuss the science and the art of management in organisations today.

Assessment: All assessments are compulsory. Assignments, Class tests, Class discussion/participation, Final Summative Assessment

MANUFACTURING TECHNOLOGY 1

Pre-requisites: None

Mode of delivery: Lectures and practicals 2¼ hrs per week

Subject outline: Describe all sectors of the clothing and textile industry pipeline; identify workflow in a clothing factory; identify the role of different personal and departments in a factory; identify a wide range of machinery used in the clothing industry; identify and classify stitch types and seams types used in the clothing industry; identify and classify a wide variety of trims and other components used in the clothing industry; recommend correct procedures of application, uses or attachments of related equipment or machine parts for garment production; identify and complete basic technical reports.

Assessment: All assessments are compulsory. Assignments, Class tests, Factory report, Oral presentations, Final Summative Assessment.
MANUFACTURING TECHNOLOGY 2

Pre-requisites: Manufacturing Technology 1

Mode of delivery: Lectures and practicals 2½ hrs per week

Subject outline: This subject covers aspects of clothing with regard to the various components used to produce and trim garments, and a comprehensive understanding of specialised machinery used for their construction. The Manufacturing Technology module is closely related to Garment Construction with regard to garment components, machinery used and garment analyses. In Production Technology students are required to demonstrate an understanding of manual pattern construction, garment construction and the use fabric; apply garment engineering techniques to the construction and finish of the garment to specification; have the knowledge and ability to lay-up, cut and fuse garment parts to a variety of garment types.

Assessment: All assessments are compulsory. Assignments, Class tests, Practical work, Final Summative Assessment.

PATTERN CONSTRUCTION 1

Pre-requisites: None

Mode of delivery: Practicals and computer laboratory work 4½ hrs per week

Subject outline: To introduce students to basic pattern-making concepts; to impart knowledge of basic blocks and flat pattern techniques. Introduction to pattern making: terminology: notches, grain, grain line, construction lines, perforations, centre front line – front and back, bias, true bias, bust line, waistline, seat line, seam allowance, seams, darts, dart points, direction of dart excess, dart shape at pattern edge. Figure analysis: body ideals – body proportion, height and weight distribution, individual figure analysis; study of all body measurements for all age groups – infants, children, women and men – standards of body measurement, importance, standardisation and size charts; principles of pattern construction – drafting, draping and flat pattern-principles, advantages and disadvantages; methods and preparation of basic blocks – front, back, sleeve, skirt front and skirt back for infants, children, women, and men; flat pattern techniques – pivot and slash-spread methods, single dart series, double dart series, parallel darts, conversion of darts to tucks, pleats and gathers; Figure analysis – body, ideal proportion, height and weight distribution, individual figure analysis. Additionally students will be introduced to computer-aided pattern design.

Assessment: All assessments are compulsory. Assignments, Class tests, Practical tests, Final Summative Assessment.
PATTERN CONSTRUCTION 2

Pre-requisites: Pattern Construction 2

Mode of delivery: Practicals and computer laboratory work 4½ hrs per week

Subject outline: Students will develop observational and analytical skills to construct patterns, using basic blocks suitable for different garment types, styling and customer requirements. This subject is closely related to manufacturing technology and garment construction and is one of the most important preparation components in the product development cycle.

To introduce students to basic pattern-making concepts; to impart knowledge of basic blocks and flat pattern techniques; introduction to pattern making; terminology: notches, grain, grain line, construction lines, perforations, centre front line – front and back – bias, true bias, bust line, waistline, seat line, seam allowance, seams, darts, dart points, direction of dart excess, dart shape at pattern edge. Figure analysis: body ideals – body proportion, height and weight distribution, individual figure analysis; Study of all body measurements for all age groups – infants, children, women and men – standards of body measurement, importance, standardisation and size charts; principles of pattern construction: drafting, draping and flat pattern-principles, advantages and disadvantages; methods and preparation of basic blocks: front, back, sleeve, skirt front and skirt back for infants, children, women, and men; flat pattern techniques: pivot and slash-spread methods, single dart series, double dart series, parallel darts, conversion of darts to tucks, pleats and gathers; figure analysis: body ideals – proportion, height and weight distribution, individual figure analysis. Students will continue to use the principles from manual pattern making and incorporate them into their computer-aided pattern design.

Assessment: All assessments are compulsory. Assignments, Class tests, Practical tests, Final Summative Assessment.

PRODUCT DEVELOPMENT 3

Pre-requisites: Pattern Construction 2; Garment Construction 2; Manufacturing Technology 2; Textiles 2

Mode of delivery: Practical work in sewing laboratory 9 hrs per week

Subject outline: Develop and produce a range of three garments including a lady's tailored jacket, a skirt or pants and a top; incorporate all the aspects of design, customer specifications, fabric and trim sourcing, sizing, technical drawing, costing, construction, finishing, distribution and technical reports.

Assessment: All assessments are compulsory. Assignments, Class tests, Practical tests, Final Summative Assessment.
PRODUCTION ORGANISATION 3

Pre-requisites: Work Organisation 2; Quality Management 2; Cutting Room Control 2

Mode of delivery: Lectures 4½ hrs per week

Subject outline: The following topics will be covered: Accounting terminology, the cycle of transactions, source documents, cost accounting concepts, break-even analysis and standard cost measures. Students will provide written evidence of understanding all of the above, with tutorial exercises showing understanding of subsidiary journals and final accounting statements; present evidence of an understanding of cost accounting concepts; show an understanding of break-even analysis and standard cost measures; show understanding of the financial aspects of a clothing business.

Assessment: All assessments are compulsory. Assignments, Class tests, Practical tests, Final Summative Assessment

QUALITY MANAGEMENT 2

Pre-requisites: Work Organisation 1; Cutting Room Control 1

Mode of delivery: Lectures 2¼ hrs per week

Subject outline: The subject aims to equip students with a holistic understanding of the term ‘quality’. It deals with quality from a manufacturing, retailing and consumer perspective. It aims to expand the student's knowledge of the importance of quality throughout the supply chain. Students are required to apply theoretical knowledge to practical application, by conducting quality projects and tests which meet customer standards and specifications. The subject is offered only during the second year of the course. The subject ties in with production organisation subjects, such as work organisation and cutting room control.

Students will learn to understand the concept of quality; differentiate between quality assurance and quality control; understand the terminology used in quality; relate customer expectations to satisfaction with products; identify and understand the purpose of different types of specifications and standards for textile products; identify the categories of quality costs, prevention costs, inspection costs and failure costs; understand how quality function deployment (QFD) can link the needs of customers to the business; identify role players and their functions in Quality Assurance and Quality Control (QA and QC); record and report quality repairs and prepare reports; understand inspecting, measuring and testing of textile products.

Assessment: All assessments are compulsory. Assignments, Class tests, Project, Portfolio, Final Summative Assessment.
RETAILING 3

Pre-requisites: Business Studies 2

Mode of delivery: Lectures and projects 2¼ hrs per week

Subject outline: Students will gain a broad understanding of what retailing is about, from always putting customers first to knowing what activities happen in stores, dealing with suppliers and the busy world of a retail head office: who does what, when and how, to ensure the right product ranges are delivered to the right stores on time.

Assessment: All assessments are compulsory. Assignments, Class tests, Project, Final Summative Assessment.

TEXTILES 1

Pre-requisites: None

Mode of delivery: Lectures and practicals 4½ hrs per week

Subject outline: This module focuses on the different aspects of natural, regenerated and synthetic fibres, as well as processes used to convert textile fibres into finished products – yarn and fabric construction, dyeing, printing and finishing processes – both in theory and practice.

Students must demonstrate an understanding of fibre theory and how the external structure, chemical composition and internal structure of fibres impact on fabric properties and end products; demonstrate an understanding of the manufacturing processes, fibre properties, care instructions and end uses of different types of fibres; demonstrate an understanding of different methods used in fibre identification; distinguish between different fibre and fabric types in term of their inherent characteristics and properties, as well as end uses; demonstrate an understanding of the processing of natural fibres and the manufacturing of synthetic fibres; distinguish between different fibre categories, e.g. cellulosic, protein, regenerated and synthetic, by listing common properties and end uses associated with each of these categories; develop a portfolio of swatches/samples of different fibre types and fabrics; develop the ability to source information from various textile sources (including textile manufacturing companies in the Western Cape); collate information obtained from various textile sources into assignments/projects using the English language in an academically acceptable manner through written and visual communication.

Assessment: All assessments are compulsory. Assignments, Class tests, Practical tests, Laboratory report portfolio, Laboratory work, Final Summative Assessment.
TEXTILES 2

Pre-requisites: Textiles 1

Mode of delivery: Lectures and practicals 4½ hrs per week

Subject outline: This subject expands on the existing knowledge and skills of learners in yarn and fabric construction, as well as dyeing, printing and finishing processes. Students will be required to find information from various sources to demonstrate their understanding of application areas and of colour and fabric trends in textiles. Learners are required to demonstrate a theoretical and practical understanding and knowledge of the following:

Yarn construction: The processes used in the production of filament and spun yarns; different types and qualities of yarns and how these relate to their properties and end-use; different types and qualities of novelty yarns and how these relate to their end use; identification of different types of bulk yarns and how these to their end use; the interrelationship between fibre and yarn properties.

Fabric construction: The terminology of woven and knit structures; the weaving process and the three basic weaves; the identification of fabrics made by using the three basic weaves; the differences between woven and knit fabrics; the characteristics of warp and weft knit fabrics; the various knit structures and their identifying characteristics; the production of knit fabrics; the prediction of the performance of fabrics based on fabrication, yarn structure and fibre content; the versatility of knit fabrics for apparel, furnishing and industrial products.

Dyeing, printing and finishing processes: The theory, techniques and processes of the dyeing, printing and finishing of textiles; the differences among the different stages of dyeing; the impact of dyeing, printing and finishing processes on the performance of textile products.

Assessment: All assessments are compulsory. Assignments, Class tests, Laboratory report portfolio, Laboratory test, Final Summative Assessment

TEXTILES 3

Pre-requisites: Pattern Construction 2; Garment Construction 2; Manufacturing Technology 2; Textiles 2

Mode of delivery: Lectures and Practicals 4½ hrs per week

Subject outline: This subject further expands the knowledge gained in previous years and focuses on the fibre, yarn and fabric properties that are divided into four categories, namely: aesthetic appearance, durability, comfort and care. This semester focuses on the fibre, yarn and fabric properties related to these four categories. Students will also be required to analyse textile products and compile a technical reports based on fibre, yarn and fabric analysis, incorporating textile test results obtained from tests performed in the textile testing laboratory.

Assessment: All assessments are compulsory. Assignments, Class tests, Laboratory report portfolio, Laboratory tests, Final Summative Assessment.
WORK ORGANISATION 1

Pre-requisites: None

Mode of delivery: Lectures 4½ hrs per week

Subject outline: Provide the learner with the theoretical and practical background of work organisation techniques and processes; expose learners to work measurement and method study techniques; provide the learner with the necessary tools to analyse and solve problems relating to clothing manufacturing processes to be able to conduct basic research to enhance quality, profitability and productivity in clothing technology; maintain acceptable levels of productivity meeting standards; apply work measurement techniques to establish standard times; analyse processes and resources to produce and implement effective work methods; produce production plans to meet customer demand and suit workplace production systems; use clear and effective language confidently in written format and oral presentation, to report on products, processes and findings; use and construct numerical data and formulae in calculations and costings; access and process information through the use of relevant skills using a variety of media; show the relationship of the clothing industry structure to products, processes and customer needs; to acquire organisational and self-management skills.

Assessment: All assessments are compulsory. Assignments, Class tests, Work measurement portfolio, Quizzes, Oral presentation, Final Summative Assessment.

WORK ORGANISATION 2

Pre-requisites: Work Organisation 1; Cutting Room Control 1

Mode of delivery: Lectures 4½ hrs per week

Subject outline: This module sets the background for the work organisation function in the clothing industry, which includes variety control, value analysis, work measurement and efficiency control. It underpins the development of the understanding of the various aspects linked to timing a job and subsequently costing the job, so that the learner gets an understanding of the multifaceted aspects to the production processes and how the different parts may impact these. Students will explore the concept of flexible time-based production systems; apply manual and computer-aided work study techniques to the factory floor situation; identify and employ a specific planning and control system used in the clothing industry; demonstrate understanding of outwork processes and product requirements and the effect on operations systems; demonstrate a wide understanding of productivity improvement applicable to the clothing industry.

Assessment: All assessments are compulsory. Assignments, Class tests, Project, Final Summative Assessment.
BTECH SUBJECTS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

BUSINESS STUDIES 4

Pre-requisites: ND Clothing Management

Mode of delivery: Lectures 2¼ hrs per week combined with self study and project work

Subject outline: The learner is introduced to economics taking the macro and micro environment into consideration. Concepts of individual choice are discussed, as are the influence of economic systems and the impact this has on society. The student will learn to critically evaluate financial aspects of the business using balance sheets, income statements and ratio analyses; to evaluate the strategy of a business, using the tools above; and lastly, to identify entrepreneurial companies and the characteristics associated with these companies by means of investigation. Industrial and business studies form an integral part in the function of a business. Various business decisions are taken based on the financial records that are generated by the business.

The business has to be strategic in the decisions that are made and the economy plays a vital role in this process.

Learning outcomes: Demonstrate an ability to collect, analyse and interpret marketing data; identify areas of relative competitive advantage; demonstrate an ability to project and manage expense budgets; demonstrate an ability to conduct financial feasibility analysis for capital investment; strategically manage businesses using analytical tools.

Assessment: All assessments are compulsory. Assignments, Class tests, Project, Oral presentations.

MANAGEMENT 4

Pre-requisites: ND Clothing Management

Mode of delivery: Lectures 2¼ hrs per week combined with self-study and project work

Subject outline: The nature and process if strategic management, strategic intent and analysis are discussed, as well as strategy development, formulation and implementation. Also included are those emerging political, economic, technological and social trends that are integral to good strategic decisions in business.

Students are encouraged to look to the future and make predictions on strategic management in a high-tech fast-paced world. In short strategic management is covered from the outside in and from the outside out.

This module on Strategic Management complements the fundamental knowledge (technical
skills) students are acquiring, in pursuit of this qualification. It highlights the importance of the ability of management to properly strategise and use available resources to deal with those changes in the external environment that put pressure on organisational operations. It equips students with strategic management knowledge on how organisations are able to maintain competitive advantage in an increasingly complex and challenging business environment.

Foundational knowledge: Understand the nature of strategy as well as strategic intent, strategic analysis, strategy development and formulation, strategy implementation and future perspectives.

1. Application
   - Apply theoretical knowledge by analysing, interpreting information and solving problems presented in case studies, illustrating strategic management principles in everyday situations;
   - Reflect on and discuss with peers examples of how top organisations in Southern Africa and elsewhere have turned their organisations around using strategic thinking;
   - Deal with questions which provoke in-depth discussion and analysis;
   - Perform experiential exercises to consolidate students’ understanding of the principles of strategic management;
   - Consult certain websites to stimulate sustained knowledge acquisition in most of the topics discussed;
   - Discuss contemporary examples reported in the press.

2. Integration
   - Use various sources of information available to students in this field of study to complete tasks, assignments and case studies that integrate knowledge gained and show the relationship between theory and practice.

3. Human dimension
   - Manage oneself in relation to the available time and resources, including feedback from lecturer. Learn to interact significantly with others who are different to oneself by discussing options to deal with problems being experienced in their lives by applying strategic thinking.

4. Caring
   - Reflect on the nature of strategic management and how it could be used to influence one’s future career, personal development and those of others significantly.

5. Learning how to learn
   - Become a self-directing learner who is able to reflect and pass judgement on one’s own performance. In the process be able to identify what further steps need to be taken to make the learning process an experience of significant change in oneself and one’s life.

Assessment: All assessments are compulsory. Assignments, Class tests, Final Summative Assessment..
PRODUCTION ORGANISATION 4

Pre-requisites: ND Clothing Management

Mode of delivery: Lectures 2¼ hrs per week combined with self-study and project work

Subject outline: The subject seeks to impart strategic production organisation principles to learners so they understand the demanding and competitive environment of the clothing and textile manufacturing industry in today’s global economy. It draws on production management theory from multidisciplinary businesses, offering learners an objective overview of successful management interventions, to manage the demanding task required for a successful operations (production) manager. This subject seeks to impart operational, tactical and strategic management tools to learners in the clothing and textile industry at large.

Assessment: All assessments are compulsory. Assignments, Class tests, Technical reports, Oral presentations.

SPECIALISED PRODUCTION TECHNOLOGY 4

Pre-requisites: ND Clothing Management

Mode of delivery: Lectures 2¼ hrs per week combined with self-study and project work

Subject outline: This subject equips the learners with advanced technical knowledge and skills in product development and in product analysis and evaluation, as well as basic research skills in clothing and textiles.

Students will be able to evaluate clothing and textile product performance; evaluate clothing and textile production processes and technology; conduct basic research by compiling a literature review, using appropriate research methods, collecting and analysing data; demonstrate analytical thinking skills; demonstrate the ability to pass judgement and focus on detail; demonstrate good time and project management skills; demonstrate accountability for their own research work.

Report work: This component equips the learner with advanced technical knowledge and skills in developing clothing and textile products, analysing and evaluating clothing and textile product performance against customer needs and evaluating clothing and textile production processes performance and technology against set specifications and standards.

Research methodology: This component enables the learner to conduct a literature review, design and apply appropriate research methods to collect data, analyse data, draw conclusions and effectively communicate research to the research community.

Assessment: All Assessments are compulsory. Assignments, Technical Reports, Oral presentations.
## DEPARTMENT OFFICE-BEARERS

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of Department</td>
<td>Mrs TK Stringer,</td>
<td>021 959 6629</td>
<td></td>
<td><a href="mailto:StringerT@cput.ac.za">StringerT@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>PostGrad Dip Higher Education, BSc Civil Engineering, MSc Engineering</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Secretary</td>
<td>Ms C Daniels</td>
<td>021 959 6527/ 6631</td>
<td>021 959 6656</td>
<td><a href="mailto:DanielsCh@cput.ac.za">DanielsCh@cput.ac.za</a></td>
</tr>
<tr>
<td>Admin Assistants</td>
<td>Ms N Leve</td>
<td>021 959 6631</td>
<td></td>
<td><a href="mailto:LeveN@cput.ac.za">LeveN@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Ms B Mtuze</td>
<td>021 953 8696</td>
<td></td>
<td><a href="mailto:Mtuzeb@cput.ac.za">Mtuzeb@cput.ac.za</a></td>
</tr>
</tbody>
</table>

## DEPARTMENTAL STAFF

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Qualifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Lecturer</td>
<td>Dr J Fapohunda</td>
<td>MSc Building, PhD</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr D N Ramsay</td>
<td>BSc Quantity Surveying</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr L Bikitsha</td>
<td>ND Building, BTech Quantity Surveying, MTech Construction Management</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr J L Crowe</td>
<td>National Technicians Diploma, NHD Post School Education, MSc Project Management</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr M Laatoe</td>
<td>NHD Post School Education, BSc Quantity Surveying, MSc Property Studies</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr S Mbeki</td>
<td>ND Building, BTech Quantity Surveying, MTech Construction Management</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr R Ndihokubwayo</td>
<td>Bachelor of Quantity Surveying (Honours), MTech Construction Management, PhD (Construction Economics)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr X Nghona</td>
<td>ND Building, MTech Construction Management</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr S S S Nompunga</td>
<td>ND Building, HD Higher Education and Training, MTech Construction Management</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms K L Rau</td>
<td>M Tech Language Practice</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr M D Ryan</td>
<td>HD Higher Education and Training, HonsB Business Management and Admin, NHD Building Surveying, BTech Post School Education</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr E Simpeh</td>
<td>BTech Quantity Surveying, MTech Construction Management, NHD in Building Technology</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr L Wentzel</td>
<td>M Tech Construction Management, BTech Quantity Surveying, ND Building</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Ms B Damba</td>
<td>ND Building; HD Higher Education and Training, BTech Quantity Surveying</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Mr R Fisher</td>
<td>NHD Building Surveying, ND Building Surveying</td>
</tr>
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### Qualifications Offered

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<tr>
<th>Qualification Type</th>
<th>Qualification Code</th>
<th>Minimum Duration</th>
<th>Maximum Duration</th>
<th>Work Integrated Learning</th>
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<tr>
<td>ND: Building</td>
<td>NDBLDG</td>
<td>3 years</td>
<td>6 years</td>
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<td>ND: Building (Extended)</td>
<td>NDBLDX</td>
<td>4 years</td>
<td>8 years</td>
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<td>BTech: Construction Management</td>
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<td>BTech: Construction Management</td>
<td>BTPCSM</td>
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<tr>
<td>BTech: Construction Management: Facility Management</td>
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<tr>
<td>BTech: Construction Management (Health and Safety)</td>
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<td>BTech: Construction Management</td>
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<td>1 year (full-time)</td>
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<td>MTech: Construction Management</td>
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<tr>
<td>BTech: Quantity Surveying</td>
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<td>MTech: Quantity Surveying</td>
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<td>1 year (full-time)</td>
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</table>
ND: BUILDING

Course aim
The course is structured to provide a career-oriented technological education and to prepare students for supervisory level employment in the construction management, quantity surveying and allied industries in the built environment. The ND Building lays the foundation for further study towards the degree BTech Construction Management or BTech Quantity Surveying which are awarded after a further one year of study and allows for specialisation in these fields.

Purpose and rationale of the qualification
This is a broad-based qualification intended to prepare diplomates for supervisory and middle management level employment in the building industry and for technical and support level in the quantity surveying profession. Persons achieving this qualification will be competent to support supervisors, managers, building surveyors and quantity surveyors.

Career opportunities
Graduates practise as construction managers or quantity surveyors. Consultants, contractors or local authorities may employ the quantity surveyor or construction manager. Duties include taking off quantities, estimating and pricing for tendering purposes or the submission of payment certificates or managing the construction of buildings.

Admission requirements
For the Minimum Admission requirements, see Admission requirements.

Professional Registration
The ND Building is accredited by the South African Council for the Quantity Surveying Profession. All ND students will only be able to register with the council after successful completion of the BTech: Quantity Surveying.

Duration of course
Full-time: Three years, including work-integrated learning. For further information regarding work-integrated learning, please contact the Department of Construction Management and Quantity Surveying.

Venues of Offering
Bellville
## DEPARTMENT OF CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING

### ND: BUILDING (NDBLDG)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
<th>NQF Exit Level</th>
<th>SAQA Credit</th>
<th>HEMIS Credit</th>
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<tr>
<td>1 Y</td>
<td>ABS100S</td>
<td>Applied Building Science 1</td>
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<td>Communications 1</td>
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<td>1 Y</td>
<td>SSU100S</td>
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</table>

During the second year the student works in the construction industry while completing academic assignments in the three major subjects: All MAJOR subjects (CNT100S, QSU100S, CTM100S) MUST be passed before a student will be allowed to register for any second year subjects. You may not register for any 1st year minor subjects whilst registered for Building Practice 1.

| 2 Y             | BLP100S           | Building Practice 1 (Work Integrated Learning) | C | CNT100S, QSU100S, CTM100S MUST have been passed before a student will be able to register for any second year subjects: | 6 | 60 | .500 | Continuous |
| 2 Y             | CNT200S           | Construction Management 2 | C | | 6 | 20 | .167 | Continuous |
| 2 Y             | CTM200S           | Construction Technology 2 | C | | 6 | 20 | .167 | Continuous |
| 2 Y             | QSU200S           | Quantity Surveying 2 | C | | 6 | 20 | .167 | Continuous |
| 3 Y             | CAC300S           | Construction Accounting 3 | C | ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects. | 6 | 20 | .167 | Continuous |
| 3 Y             | CNT300S           | Construction Management 3 | C | | 6 | 20 | .167 | Continuous |
| 3 Y             | CTM300S           | Construction Technology 3 | C | | 6 | 20 | .167 | Continuous |
| 3 Y             | PAE300S           | Price Analysis and Estimating 3 | C | | 6 | 20 | .167 | Continuous |
| 3 Y             | QSU300S           | Quantity Surveying 3 | C | | 6 | 20 | .167 | Continuous |
| 3 Y             | STC300S           | Structures and Concrete 3 | C | | 6 | 20 | .167 | Continuous |
ND: BUILDING (EXTENDED)

Course aim
In the Extended Curriculum with Foundational Provision Programme, first-year subjects of the National Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two-year Foundational Programme, students will integrate with the mainstream programme.

Duration of course
Full-time: Four years, including work integrated learning. For more information regarding work integrated learning, please contact the Department of Construction Management and Quantity Surveying.

ND: BUILDING (EXTENDED) (NDBLDX)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
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<tr>
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<td>Applied Building Science 1</td>
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<td>0 Y</td>
<td>CMM110X</td>
<td>C</td>
<td>Communication 1</td>
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<td>0 Y</td>
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<td>Computer Applications 1</td>
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<tr>
<td>0 Y</td>
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<td>C</td>
<td>Construction Technology 1</td>
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<td>1 Y</td>
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<td>C</td>
<td>Construction Management 1</td>
<td>C</td>
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<td>5</td>
<td>20</td>
<td>.167</td>
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</tbody>
</table>
During the second year the student works in the construction industry while completing academic assignments in the three major subjects: All MAJOR subjects (CNT110X, QSU110X, CTM111X) MUST be passed before a student will be allowed to register for any second year subjects. You may not register for any 1st year minor subjects whilst registered for Building Practice 1.

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<th>Year/Sem</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
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<td>Building Practice 1 (Work Integrated Learning)</td>
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<td>CNT110X, QSU110X and CTM111X MUST have been passed before a student will be able to register for any second year subjects:</td>
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<tr>
<td>2</td>
<td>Y</td>
<td>CTM200S</td>
<td>Construction Technology 2</td>
<td>C</td>
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<tr>
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<td>Y</td>
<td>CAC300S</td>
<td>Construction Accounting 3</td>
<td>C</td>
<td>ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects.</td>
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<td>CTM300S</td>
<td>Construction Technology 3</td>
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<td>Price Analysis and Estimating 3</td>
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<td>Quantity Surveying 3</td>
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<td>3</td>
<td>Y</td>
<td>STC300S</td>
<td>Structures and Concrete 3</td>
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</table>
BTECH: QUANTITY SURVEYING

Course aim
The course prepares students for middle and top management employment in the construction, property development and allied industries, as well as financial institutions and government departments.

The quantity surveyor is the cost- and financial specialist of the construction industry. The work is varied, but mainly comprises the following:

- Estimating the cost of and assisting with determining the feasibility of projects.
- Preparing documentation for competitive tendering.
- Tendering and negotiating for contracts.
- Managing and exercising financial control over contracts to ensure cash flow and the profitability of projects.
- Controlling and managing sub-contractors and suppliers.
- Finalising financial aspects of contracts upon completion of projects.

Purpose and rationale of the qualification
This qualification is intended for persons specialising in the field of quantity surveying, in the construction and property industries and the Quantity Surveying profession. Persons achieving this qualification will be competent to independently perform services relevant to contract procurement, financial and cost management and property development.

Career opportunities
Employment opportunities are many and varied: the main areas of employment are with building contractors and professional quantity surveyors. Opportunities also exist for self-employment, in property development, with mining houses, financial and insurance institutions, with state and semi-state departments and in marketing with retailers and manufacturers in the construction industry.

Admission requirements
The National Diploma in Building with an average pass mark of at least 60% for the final year subjects of the National Diploma,

OR

The National Diploma in Building with one year’s post-diploma work experience in a construction environment.

The quantity surveyor should be well organised and methodical with a flair for working with figures and computers, and should enjoy working indoors and outdoors. Good human relations as well as the ability to think logically and report on situations in an orderly manner
are important, as the quantity surveyor needs to develop a close working relationship with the architect, client, engineer and other members of the professional team.

**Professional registration**
Graduates are eligible for particular categories of membership of the Association of South African Quantity Surveyors (SACQSP), the Chartered Institute of Building (CIOB Southern Africa) and registration with the South African Council for the Quantity Surveying Profession.

**Duration of course**
*Full-Time:* One year  
*Part-Time:* Minimum of two years

**Venues of Offering**
Bellville

### BTECH: QUANTITY SURVEYING (BTQSUR)

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<tr>
<td>4</td>
<td>Y</td>
<td>MVA400S</td>
<td>Market Valuations 4</td>
<td>C</td>
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Select one of the following electives:

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<th>Subject Name</th>
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<td>Research Methodology</td>
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<td>4</td>
<td>Y</td>
<td>DVM400S</td>
<td>Development Management 4</td>
<td>E</td>
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<td>7</td>
<td>20</td>
<td>.167</td>
<td>Continuous</td>
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</table>
BTECH: CONSTRUCTION MANAGEMENT

Course aim
The course focuses on the planning, execution and management of construction projects. The work of the construction manager mainly comprises the following:

- Pre-tender planning and programming of projects to determine the optimal use of resources.
- Post-tender refining and monitoring of construction programmes to ensure the smooth running and the completion of contracts on time.
- Quality control of labour and materials used in buildings.
- Controlling and managing sub-contractors, suppliers and the like.
- Co-ordinating the handing over of the completed projects.

Purpose and rationale of the qualification
This qualification is intended for persons specialising in the field of construction management. Persons achieving this qualification will be competent to independently perform services relevant to contract planning management and property development.

Career opportunities
The main areas of employment are with building contractors and sub-contractors. Opportunities exist for self-employment, in property development, with mining houses, financial and insurance institutions, with state and semi-state departments, and in sales and marketing with retailers and manufacturers in the construction industry.

Admission requirements
Appropriate National Diploma in a construction related discipline with an average of at least 60% for the final year subjects of the National Diploma,
OR
Appropriate National Diploma in a construction related discipline with one year’s post-diploma work experience in a construction environment.

The ideal construction manager is a practical problem-solver and a self-motivated achiever who enjoys getting things right the first time. Applicants should be goal-orientated, enjoy working in a robust and predominantly outdoor environment, and have the ability to communicate with and motivate people at all levels. Good human relations, as well as the ability to think logically and report on situations in an orderly manner, are important as the construction manager needs to develop a close working relationship with the architect, client, engineer and other members of the professional team.
Professional registration
Graduates are eligible for professional registration with the South African Council for Project and Construction Management Professions (SACPCMP) and the Chartered Institute of Building (CIOB Southern Africa) after the prescribed period of work. Professional registration enables them to practise as construction managers. In addition, graduates are eligible for particular categories of membership of the CIOB.

Duration of course
Full-time: One year
Part-time: Minimum of two years

Venues of Offering
Bellville

BTECH: CONSTRUCTION MANAGEMENT (BTCNSM)

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<tr>
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<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective Subject</th>
<th>Pre-requisite Subject Codes</th>
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<th>HEMS Credit</th>
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<td>BEP400S</td>
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<td>C</td>
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<td>4</td>
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<td>CES400S</td>
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<tr>
<td>4</td>
<td>Y</td>
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<td>C</td>
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<tr>
<td>4</td>
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<td>LAW400S</td>
<td>Construction Law And Procedures 4</td>
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<td>4</td>
<td>Y</td>
<td>MTN400S</td>
<td>Maintenance Management 4</td>
<td>C</td>
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Select one of the following electives:

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<td>4</td>
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<td>DVM400S</td>
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<td>E</td>
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<td>7</td>
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</table>
BTECH: CONSTRUCTION MANAGEMENT: (FACILITY MANAGEMENT)

Course aim
The course focuses on the planning, execution and management of facility management projects. The work of a facility manager mainly comprises the following:

- Ensuring management of facility-related services.
- Managing the maintenance of facilities.
- Assessment of properties and facilities.
- Planning and programming of projects relating to facilities.
- Controlling and managing contractors and service providers.

The ideal facility manager is a practical problem-solver and a self-motivated achiever who enjoys working in multidisciplinary teams. Applicants should be goal-orientated, enjoy working in a project environment, and have the ability to communicate with and motivate people at all levels. Good human relations, as well as the ability to think logically and report on situations in an orderly manner, are important as the facility manager needs to develop close relationships with a variety of stakeholders.

Purpose and Rationale of the qualification
This qualification is intended for persons specialising in the field of construction management. Persons achieving this qualification will be competent to independently perform services relevant to contract planning management and property development.

Career opportunities
The main areas of employment are with facility management companies, insurance institutions and state and semi-state departments. Opportunities exist for careers as consultants or self-employed service providers.

Admission requirements
An appropriate National Diploma in a construction-related discipline with an average of at least 60% for the final year subjects of the National Diploma,

OR

An appropriate National Diploma in a construction-related discipline with one year’s post-diploma work experience in a construction/facility management environment.

Offering type and duration of course
- **Full-time**: One year
- **Part-time**: Minimum of two years

Venues of Offering
Bellville
BTECH: CONSTRUCTION MANAGEMENT (Facility Management)
All subjects compulsory

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<td>LAW400S</td>
<td>Construction Law And Procedures 4</td>
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<td>MVA400S</td>
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</table>
BTECH: CONSTRUCTION MANAGEMENT: (HEALTH AND SAFETY)

Course aim
This programme will provide crucial construction health and safety skills, and add value to existing construction enterprises, as well as new construction enterprises as required for practising as a construction health and safety officer and a construction health and safety manager.

Purpose and rationale of the qualification
The study of construction health and safety management at this level aims to equip students with advanced knowledge in the discipline of construction health and safety management, and to apply that knowledge, skills, and values within a business or project environment.

Career opportunities
Given the prioritisation of improvements in construction health and safety worldwide and the dire shortage of qualified health and safety practitioners, this qualification equips students to render health and safety consulting seminars and be employed as health and safety specialists in construction.

Admission requirements
An appropriate National Diploma in a construction related discipline with an average of at least 60% for the final year subjects of the National Diploma, OR
An appropriate National Diploma in a construction related discipline with one year’s post-diploma work experience in a construction environment.

Offering type and duration of course
Full-time: One year
Part-time: Minimum two years

Venue of offering
Bellville
### BTECH: CONSTRUCTION MANAGEMENT (Health and Safety)

All subjects compulsory

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<tr>
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<th>Year/Sem Subject</th>
<th>Subject Code</th>
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MTECH: CONSTRUCTION MANAGEMENT

Course aim
The course produces experts with integrated technical knowledge and skills, as well as advanced analytical and problem-solving capabilities, in specialised fields of construction, financial control, and policy formulation. The research focus of the department is on community-based research.

Research-based degree
Students conduct supervised research in a specialised area of construction management or quantity surveying and complete a dissertation.

Purpose and Rationale of the qualification
This qualification is intended to enable graduates to apply integrated technical knowledge/skills and advanced analysis and problem solving to a particular specialisation in construction management, property and other related fields, through involvement in an applied research project.

Career opportunities
Employment opportunities are many and varied. The main areas of employment are with building contractors and professional quantity surveyors. Opportunities also exist for self-employment, or employment in property development, with mining houses, financial and insurance institutions, with state and semi-state departments and in marketing with retailers and manufacturers in the construction industry.

Admission requirements
A 60% aggregate in either the BTech: Construction Management or BTech: Quantity Surveying is required, with a pass in Research Methodology, OR
A first degree in a field relevant to construction, with two years’ related industrial experience. Students will register for either the MTech Construction Management or the MTech Quantity Surveying, depending on the focus area of their research project.

Acceptance into the programme is subject to:
- Availability of a supervisor within the selected field of research
- Submission and acceptance of a draft proposal
- Applicants meeting the academic requirements of the supervisor
Professional registration
Graduates may be eligible for particular categories of membership of:
• The Association of South African Quantity Surveyors
• The South African Council for the Project and Construction Management Professions
• The Chartered Institute of Building (CIOB Southern Africa)
• The South African Council for the Quantity Surveying Profession.

Offering type and duration of course
Full-time: Two years
Part-time: Three years

Venue of offering
Bellville

MTECH: CONSTRUCTION MANAGEMENT (MTCNMR)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/SEM Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
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MTECH: QUANTITY SURVEYING

Course aim
The course produces experts with integrated technical knowledge and skills, as well as advanced analytical and problem-solving capabilities, in specialised fields of construction, financial control, and policy formulation. The research focus of the department is on community-based research.

Research-based degree
Students conduct supervised research in a specialised area of construction management or quantity surveying and complete a dissertation.

Purpose and rationale of the qualification
This qualification is intended to enable graduates to apply integrated technical knowledge/skills and advanced analysis and problem solving to a particular specialisation in quantity surveying, property development and other related fields, through involvement in an applied research project.

Career opportunities
Employment opportunities are many and varied. The main areas of employment are with building contractors and professional quantity surveyors. Opportunities also exist for self-employment, or employment in property development, with mining houses, financial and insurance institutions, with state and semi-state departments and in marketing with retailers and manufacturers in the construction industry.

Admission requirements
A 60% aggregate in either the BTech: Construction Management or BTech: Quantity Surveying is required, with a pass in Research Methodology,
OR
A first degree in a field relevant to construction, with two years’ related industrial experience. Students will register for either the MTech Construction Management or the MTech Quantity Surveying, depending on the focus area of their research project.

Acceptance into the programme is subject to:
• Availability of a supervisor within the selected field of research
• Submission and acceptance of a draft proposal
• Applicants meeting the academic requirements of the supervisor
Professional Registration
Graduates may be eligible for particular categories of membership of:
- The Association of South African Quantity Surveyors
- The South African Council for the Project and Construction Management Professions
- The Chartered Institute of Building (CIOB Southern Africa)
- The South African Council for the Quantity Surveying Profession.

Offering type and duration of course
Full-time: 1 year
Part-time: 2 years

Venues of Offering
Bellville

MTECH: CONSTRUCTION MANAGEMENT (MTCNMR) and
MTECH: CONSTRUCTION MANAGEMENT - Facility Management (MTCNFR)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
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<td>8</td>
<td>120</td>
<td>1.000</td>
<td>Full Thesis</td>
</tr>
</tbody>
</table>
PROGRESSION RULES AND CRITERIA

EXCLUSION

Extended Curriculum Programme
Students are excluded if they fail any or all subjects registered for in an academic year.

Mainstream
Students are excluded if they fail:
- 50% or more of the subjects registered for in any level of study.
- All the major subjects, namely Construction Management, Quantity Surveying and Construction Technology in any level of study.
- Any subject twice.

PROMOTION

To second year
Students may not progress to the next level of study if they fail 50% or more of the subjects of the first year.

Students may also not progress to the next level of study if they fail all the major subjects, namely Construction Management 1, Construction Technology 1 and Quantity Surveying 1.

To third year
Students must have successfully completed all their first- and second-year subjects for progression into the third year.

Students who are repeating a first-year subject will have the option after the first year of either:
- Completing the subject Building Practice (experiential learning component), along with the three second-year subjects, and then registering for their first-year subject repeats the following year, OR
- Registering for their three second-year subjects as well as the first-year subjects being repeated, and then completing the subject Building Practice the following year.

Re-admission
Any case may be appealed to the Head of Department. The student has recourse to submit in writing an appeal against exclusion or non-re-admission. If the student is not satisfied with the response from the Head of Department, submission for an appeal may be made to the Dean. Interventions during the year include a marks review and an “Early Warning System”, where students are advised of their poor performance. Individual lecturers do this on a subject-to-subject basis, with the Curriculum Officer.
SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

ELECTIVE SUBJECT: This is a subject required for degree purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

*Subjects ending in an ‘X’ are Extended curriculum subjects*
Note that the details below are summarised – refer to the individual Subject Guides for more detail.

**APPLIED BUILDING SCIENCE 1**

**Pre-requisites:** None

**Mode of delivery:** Lectures

**Subject outline:** Applied mathematics – scientific calculator, basic algebra, indices and logarithms, significant figures and estimation, transposition and evaluation of formulae, fractions and percentages, graphs, units and conversions, geometry, areas, volumes, surface areas, frustum of cone/pyramid, setting out mathematical principles, rates, ratios and proportions, sine rule, cosine rule, mid-ordinate rule, trapezoidal rule, Simpson’s rule, prismatic rule, statistics.

 Structural mathematics – force and gravity, vectors and scalars, vector components, resultants, force triangles, polygons.
 Applied mechanics – mass, volume and density (solid, bulk and relative), conditions of static equilibrium, moments, types of loading, beam supports, beam reactions, shear force and bending moments, the structural behaviour of timber, steel and concrete elements under loading.
 Building science – properties of materials, heat, sound, behaviour of fluids, light, electricity.

**Assessment:** All assessments are compulsory. Tests, projects, and tutorials.

**BUILDING PRACTICE 1 (WORK INTEGRATED LEARNING)**

**Pre-requisites:** Construction Management 1, Quantity Surveying 1, Construction Technology 1.

**Mode of delivery:** In-service training.

**Subject outline:** The aim of experiential learning is to give the student, through exposure and guidance, the opportunity to familiarise him/herself in industry with construction principles that have been studied during the theoretical component of the course, apply construction principles in practice with responsibility and accountability, carry out tasks with confidence, participate in effective problem solving, and operate effectively in a team relationship.

**Assessment:** All Assessments are compulsory. Report, portfolio, presentation, and logbook.
COMMUNICATIONS 1
Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Academic literacy, information literacy, written communication, spoken communication, small-group communication.

Assessment: All assessments are compulsory. Assignments and tests

COMPUTER APPLICATIONS 1
Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Computer basics, the Internet and the World Wide Web, introduction to presentations, introduction to word-processing, file management, Microsoft Excel, databases.

Assessment: All assessments are compulsory. Tutorials, assignments and tests.

CONSTRUCTION ACCOUNTING 3
Pre-requisites: ALL first- and second-year subjects MUST be passed before a student will be allowed to register for any third-year subjects.

Mode of delivery: Lectures

Subject outline: Accounting concepts, policies and generally accepted accounting practices in construction accounting

Assessment: All assessments are compulsory. Tutorials, tests, and assignments.
CONSTRUCTION MANAGEMENT 1

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Site administration and cost control, mechanical plant and equipment, management functions, materials management, project planning, safety, human resources management, sub-contractor management.

Assessment: All assessments are compulsory. Tutorials, assignments and tests.

CONSTRUCTION MANAGEMENT 2

Pre-requisites: The following subjects MUST have been passed before a student will be able to register for any second-year subjects: Construction Management 1, Quantity Surveying 1, Construction Technology 1.

Mode of delivery: Complete assignments while working in the Construction Industry

Subject outline: Communication in the micro-environment of the site, management of mechanical plant and equipment, materials management, human resources management, contract administration, administering of construction projects, introduction to construction law, introduction to quality management, health and safety management, introduction to environmental management, facilities management.

Assessment: All assessments are compulsory. Assignments.

CONSTRUCTION MANAGEMENT 3

Pre-requisites: ALL first- and second-year subjects MUST be passed before a student will be allowed to register for any third-year subjects

Mode of delivery: Lectures

Subject outline: Techniques of planning, contract planning, machinery and plant management, materials and logistics, work studies, office and site administration, quality control, contract law, human resource management, labour law, labour relations, health and safety, facilities management.

Assessment: All assessments are compulsory. Assignments and tests.
# CONSTRUCTION TECHNOLOGY 1

**Pre-requisites:** None

**Mode of delivery:** Lectures and lab practicals

**Subject outline:** Interpretation of drawings, lettering, isometric and oblique projection, first and third angle projection, 3D drawing, introduction to AutoCad, Construction Methods, Construction Materials, Building Services, Workshop/Project, Site Visits.

**Assessment:** All assessments are compulsory. Assignments, tests, presentations, and lab practicals.

# CONSTRUCTION TECHNOLOGY 2

**Pre-requisites:** The following subjects MUST have been passed before a student will be able to register for any second-year subjects: Construction Management 1, Quantity Surveying 1, Construction Technology 1.

**Mode of delivery:** Complete assignments while working in the Construction Industry

**Subject outline:** Formwork materials and re-use factors, Pre-cast beams, concrete and floors, Metal doors and windows, timber doors and windows, characteristics of glass, prefabricated timber trusses, roof coverings, eaves, flashings and rainwater goods, Dormer windows and use of attic spaces, fireplaces, fixings fastenings and adhesives, floor, wall and ceiling finishes, drainage and plumbing details, paint to metal plaster and timber, industrial building systems.

**Assessment:** All assessments are compulsory. Assignments

# CONSTRUCTION TECHNOLOGY 3

**Pre-requisites:** ALL first- and second-year subjects MUST be passed before a student will be allowed to register for any third-year subjects.

**Mode of delivery:** Lectures and lab practicals

**Subject outline:** Definition of multi-floor concepts, demolitions, protection of public and adjoining properties, soils and excavations, foundations and piles, basements and retaining walls, concrete structures, steel structures, cladding, installation of services, finishes.

**Assessment:** All assessments are compulsory. Assignments, tests and tutorials.
PRICE ANALYSIS AND ESTIMATING 3
Pre-requisites: ALL first- and second-year subjects MUST be passed before a student will be allowed to register for any third-year subjects.

Mode of delivery: Lectures


Assessment: All assessments are compulsory. Assignments and tests.

QUANTITY SURVEYING 1
Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Introduction to the quantity surveying profession; the form of the “bills of quantities”; items, order and unit of measurement; dimension preparation, measuring and “working up” applicable to simple single-storey buildings; external finishes; schedules; bills of quantities preparation; abstracting and billing of a simple structure.

Assessment: All assessments are compulsory. Tutorials, Assignments and tests.

QUANTITY SURVEYING 2
Pre-requisites: The following subjects MUST have been passed before a student will be able to register for any second-year subjects: Construction Management 1, Quantity Surveying 1, Construction Technology 1.

Mode of delivery: Complete assignments while working in the Construction Industry

Subject outline: Foundations (stepped, raft, passings), roofs (hips and valleys, construction, covering, eaves and verges, rainwater disposal), finishes, windows and doors, bill production, preambles, preliminaries bill, valuation and construction work.

Assessment: All Assessments are compulsory. Assignments.
QUANTITY SURVEYING 3
Pre-requisites: ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects.
Mode of delivery: Lectures
Subject outline: “Standard system of measuring building work”; interpret and apply the directives given to the measuring process; the order of trades, and items in the bills of quantities; critically evaluate the quality of information supplied on working drawings; accurately measure from drawings, and be able to “book” the dimensions in the correct format; apply the necessary mathematical formulas required to calculate areas and volumes; understand the “abstracting” and “billing” processes in compiling a “bills of quantities” for a simple structure.
Assessment: All assessments are compulsory. Tests.

SITE SURVEYING 1
Pre-requisites: None
Mode of delivery: Lectures and practicals
Subject outline: Basic principles of surveying, linear surveying, levelling, theodolite, setting out, introduction to electronic survey equipment.
Assessment: All assessments are compulsory. Practicals and tests.

STRUCTURES AND CONCRETE 3
Pre-requisites: ALL first- and second-year subjects MUST be passed before a student will be allowed to register for any third-year subjects.
Mode of delivery: Lectures and practicals
Subject outline: Structural analysis; the theorem of Pythagoras; trigonometric ratios for rightangled triangles; introduction to forces; moment of a force; equilibrium of structures; forces in frameworks; cross-sectional properties; standard steel sections; direct stress and strain; theory of elastic bending. concrete technology, cement, mortar and concrete; testing of concrete; transporting equipment and placing; reinforcing steel and pre-stressed concrete; building construction; introduction to formwork and formwork materials.
Assessment: All assessments are compulsory. Assignments and tests.
BTECH SUBJECTS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

ADVANCED STRATEGIC MANAGEMENT 4

Pre-requisites: None.

Mode of delivery: Lectures

Subject outline: Introduction to strategic management, strategic management approaches, functions of management, the business environment and external stakeholders, strategy analysis and choice, strategic planning, implementation and control, management by objectives, managing change, corporate communication, small business management, business ethics and social responsibility, contemporary management issues relevant to strategic management, leadership and culture, international strategies, practical application of strategic management.

Assessment: All assessments are compulsory. Tests and assignments, and tutorials.

BUILDING ENTREPRENEURSHIP 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Learn the concept of entrepreneurship; understand the relationship between the economy and the entrepreneur; discover the essential difference between entrepreneurship and small business; establishing a strategy for ethical responsibility; the implementation factors of entrepreneurship; financial factors for the entrepreneur; the business plan; Copyright Act; Patents Act; international entrepreneurship – globalisation; international entrepreneurship – the political factor; international entrepreneurship – the cultural impact and international cultural environments; the economic environment; the global monetary system and foreign exchange market.

Assessment: All assessments are compulsory. Assignments and tests.

CONSTRUCTION ECONOMICS 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Micro-economics, outline of economic Economics theory to economic activities. Output and the effect on prices of construction work and re-work. Price and market

Assessment: All assessments are compulsory. Tests and assignments.

**CONSTRUCTION LAW AND PROCEDURES 4**

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Basic principles of South African Law, law of contracts, principles of construction law, detailed study of the standard conditions in building and civil engineering contracts commonly used in South Africa; the tendering process, payment valuations, payment certificates, contract instructions, escalation, final account preparation and settlement, health and safety, construction regulations, claims and claims procedures

Assessment: All assessments are compulsory. Tests.

**CONSTRUCTION MANAGEMENT 4**

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Optimum use of available funds; control of the scope of the work; project scheduling; optimum use of design and construction firms’ skills and talents, avoidance of delays, changes and disputes; enhancing project design and construction quality; optimum flexibility in contracting and procurement.

Assessment: All Assessments are compulsory. Assignments and tests.
DEVELOPMENT MANAGEMENT 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Elements and principles of management; introductions to regional and urban economics; land, regional and town planning; human settlements and squatter settlement; township development; development procurement methods; Reconstruction and Development Programme – South Africa, community development, project management of mass and low-cost housing projects.

Assessment: All assessments are compulsory. Assignments and tests.

FACILITY MANAGEMENT 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Facility management industry, global and south african; modern facility management; real estate; finance; project management; technology; human and environmental factors; building systems; energy management and green building; quality management and assessment.

Assessment: All assessments are compulsory. Assignments and tests.

HEALTH AND SAFETY MANAGEMENT SYSTEMS AND PROCEDURES 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: The nature of construction health and safety; occupational health, hygiene, primary health and health promotion; occupational safety; construction ergonomics; HIV and AIDS; psychology of health and safety; roles and responsibilities of industry participants; roles, responsibilities and accountability of management; health and safety education and training; health and safety legislative framework; hazard identification and managing risk; designing for health and safety; procurement and cost of health and safety; health and safety management systems; communication and meetings; health and safety audits and inspections; theories of accident causation; investigations and reporting; measuring health and safety performance; international health and safety.

Assessment: All assessments are compulsory. Tests, assignments and tutorials.
MARKET VALUATIONS 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Understand, interpret and apply what the market is saying; needing to be forward thinking in the valuation process; aspects of engineering, town planning, law, architecture, quantity surveying, property development, economics and mathematics; general economic climate (both South African and world trends); the state of the property market and general “money” principles; introduction to the basics of the economy; the state of the property industry and techniques of various valuation methods.

Assessment: All assessments are compulsory. Assignments, tests and tutorials.

MAINTENANCE MANAGEMENT 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: To identify the various management approaches involved in maintaining and refurbishing buildings; to explain the various types of maintenance and their resourcing arrangements; to outline the functions involved in recording, storing and analysing data for building service installations; the use of data to refine policy and determine strategies for maintenance and refurbishing; outlining the factors involved when developing cost modelling for maintenance and refurbishing; producing programmes for planned maintenance for groups of buildings; developing performance criteria and outline procedures for monitoring performance.

Assessment: All Assessments are compulsory. Assignments and Tests

QUANTITY SURVEYING 4: CIVIL; AND QUANTITY SURVEYING 4: BUILDING

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: To conduct a detailed study of the measurement and documentation of more specialised elements of building work, to conduct a detailed study of the measurement and documentation of electrical and mechanical installations, to conduct a detailed study of the measurement and documentation of civil engineering work, to use and apply specialist computer software (WinQS) in order to attain the above three objectives.

Assessment: All assessments are compulsory. Assignments and tests.
RESEARCH METHODOLOGY

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Considering that the body of knowledge in construction is established and advanced by the use of appropriate methodologies and methods of research, this subject is designed to outline the process of research, while discussing the main issues in research, as well as examining the various approaches to research. It will provide guidance on how to solve problems rigorously and present these solutions in the form of a written document.

Assessment: All assessments are compulsory. Assignments, report, and presentation.

RISK MANAGEMENT 4

Pre-requisites: None

Mode of delivery: Lectures

Subject outline: Introduction to risk concepts, projects and risk; the project environment; understanding the human aspects; risk and value management; qualitative and quantitative methods of risk assessments and analysis; IT and risk modelling and simulation; risk allocation in the project cycle; managing financial risks; risk management at corporate, strategic business and project levels; practical risk management.

Assessment: All assessments are compulsory. Tests and assignments.
## DEPARTMENT OFFICE-BEARERS

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>Email</th>
</tr>
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<tbody>
<tr>
<td>Head of Department</td>
<td>Mr B B J Groenewald, MSc Electrical</td>
<td>021 959 6859</td>
<td><a href="mailto:GroenewaldB@cput.ac.za">GroenewaldB@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Engineering, BCom, HDE</td>
<td></td>
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</tr>
<tr>
<td>Secretary</td>
<td>Ms J Rogers</td>
<td>021 460 3083</td>
<td><a href="mailto:RogersJ@cput.ac.za">RogersJ@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Ms D de Jongh</td>
<td>021 959 6246</td>
<td><a href="mailto:deJonghD@cput.ac.za">deJonghD@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Mrs C Engel</td>
<td>021 959 6859</td>
<td><a href="mailto:EngelCL@cput.ac.za">EngelCL@cput.ac.za</a></td>
</tr>
<tr>
<td>Head of Programme</td>
<td>Dr Z T Nkosi, PhD Engineering Mathematics</td>
<td>021 959 6859</td>
<td><a href="mailto:NkoziZ@cput.ac.za">NkoziZ@cput.ac.za</a></td>
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## DEPARTMENTAL STAFF

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<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Qualifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>Prof M T E Kahn</td>
<td>BSc Engineering, DTech Electrical Engineering</td>
</tr>
<tr>
<td>Professor</td>
<td>Prof R Tzoneva</td>
<td>Doctor Philosophiae</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>AProf R R van Zyl</td>
<td>Baccalaureus in Engineering, MSc Engineering, Philosophiae Doctor</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>Dr V Balyan</td>
<td></td>
</tr>
<tr>
<td>Adjunct Professor</td>
<td>Dr E Biermann</td>
<td>PhD Computer Science</td>
</tr>
<tr>
<td>Adjunct Professor</td>
<td>Prof G De Jager</td>
<td>PhD Electrical Engineering, MBL</td>
</tr>
<tr>
<td>Adjunct Professor</td>
<td>Prof PA Petev</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Adjunct Professor</td>
<td>Prof PA Apostolov</td>
<td>PhD Electrical Engineering</td>
</tr>
<tr>
<td>Adjunct Professor</td>
<td>Dr B Opperman</td>
<td>PhD Electrical Engineering</td>
</tr>
<tr>
<td>Adjunct Professor</td>
<td>Dr R Lehmansiek</td>
<td>PhD Electrical Engineering</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Dr M L Adonis</td>
<td>DTech Electrical Engineering</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr S Behardien</td>
<td>BSc Eng</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Dr W L O Fritz</td>
<td>PrEng, MSc (Elec Eng), DTech (Eng)</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Dr K Govender</td>
<td>MSc (Eng), PhD (Physics)</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr D C Kallis</td>
<td>NHD. Elec Eng: Light Current</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Dr C Kriger</td>
<td>DTech Electrical Engineering, CREP</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Dr P Lazanas</td>
<td>PrTechEng, PhD Electrical Engineering</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Dr L Mwansa</td>
<td>PhD Computer Science and Engineering, PMSA</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Dr Z T Nkosi</td>
<td>PhD Engineering Mathematics, HDE, FSAMS</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Dr A K Raji</td>
<td>BSc Electrical Engineering, MTech Electrical Engineering, DTech Electrical Engineering</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr M Sitshinga</td>
<td>PrTechEng, MBA, MTech Entrepreneurship, MDipTech</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr F Visser</td>
<td>MSc Electrical Engineering</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr E Voss</td>
<td>Dipl.Ing (Germany) MSc (Eng) FSAIEE</td>
</tr>
<tr>
<td>Position</td>
<td>Name</td>
<td>Qualifications</td>
</tr>
<tr>
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</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr C V Whaits</td>
<td>MSc (Eng)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr L G Abrahams,</td>
<td>NHD Elec Eng: Light Current, Master's Diploma Technology</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms A Abrahams</td>
<td>BEd (hons), MEd (Education)</td>
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<tr>
<td>Lecturer</td>
<td>Mr V Archer</td>
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<tr>
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<td>Mr Q J Bart</td>
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<tr>
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<tr>
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</tr>
<tr>
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<td>Lecturer</td>
<td>Mr R K Setshedi</td>
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<td>Mr B Hicks</td>
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<td>Mr L Khetla</td>
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<td>Mr AHM Meru</td>
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<tr>
<td>Development Engineer</td>
<td>Mr CR Jooste</td>
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<td>Engineer-in-Training</td>
<td>Mr CD Olivier</td>
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<td>Engineer-in-Training Senior</td>
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<td>Mr S Nkwana</td>
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<tr>
<td>Research Administrative Staff</td>
<td>Mr WA van Zyl</td>
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QUALIFICATIONS OFFERED

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<tr>
<th>Qualification Type</th>
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<th>Minimum Duration</th>
<th>Maximum Duration</th>
<th>Work Integrated Learning</th>
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ND: ENGINEERING: COMPUTER SYSTEMS

Course aim
The engineering industry contributes to the technical, social, economic and environmental infrastructure of the country, leading to socio-economic growth. These qualifications are intended for technician and technologist level employment in industry. The framework of engineering qualifications develops the human resources essential for sustaining this profession.

A person achieving a qualification will:
- Demonstrate well-rounded general engineering knowledge, of the main terms, procedures, principles and operations in the field of electrical and electronic engineering;
- Be able to follow developments in the field and critique the status of current knowledge;
- Be able to apply the knowledge gained to new situations, both concrete and abstract, in the workplace/community;
- Be able to gather evidence from primary sources and journals using effective retrieval skills, and organise, synthesise and present the information professionally in a mode appropriate to the audience;
- Have the ability to develop him/herself professionally;
- Be capable of independent decision making taking into account the relevant technical, economic, social and environmental factors;
- Be able to work independently, and as a member of a team;
- Be equipped for further studies;
- Have met the academic requirements for registration with the Engineering Council of South Africa (ECSA);
- As a computer systems technician, be able to design, implement, install and maintain computer hardware, software and networks. Since computers affect every facet of modern society, graduates should have little difficulty in obtaining fulfilling employment.

Purpose and rationale of the qualification
A learner who has completed this qualification will be competent in providing professional, technical and developmental support in the computer industry.

Career opportunities
Graduates apply proven techniques and procedures to the solution of practical engineering problems and carry a range of technical responsibilities. The career route offers challenging work in all areas of electrical engineering. Graduates are usually placed in one of five main areas, namely, manufacturing, commissioning and maintenance, design and development, consulting and sales.
Graduates find employment at the following organisations among others: MTN, Eskom, Tellumat, Caltex, Siemens, Vodacom, Telkom, Transtel, Grand West Casino, South African Weather Service, South African Observatory, Air Traffic and Navigation Services, Spoornet.

While the demand for Electrical Engineering graduates is high, the University encourages an entrepreneurial spirit among its students through the integration of appropriate business skills and incentives within the mainstream programme. The technical skills acquired should enable entrepreneurial-minded individuals to identify and develop viable business entities.

**Admission requirements**
For the minimum admission requirements, see admissions pages.

**Professional Registration**
The ND: Computer Systems is accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technicians.

*Note: A system of pre- and co-requisites applies.*

**Experiential Learning**
Experiential learning should be completed in the third year of study.

**Offering type and duration of course**
**Full-time:** Three and a half years, including one year experiential learning  
**Part-time:** Six years

**Venues of Offering**
Bellville

**IMPORTANT UPDATE:** Building work has been delayed on the new Electrical Engineering Building in Bellville. Therefore from January 2016:
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- Cape Town BTech Industrial Electronics and Computer Systems students will continue attending classes in Cape Town, and only move to Bellville in July.
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- ALL MTech and DTech students will study in Bellville from January 2016.
### ND: ENGINEERING: COMPUTER SYSTEMS (NDECOM)

All subjects compulsory

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<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
<th>NQF Exit Level</th>
<th>SAQA Credit</th>
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<th>Assessment Type</th>
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ND: ENGINEERING: ELECTRICAL

Course aim
The engineering industry contributes to the technical, social, economic and environmental infrastructure of the country, leading to socio-economic growth. These qualifications are intended for technician and technologist level employment in industry. The framework of engineering qualifications develops the human resources essential for sustaining this profession.

A person achieving a qualification will:
• Demonstrate well-rounded general engineering knowledge of the main terms, procedures, principles and operations in the field of electrical and electronic engineering;
• Be able to follow developments in the field and critique the status of current knowledge;
• Be able to apply the knowledge gained to new situations, both concrete and abstract, in the workplace/community;
• Be able to gather evidence from primary sources and journals using effective retrieval skills, and organise, synthesise and present the information professionally in a mode appropriate to the audience;
• Have the ability to develop him/herself professionally;
• Be capable of independent decision making taking into account the relevant technical, economic, social and environmental factors;
• Be able to work independently, and as a member of a team;
• Be equipped for further studies;
• Have met the academic requirements for registration with the Engineering Council of South Africa (ECSA).

Areas of Specialisation
Students should select one of five specific streams:

Control Systems
Dealing with theoretical and practical concepts in the measurement, acquisition and control of various manufacturing and/or refining processes, this sub-discipline places emphasis on the use of industry-related techniques and tools such as programmable logic controllers (PLCs), classic and modern control strategies and industry-standard software development tools, in order to bring a level of optimisation and efficiency to the process at hand. Students have access to modern laboratory facilities allowing for the immediate application of theoretical concepts.

Electronic Communication
This sub-discipline involves the study of concepts related to the efficient transmission of information, from traditional analog radio frequency (RF) techniques to modern digital methods. Students pursuing this sub-discipline have access to a modern
telecommunications laboratory, equipped with the necessary educational tools and instrumentation to reinforce theoretical concepts.

**Power Electronics**
This sub-discipline concentrates on the distribution and control of electrical energy. Power electronics is a key enabling technology in almost all electronic systems. It is increasingly important in the grid interface of renewable energy sources and in energy management. Electrical motor controllers, electrical protection, inverters and power factor correction are examples of power electronic circuits. Students pursuing this sub-discipline have access to modern power electronics and power systems laboratories, equipped with the necessary equipment to reinforce theoretical concepts.

**Power Systems**
This sub-discipline concentrates on the generation, distribution and control of electricity with the aid of computing techniques. The electrification needs of South Africa require individuals with the above competencies. Students following this sub-discipline have access to well-equipped power engineering and computer laboratories.

**Industrial Electronics**
Industrial electronics is largely concerned with the application, development and maintenance of electronic systems and processes in industry. Students have access to modern laboratory facilities allowing for the immediate application of theoretical concepts.

**Career opportunities**
Graduates apply proven techniques and procedures to the solution of practical engineering problems and carry a range of technical responsibilities. The career route offers challenging work in all areas of electrical engineering.

Graduates are usually placed in one of five main areas, namely manufacturing, commissioning and maintenance, design and development, consulting, and sales.

Graduates find employment at the following organisations among others: MTN, Eskom, Tellumat, Caltex, Siemens, Vodacom, Telkom, Transtel, Grand West Casino, South African Weather Service, South African Observatory, Air Traffic and Navigation Services, Spoornet.

While the demand for Electrical Engineering graduates is high, the University encourages an entrepreneurial spirit among its students through the integration of appropriate business skills and incentives within the mainstream programme. The technical skills acquired should enable entrepreneurial-minded individuals to identify and develop viable business entities. Admission requirements

For the minimum admission requirements, see admissions pages.
Professional Registration
The ND: Engineering: Electrical is fully accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technicians.

Note: A system of pre- and co-requisites applies. Subjects at each level are made up of compulsory, core and optional offerings. A number of other subjects, depending on the stream chosen, are considered to be core and must be taken by all students following that stream.

Please consult the Department.

Experiential Learning
Experiential learning may also be undertaken after completion of ten academic subjects.

Offering type and duration of course
Full-time: Three years, including one year experiential learning

Venues of Offering
Bellville

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- ALL MTech and DTech students will study in Bellville from January 2016.
ND: ENGINEERING: ELECTRICAL (CONTROL SYSTEMS) (NDELCS)

Select two of the three electives indicated with **

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<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
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| 2 S3            | ELT300S          | Electronics 3 | C | ELE200S, ELE200S | 6 | 12 | 0.1 | Continuous |
| 2 S3            | MAT301S          | Mathematics 3 | C | MAT206S | 6 | 12 | 0.1 | Continuous |
| 2 S3            | PMM100S          | Programming 1 | C | CMS101S | 6 | 12 | 0.1 | Continuous |
| 2 S3            | EPJ200S          | Projects 2 | C | EPJ100S | 6 | 12 | 0.1 | Continuous |
| 2 S4            | DES300S          | Design Project 3 | C | 1.5 Credits | 6 | 12 | 0.1 | Continuous |
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(No entry to second year unless credits have been obtained for all above compulsory subjects)

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### ND: ENGINEERING: ELECTRICAL (INDUSTRIAL ELECTRONICS) (NDELIE)

All subjects compulsory

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(No entry to second year unless credits have been obtained for all above compulsory subjects)

| 2 S3            | ELM200S          | Electrical Machines 2 | C ELE200S                           | 6 12                  | 0.1                         | Continuous      |
| 2 S3            | ELT300S          | Electronics 3         | C ELT200S                           | 6 12                  | 0.1                         | Continuous      |
| 2 S3            | MTT300S          | Measurement Technology 3 | C ELE200S, MAT206S                | 6 12                  | 0.1                         | Continuous      |
| 2 S3            | PMM100S          | Programming 1         | C --                                | 6 12                  | 0.1                         | Continuous      |
| 2 S3            | EPJ201S          | Projects 2            | C EPJ100S                           | 6 12                  | 0.1                         | Continuous      |
| 2 S4            | DIG300S          | Digital Systems 3     | C DIG201S, PMM100S                  | 6 12                  | 0.1                         | Continuous      |
| 2 S4            | DES302S          | Design Project 3      | C 1.5 Credits                       | 6 12                  | 0.1                         | Continuous      |
| 2 S4            | ICL300S          | Industrial Control 3  | C ELE200S, ELM200S                  | 6 12                  | 0.1                         | Continuous      |
| 2 S4            | MAT301S          | Mathematics 3         | C MAT206S                           | 6 12                  | 0.1                         | Continuous      |
| 2 S4            | POW300S          | Power Electronics 3   | C MAT206S, ELM200S                  | 6 12                  | 0.1                         | Continuous      |
ND: ENGINEERING: ELECTRICAL (EXTENDED CURRICULUM)

Course aim
In the Extended Curriculum with Foundational Provision Programme, first year subjects of the National Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two-year Foundational Programme, students will integrate with the normal programme.

Duration of course
Full-time: The four-year programme comprises six academic semesters and two semesters of inservice training.

Venues of Offering
Bellville

IMPORTANT UPDATE: Building work has been delayed on the new Electrical Engineering Building in Bellville. Therefore from January 2016:
- ALL First Year Electrical Engineering and Computer Systems students (Mainstream, and ECP Year 0 & 1) will attend classes in Bellville.
- Cape Town Second and third year students will continue attending classes in Cape Town, and only move to Bellville in July.
- Cape Town BTech Industrial Electronics and Computer Systems students will continue attending classes in Cape Town, and only move to Bellville in July.
- BTech Power Systems will attend classes in Bellville from January 2016.
- ALL MTech and DTech students will study in Bellville from January 2016.
BTECH: ENGINEERING: ELECTRICAL

Course aim
Graduates are competent technologists, capable of decision making requiring mature judgement, and will have the ability to conceive, identify and optimise technical solutions. Learners have the option of specialising in one of six specific sub-disciplines:
- Computer Systems
- Control Systems
- Electronic Communication
- Industrial Electronics
- Power Electronics
- Power Systems

Purpose and rationale of the qualification
A qualifying learner will be competent to design, implement and control production, testing, planning, construction, commissioning and maintenance in the field of Electrical Engineering by applying technical knowledge, engineering principles, innovative design, problem-solving techniques and managerial skills.

S/he will be capable of exercising independent technological judgement and responsible decision-making by taking into account the relevant financial, economic, commercial, social, environmental and statutory factors.

Career opportunities
The career offers challenging work in all areas of Electrical Engineering. Graduates usually work in one of five main areas, namely manufacturing, commissioning and maintenance, design and development, consulting and sales.

Admission requirements
- National Diploma: Engineering: Electrical, including a credit for Mathematics 3, and with an overall average for specific subjects per sub-discipline of at least 60%.
- An equivalent qualification with the necessary pre-requisites for the subjects taken in the BTech: Engineering: Electrical qualification.

Professional registration
The BTech: Engineering: Electrical is accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technologists.
Programme structure
The Baccalaureus Technologiae is achieved after successful completion of at least 10 credits (usually spread over two semesters) of academic coursework at the University. Unless otherwise specified, a subject successfully completed is worth 0.1 credits.

Sub-disciplines Control Systems, Electronic Communication, Power Systems, and Power Electronics are available on the Bellville Campus only and sub-disciplines Computer Systems, and Industrial Electronics are available on the Cape Town campus only, until the whole of the Department of Electrical Engineering is consolidated on the Bellville campus.

Duration of Course
Full-time: Minimum of one year.
Part-time: Two years.

Venues of Offering
Bellville

IMPORTANT UPDATE: Building work has been delayed on the new Electrical Engineering Building in Bellville. Therefore from January 2016:
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- ALL MTech and DTech students will study in Bellville from January 2016.
## BTECH: ENGINEERING: ELECTRICAL - CONTROL SYSTEMS (BTELCS)
All subjects compulsory

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## BTECH: ENGINEERING: ELECTRICAL – ELECTRONIC COMMUNICATION (BTELCM) All subjects compulsory

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BTECH: ENGINEERING: ELECTRICAL – POWER ELECTRONICS (BTELPE)
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**BTECH: ENGINEERING: ELECTRICAL - POWER SYSTEMS (BTELPS)**

Select three of the five electives

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<th>Subject Name</th>
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## BTECH: ENGINEERING: ELECTRICAL - INDUSTRIAL ELECTRONICS (BTELIE)
All subjects compulsory

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<th>Year/Sem Subject</th>
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## BTECH: ENGINEERING: ELECTRICAL - COMPUTER SYSTEMS (BTELCP)
All subjects compulsory

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MTECH: ENGINEERING: ELECTRICAL

Course aim
The course equips students with the necessary knowledge and skills to conduct independent research in electrical engineering and to contribute to knowledge production through the understanding, application and evaluation of existing and new knowledge.

New qualifications for 2016
The new Master of Engineering (MEng) is being offered from 2016. The new qualifications ensure that the curriculum offered at CPUT can be directly compared to that of other institutions; not only nationally, but also internationally through the benchmarking process that took place during the development of these new qualifications.

Pipeline MTech students will be able to continue with their MTech, or convert to the new Master of Engineering (MEng). BTech graduates who want to register for the MEng may be required to complete additional modules as determined by the department. For more information go to the “New Qualifications” link on the Engineering page.

Purpose and Rationale of the qualification
A qualifying learner will conduct independent research, under minimum guidance, in a chosen field of Electrical Engineering, and contribute to knowledge production in that field. The research problem, its justification, process and outcome is reported in a dissertation that complies with the generally accepted norms for research at that level.

Career opportunities
Graduates may follow a career in research and development in industry, or may be employed at research institutes. They are also employed in teaching and research positions at higher education institutions.

Admission requirements
A BTech in Engineering: Electrical including Engineering Mathematics 4 (or an equivalent qualification), with a pass in Research Methodology, is required.

Offering type and duration of course
Full-time: Minimum of one year
Part-time: Minimum of two years

Venues of Offering
Bellville
### MTECH: ENGINEERING: ELECTRICAL (MTELER)

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<th>Period of Study</th>
<th>Year/Sem Subject</th>
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### MASTER OF ENGINEERING IN ELECTRICAL ENGINEERING (MGELER)

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DTECH: ENGINEERING: ELECTRICAL

Course aim
Graduates develop the competence to conduct independent research in the field of electrical engineering and contribute significantly to the body of knowledge through the understanding, application and evaluation of existing knowledge.

New qualifications for 2016
The new Master of Engineering (MEng) is being offered from 2016. The new qualifications ensure that the curriculum offered at CPUT can be directly compared to that of other institutions; not only nationally, but also internationally through the benchmarking process that took place during the development of these new qualifications.

Pipeline MTech students will be able to continue with their MTech, or convert to the new Master of Engineering (MEng). BTech graduates who want to register for the MEng may be required to complete additional modules as determined by the department. For more information go to the “New Qualifications” link on the Engineering page.

Purpose and Rationale of the qualification
A qualifying learner will conduct independent research, under minimum guidance, in a chosen field of electrical engineering, and contribute to knowledge production in that field. The research problem, its justification, process and outcome is reported in a dissertation that complies with the generally accepted norms for research at that level.

Career Information
Graduates follow a career in research and development in industry, and are employed at research institutes. They may also find employment in research positions at higher education institutions.

Offering type and duration of course
Full-time: Three years

Venues of Offering
Bellville
DEPARTMENT OF ELECTRICAL, ELECTRONIC AND COMPUTER ENGINEERING

**DTECH: ENGINEERING: ELECTRICAL (DTELER)**

all subjects compulsory

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**DOCTOR OF ENGINEERING IN ELECTRICAL ENGINEERING (DGELER)**

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PROMOTION CRITERIA: ELECTRICAL ENGINEERING

Academic Exclusion Rules and Appeal: Electrical Engineering

A National diploma candidate shall not be permitted to renew his or her registration except by permission of the Dean and or Head of Department, if he or she fails to complete the subjects as prescribed below:

a) For first-semester subjects within one year [two semesters] after his/her first registration for the diploma;

b) For second-semester subjects within two years [four semesters] after his/her first registration for the diploma;

c) Referring to sections a and b, it is a requirement that a candidate complete all first- and second-semester subjects before enrolling for the third semester;

d) For third semester subjects within three years after his/her first registration for the diploma;

e) Maximum time to complete the National Diploma is six years, which includes one year inservice training.

Appeals

a) Notwithstanding the above, the department has an appeals process, which affords excluded candidates an opportunity to appeal such an exclusion and present mitigating factors.

b) Departments formally present such an excluded candidate to the Dean at the earliest occasion subsequent to the exclusion.
SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for qualification purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

Subjects ending in an ‘X’ are Extended Curriculum subjects.
NATIONAL DIPLOMA SUBJECTS
Electrical Engineering and Computer Systems

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

**COMMUNICATION SKILLS 1**

**Pre-requisites:** None

**Mode of delivery:** 5 periods/week (3 lectures, 2 tutorials)

**Subject outline:** Academic literacy, information literacy, written communication, spoken communication, small group communication.

**Assessment:** All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

**COMPUTER SKILLS 1**

**Pre-requisites:** None

**Mode of delivery:** 3 practical periods/week

**Subject outline:** Use the Windows operating system to manipulate folders and files; use a word processor to create, format and print documents; use a spreadsheet to solve problems and display the results; use a presentation tool to prepare a presentation.

**Assessment:** All assessments are compulsory. Tutorials, practical tests.

**COMPUTER SYSTEMS PRACTICE 1 AND COMPUTER SYSTEMS PRACTICE 2**

**Pre-requisites:** At least 16 subjects

**Mode of delivery:** 12 months practice in industry (Report and Presentation)

**Subject outline:** The aim of experiential learning is to give the student, through exposure and guidance, the opportunity to, familiarise him/herself in industry with construction principles that have been studied during the theoretical component of the course; apply construction principles in practice with responsibility and accountability; carry out tasks with confidence; participate in effective problem solving; and operate effectively in a team relationship.

**Assessment:** All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.
DATABASE PRINCIPLES 3

Pre-requisites: Programming 2, Systems Analysis 2

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: Database systems, data models, the relational database model, entity relationship (ER) modelling, introduction to Structured Query Language (SQL), advanced SQL.

Assessment: All assessments are compulsory. Theory evaluation, practical evaluation.

DESIGN PROJECT 3

Pre-requisites: Programming 2, Systems Analysis 2, Network Systems 2

Co-requisites: Programming 3, Network Systems 3, Database Principles 3, Digital Systems 3

Mode of delivery: 8 periods/week (3 lectures, 5 practicals)

Subject outline: Light current and computers: This unit is intended to guide and train the learner in the art of integrating all the various aspects involved in the execution of an engineering project, from conception through to the final building, testing, and analysis of a prototype, and the completion of the documentation.

Heavy current: This unit is intended to guide and train the learner in the art of integrating all the various aspects involved in the execution of an engineering project, from the conception through to the final deliverables. The liaison with clients, consultants, suppliers, contractors and other team members is emphasised.

Assessment: All assessments are compulsory. Proposal assignment, cost estimate, library report, test, project.

DIGITAL SYSTEMS 1

Pre-requisites: None

This subject is intended to enable the learner to develop a good understanding of digital electronics and systems and their importance in the technology units studied elsewhere in this programme and as applied in industry.

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: Understand basic computer logic concepts and functions to prepare a base for a deeper understanding of digital fundamentals; develop an understanding of how a computer number crunches and study the different number systems and codes that exist; understand the operation, application and trouble-shooting of logic gates; grasp the laws, rules and theorems of Boolean algebra; gain the ability to simplify (reduce) and combine
logic circuits using the methods of Boolean algebra and Karnaugh maps, which includes
the analysis, design and trouble-shooting of various combinational logic circuits, inclusive of
adders, comparators, decoders, encoders, code converters, multiplexers, de-multiplexers
circuits with reference to fixed-function IC devices; study the fundamentals of sequential
logic using two categories of bi-stable devices, namely the latch and flip-flops, and the basic
application thereof in counters, registers and other sequential control logic such as basic two
bit synchronous and asynchronous counters.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory
work, Final Summative Assessment.

DIGITAL SYSTEMS 2

Pre-requisites: Digital Systems 1

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: This unit is intended to enable the student to develop a good understanding
digital electronics and systems and their importance in the technology units studied
elsewhere in this programme.

Course outline: Pulsed circuits, flip-flops, retriggerable and non-retriggerable one-shots
(monostables), 555-timers, Schmitt-trigger circuits, sequential circuits, digital-to-analogue
and analogue-to-digital conversion, TTL and CMOS circuits, IC manufacture, ROM, RAM,
PROMs, static RAMs (SRAMs) and dynamic RAMs (DRAM’s), use of PLDs to implement
Boolean logic functions, BCD-to-seven-segment decoders and LEDs or LCDs in display
systems, dot matrix displays, introduction to the PIC family of micro-controllers.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Laboratory
test, Final Summative Assessment (50% on lab test; 40% on Final Summative Assessment).

DIGITAL SYSTEMS 3

Pre-requisites: Digital Systems 2

Mode of delivery: 8 periods/week (3 lectures, 5 practicals)

Subject outline: Analyse a problem/project in order to produce a precise specification of
user requirements; develop a solution to solve the problem through sequential, flow or line
diagrams; implement a software version of the solution using the Assembler language; test
software effectively on a simulator and a practical circuit; communicate effectively using both
written and oral techniques; evaluate software against its specification.

Assessment: All assessments are compulsory. Assignments, class tests; tutorials, practical
assessment, Final Summative Assessment.
ELECTRICAL DISTRIBUTION 3

Pre-requisites: Electrical Engineering 1, Electrical Machines 2

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: The majority of the industrial, commercial and residential loads are connected to the distribution systems. This unit will teach the radial and ring distribution system with both AC and DC load customers connected to it. The construction and operation of the different types of insulation materials, insulators, and cables used in the distribution system will be analyzed. The short, medium and long transmission lines and its effect of corona, sag, power loss, and voltage regulation, sending and receiving end powers and efficiency of the transmission lines will be analyzed. The insulation resistance, capacitance and dielectric loss on the underground cables will be analyzed. The MATLAB programming and SimPowerSystem Tool box softwares are used to analyse the load profiles and operation characteristics of the distribution system and efficiency of the medium transmission lines.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment, Practical test

ELECTRICAL ENGINEERING 1

Pre-requisites: None

Electrical Engineering 1 is the language of electrical engineering. This subject will introduce the student to many of the concepts required for the study of all branches of this exciting science. This subject is for technicians who need to study electrical engineering in general. It forms the general backbone knowledge for all electrical engineering studies.

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: Understand the basic science principles for electrical engineering; electrical units and Ohm’s laws; identify electrical conductors, insulators and resistance; identify and understand the operation of different voltage cells; basic DC analysis; AC fundamental concepts; magnetism and magnetic circuits; inductance; capacitance; simple AC analyses using complex mathematical notation.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment
ELECTRICAL ENGINEERING 2

Pre-requisites: Electrical Engineering 1

This unit is intended to enable the student to develop a good understanding of electrical engineering principles and their importance in the technology offerings studied elsewhere in the programme.

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: Single-phase AC networks, three phase circuits, power factor correction, resonance, harmonics, network analysis, electrical safety.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

ELECTRICAL ENGINEERING 3

Pre-requisites: Electrical Engineering 2, Mathematics 2, Electrical Machines 2

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: Analyse a problem/project in order to produce a precise solution; create a sketch/drawing to represent the problem; simulate the problem; test the simulation effectively; communicate effectively using both written and oral techniques; evaluate measurements against prior calculations; calculate unbalanced loads; understand Star/Delta transformation, power factor correction, symmetrical components.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

ELECTRICAL MACHINES 2

Pre-requisites: Electrical Engineering 1

This unit is intended to enable the student to develop a good understanding of electrical machines principles and their importance in the technology offerings studied elsewhere in the program.

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: DC machines: construction and components of basic DC machines; types of DC machines, their applications, torque and speed characteristics; speed values of DC motors; the process of switching DC motors on and off practically; losses in DC machines. AC machines: construction and components of a basic AC motor; different types of AC
machines, their applications, torque and speed characteristics; torque and power output; the process of switching AC motors on and off.

Single phase transformers: Construction of a basic single phase transformer and determining the basic components of such a machine; outputs of the transformers under different loads; losses in transformers practically using no load and short-circuit test; efficiency of transformers using either primary or secondary values.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

**ELECTRICAL MACHINES 3**

**Pre-requisites:** Electrical Machines 2, Electrical Engineering 3

**Mode of delivery:** 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

**Subject outline:** Review speed and power equations of three-phase induction motors, rotor equivalent circuit of three-phase induction motors, the torque of three-phase induction motors, starting three-phase induction motors, speed control of three-phase induction motors, examples and problems, open- and short-circuit tests on three-phase transformers, voltage regulation and parallel operation on three-phase transformers, construction of the DC-shunt and DC-series machines, speed control of shunt and series motors.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

**ELECTRICAL PROTECTION 3**

**Pre-requisites:** Electrical Engineering 3, Electrical Machines 2, Mathematics 2

**Mode of delivery:** 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

**Subject outline:** Electrical Protection 3 provides basic understanding and structure of the power systems including generation, transmission and distribution systems. The power system single line diagram, per unit analysis, construction and operation characteristics of the fuses, circuit breakers, current transformers, potential transformers are taught in protection 3. The basic operation characteristics of the current and time grading overcurrent protection scheme is introduced to the students. The power system simulation packages such as Power World Simulator (PWS) and MATLAB SimPowerSystem Toolbox is used to design, implement and test the power system network for symmetrical events and to analyse the operation characteristics of the single and three phase circuit breakers. The numerical programmable relay SEL751A is used to teach the relay configuration setting and test the time and current grading of the overcurrent protection scheme using the Omicron test injection device in the lab-scale environment.
Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, practical test, Final Summative Assessment.

**ELECTRICAL ENGINEERING PRACTICE 1 AND ELECTRICAL ENGINEERING PRACTICE 2**

Pre-requisites: At least 15 subjects

Mode of delivery: 12 months practice in industry

Subject outline: The aim of experiential learning is to give the student, through exposure and guidance, the opportunity to, familiarise him/herself in industry with construction principles that have been studied during the theoretical component of the course, to apply construction principles in practice with responsibility and accountability, to carry out tasks with confidence, to participate in effective problem solving and to operate effectively in a team relationship.

Assessment: All assessments are compulsory. Presentations, log book.

**ELECTRONIC COMMUNICATION 2**

Pre-requisites: Electrical Engineering 2, Electronics 2, Mathematics 2

Mode of delivery: See faculty office for further information.

Subject outline: Introduction to communication systems, analysis of passive circuits, transmission lines, modulation, electromagnetic waves and propagation, receivers, antennas, data communication.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.
ELECTRONIC COMMUNICATION 3

Pre-requisites: Electronic Communication 2, Mathematics 3

Electronic Communication 3 introduces the student to the GSM cellular telephone system. Specific topics covered include the general specifications, the radio interface and the services provided by the system. Voice and data services as well as the modulation schemes used for each are studied in detail. The subject material is provided by Alcatel.

Mode of delivery: See faculty office for further information.

Subject outline: A thorough knowledge of: the correct use of terminology, an understanding of the structure of the GSM cellular telephone system and how the different sub-systems interact to complete a call or provide a data service, an understanding of the modulation and multiplex schemes used by the GSM system.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

ELECTRONICS 1

Pre-requisites: None

Electronics 1 introduces circuit analysis techniques and how the basic electronic components work.

Mode of delivery: 8 periods/week (3 lecturers, 2 tutorials, 3 practicals)

Subject outline: Identify and read the values of components, apply laws: Ohm’s and Kirchoff’s, voltage and current laws, apply circuit theorems: Norton, Thevenin, Superposition and maximum power transfer, explain the functioning of a P-N junction with reference to a diode and a BJT, design a traditional power supply, design a discrete voltage regulator using a zener diode, use a BJT as a switch or amplifier, apply the basic biasing techniques to bias a JFET and MOSFET in the right region, use op-amps for the purpose of adding and subtracting two signals.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

ELECTRONICS 2

Pre-requisites: Electronics 1, Electrical Engineering, 1, Mathematics 1

Electronics 2 gives an introduction to class “A” amplifier design, power supply design and basic op-amp circuits.
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Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: Explain basic bipolar transistor configurations and the concept of small-signal amplifiers; describe basic field effect transistors configurations and the concept of small-signal amplifiers; describe operational amplifiers, their common configurations and characteristics; explain the concept of frequency response and its relevance to amplifier design; explain the concept of voltage regulation and the various methods used to achieve this; use appropriate instrumentation to build, test and measure key characteristics of electronic circuits.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

ELECTRONICS 3

Pre-requisites: Electronics 2, Electrical Engineering 2

Electronics 3 covers class “A”, multi-stage and differential amplifiers. It also deals with heat sink design and active filter design. PSpice is used to simulate circuits.

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: Use PSpice to simulate circuits; design a collector to base feedback large signal amplifier according to given specifications, design a multi-order active filter, design a multi-stage amplifier according to given specifications, explain the basic principle of feedback and the advantages of negative feedback, design a DC amplifier according to given specifications, design a heat sink for analogue applications.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

INDUSTRIAL CONTROL 3

Pre-requisites: Electrical Engineering 2, Electrical Machines 2

This subject equips learners to solve basic industrial control problems by means of ladder logic control or relay control, and helps learners understand how SCADA, VSDs, PID controllers and fieldbus are all interrelated.

Mode of delivery: 8 periods/week (3 lectures, 5 practicals)

Subject outline: Industrial Controls 3 covers some of the basic principles and philosophy of programmable logic controllers (PLCs) and relay control. To give a clearer and broader picture to PLCs and relay control, brief exposure is given to supervisory control and data acquisition (SCADA) systems, variable speed drives (VSDs), proportional integral differential (PID) controllers and commonly used fieldbus in South Africa.
Theoretical outcomes: Basic knowledge of PLCs, SCADA systems, VSDs, PID controllers and some of the most commonly used fieldbus in South Africa. The learner will understand and explain basic motor control devices and their applications, understand and explain programmable logic controllers, understand and explain the differential control media, understand and explain the different types of fieldbus commonly used in South Africa, draw neat, fully labelled relaycontrol circuits, power circuits and ladder logic programs, draw neat full labelled I/O module diagrams, design a control solution for a specific problem.

Practical outcomes: Wire, test and fault-find typical control circuits; wire, test and fault-find typical power circuits; program, test and fault-find basic ladder logic programs.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

MATHEMATICS 1

Pre-requisites: None

Mode of delivery: 8 periods/week (5 lectures, 3 tutorials)

Subject outline: Apply logarithms law in formulae manipulation, identify different form of complex numbers, apply De Moivre’s theorem and Euler’s formula in complex numbers, relate complex numbers to complex impendence in electrical engineering, identify different types of matrices and perform elementary operations on them, evaluate the determinant of a matrix, use the determinant to solve the system of linear equation, apply the determinant in current voltage analysis, apply Pascal ‘s triangle to expand any expression, use binomial theorem in binomial expansion, apply trigonometric identities to solve trigonometric equations, use the trigonometric function to analyse the general sine function, identify the correct formula for the area of a sector and segment, apply the rules of differentiation to evaluate any function, analyse and sketch graphs by using derivatives, use Maclaurin’s theorem in series expansion of elementary function, use standard integration techniques to integrate functions.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment.

MATHEMATICS 2

Pre-requisites: Mathematics 1

Mode of delivery: 8 periods/week (5 lectures, 3 tutorials)

This subject is aimed at developing the mathematical abilities of engineering students and at supporting and promoting the learning process in other disciplines.

Subject outline: Linear algebra, Differentiation, partial differentiation, integration, applications of differentiation and integration, first order equations, introduction to Laplace transform, introduction to Fourier series.
Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment.

MATHEMATICS 3
Pre-requisites: Mathematics 2
Mode of delivery: 8 periods/week (5 lectures, 3 tutorials)
Subject outline: Second order differential equations, Fourier transform and Fourier series, Laplace transforms, Z transforms.
Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

MEASUREMENT TECHNOLOGY 3
Pre-requisites: Mathematics 2, Electrical Engineering 2.
Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)
Subject outline: Measurement Technology 3 introduces basic measurement theory, the law governing measurements and the standards associated with measurement. Measurement equipment in industry is also introduced as well as design considerations.
Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

NETWORK SYSTEMS 2
Pre-requisites: Digital Systems 2
Mode of delivery: 8 periods/week (5 lectures, 3 tutorials)
Course outline: With Networks 2, students will have knowledge of networking hardware and protocols, as well as the correct use of terminology. The ability to design and configure networking hardware is also included in the theoretical outcomes and overlap to a degree with the practical outcomes
Practical outcomes will include: Analysis of a problem in order to produce a network design and configuration that will satisfy performance and capacity requirements. Design the resulting topology and decide on the type of devices to be used. Wire all types of CAT cables. Configure and test a computer network to a given specification. Implement and test
networking hardware including switches, routers and Ethernet. Communicate effectively using both written and oral techniques. Work effectively as part of a team.

This subject is limited to the course material contained in the CISCO Introduction to Networks, and Switching and Routing Essentials certification course. It prepares students for the CCENT (Cisco Certified Entry Networking Technician) certification. IPv4 and IPv6 addressing scheme. Class A, B and C public addresses. Class A, B and C private addresses. Implementation using packet tracer. Implementation using Cisco switches and routers.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

NETWORK SYSTEMS 3

Pre-requisites: Network Systems 2

In Network Systems 2 the bottom layer of the OSI model, namely the physical layer, is studied in detail. The subject starts with an overview of networks in general, looking at different types of networks, their structure and application. The subject then proceeds to investigate the different physical ways in which data can be transmitted, namely cables and electromagnetic waves including radio and light waves. The properties of each transmission medium are studied. In Network Systems 3 the next two layers of the OSI model are studied, namely the data link and network layers.

Mode of delivery: 8 periods/week (3 lecturer, 2 tutorials, 3 practicals)

Subject outline: Data link layer, medium access control sub-layer, network layer.

Theoretical outcomes: To describe, discuss and apply the concepts and theorems pertaining to the data link and network layers of the OSI model.

Practical outcomes: To apply knowledge of the physical, data link and network layers of the OSI model by creating and configuring computer networks.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

POWER ELECTRONICS 3

Pre-requisites: Electronics 2; Engineering Machines 2; Mathematics 2

Power electronics provides the candidate with the tools to identify and use the specifications of components required in power electronics applications and describe the principles and explain the operation of basic circuits used in popular arrangements for industrial power control.
It will also empower the candidate with the ability to design basic power electronic circuits, to model these circuits using simulation software, and to construct and evaluate the circuit base on predefined specifications. The learner will also be able to accumulate up-to-date information on one specific topic and present the information in a technical format as a technical document.

**Mode of delivery:** 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

**Subject outline:**

Theoretical outcomes: Identify and use the specifications of components required in power electronics applications, describe the principles and explain the operation of basic circuits used in popular arrangements for industrial power control.

Practical outcomes: Accumulate up-to-date information on one specific topic and present the information in a technical format as a technical document; design, model, construct and evaluate circuits used for power control.

**Assessment:** All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

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**PROGRAMMING 1**

**Pre-requisites:** None

**Mode of delivery:** 8 periods/week (3 lectures, 5 practicals)

**Subject outline:**

Problem solving is the most important attribute of an engineering practitioner. Programming is a systematic way of finding and describing a solution to a problem.

Computer applications are used throughout the electrical engineering field for modelling, design, operation, control and maintenance. These subjects equip learners to solve problems, describe their solutions clearly and to implement solutions using general and application-specific software. Programming 1 introduces procedural design, using pseudo-code and flow diagrams, and programming using the C language.

Theoretical outcomes: Knowledge of processes and techniques, and the correct use of terminology. This being essentially a practical subject, they are embedded in the practical outcomes.

Practical outcomes: Analyse a problem/project in order to produce a precise specification of user requirements, develop an algorithm to meet a problem specification, implement a software version of an algorithm using a procedural computer language, test software effectively, evaluate software against its specification and international standards.

**Assessment:** All assessments are compulsory. Minor tests, program projects, software production project.
PROGRAMMING 2

Pre-requisites: Programming 1

Mode of delivery: 8 periods/week (3 lectures, 5 practicals)

Subject outline: Problem solving is the most important attribute of an engineering practitioner. Programming is a systematic way of finding and describing a solution to a problem. Computer applications are used throughout the electrical engineering field for modelling, design, operation, control and maintenance. These subjects equip learners to solve problems, to describe their solutions clearly and to implement solutions using general and application-specific software. Programming 2 gives an introduction to object-oriented design using the Unified Modelling Language and to object-oriented programming using the Java language. Theoretical outcomes: Knowledge of processes and techniques, and the correct use of terminology. This being essentially a practical subject, they are embedded in the practical outcomes.

Practical outcomes: Analyse a problem / project in order to produce a precise user specification, design a conceptual model of a software solution that meets the problem specification, implement an object-oriented computer language version of a conceptual model, test software effectively, evaluate software against its user specification and international standards, Communicate effectively using both written and oral techniques, Perform effectively as a member of a team.

Assessment: All assessments are compulsory. Minor tests, program projects, software production project.

PROGRAMMING 3

Pre-requisites: Programming 2

Mode of delivery: 8 periods/week (3 lectures, 5 practicals)

Subject outline: Problem solving is the most important attribute of an engineering practitioner. Programming is a systematic way of finding and describing a solution to a problem. Computer applications are used throughout the electrical engineering field for modelling, design, operation, control and maintenance. These subjects equip learners to solve problems, to describe their solutions clearly and to implement solutions using general and application-specific software. Programming 3 has a strong emphasis on object-oriented design and application development.

Theoretical outcomes: Knowledge of processes and techniques and the correct use of terminology. This being essentially a practical subject, they are embedded in the practical outcomes.

Practical outcomes: Gather user requirements for a proposed software system and create a model of them; analyse the requirements of the proposed system and plan for iterative
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development; design the proposed system iteratively, using and refining the model of the system; implement the software system iteratively; test the software system iteratively.

Assessment: All assessments are compulsory. Minor tests, program projects, software production project.

PROJECTS 1

Pre-requisites: None

This is a fundamental practical skill subject. On successfully completing this module, the learners will be able to use a soldering iron and hand tools to assemble and populate printed circuit boards.

Mode of delivery: 8 periods/week (2 lectures, 6 practicals)

Subject outline: Understand how to identify various standard electronic components and their symbols, how to assemble small circuits, and soldering skills; build a work station that can be used for practicals (labs); build a logic probe that can be used to test digital circuits.

Assessment: All assessments are compulsory. Laboratory work, theory test.

RADIO ENGINEERING 3

Pre-requisites: Electronic Communication 2, Electronics 3, Mathematics 3

This unit is intended to enable the student to utilise the knowledge of the basic concepts and building blocks obtained in Electronic Communication 2 and further develop the understanding thereof and their applications in radio communication systems.

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: Radio frequency amplifiers, signal spectra, amplitude modulation and demodulation, angle modulation and demodulation, frequency conversion and mixing, basic monochrome television, digital radio communications, antennas.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.
SIGNAL PROCESSING 3

Pre-requisites: Mathematics 3

This offering is intended to form the foundation for further studies and research in the communication, signal processing, instrumentation, power engineering and control system fields, where the concepts and theory of signals and systems are needed.

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: Signals and systems, linear time-invariant systems, the Fourier transform, sampling and reconstruction of continuous-time signals.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

SYSTEMS ANALYSIS 2

Pre-requisites: Programming 1

In this technological era, computers and computer systems are needed in our everyday lives. It is essential for students to be able to decide on the necessary and sufficient data for planning, designing, developing and maintaining a computer system. Students need these basic ideas, which are entrenched in systems analysis and design, in order to be able to develop lasting computer systems. This will form part of their entry-level job as systems analysts, business analysts, development engineers or system architects.

Students learn how to translate business requirements into information systems that support a company’s short-and long-term objectives. Learners will use case studies to learn analytical, problem solving and decision-making techniques.

Mode of delivery: 8 periods/week (3 lectures, 2 tutorials, 3 practicals)

Subject outline: Describe important systems developments and trends; resolve information systems problems; describe the systems development life cycle (SDLC); have an in-depth understanding of how information technology (IT) supports operational and business requirements in today’s intensely competitive environment; explain how systems analysts interact with users, management and other IT professionals in a typical business organisation, gain the ability to plan a system, analyse a system, design a system, implement a system, and support and maintain a system.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment.
BTECH SUBJECTS
Note that the details below are summarised – refer to the individual Subject Guides for more detail.

AUDIO ENGINEERING 4

Pre-requisites: Electronics 3

This subject is for technicians in the industrial electronics field who are also exposed to the sub field of audio engineering.

Mode of delivery: Lectures 4 hours/week

Subject outline: Understand sound and use sound waves in the engineering environment, understand the construction and operation of a loudspeaker, understand the purpose of a good speaker enclosure as part of loudspeaker operation, design a suitable enclosure for a loudspeaker using CAD software, design and understand audio files, design or alter the acoustic response of a building.

Assessment: All assessments are compulsory. Assignments, class tests, project; laboratory work, Final Summative Assessment.

COMPUTER NETWORKS 4

Pre-requisites: Network Systems 3, Digital Systems 3

The primary objective of this subject is to provide the learner with a detailed knowledge of the structure, design, technologies and protocols used in computer networks.

Mode of delivery: Lectures 4 hours/week

Subject outline:
- Data compression: Frequency-dependant codes, run-length encoding relative, encoding Lempel-Ziv, compression image
- Data integrity: Simple error detection techniques, cyclic redundancy checks for error detection, Hamming codes: error correction
- Data security: Encryption algorithms, key distribution and protection, public key encryption, transport layer security and server authentication, firewalls, viruses, threats and attacks
- Flow control: Signalling, frame-oriented control, go-back-n: a sliding window protocol, selective repeat: a sliding window protocol, efficiency of sliding window protocols, protocol correctness
- Internet programming: socket programming, World Wide Web, common gateway interface and server-side programming, setting up a search engine Perl, programming: pizza ordering system example
- MySQL and database management: Practical aspects of installing, creating, managing and securing a MySQL based database on both the Windows and Linux platform.

Assessment: All assessments are compulsory. Assignments, class tests, Final Summative Assessment.
ELECTRICAL MACHINES 4

Pre-requisites: Electrical Machines 3

Electrical Machines 4 introduces advanced topics in three-phase theory like transformations and the generation of power in power plants including synchronous generators.

Mode of delivery: Block course (5 days/week for 1 month)

Subject outline: In-depth knowledge of the terminology, the transformations and the construction of synchronous machines; MATLAB introduction, basic operators and mistakes; basic mechanics; synchronous machines; D-q-0 transformation; influence of R-L-C elements on harmonics; Faraday’s law.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

ELECTRICAL PROTECTION 4

Pre-requisites: Electrical Protection 3

Electrical protection is one of the fundamental skills that engineers, technologists and technicians should have to be able to operate in a power utility environment. Electrical protection has the potential to allow the operation of a power system with minimum disruption to the customers who draw power from the power network. This unit will enable the student to develop a good understanding of power system protection. The subject will give students the ability to analyse power system faults and will give a basic understanding of protection relays and their application in protection schemes. The subject provides grounding for Protection Technology 4.

Mode of delivery: Lectures 4 hours/week

Subject outline:
- Fault calculations: Symmetrical components – positive, negative and zero sequences; types of unbalanced faults; short circuit current waveform during sub-transient, transient and steady state periods; asymmetrical short circuit calculations using symmetrical components; effect of including resistance: busbar sectionalising; mechanical and thermal effects of short circuits on busbars, busbar connections.
- Protection systems: Generators; transformer; feeder protection (impedance protection); busbar protection (busbar zone protection); protection signalling; AC motor protection; capacitor bank protection.

Assessment: All assessments are compulsory. Assignments, class tests, programming project.
ELECTRONIC COMMUNICATIONS 4

Pre-requisites: Electronic Communications 3

This unit is intended to introduce the student to digital communications, with emphasis on signals and systems analysis using Fourier series and Fourier transforms, baseband data transmission and reception, modulation, demodulation and the development of the mathematical principles upon which digital transmission is based.

Mode of delivery: Lectures 4 hours/week

Subject outline:

- Fourier analysis: Fourier series for periodic functions, the Fourier integral, Fourier transforms of important functions, method of successive differentiation, convolution, properties of the Fourier transform.
- Filtering and signal distortion: Time response, frequency response, linear distortion and equalisation, ideal low-pass filters, band-pass transmission, phase delay and group delay, non-linear distortion.
- Spectral density and correlation: Energy spectral density, correlation of energy signals, power spectral density, correlation of power signals, flowchart summaries, spectral characteristics of periodic signals, spectral characteristics of random signals and noise, noise equivalent bandwidth.
- Digital coding of analog waveforms: Digital pulse modulation, pulse-code modulation, sampling, quantising, coding, regeneration, differential pulse-code modulation, delta modulation.
- Inter-symbol interference and its cures: Baseband transmission of binary data, the inter-symbol interference problem, the ideal solution, raised cosine spectrum, correlative coding, baseband transmission of M-ary data, eye pattern, equalisation.
- Optimum receivers for data communication: Formalisation of the optimum receiver problem, maximisation of the output signal to noise ratio, the matched filter, correlator realisation of the matched filter, probability of error for binary PCM, error performance of binary signalling.
- Digital modulation techniques: Amplitude shift keying, frequency shift keying, phase shift keying, noise in digital modulation schemes, coherent detection of binary modulated waves.

Assessment: All Assessments are compulsory. Assignments; Class tests; Tutorials; Lab work; Final Summative Assessment.

ELECTRONIC COMMUNICATION SYSTEMS 4

Pre-requisites: Electronic Communications 4

Mode of delivery: See faculty office for further information.

Subject outline: This unit is intended to further expand the student’s knowledge of digital communications, with the emphasis on digital passband transmission and the geometric representation of signals which are then used to analyse various digital modulation
• Digital passband transmission: Passband transmission model; Gram-Schmidt orthogonalisation procedure, geometric representation of signals, response of a bank of correlators to a noisy input, coherent detection of signals in noise, probability of error, correlation receiver, detection of signals with unknown phase, hierarchy of digital modulation techniques, coherent binary PSK, coherent binary FSK, coherent QPSK and OQPSK, coherent MSK, non-coherent orthogonal modulation, non-coherent binary FSK, differential phase shift keying, comparison of binary and quaternary modulation schemes, M-ary modulation techniques, power spectra, bandwidth efficiency, synchronisation.

• Fundamental limits in information theory: Uncertainty, Information and Entropy; Source Coding Theorem; Data Compaction; Discrete Memoryless Channels; Mutual Information; Channel Capacity; Channel Coding Theorem; Differential Entropy and Mutual Information for Continuous Ensembles; Implications of the Information Capacity Theorem; Rate distortion Theory

• Rate distortion theory error control coding: Introduction, discrete memory-less channels, linear block codes, cyclic codes, convolutional codes, maximum likelihood decoding of convolutional codes.

• Spread spectrum modulation: Pseudo-noise sequences, a notion of spread spectrum, direct sequence spread-spectrum with coherent binary phase shift keying, signal space dimensionality and processing gain, probability of error, frequency hop spread spectrum, code division multiplexing.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

**ELECTRONICS 4**

**Pre-requisites: Electronics 3**

The subject introduces the learner to dependent sources and the analysis of circuits containing dependant sources using node and mesh analysis. Learners are also shown how to use Thevinin and Norton equivalent circuits to reduce the number of nodes or meshes during analysis. The learner is introduced to the concept of the transfer function of active devices and is shown how dependant sources can be used to model such devices. The learner is introduced to the four standard types of feedback topologies and the analysis of circuits containing these topologies using two-port network theory. The learner is taught to simulate the various types of feedback topologies using PSpice. The techniques developed in this system are then applied to the analysis of an audio power amplifier.

**Mode of delivery:** Lectures 4 hours/week

Subject outline: Linear dependant sources and the analysis of circuits with linear dependant sources; modelling of transistors and op-amps using dependant sources; the four standard twoport parameter models; the four standard feedback network configurations; feedback analysis using two-port network theory; simulation of the various feedback networks using..
PSpice; application of 1 to dynamic op-amp circuits (integrator and differentiator circuits); application on, 4 and 5 to audio circuits.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

ENGINEERING MATHEMATICS 4

Pre-requisites: Mathematics 3

Mode of delivery: Lectures 4 hours/week


Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment.

HIGH VOLTAGE ENGINEERING 4

Pre-requisites: Power Systems 4

High Voltage Engineering provides the student with the necessary knowledge to understand the phenomena encountered in a power system in practice with specific emphasis on insulation. This unit is intended to enable the student to develop a good understanding of electrical fields, the breakdown of solids, liquids and gases, high voltage generation measurements, testing and design techniques.

Mode of delivery: Lectures 4 hours/week

Subject outline: Operation of power system equipment, basic physical principles underlying high voltage phenomena – electric fields and potential, distribution of electric fields in various media and with different electrode geometries, electrical breakdown phenomena relating to insulation, generation of high voltage and measurements, insulation co-ordination and over-voltages.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment.
INDUSTRIAL PROJECT 4 (YEAR SUBJECT)

Pre-requisites: Design Project 3; Mathematics 3

Mode of delivery: Research based (consultation 30 minutes/week)

Subject outline: The growth in industry in recent years requires a growth in the theory and application of systems capable of controlling all industrial technologies. This process has realised the need for individuals with the appropriate skills to actively participate at various levels within this sector. This subject, Industrial Project 4, is intended to provide skills required within the field of electrical engineering, covering both existing and emerging technologies. It is a continuation of material covered within the Design Project 3 subject offered at the National Diploma level, and draws on concepts and skills acquired within the core subjects covered at the study levels one to six.

The subject is designed to expose the student to the major facets of moderately sized industrial projects in electrical engineering. Students are required to identify and develop a solution for a specific, real-world problem. It is expected of the student to run the project from its inception to completion. A project will preferably have the elements of specification, design and manufacture, culminating in the production of an industrially relevant artefact. However, it could also be an analytical study of a relevant engineering technology or method. This document focuses on projects that require the development of an artefact, or analytical and other project types as agreed with the supervisor.

Assessment: All assessments are compulsory. Assignments, presentations, written reports, demonstration.

MEASUREMENT TECHNOLOGY 4

Pre-requisites: Measurement Technology 3

Measurement Technology 4 continues with measurement theory and moves on to modern instrumentation, enabling students to develop a good understanding of the purpose and application of sensors and instrumentation. Students are also introduced to sensor design.

Mode of delivery: Lectures 4 hours/week

Subject outline: Measurement Technology 4 enables students to develop a good understanding of the purpose and application of the sensors and instrumentation.

Theoretical outcomes: Understand the theory and application of measurement units, measurement standards and the importance of calibration, as well as performing these actions on their own sensors; grasp fundamental theory and application of measurement statistics and the concept of traceability; understand different sensor types, their performance and characteristics; understand and quantify measurement errors; understand voltage, current, resistance, reactance and electromagnetic sensors; understand linear variable differential transformers (LVDTs) and synchronous detection; understand mass, force and torque measurement; design a digital scale using strain gauges; understand flow.
measurement techniques and design of a spirometer; understand temperature sensing using thermocouples; understand piezoelectric devices and ultrasound; design an ultrasonic ranging system; understand commercial instrumentation networks and communication methods; understand wireless sensor networks and new technologies – Wi-Fi, Bluetooth, 802.15.4 and ZigBee.

Practical Outcomes: Design basic sensors; design a digital scale using strain gauges; design an ultrasonic ranging system; design an inductive proximity sensor; design a torque sensor; design an angular displacement and velocity sensor; design an altimeter.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

MICRO SYSTEMS DESIGN 4

Pre-requisites: Digital Systems 3

Micro Systems Design covers the design and applications of digital circuits that are programmed into a single field-programmable logic device to emulate the original discrete circuit. The design entry is done in two hardware design languages, AHDL and VHDL. Group work and the application of micro-controllers and specific problem solving are addressed in the design of a robotic buggy that must find its way out of a random maze on own intelligence. The third main objective is to do specific research and information gathering on a chosen or given technical subject, the consolidation of the data and the preparation of notes and an oral presentation.

Theoretical Outcomes: These would include knowledge of processes and techniques, and the correct use of terminology. This being essentially a practical subject, they are embedded in the practical outcomes.

Practical Outcomes: Analyse a problem/project in order to produce a precise specification of user requirements, develop a solution through analysis of the objectives and available tools, implement a prototype solution using the Quartus II, and standard micro-controller software, test software effectively on a simulator and a practical circuit, evaluate final projects against their specifications.

Assessment: All Assessments are compulsory. Assignments; Lab work; Practical test.
MICROCONTROLLER SYSTEMS 4 (INDUSTRIAL ELECTRONICS STREAM – MCS400S / CONTROL SYSTEMS STREAM – MCS401S)

Pre-requisites: Digital Systems 3

Mode of delivery: Lectures 4 hours/week

Subject outline: This subject is for technicians who specify, develop, construct, produce and maintain microprocessor-based systems typically used in the form of embedded systems in an industrial measurement environment. Microcontroller Systems 4 (Industrial Electronics stream – MCS400S / Control Systems stream – MCS401S)

Persons credited with this subject are able to: Analyse user problems in order to produce a specification for an embedded system, select optimal commercial HW (CPU), allocate specification functionality to the CPU HW and SW, carry out electronic development and construction of the CPU HW, develop the interfacing electronics to sensors, testing and debug the HW, synthesise an algorithm using structure SW development techniques to meet the SW part of the specification, test the developed SW on a simulator, integrate the SW with the HW and test and debug the resultant system, document and maintain the integrity of all development data using structured configuration control techniques, build and demonstrate a working model of a smart sensor, produce a data pack containing all relevant data to enable a third party to produce the developed smart sensor system.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

POWER SYSTEMS 4

Pre-requisites: Electrical Distribution 3, Electrical Protection 3, Power Electronics 3

This unit will enable the student to develop a good understanding of power system operation. The subject will give students the ability to analyse power systems and will give a basic understanding of power flow. The subject provides grounding for Power System Simulation 4.

Mode of delivery: Lectures 4 hours/week

Subject outline: Sketch, explain and per-unitise power system layouts, calculate line constants of bundled overhead transmission systems, understand theory and do calculation on steady-state operation of transmission lines, calculate and evaluate power flow through interconnectors in a multi-bus system, calculate admittance and impedance matrices in multi-bus systems, analyse load flows in multi-port power systems, understand and do calculations on power system harmonics, understand and explain contingency analysis.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work; Final Summative Assessment.
PROTECTION TECHNOLOGY 4

Pre-requisites: Electrical Protection 4

Mode of delivery: Lectures 4 hours/week

Subject outline: This unit will equip the student to understand and be able to achieve the practical implementation of protection philosophies and hardware into a solution for the electrical protection of electrical power system plant. This unit will enable the student to develop a good understanding of power system protection. The subject will give students the ability to design schemes of protection that will minimise the effects of power system faults.

Theoretical outcomes: Engineering principles behind protection relays and an introduction to the philosophies behind the application of protection of power networks.
Practical Outcomes: Understand how protection relays function; operate three different relays (set the relays, download event reports and marshal the inputs and outputs of the relays); design, in “black box format”, schemes of protection that implement basic philosophies of protection.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

RADIO ENGINEERING 4

Pre-requisites: Radio Engineering 3

This offering is intended to enable the student to understand the theory and techniques associated with the design of harmonic oscillators and linear power amplifiers.

Mode of delivery: Lectures 4 hours/week

Subject outline: Theoretical and practical understanding of the principles of harmonic oscillator design; the theory of resonators in oscillators and how active devices are selected; theoretical analysis and design of alternative types of resonators; definition and analysis of noise as found in oscillators and presentation of a method of phase noise measurement; theory and analysis of negative resistance oscillators; theoretical and practical aspects of linear power amplifier design.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.
DATABASE PROGRAMING 4

Pre-requisites: Database Principle 3

Mode of delivery: Lectures 4 hours/week.

This offering is intended to introduce student to advanced concepts in database management including data warehouses and On-line Analytical Processing, the practicals will use open source and oracle database for database administration.

Subject outline: Enable the student to understand the recent trends in data development, the concept of distributed databases and able to design a distributed database. Familiar with database administration and advance data technology such as OLAP, OLTP and built an interactive web application using WAMP technology. The course cover the physical database design, transaction processing, Object-Oriented database, distributed database, web technology and database application, Data warehousing concepts and Data mining technique.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment (FSA).

SIGNAL PROCESSING 4

Pre-requisites: Signal Processing 3

This offering is intended to build on the foundation laid in Signal Processing 3 to allow for more advanced study and research in the electronic communications, signal processing, instrumentation, power electronics and control systems fields, where the concepts and theory presented in this offering are required.

Mode of delivery: Lectures 4 hours/week.

Subject outline: The use of Laplace transforms to represent continuous-time signals in the s-domain, the concept of system transfer functions for continuous-time LTI systems and using this to gain insight into the properties of continuous-time systems, the use of the z-transform to represent discrete-time systems in the z-domain, the concept of system transfer functions for discrete-time systems and the use of this function to gain insight into the properties of discretetime systems, the use of the discrete Fourier transform (DFT) to convert discrete-time sequences into frequency domain representations of the signal.

Assessment: All Assessments are compulsory. Assignments; Class tests; Tutorials; Lab work; Final Summative Assessment.
SOFTWARE ENGINEERING 4

Pre-requisites: Programming 3, Systems Analysis 2

The objectives of this subject are to give the learner a thorough understanding of the latest developments in software engineering and practice and to show how software engineering integrates with the relevant aspects of systems engineering. The subject includes program examples in Java and graphical system models in UML.

Mode of delivery: Lectures 4 hours/week.

Subject outline: Socio-technical systems, critical systems, software processes, project management, software requirements, requirements of engineering processes, system models, critical systems specification, formal specification, architectural design, distributed systems architectures, application architectures, object-oriented design, real-time software design, user interface design, rapid software development, software re-use, component based software engineering, critical systems development, software evolution, verification and validation; software testing; critical systems validation.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

SOFTWARE SYSTEMS 4

Pre-requisites: Programming 3, Digital Systems 3

Software Systems 4 teaches learners how to build wireless sensor network (WSN) applications. WSN is an exciting new, rapidly expanding field. This subject can be seen as a culmination of much of the computer and embedded system work a learner would have covered by this point. It includes working with a (WSN-specific) operating system, programming software within the constraints of an embedded device, and practically implementing networks. This subject provides a core of knowledge to enable a learner to do BTech and postgraduate research at this university and opens the possibility of postgraduate research at many other universities. WSN industry opportunities are expanding.

Software Systems 4 is a BTech level subject that will provide a practical introduction to wireless sensor networks (distributed embedded computer systems). This subject is built primarily around the TinyOS embedded network operating system and the TelosB hardware platform. A number of skills are required before wireless sensor network application development can occur.

Mode of delivery: Lectures 4 hours/week.

Subject outline: The concept of wireless sensor networks (WSN) and their uses; using version control software; documentation tools; UNIX/Linux basic commands and operation; developing WSN applications using TinyOS on TelosB motes.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.
SYSTEM SIMULATION 4

Pre-requisites: Digital Systems 3

This subject is for technicians who need to produce harmonic analysis solutions in a power engineering environment.

Mode of delivery: Lectures 4 hours/week.

Subject outline: Analyse a problem/project in order to produce a harmonic analysis solution, conduct harmonic analysis with ERACS industrial grade software, conduct harmonic analysis with SuperHarm industrial grade software, conduct harmonic analysis with DlgSILENT industrial grade software, test and compare software effectively, communicate effectively using both written and oral techniques, evaluate software against its specification and international standards.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.
DEPARTMENT OF
INDUSTRIAL & SYSTEMS ENGINEERING

QUALIFICATIONS OFFERED

<table>
<thead>
<tr>
<th>Qualification Type</th>
<th>Qualification Code</th>
<th>Minimum Duration</th>
<th>Maximum Duration</th>
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DEPARTMENT OFFICE-BEARERS

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<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>Fax</th>
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<tbody>
<tr>
<td>Head of Department</td>
<td>Mr A Bester, BTech (Mechanical Engineering), MTech (Information Technology), Professional Engineering Technologist: Mechanical</td>
<td>021 969 6225</td>
<td></td>
<td><a href="mailto:BesterA@cput.ac.za">BesterA@cput.ac.za</a></td>
</tr>
<tr>
<td>Secretary</td>
<td>Ms S V Ngonda</td>
<td>021 959 6600</td>
<td>021 953 8481</td>
<td><a href="mailto:Ngondasv@cput.ac.za">Ngondasv@cput.ac.za</a></td>
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DEPARTMENTAL STAFF

<table>
<thead>
<tr>
<th>Position</th>
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<th>Qualifications</th>
</tr>
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<tbody>
<tr>
<td>Associate Professor</td>
<td>Dr M Moll, PrEng</td>
<td>PhD (Industrial Engineering)</td>
</tr>
<tr>
<td>Senior Lecturer</td>
<td>Mr B Morar</td>
<td>MSc Eng in Eng Management; BSc Mech Eng</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms M Harris</td>
<td>ND (Management), MTech (Quality)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mrs D V Jaftha</td>
<td>ND (Textile Technology), MTech (Quality)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr W M Mukendi</td>
<td>BSc (Mechanical), MTech (Mechanical)</td>
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<tr>
<td>Lecturer</td>
<td>Ms B C Swartz</td>
<td>ND Veterinary Technology, MTech Quality</td>
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<tr>
<td>Lecturer</td>
<td>Mrs L Z Valentine</td>
<td>BTech (Food Technology), MTech (Quality)</td>
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<tr>
<td>Lecturer</td>
<td>Mr W Ngetich</td>
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</tr>
<tr>
<td>Lab Technician: IT</td>
<td>Mr V Funda</td>
<td>BTech (Information Systems)</td>
</tr>
</tbody>
</table>
ND: ENGINEERING: INDUSTRIAL

Course aim
Graduates are competent members of the engineering team, executing technical tasks by applying their knowledge to the identification and solution of industrial engineering problems.

Purpose and Rationale of the qualification
Graduates obtaining this qualification will be competent in applying operations management techniques and strategies resulting in effectiveness and productivity in industry. The qualified person will be able to register with the Engineering Council of South Africa (ECSA).

Career opportunities
Graduates are usually employed by manufacturing firms and may also find employment in the service sector. Training and experience enable the graduate to influence the factors contributing to productivity, including the best utilisation of people, machines, space, materials, information, and money. They undertake investigations and advise management on systems, manufacturing methods, plant layout, materials handling, production control, purchasing and stock control, quality control, work standards and industrial economics.

Offering type and duration of course
Full-time: Three years, including six months of experiential learning

Venues of Offering
Bellville
## ND: ENGINEERING: INDUSTRIAL (NDINDS)

All subjects compulsory

<table>
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<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
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BTECH: ENGINEERING: INDUSTRIAL

Course aim
Graduates are members of engineering teams executing technical tasks, and applying their knowledge in independent thinking and communication. They are also proficient in the identification and solution of engineering problems.

Purpose and Rationale of the qualification
Graduates achieving this qualification will be competent in the leading of programs regarding productivity improvement, integrated manufacturing systems, operating information systems, and those of project and logistics management. The graduates will be able to register with the Engineering Council of South Africa (ECSA).

Career opportunities
An industrial engineer is usually employed by manufacturing firms, but may also find employment in commerce. Training and experience enable the graduate to influence the factors contributing to productivity, in other words, the best utilisation of people, machines, space, materials, information, and money, and to undertake investigations and advise management on: systems, manufacturing methods, plant layout, materials handling, production control, purchasing and stock control, quality control, work standards and industrial economics.

Admission requirements
National Diploma: Engineering: Industrial with an average pass mark of 60% for ALL subjects passed on the National Diploma.

Offering type and duration of course
Part-time: Two years

Venues of Offering
Bellville
BTECH: ENGINEERING: INDUSTRIAL (BTINDS)

Students register for two subjects per semester over the two years. Each subject is only offered every two years, with a new intake every year.

Year 1 is offered in 2017 and 2019 and Year 2 is offered in 2016 and 2018. Students can start in any year as there are no pre-requisite subjects.

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Semester</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>NQF Level</th>
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<th>HEMS Credit</th>
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<tr>
<td>4</td>
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<td>S1</td>
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<td>Project Research 4</td>
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</tbody>
</table>
BTECH: ENGINEERING: QUALITY

Course aim
Graduates are equipped to become quality practitioners in the manufacturing, commercial and servicing industries. They use analytical, quantitative and qualitative techniques and technologies in a variety of organisational situations, in order to implement, maintain and improve technologies, techniques and productivity.

Purpose and Rationale of the qualification
The qualification equips the qualifying learner coming from a production and/or service environment to become a quality practitioner specialising in quality technologies. The qualified person will apply a body of knowledge of quality and quality principles, tools and techniques to develop, implement, maintain and improve competitiveness in his/her organisational field.

Career opportunities
With globalisation and the opening of international markets, the demand for quality assurance of products and services is at an all-time high, in all sectors of industry, as well as in government sectors.

Admission requirements
A National Diploma (or an equivalent M+3 qualification) with an average pass mark of 60% for ALL subjects passed on the National Diploma (or M+3 equivalent) and TWO years of appropriate industry experience. Preference will be given to students studied in the field of Engineering and Applied Sciences.

Offering type and duration of course
Part-time: Two years

Venues of Offering
Bellville
### BTECH: QUALITY (BTQLTY)
All subjects compulsory

Co-requisite subjects listed in [brackets]

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
<th>NQF Level</th>
<th>SAQA Credit</th>
<th>HEMS Credit</th>
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<td>Quality Auditing Techniques 4</td>
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<td>7</td>
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</table>
MTECH: QUALITY

Course aim
The course equips students with the necessary knowledge and skills to conduct independent research in quality implementation, maintenance and improvement, and to contribute to knowledge production through the understanding, application and evaluation of existing and new knowledge.

Purpose and rationale of the qualification
The qualifying learner can conduct independent research under minimal guidance in a chosen quality-related field and contribute to knowledge production in that field. The research problem, its justification, process and outcome are reported in a dissertation which complies with the generally accepted norms for research at this level.

Career opportunities
With globalisation and the opening of international markets, the demand for quality assurance of products and services is at an all-time high, in all sectors of industry, as well as in government sectors. Graduates play an important and direct role in these fields and are employed in research and development in industry. They are also employed in research positions at higher education institutions.

Admission requirements
A BTech in Quality with a pass mark of 65 % for Project 4, and 60% average for all the subjects. Minimum of two years relevant industrial experience in the field of Quality.

Offering type and duration of course
Part-time: Two years

Venues of Offering
Bellville

MTECH: QUALITY (MTQLTR)
All subjects compulsory

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
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<th>Pre-requisite Subject Codes</th>
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</table>
SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for qualification purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

Subjects ending in an ‘X’ are Extended Curriculum subjects.
NATIONAL DIPLOMA SUBJECTS
Industrial Engineering

AUTOMATION 3
Pre-requisites: Mechanical Manufacturing Engineering 2

Mode of delivery: 3.5 hours/week lectures; 1 hour/week practicals and assignments/presentations

Subject outline: Introduction to Automation: Definition of Automation; Describing the basic elements of an automated system; Description of advanced automation functions, levels of automation in a production plant
Industrial Control Systems: Sensors, actuators and other industrial components
Manufacturing Systems: Basic control methods such as NC and CNC; Introduction to Manual and Computer based programming
Basic PLC Course: The basics of PLCs; Overview and background information about PLCs; Architecture of a PLC, the numbering system, the electrical logic circuits and introduction to PLC programming
Robotics: The basics and application of robotics and robotics systems
Automated Material Handling & Storage: An important feature of modern manufacturing is the automation of material handling and storage and retrieval.
Group Technology And Manufacturing Cells: Group technology, design and use of cellular manufacturing
Flexible Manufacturing Systems: Definition of FMS, types, the components of FMS, the layouts and benefits
CIM And Enterprise Intergration: The integration of the enterprise by methods like CIM (Computer Aided Manufacturing) is discussed together with views of the future.
Practicals: Practicals are done on PLCs (latching circuits and sensors), hydraulic and pneumatic actuators, and CNC Machining (Milling & Turning)

Assessment: All Assessments are compulsory. Assignments; Class tests; Lab work; Tutorials; Final Summative Assessment;

COMMUNICATION SKILLS 1
Pre-requisites: None

Mode of delivery: 4 ½ hours / week Lectures

Subject outline: The key to your academic and professional life will be how effective your communication and professional practices are in an environment of diversity as well as engineering. Communication Skills 1 will prepare you for the oral, visual and written forms of communication you need to cope successfully in a tertiary environment, and will pave the way for your future professional practices in Industrial and Systems Engineering.
Read with comprehension, write clearly, speak and listen to others, collect and analyse
information, organise information, present information, produce a portfolio of evidence; master professional practices, academic literacy, information literacy, written communication, spoken communication, small group communication.

DP requirements: Satisfactory performance in assessments; satisfy the requirements of the exit level outcomes and competencies of the course.

Assessment: All assessments are compulsory. 20% on tests, 10% on essay, 30% on presentations, 40% on reports.

Sub-minimum: Satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the course.

COMPUTER AIDED DRAUGHTING 1

Pre-requisites: Mechanical Engineering Drawing 1, Communication Skills 1

Mode of delivery: 4 ½ hours/week, 6 tutorials Lectures

Subject outline: Understand AutoCAD screen layout, and AutoCAD Help to start a new drawing and open an existing file; save a drawing to a given name and also save a drawing as a template; close a drawing and exit AutoCAD program; construct a geometric figure, using the line, rectangle, polygon, point, circle and arc commands; use the undo and redo commands; do isometric circles, sectional, geometrical constructions and assembly drawings; use different layers such as centre, dimension, hatch, text, hidden layers.

Assessment: All assessments are compulsory. Class tests, assignments and projects.

COMPUTER SKILLS 1

Pre-requisites: None

Mode of delivery: 4 ½ hours/week lectures

On successful completion of this subject, the learner will be able to: Understand and use the Microsoft Office suite, Microsoft Project, the Internet, email and the Windows Operating System, and file management optimally.

Subject outline: Use the Windows operating system to manipulate folders and files; use a word processor to create, format and print documents; use a spread sheet to solve problems and display the results; use a presentation tool to prepare a presentation.

Assessment: All assessments are compulsory. Tutorials, practical tests.
ELECTROTECHNOLOGY 1

Pre-requisites: None

Mode of delivery:

Subject outline:

Assessment: All Assessments are compulsory. Assignments; Class tests; Tutorials; Final Summative Assessment; Lab work.

ENGINEERING WORK STUDY 1

Pre-requisites: Computer Skills 1, Communication Skills 1

Mode of delivery: 3½ hours/week lectures, 1 hour/week practicals/assignments, industrial visits.

Subject outline: The primary learning objective is to bring students to a basic level of knowledge so that industrial engineering issues, tools and theories can be understood and confidently applied where required. Students will be assisted with their development as applied scientists, prepared for the various complex issues that they will have to deal with as future engineers and managers, and provided with a sound basis for further studies in engineering work-study.

Topics: Work study techniques and related aspects, which include method study, time study (work measurement), productivity, human factors, working conditions, environment, ergonomics and jigs and fixtures. Method study, using the correct techniques to effect and make improvements in productivity as per International Labour Organization (ILO) procedures and standards; Time study, to determine the standard time for a job.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.
ENGINEERING WORK STUDY 2

Pre-requisites: Engineering Work Study 1

Mode of delivery: 3½ hours/week lectures, 1 hour/week practicals/assignments.

Subject outline: On completion of the subject students should be able to define, describe and discuss the relevant matter and have the ability to carry out the following: Conduct a method/time study, using the correct technique to determine a standard time for a job; conduct work sampling exercises; apply ergonomic principles in work methods design; apply value analysis principles in product design.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

ENGINEERING WORK STUDY 3

Pre-requisites: Engineering Work Study 2.

Mode of delivery: 4½ hours/week Lectures

The aim is to equip students with knowledge and understanding of engineering work, which includes management information systems analysis and design, and performance improvement programmes. On completion of the subject students should be able to define, describe and discuss the relevant matter and have the ability to analyse, design and implement information systems, and to design and implement measurement and improvement programmes.

Subject outline: Management information systems (MIS), structures of MIS, systems concepts, MIS planning, operation, control and maintenance of MIS, role of productivity measurement, requirements for sound productivity measurement, change in real terms using calculations and geometric representations, contributors to profit and cost using calculations and geometric representations, a data specification, partial productivity, incentive schemes using calculations and graphs.

Assessment: All assessments are compulsory. Assignments, class tests, projects, Final Summative Assessment.
FACILITY LAY-OUT AND MATERIALS HANDLING 2

Pre-requisites: Computer Skills 1, Communication Skills 1, Engineering Work-study 2, Mechanical Manufacturing Engineering 2, Computer Aided Draughting 2 and Costing 2.

Mode of delivery: 4½ hours/week Lectures

Subject outline: To equip students with knowledge and understanding of facility lay-out and materials handling, which include the complete design procedure and the materials handling equipment. On completion of the subject the students should be able to define, describe and discuss the relevant matter and have the ability to:

- Analyse an existing facility; Design a new facility; Design the materials handling system.
- Collect, design and generate basic data: Policy / Sales / Product Drawing / Parts Listing / Routing / Production method.
- Draw up activity relationship chart: Work sheet / diagram.
- Design receiving/warehouse/stores shipping: Data for flow + Size + Layout and flow charts and flow diagrams for each.
- Design offices/parking
- Determine total space requirement work sheet
- Conduct area allocation: Expansion / Flexibility / Ailes Design / Templates / Diagram + Flowlines.
- Design plot plan/expansion:
- Draw layout construction/flow lines/key plans: Detailed floor-plan with detail at each work station plus all flow lines.

Assessment: All assessments are compulsory. Projects, final project.

INDUSTRIAL ACCOUNTING 3

Pre-requisites: Costing 2.

Mode of delivery: 4½ hours/week Lectures, Tutorials.

Industrial accounting provides the learner with insight into the operational principles of sound financial decision making and to equip the learner with the required financial management skills to be able to understand the role of financial management in the decision making process in a business.

Subject outline: Prepare the Industrial Engineers with the basic understanding of the financial aspects of a business; equip the engineers with the basic financial tools to enable them to develop a well-designed, logical financial plan; develop a logical thinking and a systematic approach to problem solving; overview of financial statements; the time value of money; risk
& return; financial statement analysis; the cost of capital; capital budgeting; working capital; asset management and short term financing; sources of finance; forms of business

Assessment: All assessments are compulsory. Assignments, class tests, projects, Final Summative Assessment.

INDUSTRIAL ENGINEERING PRACTICE 1 AND 2

Pre-requisites: Computer Aided Draughting 1, Computer Skills 1, Communication Skills 1, Costing 2, Engineering Work Study 2, Mathematics 3, Mechanical Manufacturing Engineering 2, Production Engineering: Industrial 1, Quality Assurance 2

Mode of delivery: Work experience in industry.

Subject outline: Students gain work-based experience by completing projects, work assignments and tasks at a company where they are placed. These projects are based on real life situations, must have practical applications and form part of the daily duties of the student in the workplace.

The required Learning Areas applicable to the workplace learning, is indicated below. It is required that the student covers at least four of these core learning areas. Evidence of this must be shown in a Logbook.

At least one Project Report must be handed in for each semester of training. The Logbook is checked by the Work Integrated Learning co-ordinator during workplace visit and handed in before final submission at end of training period.

The student is expected to prepare 5 minute Oral Presentations to the assigned supervisors at the end of each completed project in the workplace.

During either P1 or P2 the Head: Work Integrated Learning lecturer will come and assess one Oral presentation. Project 1 topic: Health & Safety Standards, and any other applicable Standards/Laws.


Assessment: Projects, work assignments, oral presentations, logbook, project reports.
INDUSTRIAL LEADERSHIP 3

Pre-requisites: Manufacturing Relations 2.

Mode of delivery: 4½ hours/week Lectures

Subject outline: The dynamic new work place, environment and competitive advantage. Global dimensions of management, ethical behaviour and social responsibility. Mission, planning, strategic management and entrepreneurship roles, controlling, organization. Leadership; - Leading; - to inspire effort, Motivation and rewards, individual performance and job design, Communication and interpersonal skills, teams and teamwork, Innovation and change management.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

MANUFACTURING RELATIONS 2

Pre-requisites: Communication Skills 1, Computer Skills 1

Mode of delivery: 4½ hours/week Lectures, tutorials, practicals.

Subject outline: Read with comprehension, write clearly, speak and listen to others, collect and analyse information, organise information, present information, professional practices, conducting research, report writing, produce a portfolio of evidence.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

MATHEMATICS 1

Pre-requisites: None.

Mode of delivery: 4 ½ hours/week Lectures, tutorials, practicals.

Subject outline: Revisiting and extent basic Algebra, including exponents and logarithms. The Complex Number System is then introduced and explored, along with Pascal’s Triangle and the Binomial Theorem for expanding products. Some Trigonometry is then revisited as an introduction to Differential and Integral Calculus.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.
MATHEMATICS 2

Pre-requisites: Mathematics 1.

Mode of delivery: 4 ½ hours/week Lectures, tutorials, practicals.

Subject outline: The course consists of Differential Calculus (formulae and table usage), Integral Calculus and Matrices.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

MATHEMATICS 3

Pre-requisites: Mathematics 2.

Mode of delivery: 4 ½ hours/week Lectures, tutorials, practicals.

Subject outline: Various techniques of solving differential equations. Techniques include applications of Integration, using D-operators, and La Place transforms.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

MECHANICAL ENGINEERING DRAWING 1

Pre-requisites: None.

Mode of delivery: 4½ hours/week lectures, 6 tutorials.

Subject outline: Produce a freehand sketch of any mechanical component from which an accurate drawing can be produced, produce hand printed title blocks in different A series sizes, produce instrument-drawn drawings with dimensions, produce basic geometric constructions, produce an assembly drawing of all manufactured parts of the assembly.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment.
MECHANICAL MANUFACTURING ENGINEERING 1

Pre-requisites: None.

Mode of delivery: 4½ hours/week lectures, 6 tutorials.

Subject outline: Occupational Health & Safety Act: Safety structure in terms of the OHS ACT; Functions and duties of stakeholders; Categories and identification of hazards; Application of hazard control measures
MIG and TIG welding: Standard equipment; Principles of operation; Advantages and disadvantages
Analysis of materials to determine manufacturing processes: Raw materials; Types of plastics/polymerms; Application of different types of plastics; Manufacturing processes of plastics
Characteristics and manufacturing process of powder metal products (including additional/supplementary processes)
Processes and applications of hot-worked metals: Hot roll-forming & hot extrusions, Foundry, forging and Casting/moulding processes
Processes and applications of cold-worked metals: Cold roll-forming, cold drawing, bending, shearing, cold forging.
Presses and applications of presswork: Presswork operations and associated tooling, eg. punching, piercing, blanking, notching, lancing, coining, etc; Press tonnage, cutting forces, punch-and-die clearances and bending allowances
Milling machine operations: Grinding machine operations & grinding wheel technology;
Machining cost calculations
Research methods: Obtain and adapt information for report writing on group and individual projects/assignments

Assessment: All Assessments are compulsory. Assignments; Class tests; Tutorials; Written report, Oral presentation Final Summative Assessment

MECHANICAL MANUFACTURING ENGINEERING 2

Pre-requisites: Mechanical Manufacturing Engineering 1, Computer Skills 1, Communication Skills 1

Mode of delivery: 4½ hours/week Lectures, assignments.

Subject outline: Basic Conditions of Employment Act (BCEA); Unemployment Insurance Fund (UIF); The Occupational Health & Safety Act (OHSA); The Compensation for Occupational Injuries and Diseases Act (COIDA); Labour Relations Act (LRA); Employment Equity Act (EEA); Skills Development Act (SDA); Code of Good Practice on HIV Aids; Code of Good Practice on Sexual Harassment; Value added tax (VAT) and Pay as you Earn (PAYE); Personnel Management/HR.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.
MECHANICS 1

Pre-requisites: None

Mode of delivery: 4 ½ hours/week lectures, tutorials, and practicals

On successful completion of this subject, the learner will be able to: Make a free body diagram and analyse all the forces; calculate the centroid and centre of gravity; differentiate and analyse the linear motion of single or two bodies and angular motion; understand and calculate work, energy and power; calculate the momentum and impulse.

Subject outline: Measurements, units conversion and numbers; forces applied on a body or systems (free body diagram [FBD]); moments of forces; internal forces in trusses and frames; centroids and centre of gravity; dry friction; accelerating systems; linear motion; angular motion and centripetal forces; work, energy and power.

Assessment: All assessments are compulsory. Assignments, class tests, laboratory work, Final Summative Assessment.

OPERATIONAL RESEARCH 3

Pre-requisites: Quality Assurance 2, Production Engineering: Industrial 2

Mode of delivery: 4½ hours/week lectures, Industry visits.

The objective is to equip students with knowledge and understanding of statistical techniques and principles, which include transportation and assignment models, simulation, Markov analysis, game theory, linear programming, network models, waiting lines and queuing theory models, decision trees and dynamic programming.

Subject outline: Apply transportation and assignment models to solve special LP problems; use simulation to solve a wide variety of problems; apply Markov analysis to determine future states and compute long-term or steady-state conditions; apply game theory to formulate two-person, zero-sum games and determine the value of the games; solve linear programming problems graphically and with Excel spread sheets; model a wide variety of medium to large linear programming problems; solve linear programming problems with simplex tableaus; solve network models using the minimal-spanning tree, maximalflow and shortest-route techniques; analyse a variety of operating characteristics of waiting lines; construct decision trees and use them to determine best course of action; set up and solve dynamic programming problems.

Assessment: All assessments are compulsory. Assignments, class tests, Final Summative Assessment
PRODUCTION ENGINEERING: INDUSTRIAL 1

Pre-requisites: Mathematics 1, Computer Skills 1

Mode of delivery: 2½ hours / week lectures; 1 hour/week tutorials, 1 hour/week projects.

The objective is to equip students with knowledge and understanding of operations management techniques and principles which include productivity calculations, facility layout, forecasting and short-term scheduling.

Subject outline: On completion of the subject students should be able to define, describe, explain and discuss the relevant matter and be able to: Do productivity calculations, use the seven tools of total quality management (TQM); design process control charts; apply forecasting methods; use the EOQ and POQ models; compute reorder points; apply appropriate short-term scheduling techniques.

Assessment: All assessments are compulsory. Assignments, class tests, projects, Final Summative Assessment.

PRODUCTION ENGINEERING: INDUSTRIAL 2

Pre-requisites: Production Engineering: Industrial 1.

Mode of delivery: 4½ hours/week lectures, Industry visits

The objective is to equip students with knowledge and understanding of operations management techniques and principles, which include project management, scheduling for batch processing, inventory management, scheduling for flow processing, just-in-time and lean systems, and the theory of constraints.

Subject outline: On completion of the subject students should be able to define, describe, explain and discuss the relevant matter and be able to: Schedule and manage projects, schedule for batch processing, manage deterministic and probabilistic inventory management models, design and schedule flow processing systems, Build a lean organisation by identifying and eliminating waste from the customer’s viewpoint, apply the Theory of Constraints to identify and treat any constraints in a business.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment.
QUALITATIVE TECHNIQUES 1

Pre-requisites: Mathematics 1, Computer Skills 1

Mode of delivery: 4 hours/week lectures, tutorials, practicals.

On successful completion of this subject, the learner will be able to: Collect and classify data, apply descriptive statistics and probability, use inferential statistics.

Subject outline: Introduction to statistics, descriptive statistics, probability, discrete probability distributions, normal probability distributions, confidence intervals, hypothesis testing with one sample, hypothesis testing with two samples, correlation and regression, chi-square tests, nonparametric tests.

Assessment: All assessments are compulsory. Assignments, class tests, laboratory work, Final Summative Assessment.

QUALITY ASSURANCE 2

Pre-requisites: Qualitative Techniques 1.

Mode of delivery: 2 1/2 hours/week lectures, 1 hour/week tutorials, 1 hour/week practicals.

Subject outline: Statistical Process Control (SPC) Charts (SPC, self control); dominance in processes; spc-charts for Variables, spc-charts for Attributes; Companywide Assessment of Quality.

Quality Improvement and Cost Reduction (management controllable defects, operator controllable defects, motivation for quality, self control); Employee Involvement; Quality Systems (ISO 9000, other); Quality in Manufacturing in the 21st Century.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.
BTECH: INDUSTRIAL ENGINEERING

ENTREPRENEURSHIP 4

Pre-requisites: None.

Mode of delivery: 4 ½ hours /week lectures, 3 hours/week projects

The 21st century production and business environment is characterised by expanding global competition and an increasing variety of products with low demand. This has evolved into an era of mass customisation of innovative products. To survive in such a competitive environment will entail not only efficient manufacturing processes and technologies, but also how to translate a creative idea into a feasible commercial product. This requires a thorough understanding of its various elements of entrepreneurship. The objective of this course is to provide students with coverage of the latest topics in entrepreneurship to foster a creative and global entrepreneurial mindset among students.

Subject outline: The Nature of Entrepreneurship and how it is related to Small Business; Analyze whether it is better to Start a Business from Scratch or Buy an Existing Business; Develop New Venture Business Plans; Develop Market Growth Strategies by focusing on the Customer. Managing Growth in the Small Business; Manage Assets and evaluate Financial Performance in the Small Business.

Entrepreneurship and Entrepreneurs; Creativity and Business Opportunity; The Window of Opportunity; The Business Plan; Resources Requirements and Legal Related Aspects; Getting Started; Financing an Entrepreneurial Venture; Networking and Support; Entering the Family Business; Buying a Franchise; The Business Buyout; Managing Growth; Growth Strategies and Options; Business Failure and Turnaround Measures; Harvesting and Exiting the Venture; International Business Opportunities; e-Commerce Opportunities; Corporate Entrepreneurship.

Assessment: Test, Assignment, Project (Business Plan), Final Summative Assessment.

INFORMATION SYSTEMS 4

Pre-requisites: None

Mode of delivery: 4 1/2 hours / week lectures

The purpose of this subject is to introduce Information Systems (IS) topics relevant to the study field ensuring that a student is able upon the completion of this subject to deal successfully and efficiently with Information System professionals in today’s competitive, complex and everchanging global business environment.

Subject outline: Communicate using advanced electronic media to support academic research; Knowledge of various IS requirements necessary for academic research, the Break-
through Process, applicable IS tools, qualitative and quantitative research techniques.

Assessment: Assignments, project, tests, Final Summative Assessment.

**LOGISTICS ENGINEERING 4**

**Pre-requisites:** None

**Mode of delivery:** 4 ½ hours /week lectures, projects

To bring an understanding of the true meaning of the term “Logistics Engineering”, an awareness of its place in industry and to illustrate its engineering nature; specifically its role in Industrial Engineering

**Subject outline:** Key terms and definitions of logistic engineering; The need to include logistic engineering in the design of a system; Identify the elements of logistics; Describe measures of logistic; The relationship between system engineering and logistic engineering; The purpose and models used for logistic supportability analysis; Grasp the significance of logistic engineering during the design and development phase of a system; Distinguish the facets of logistics during the production and construction phase of a system; Understand the role of logistic engineering during the operational life and retirement of the system; Able to utilize logistic engineering processes and tools; Understand the planning and management activities for logistic management.

**Assessment:** Tests, Final Summative Assessment, assignments, projects.

**PRODUCTION TECHNOLOGY 4**

**Pre-requisites:** None.

**Mode of delivery:** 4 ½ hours /week Lectures, assignments, projects

Subject outline: Introduction to Manufacturing and Production: The background to the manufacturing environment, the importance of manufacturing to improve competitiveness and to create wealth.

CAD Systems: The success of a production process starts with efficient design processes like Computer Aided Design (CAD) Computer Control of Machines: Basic control methods like NC and CNC are covered. The basics of PLC’s is also explained. Robotics: The basics and application of robotics and robotics systems are explained. Automated Material Handling And Storage: An important feature of modern manufacturing is the automation of material handling and storage and retrieval. This session covers the important aspects of this issue. Group Technology And Manufacturing Cells: Group technology is explained and the design and use of Cellular Manufacturing is discussed. Flexible Manufacturing Systems: What is an FMS, the features, the layouts and benefits are
CIM And Enterprise Integration: The integration of the enterprise by methods like CIM (Computer Integrated Manufacture) is discussed together with views of the future.

Assessment: Test, Assignment, Project, Oral Presentation, Final Summative Assessment

**PROJECT ENGINEERING 4**

**Pre-requisites:** None.

Mode of delivery: 4 ½ hours /week lectures, projects, assignments

Subject outline: The World Of Project Management: The project environment, life cycles of a project, a first look at evaluating risks.
The Manager, The Organisation And The Team: Different roles and responsibilities during a project, organisation structures, project teams.
Project Activity And Risk Planning: Project plans and processes, work breakdown structures.
Budgeting The Project: Methods, estimations, uncertainties.
Scheduling The Project: Scheduling networks and methods, risk management, simulation.
Allocating Resources To The Project: Expediting, resource loading, critical chains. Monitoring And Controlling The Project: Reporting, earned value, control systems.
Evaluating And Terminating The Project: Evaluation, audits, termination.

Assessment: Test, Theoretical Assignments, Practical Project, Oral Presentations, Final Summative Assessment.

**PROJECT RESEARCH 4**

**Pre-requisites:** None.

Mode of delivery: 4 1/2 hours/week lectures, research, consultation

Subject outline: Communicate using advanced electronic media to support academic research; Formulate information systems effectively utilizing critical analysis techniques; Apply quality assurance procedures correctly utilizing specialised diagnostic and monitoring techniques; Perform simulation of interacting activities in industry; Apply cost effective planning and integration of principles and strategies to provide sustained support to systems/products, through their development and operational phases to completion; Apply entrepreneurial and business principles to establish, manage and maintain a small business; Conceptually (and effectively) design manufacturing systems utilizing modern technology; Identify research problems and engage in research, utilizing scientifically formulated approaches to make recommendations towards solutions. Knowledge of qualitative and quantitative research techniques; Knowledge of applicable statistical tools.

QUALITY ASSURANCE 4

Pre-requisites: None.

Mode of delivery: 4 1/2 hours/week lectures, assignments/projects, self study, consultation

Subject outline: Understanding Quality Concepts: Differing Perspectives on Quality; Quality Theory; Global Supply Chain Quality and International Quality Standards; Strategic Quality Planning; Designing And Assuring Quality: The Voice of the Customer & The Voice of the Market; Quality and Innovation in Product and Process Design; Designing Quality Services; Managing Supplier Quality in the Supply Chain; Implementing Quality: The Tools of Quality; Managing Quality Improvement Teams and Projects; Implementing and Validating the Quality System

Assessment: Test, Assignments, Project, Presentation, Final Summative Assessment.

SYSTEMS DYNAMICS 4

Pre-requisites: None.

Mode of delivery: 4 1/2 hours/week lectures, laboratory, projects

Subject outline: Key terms and definitions of System Thinking, tools of System Thinking in solving problems, qualitative and quantitative tools of System Thinking, feedback structure of a dynamic system, the relationship between feedback structure and behaviour of a dynamic system, purpose and models used for system supportability analysis, the significance of simulation for policy design, evaluation and implementation, dynamics of stocks and flows in a nonlinear system, the significance of model testing when conducting a system dynamic project, model the dynamics of a simple structure and growth.

Assessment: All Assessments are compulsory. Assignments; practicals; class tests; projects, Final Summative Assessment.
BTECH: QUALITY

CONTINUAL QUALITY IMPROVEMENT 4

Pre-requisites: None

Presentation: 4 hours/week Lectures / Practicals

Subject outline: On successful completion of this subject, the learner will be able to: communicate effectively using all appropriate media and facilitate quality related issues in the organisation; design, implement and improve a quality management system (QMS) and demonstrate conformance to quality requirements; perform quality management systems audits to demonstrate and facilitate conformance to quality requirements; function as a change agent of organisational quality culture for the achievement of best practices; apply research methodologies to quality related aspects of products, processes, problem solving, and/or continuous improvement for competitiveness.

Assessment: All assessments are compulsory. Assignments, practicals, class tests, Final Summative Assessment.

PROJECT 4

Pre-requisites: Quality Management Systems 3

Co-requisites: Statistical Quality Techniques 3

Mode of delivery: 3 hours/week Lectures.

Subject outline: On successful completion of this subject, the learner will be able to: Evaluate existing empirical and/or applied research projects, plan an empirical and/or applied research project, analyse and interpret empirical and/or applied research data, present research project results verbally or as a written report, conduct an applied research project.

The syllabus entails problem identification, choice and use of measuring instruments, literature study, experimentation, analysis and interpretation of data, compiling a project report, computer applications, case studies and applied projects; communication using advanced electronic media to support academic research; quality management system (QMS) requirements necessary for academic research; application of QMS requirements to audit the QMS; knowledge of the breakthrough process; applicable statistical tools; qualitative and quantitative research techniques.

Assessment: All assessments are compulsory. Research topic approval, research report proposal, research project report, research project presentation.
QUALITY AUDITING TECHNIQUES 4

Pre-requisites: Quality Management Systems 3

Mode of delivery: 3 hours/week Lectures.

Subject outline: On successful completion of this subject, the learner will be able to: effectively communicate using all appropriate media and facilitate quality related issues in the organisation; design, implement and improve a quality management system (QMS) and demonstrate conformance to quality requirements; perform QMS audits to demonstrate and facilitate conformance to quality requirements; function as a change agent of organisational quality culture for the achievement of best practices; apply research methodologies to quality-related aspects of product and processes, problem solving and/or continuous improvement for competitiveness; confidently assist and participate in any quality-related audits, either internal or external; plan an audit, taking into consideration all aspects as stated in the standard, ISO 19011; generate a detailed audit report; participate in an external auditors’ course that will enable him/her to register with a professional body, e.g. the International Register of Certified Auditors (IRCA).

Assessment: All assessments are compulsory. Assignments, class tests, project; presentation, Final Summative Assessment.

QUALITY MANAGEMENT SYSTEMS 3

Pre-requisites: None

Mode of delivery: 3 hours/week Lectures

Subject outline: In this unit of Quality Management Systems the objective is to contribute to the level of competence expected from a quality practitioner. The anticipated general outcomes of this subject are to: Describe the function of a quality management system (QMS); apply the principles of planning and executing an internal audit; plan and implement a QMS, understanding the following essential aspects of this subject: quality and its meaning in terms of definitions, systems and principles; quality philosophies; ISO 9000 system overview and concepts, definitions, elements; QMS documentation, process analysis, flow diagrams; corrective action systems; types of audits, audit preparation, introduction to internal audits.

Assessment: All assessments are compulsory. Assignments, class tests, Tutorial tests; Project, Final Summative Assessment.
QUALITY PLANNING AND IMPLEMENTATION 4

Pre-requisites: Continual Quality Improvement 4.

Mode of delivery: 4 hours/week Lectures

Subject outline: On successful completion of this subject, the learner will be able to: effectively communicate using all appropriate media and facilitate quality-related issues in the organisation; design, implement and improve a quality management system (QMS) and demonstrate conformance to quality requirements; perform QMS audits to demonstrate and facilitate conformance to quality requirements; function as a change agent of organisational quality culture for the achievement of best practices; apply research methodologies to quality-related aspects of product and processes, problem solving, and/or continuous improvement for competitiveness.

Assessment: All assessments are compulsory. Assignments, presentations; class tests, Final Summative Assessment, laboratory work.

QUALITY TECHNIQUES 4

Pre-requisites: Statistical Quality Techniques 3

Mode of delivery: 3 hours/week Lectures.

Subject outline: On successful completion of this subject, the learner will be able to: evaluate existing empirical and/or applied research projects, plan an empirical and/or applied research project, analyse and interpret empirical and/or applied research data, present research project results verbally or as a written report, and conduct an applied research project.

The syllabus entails problem identification, choice and use of measuring instruments, literature study, experimentation, analysis and interpretation of data, compiling a project report, computer applications, case studies and applied projects, effective utilisation of management information systems (MIS) (and other information sources), statistical tools for research, the design of experiments, quality improvement and process control, the application of statistics using suitable software packages, principles of statistical decision modelling.

Assessment: All assessments are compulsory. Assignments, class tests, projects, Final Summative Assessment, laboratory work.
STATISTICAL QUALITY TECHNIQUES 3

Pre-requisites: None

Mode of delivery: 3 hours/week Lectures.

On successful completion of this subject, the learner will be able to: appreciate the omnipresence of variability; make use of simple graphical tools such as run charts, histograms, scatter plots, probability plots and control charts; appreciate basic concepts of statistical interference; understand the philosophies of Shewhart, Deming, Pareto and other practitioners concerning the quality of products and services.

Subject outline: Communication using advanced electronic media to support academic research: effective utilisation of management information sources (MIS) (and other information sources); presentation skills; use of application software; electronic media research techniques; present research findings using appropriate advanced electronic media; knowledge of applicable statistical tools and how to apply them to research, design of experiments, quality improvement and process control; application of statistics using suitable software packages; application of principles of statistical decision modelling; knowledge of qualitative and quantitative research techniques; project management skills; knowledge of technical writing and presentations; knowledge of problem-solving techniques.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.
## DEPARTMENT OF MARITIME STUDIES

### DEPARTMENT OFFICE-BEARERS

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of Department</td>
<td>AProf E D Snyders, NHD (Maritime Studies), NHD (Post School Education), MDipTech (Education), DTech (Education), Master Unlimited CoC</td>
<td>021 440 5755</td>
<td><a href="mailto:SnydersE@cput.ac.za">SnydersE@cput.ac.za</a></td>
</tr>
<tr>
<td>Secretary</td>
<td>Mr D Dyers, ND Comm Admin, BTech OMT, MSc (Maritime Affairs)</td>
<td>021 440 5752</td>
<td><a href="mailto:DyersD@cput.ac.za">DyersD@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="mailto:Maritime@cput.ac.za">Maritime@cput.ac.za</a></td>
</tr>
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</table>

### DEPARTMENTAL STAFF

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Qualifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturer</td>
<td>Mr F Conradie</td>
<td>ND (Maritime Studies), Deck Officer CoC</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr D Lambert</td>
<td>Chief Engineer CoC, MBA</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms L D Louw-November</td>
<td>ND (Maritime Studies), MPhil (Shipping Law)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr B Ntamba Ntamba</td>
<td>BEng (Electromechanical Engineering), MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Capt R P Pawley</td>
<td>Master Unlimited CoC</td>
</tr>
<tr>
<td>Academic Instructor</td>
<td>Mr P Naidoo</td>
<td>ND (Maritime Studies)</td>
</tr>
<tr>
<td>Academic Instructor</td>
<td>Mr E La Vita</td>
<td>ND (Mechanical), PGCE, Second Engineer CoC, MSc (Maritime Affairs)</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Mr B Alexander</td>
<td>BMil</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Ms D R Hess-Cloete</td>
<td>BTech (Mechanical), MSc</td>
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</tbody>
</table>

### QUALIFICATIONS OFFERED

<table>
<thead>
<tr>
<th>Qualification Type</th>
<th>Qualification Code</th>
<th>Minimum Duration</th>
<th>Maximum Duration</th>
<th>Work Integrated Learning</th>
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<tbody>
<tr>
<td>ND: Engineering: Mechanical: Marine</td>
<td>NDMCME</td>
<td>3 years</td>
<td>6 years</td>
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<tr>
<td>ND: Maritime Studies</td>
<td>NDMRTM</td>
<td>3 years</td>
<td>6 years</td>
<td>1 year</td>
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<tr>
<td>ND: Maritime Studies - Extended</td>
<td>NDMRTX</td>
<td>4 years</td>
<td>8 years</td>
<td>1 year</td>
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</tbody>
</table>
ND: ENGINEERING: MECHANICAL: MARINE

Course aim
The aim of the course is to afford the student the opportunity to obtain the National Diploma in Engineering: Mechanical which is accepted by maritime commerce and industry, as well as the South African Maritime Safety Authority (SAMS) certificate of competency which will enable students to serve on vessels as certificated engineer officers.

Purpose and rationale of the qualification
Persons achieving this qualification will be able to, independently as well as under supervision, integrate analytical and practical engineering techniques and engineering knowledge to solve well-defined and open-ended engineering problems. They will also be able to select criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

Career opportunities
The course provides an opportunity for marine engineer officers (or aspirant marine engineer officers) to obtain both a National Diploma and a STCW78 certificate of competency, compliant with the Manila 2010 amendments. Career opportunities also exist in the shore-based maritime industry, particularly for those persons who ultimately wish to terminate their sea-going employment.

Requirements for sea-going officers: Course Structure

ENGINEER OFFICER CERTIFICATE OF COMPETENCY (COC)
Year 1: Academic component at CPUT, i.e. Semester (S1) and S2
Year 2: SAMS approved marine engineering workshop training, e.g. De Beers Lesedi Training Centre (Kimberley)
Year 3/4: Experiential (sea-going) learning component, i.e. 12 months approved sea service required on vessels with propulsion power 750 kW or greater. SAMS ancillary certification and Level 3 oral examination

SECOND ENGINEER OFFICER COC
S3 + 12 months approved sea service required on vessels with propulsion power 3000 kW or greater. SAMS ancillary certification and Level 3 oral examination.
CHIEF ENGINEER OFFICER COC
S4 + Second Engineer CoC + 24 months approved sea service required on vessels with propulsion power 3000 kW or greater. SAMSA ancillary certification and Level 3 oral examination.

REQUIREMENTS FOR CADETSHIP
• S1 + S2
• Maximum age 21
• Foreign students to arrange their own experiential (sea-going) learning component.

Experiential Learning
Students are required to complete a minimum of 12 months unlimited sea service aboard vessels with an engine capacity greater than 750 kW as well as SAMSA approved practical workshop training.

The Department of Maritime Studies may be able to assist in finding sea-going (experiential learning) opportunities, but cannot guarantee placement. During the sea-going period, students complete a complex on-board training programme and a cadet’s record book.

Offering type and duration of course
Full-Time: Three and a half years. Students attend four semesters at the university, followed by 12 months of sea-going experiential learning.

Venues of Offering
Granger Bay
### ND: ENGINEERING: MECHANICAL: MARINE (NDMCMME)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
<th>NQF Exit Level</th>
<th>SAQA Credit</th>
<th>HEMIS Credit</th>
<th>Assessment Type</th>
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<td>1</td>
<td>S1</td>
<td>KOT102S</td>
<td>Communication Studies 1</td>
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<td>S1</td>
<td>CMS105S</td>
<td>Computer Studies 1</td>
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<td>Mechanics of Machines 2 (Thermodynamics 2)</td>
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<td>Fluid Mechanics 2</td>
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<td>Naval Architecture 1</td>
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<td>Engineering Drawing 1</td>
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<td>ICN201S</td>
<td>Internal Combustion Engines 2 (Steam)</td>
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<td>STL203S</td>
<td>Strength of Materials 2 (Applied)</td>
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<td>NAR201S</td>
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ND: MARITIME STUDIES

Course aim
The aim of the course is to afford the student the opportunity to obtain the National Diploma in Maritime Studies, which is accepted by maritime commerce and industry, as well as the South African Maritime Safety Authority (SAMSA) certificate of competency, which will enable students to serve on vessels as certificated deck officers.

Purpose and rationale of the qualification
The qualified person will have the requisite levels of theoretical knowledge, understanding and practical proficiency to establish a successful career in the shipping industry.

Career opportunities
The course provides an opportunity for deck officers (or aspirant deck officers) to obtain both a National Diploma and a STCW78 certificate of competency, compliant with the Manila 2010 amendments. Career opportunities also exist in the shore-based maritime industry, particularly for those persons who ultimately wish to terminate their sea-going employment.

DECK OFFICER CERTIFICATE OF COMPETENCY
Semester (S1) + S2 + 12 months unlimited sea service + SAMSA ancillaries + SAMSA Level 3 Assessment (oral examination)

CHIEF MATE CERTIFICATE OF COMPETENCY
Deck Officer CoC + S3 + S4 + 12 months unlimited sea service + SAMSA ancillaries + SAMSA Level 3 Assessment (oral examination)

MASTER (UNLIMITED) CERTIFICATE OF COMPETENCY
Chief Mate CoC + 24 months unlimited sea-service + SAMSA Ancillaries + SAMSA Level 3 Assessment (Oral Examination)

Experiential Learning
Students are required to complete a minimum of 12 months unlimited sea service aboard vessels greater than 500 gross tons, after successfully completing Semesters 1 and 2 (S1 and S2). The Department of Maritime Studies may be able to assist in finding sea-going (experiential learning) opportunities, but cannot guarantee placement. During the sea-going period, students complete a complex on-board training programme and a cadet’s record book.

Offering type and duration of course
Full-Time: Three years, including 12 months of sea-going experiential learning

Venues of Offering
Granger Bay
### ND: MARITIME STUDIES (NDMRTM)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
<th>Pre-requisite Subject Codes</th>
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<th>SAQA Credit</th>
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### MARITIME STUDIES (EXTENDED)

#### Course aim

In the Extended Curriculum with Foundational Provision Programme, first-year subjects of the National Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two-year Foundational Programme, students will integrate with the normal programme.

#### Duration of course

**Full-time:** The four year programme comprises six academic semesters and two semesters of inservice training.

#### Venues of Offering

Granger Bay

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PROMOTION CRITERIA & EXCLUSION RULES

ND: Maritime Studies

PROMOTIONS
Candidates shall complete all subjects for the preceding semester before being promoted to the next semester. In isolated cases, upon the merits of the case, this rule may be relaxed.

EXCLUSIONS
Candidates may be excluded if they fail three or more first-semester subjects. Upon appeal, via the head of department, each case shall be reviewed upon its merits.

ND: Engineering: Mechanical: Marine Engineering

PROMOTIONS
Candidates shall complete all subjects for the preceding semester before being promoted to the next semester. In isolated cases, upon the merits of the case, this rule may be relaxed.

EXCLUSIONS
Candidates may be excluded if they fail three or more first-semester subjects. Upon appeal, via the head of department, each case shall be reviewed upon its merits.
SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for qualification purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

Subjects ending in an ‘X’ are Extended Curriculum subjects.
NATIONAL DIPLOMA: MARITIME STUDIES

COMPUTER SKILLS 1

Pre-requisites: None

Mode of delivery: Lectures, practicals.

Subject outline: This unit is intended to introduce learners to the basic operation of the Personal Computer (PC), operating systems (Windows), e-mail and peripherals, among others, printer, mouse, hard and DVD-Rom drives. Learners should achieve basic competency in the use of software packages, such as, word processing, spreadsheets and data bases. The acquisition of these basic operating skills should enable learners to successfully complete assignments and reports. Learners should appreciate the advantages and limitations of PCs and accompanying software packages.

Assessment: All Assessments are compulsory. Practical assessments.

COMMUNICATIONS 1

Pre-requisites: None

Mode of delivery: Lectures, practicals.

The aim of this course is to ensure that students completing this subject can communicate orally, on paper and via electronic media in a more confident and skilled manner.

Subject outline: Communication theory, oral presentation, technical writing skills, group communication skills.

Assessment: All assessments are compulsory. Assignments, class tests, presentation.

MARINE ENVIRONMENTAL STUDIES 2

Pre-requisites: None

Mode of delivery: Lectures, practicals.

Subject outline: To adequately equip mariners with the necessary knowledge and skills which will enable them to: understand their marine environment; make informed decisions concerning the safety of the crew and vessel; make informed decisions concerning the choice of passage; sensitise them about the frugality of our marine resource including our responsibilities with regard to marine conservation.

Assessment: All assessments are compulsory. Assignments, class tests, exam.
MARINE ENVIRONMENTAL STUDIES 3

Pre-requisites: Marine Environmental Studies 2

Mode of delivery: Lectures, practicals.

Subject outline: To adequately equip mariners with the necessary knowledge and skills which will enable them to understand their marine environment; make informed decisions concerning the safety of the crew and vessel; make informed decisions concerning the choice of passage, and sensitize them about the frugality of our marine resource including our responsibilities with regard to marine conservation.

Assessment: All assessments are compulsory. Assignments, class tests, exam.

MARINE LAW & SHIPPING PRACTICE 1

Pre-requisites:

The aim of this course is to introduce the maritime studies student to the broad concepts of law specifically as it appertains to ships and allied marine services.

Mode of delivery: Lectures, practicals.

Subject outline: Introduction to law, the principles of law relating to maritime practice, custom and usage, contract law, delict, agency, international and local organisations that are involved with shipping matters.

Assessment: All assessments are compulsory. Assignments, class tests.

MARINE LAW 1

Pre-requisites: None

Mode of delivery: Lectures, practicals.

The aim of this course is to introduce the maritime studies student to the broad concepts of law specifically as it appertains to ships and allied marine services.

Subject outline: MARPOL 73/78, annex IV and V of MARPOL, safe working practice, management functions, International Maritime Organization (IMO), STCW95 convention.

Assessment: All assessments are compulsory. Assignments, class tests.
**MARINE LAW 2**

**Pre-requisites:** Marine Law 1

**Mode of delivery:** Lectures, practicals.

The aim is to cover those aspects of a chief mate’s commercial, legal and human resource management duties necessary for the efficient execution of his work on board a ship, and further to introduce sufficient ship master’s business and maritime law to enable him to take temporary command of a vessel in the event of the master’s incapacity or death.

**Subject outline:** Statutory control of merchant ships, IMO’s influence and ship registration; upholding standards on merchant ships by means of surveys, inspections and certification in compliance with international conventions and current South African legislation, and analysis of certificates clarifying how they are obtained and the period of validity of each; analysis of other documents required on a ship by South African legislation. Analysis of current legislation as it affects the daily running of a merchant ship with respect to the employment, discipline and repatriation of seamen; analysis of the documentation required for the carriage of goods by sea. Analysis of the ship master’s statutory navigational duties and obligations in terms of South African legislation; analysis of the master’s duties with reference to the health and welfare of the crew and general hygienic conditions on the ship; evaluation of measures for the prevention of oil and other pollution, the need for proper record-keeping on board and the penalties for causing pollution; analysis of the action to be taken on death or serious illness of the master or when changing the command of a ship in port; port practice and customs house clearance.

**Assessment:** All assessments are compulsory. Assignments, class tests, exam.

**MARINE MATHEMATICS 1**

**Pre-requisites:** None

To adequately equip the trainee deck/navigating officer with the fundamental knowledge and skills which will enable them to cope with basic and advanced calculations in navigation, naval architecture and other marine-related subjects.

**Subject outline:** Module 1: Algebraic manipulations leading to the transportation of equations and their solution; how to produce a graph of given or observed data and extract information from the graph; how to convert between polar and rectangular co-ordinates; how to interpolate quickly and accurately; the properties of the ellipse; error; absolute error and relative error; trigonometrical functions; inverse functions; radians; perimeters and areas; areas of sectors and segments of a circle; surface areas and volumes; Simpson’s 1st, 2nd and 3rd Rules; construction of a circle (Snellius problem); properties of figures, parallel lines and constructions; vector quantities; graphical solution of sums and differences of vector

Module 2: Meaning of a great circle and small circle; spherical triangles

Module 3: Differentiation and integration.

**Assessment:** All Assessments are compulsory. Assignments; Exam
MARINE SCIENCE 1

Pre-requisites: None

Mode of delivery: Lectures, practicals.

This subject serves to revise and expand on the scientific principles which act as the foundation for much of the subject material later in the subject, with special reference, where appropriate, to marine application.

Subject outline: Wave theory, heat, light, sound, magnetism, nature of an electric current, fluid mechanics, material science, mechanics.

Assessment: All assessments are compulsory. Assignments, class tests, exam

NAVAL ARCHITECTURE 1

Pre-requisites: Marine Mathematics 1

Mode of delivery: Lectures, practicals.

To develop an understanding of the principles of naval architecture and to make the student aware of the safety problems associated with the stability of construction of a ship.

Subject outline: Stability; initial transverse statical stability; transverse statical stability; movement of the ship’s centre of gravity; free surface; buoyancy, reserve buoyancy and load lines; water pressure; construction; measurement and terminology of merchant ship construction; general arrangement of common ship types; stresses in ship structure and compensation thereof; the construction of specific parts of the hull structure; ship building materials; welding; stresses and strains in hull girder.

Assessment: All assessments are compulsory. Assignments, class tests, exam.

NAVAL ARCHITECTURE 2

Pre-requisites: Naval Architecture 1, Marine Mathematics 1

Mode of delivery: Lectures, practicals.

To develop an understanding of the principles of naval architecture and to make the student aware of the safety problems associated with the stability of construction of a ship.

Subject outline: Stability; initial transverse static stability; transverse static stability; movement of the ship’s centre of gravity; free surface; buoyancy, reserve buoyancy and load lines; water pressure; measurement and terminology of merchant ship construction; general arrangement of common ship types; stresses in ship structure and compensation thereof; the construction of specific parts of the hull structure; ship building materials; welding; stresses and strains in hull girder.
of specific parts of the hull structure.

Assessment: All assessments are compulsory. Assignments, class tests, exam.

**NAVIGATION 1 (CHARTWORK)**

**Pre-requisites:** Principles of Navigation 1

**Mode of delivery:** Lectures, practicals.

**Subject Outline:**

Assessment: All assessments are compulsory. Assignments, spot tests, exam.

**NAVIGATION 1 (PRACTICAL)**

**Pre-requisites:** Principles of Navigation 1

**Mode of delivery:** Lectures, practicals.

To build on the principles studied in Principles of Navigation 1 and to concentrate on converting theoretical knowledge into applied knowledge by means of finding solutions to various practical navigational problems typically applicable to the daily tasks of a junior watch-keeping navigation officer of a ship at sea. The level of ability and knowledge is aimed at enabling the students to obtain an exemption from the SAMSA examination for qualification as a deck officer as required by the STCW-95 Convention. The subject further aims to prepare the students for the solution of complex integrated navigational problems which are anticipated at the higher levels of navigation.

**Subject outline:** Use the parallel or meridional sailing formula; use the plane sailing formula; Mercator sailing formula; use of spherical trigonometry to solve great circle tracks; use data obtained from the nautical almanac; find azimuth, amplitude, gyro and compass errors, deviation; find the latitude and LOP by meridian altitude; find the LOP derived from an observation of Polaris; position line theory and sight-reduction techniques; sight reduction; plotting LOPs to fix the position of a ship at sea.

Assessment: All assessments are compulsory. Assignments, spot tests, exam.
NAVIGATION 2

Pre-requisites: Navigation 1 (Practical) and Navigation 1 (Chartwork)

Mode of delivery: Lectures, practicals.

The aim is to consolidate the navigational knowledge and skills previously learned in order to enable the students to solve the more complex integrated applied navigational problems associated with the level of professional competence expected of an officer second-in-command of a ship, viz the chief mate. Furthermore it is intended to develop certain specialised aspects of the subject and to introduce the students to the fundamental skills of planning safe coastal passages and port approaches. Students will also be introduced to the various nautical publications typically consulted when planning a coastal passage.

Subject Outline: Ocean and offshore navigation: Meridional, parallel and plane sailing; applied Mercator sailing; trans-ocean great circle sailing; latitude by meridian altitude; sight reduction techniques; position fix by means of plotted LOPs; gyro and magnetic compass errors; advanced applied navigational problems.
Coastal navigation: Tidal calculations; coastal track planning; coastal track planning, route cards and ETAs.

Assessment: All assessments are compulsory. Assignments, class tests, exam.

NAVIGATION 2 (PRACTICAL CHARTWORK PAPER 1)

Pre-requisites: Navigation 1 (Practical) and Navigation 1 (Chartwork)

Mode of delivery: Lectures, practicals.

The aim of this course is to introduce trainee deck navigating officers to elementary and advanced chart work practice, with the view to safeguarding, at all times, the vessel and its crew.

Subject outline:
Module 1: Determining the ship’s position using latitude and longitude; simultaneous cross bearings (using compass, true or gyro bearings), transit bearings, by bearing and range, multiple ranges and relative bearings; positional information from aids to navigation, including lighthouses, beacons, buoys and electronic navigation systems or by any use of the above; dead reckoning, taking into account winds, tides, currents and estimated speed; deviation and variation; determining safe courses; converting true courses into magnetic and compass courses; allowance for gyro error; monitoring a passage along a planned route; determining an ETA taking into account speed, wind and current; time and height of high and low water at standard ports. Ability to use and maintain navigational charts and publications, such as sailing directions, tide tables, notices to mariners, radio navigational warnings and ship routing information. Broad principles and use of conventional magnetic and gyro compasses.
Module 2: Determining a safe course, flux-gate compass and magnetic compass repeaters, determining compass error, deviation and/or gyro error using transit bearings, planning a coastal passage and entry into harbour.
Module 3: The effect of current and leeway on course and speed; the course to steer to make good a certain track (making due allowance for current and leeway); the set and rate of a current and the distance at which the ship will pass off a given point. Compass error and deviation using the bearing of the sun. Determining the ship's position on a chart by use of: transferred position lines; position lines obtained from electronic navigation systems; depth contours combined with position lines; horizontal and vertical sextant angles. Determining and using dipping distances of lights and distances of sighting points of land of known height. Passage planning and execution; the use of clearing marks and horizontal and vertical danger angles. Determining the time and height of high and low water at standard ports using Admiralty Tide Tables.

Module 4: Determining the time and height of high and low water at secondary ports by tidal differences, using the Admiralty Tide Tables; determining the ship’s position on a chart; siting the magnetic compass; the earth's magnetic field, poles; equator, angle of dip and variation; deviation, its cause and effect; principle of the free gyroscope; correction for latitude, course and speed error; care and maintenance of different types of compasses; compass-error, deviation and/or gyro error using the bearing of a heavenly body; effective bridge teamwork procedures.

Assessment: All assessments are compulsory. Assignments, class tests, exam.

NAVIGATION INFORMATION SYSTEMS 1 (ENS PHASE A)

Pre-requisites: None

Mode of delivery: Lectures, practicals.

The aim of this course is to equip the trainee deck navigating officer with the fundamental knowledge and skills needed to operate electronic navigation systems commonly fitted on trading merchant vessels, and additionally, to utilise the information presented to undertake the duties of a bridge watch-keeping officer on receipt of a first Certificate of Competency (Deck Officer).

Subject Outline:
Module 1: Using electronic navigation equipment; determining the ship’s position; understanding the broad principles and limitations of electronic navigation equipment, accuracy and errors; shipboard care and maintenance of electronic navigation equipment. Operating and interpreting and analysing information obtained from radar, factors affecting performance and accuracy; setting up and maintaining displays; detection and misrepresentation of information. False echoes, sea return, racons, remarkas, EPIRBs and SARTs. Operating and interpreting and analysing information obtained from radar (including range and bearing; course and speed of other ships; time and distance of closest approach of crossing, meeting overtaking ships); identification of critical echoes; detecting course and speed changes of other ships, effect of changes in own ship’s course or speed or both; application of the International Regulations for Preventing Collisions at Sea, 1972, as amended; plotting techniques and relative and true motion concepts; parallel indexing.
Module 2: Basic principles of electromagnetic propagation; frequency, wavelength and Doppler effect; appreciating the need at all times to comply with the basic principles and operational guidance for officers in charge of a navigational watch, particularly in relation
DEPARTMENT OF MARITIME STUDIES

to the use of radar and ARPA. basic principles of ship-borne echo sounders and types; the
principal components of general-purpose navigational echo sounding equipment; principles of
ship-borne logs; principles of radar; marine radar installation. relative and true motion; satellite
navigation systems; receivers in use on board ships; sources and causes of errors; corrections
and expected accuracy; coverage areas; augmentation systems.

Assessment: All assessments are compulsory. Assignments (theoretical and practical), exam.

MECHANICAL ENGINEERING DRAWING 1

Pre-requisites: None.

Mode of delivery: 4½ hours/week lectures, 6 tutorials.

Subject outline: Produce a freehand sketch of any mechanical component from which an
accurate drawing can be produced; produce hand printed title blocks in different A series
sizes; produce instrument-drawn drawings with dimensions; produce basic geometric
constructions; produce an assembly drawing of all manufactured parts of the assembly.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final
Summative Assessment.

NAVIGATION INFORMATION SYSTEMS 2 (ENS PHASE C)


Mode of delivery: Lectures, practicals.

The aim of this course is to equip the trainee deck navigating officer with the fundamental
knowledge and skills needed to operate electronic navigation systems commonly fitted in
RSAregistered vessels, and additionally, to utilise the information presented to undertake the
duties of a bridge watch-keeping officer on receipt of a first Certificate of Competency.

Subject outline:
Module 1: Demonstrating the ability to detect and recognise targets; sources of errors in
position obtained; use of radar for navigation in confined or coastal waters including parallel
index techniques; understanding the principles and construction of a radar plot; use of plotting
aids; use of a plot to obtain information about targets; assessment of collision risk; effect of
alteration of courses and speed in relation to collision avoidance; radar reporting procedures;
application of collision regulations in restricted visibility; demonstrate the ability to describe
the principles of operation of ARPA equipment; system performance and accuracy; display
presentation; controls, system capabilities and information facilities.
Module 2: Categorising and assessing the accuracy of the differing electronic navigation
instruments available on a modern trading merchant vessel, e.g. GPS, GNS, DGPS I DGNS,
dynamic positioning (DP) systems, radar and hyperbolic navigation systems.
Assessment: All assessments are compulsory. Collision avoidance: simulator, navigation: simulator, radar plotting, exam.

**NAVIGATION INFORMATION SYSTEMS 3**

**Pre-requisites:** Navigation Information Systems 2.

Mode of delivery: Lectures, practicals.

Subject outline: To equip prospective navigating officers with the necessary knowledge and skills required for the optimal utilisation of modern electronic navigation equipment and to understand and appreciate the limitations of each contemporary electronic navigational aid.

Assessment: All assessments are compulsory. Assignments, class tests, exam.

**PRINCIPLES OF NAVIGATION 1**

**Pre-requisites:** None.

Mode of delivery: Lectures, practicals.

The aim of this course is to introduce the student to a knowledge of the fundamental principles and arithmetic of navigation so as to enable him to approach the practice of navigation at later stages by applying those principles and arithmetical processes properly; to give the students a general knowledge of marine charts, sailing methods, elementary navigational astronomy and an understanding of the movement of heavenly bodies on the celestial sphere; to introduce the students to methods of solving the PZX astro-nav triangle and various terrestrial sailing triangles.

Subject outline: Scientific calculator operations; introductory terrestrial navigation; marine navigational charts; elementary sailings; fundamental Mercator sailing; elementary great circle sailing; solar system; celestial sphere; PZX navigational triangle; time at sea; position of heavenly bodies on the celestial sphere; specific PZX astro-navigational triangles; introductory sightreduction calculations; sextant and correction of altitudes.

Assessment: All assessments are compulsory. Assignments, class tests, exam.
SEA TRANSPORT 1

Pre-requisites: None.

Mode of delivery: Lectures, practicals.

The aim of this course is to equip a young officer with basic ship’s architecture and nomenclature, including basic ship stability; to introduce the trainee to the international rules of the road applicable to all ships, and the two international buoyage systems.

Subject outline: Introduction to ships and ship types, marine traffic management, marine communication, cargo systems, occupational safety.

Assessment: All assessments are compulsory. Assignments, class tests.

SEAMANSHIP 2

Pre-requisites: Navigation Information Systems 1

Mode of delivery: Lectures, practicals.

Subject outline: Effect of propellers in ship handling; factors affecting turning circle and stopping distance of a ship; effect of wind on ship handling; effect of current on ship handling; distress at sea: search and rescue man overboard; effects of shallow water and interaction on ship handling; fundamental anchoring practice; berthing and unberthing operations; emergencies: initial action: damage control and assessment; emergencies: port procedures; South African Search and Rescue – SASAR; marine traffic management; safety equipment and procedures; marine communication systems.

Assessment: All Assessments are compulsory. Continuous assessment.

SEA TRANSPORT 3

Pre-requisites: Sea Transport 2 (Theory), Sea Transport 2 (Practical)

Mode of delivery: Lectures, practicals.

The aim of this subject is to bring junior cargo officers up to a management level in cargo operations [e.g. Class 3 (Deck) to Class 2 (Deck)]. Shore personnel that have a basic knowledge will be exposed to a higher degree of application.

Subject outline: Economics of shipping; economics of ship owning; crew structure; organisation and training of crew; carriage and handling of cargo in general cargo, Ro/Ro and container vessels; carriage of handling of cargo in bulk carriers; bulk liquid carriers, oil tankers,
gas carriers, chemical carriers; certification and survey of ships;
inspection and maintenance of ships and equipment; safety.

Assessment: All assessments are compulsory. Assignments, class tests, exam

SHIP TECHNOLOGY 2

Pre-requisites: Maritime Practice 2 A & B

Mode of delivery: Lectures, practicals.

Subject outline: To prepare the candidates for the Class 1 (Deck) Certificate of Competency in marine engineering knowledge, the correct usage of engineering terms and the ability to have discussions about the power plant with engineers and superintendents. Marine engineering terms: Mass, force, centrifugal force, thrust, torque, density, relative density, head, pressure, volume, temperature, stress, strain, modulus of elasticity, safe working load, factor of safety. Marine power plants: Diesel engines; steam plant; propellers and shafting; auxiliary boilers; distillation and fresh-water systems; hydraulic systems; bridge control; steering gears; generators, alternators and electrical distribution; deck machinery; refrigeration, air conditioning and ventilation; stabilisers; sewage treatment plants; fuel consumption.

Assessment: All assessments are compulsory. Assignments, class test
DEPARTMENT OF MECHANICAL ENGINEERING

DEPARTMENT OFFICE-BEARERS

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of Department</td>
<td>Prof M A E Kaunda, Pr. Eng, BSc (Hons), MSc, PhD (Mechanical)</td>
<td>021 953 8655 021 959 6532</td>
<td><a href="mailto:MohamedKu@cput.ac.za">MohamedKu@cput.ac.za</a> <a href="mailto:MomotiS@cput.ac.za">MomotiS@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>Ms K Mohamed</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Ms S Momoti</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secretary</td>
<td>N. Soyekwa</td>
<td>021 959 6496</td>
<td><a href="mailto:SoyekwaNo@cput.ac.za">SoyekwaNo@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>T Bangani</td>
<td>021 959 6742</td>
<td><a href="mailto:BanganiT@cput.ac.za">BanganiT@cput.ac.za</a></td>
</tr>
<tr>
<td></td>
<td>N Ngqondela</td>
<td>021 953 8431 (Mechatronics)</td>
<td><a href="mailto:NgqondelaN@cput.ac.za">NgqondelaN@cput.ac.za</a></td>
</tr>
</tbody>
</table>

DEPARTMENTAL STAFF

<table>
<thead>
<tr>
<th>Position</th>
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<th>Qualifications</th>
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<tbody>
<tr>
<td>Professor</td>
<td>Prof G J Oliver</td>
<td>BA, BSc (Honours), MSC, Doctor of Technical Sciences</td>
</tr>
<tr>
<td>Professor</td>
<td>Prof B Sun</td>
<td>DPhil</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>Dr O Philander</td>
<td>MTech (Mechanical), PhD (Mechanical)</td>
</tr>
</tbody>
</table>

Heads of Programmes

| Extended Curriculum    | Mr L Meyers           | BTech (Mechanical)                               |
| Mainstream:            | Mr S Nqabisa          | MTech (Mechanical)                               |
| BTech                  | Mr W Kohlhofer        | MSc (Mechanical)                                 |
| Mechatronics:          | Mr O Ayodele          | BSc (Hons) (Mechanical), MTech (Mechanical)      |

Cooperative Education Coordinator

<p>| Mechanical             | Mr G Morris           | BTech (Mechanical)                               |
| Mechanical             | Mr P Tebele,          | BTech (Mechanical), BTech (Project Management), BTech (Quality) |
| Mechatronics           | Dr C Moodley         | PhD (Educational Psychology)                     |
| Senior Lecturer        | Ms V C Cain           | MTech (Mechanical), MSc (Mechanical)             |
| Senior Lecturer        | Mr H T Fawkes         | BSc (Mechanical), Master of Science in Eng in Mech Eng |
| Senior Lecturer        | Dr E T Muluh          | PhD (Biomedical Engineering), DPhil              |
| Senior Lecturer        | Mr T Z Ngewana        | BSc (Maths &amp; Physics), MSc (Mechanical)          |
| Senior Lecturer        | Mr T N Ngonda         | Pr.Eng, BSc (Mechanical), MEng (Mechanical)     |
| Senior Lecturer        | Dr B Odera           | PhD (Mechanical)                                 |
| Senior Lecturer        | Mr M N Riddles        | MTech (Mechanical)                               |
| Senior Lecturer        | Dr R A Ziegler        | BA, HDE, MPhil, DPhil                            |
| Lecturer               | Mr W W Alexander      | BTech (Mechanical)                               |
| Lecturer               | Dr B O Bello-Nonjengele | MEd (Applied Linguistics), PhD (Language and Literacy studies) |</p>
<table>
<thead>
<tr>
<th>Position</th>
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<tbody>
<tr>
<td>Lecturer</td>
<td>Mr T Chipanga</td>
<td>Diploma in Technical Education, MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr M J Cloete</td>
<td>NHD (Mechanical), BTech (Post School Education)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms F C du Preez</td>
<td>BEng (Hons), MEng (Industrial Engineering)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr E K Erfurt</td>
<td>BTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr E J February</td>
<td>MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr H Fidder</td>
<td>MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mrs F Harris</td>
<td>Baccalaureus Artium, Higher Diploma in Education</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr F Ismail</td>
<td>MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr C E Justus</td>
<td>NHD (Mechanical), HED</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr K Kabangele</td>
<td>BSc (Mechanical), MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr J J Kalombo</td>
<td>BSc (Metallurgical Engineering), MTech (Chemical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr K E Kanyarusoke</td>
<td>M-ASHRAE; MSc (Mechanical), BSc Engineering (1st class Hons); HDHET Cum laude</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr O Kilumbu</td>
<td>BSc (Electromechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms P H Khwambala</td>
<td>MSC (Electrical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr M H Ludick</td>
<td>MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms M M Lynn</td>
<td>HDE, BSc (Honours)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr C M Magoda</td>
<td>Diploma in Teaching (Physics and Mathematics), MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr S R Makhomo</td>
<td>MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr W P Mitchell</td>
<td>Baccalaureus Engineering Mechanical, Diploma Datametrics</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms F Mohadien</td>
<td>MA (English Literature), MA (Clinical Psychology)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr V Msomi</td>
<td>BSc (Hons) (Industrial Science), MSc (Material Science and Engineering), DTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr O Nemraoui</td>
<td>PhD Materials Engineering;</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr I Okoloko</td>
<td>MSc, MSc (Embedded Systems &amp; Robotics), PhD Mechatronic Engineering</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr I Omar</td>
<td>HD Education (Technical), BSc Engineering</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr S Pietrangeli</td>
<td>MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr M N Riddles</td>
<td>MTech (Mechanical)</td>
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<tr>
<td>Lecturer</td>
<td>Mr SC Saal</td>
<td>MTech (Mechanical)</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Ms LM Sonn</td>
<td>BSc, Master of Applied Science</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr N Tshilumbu</td>
<td>BSc (Metallurgical Engineering); DTech (Chemical)</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Mr W B Boshoff</td>
<td>BTech (Business Administration Management)</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Ms P Snayer</td>
<td>BTech, BA (Hons), Degree in English</td>
</tr>
<tr>
<td>Junior Lecturer</td>
<td>Mr M Sam</td>
<td>BTech (Mechanical)</td>
</tr>
<tr>
<td>Laboratory Technician</td>
<td>Mr S Cassiem</td>
<td>National Technical Certificate</td>
</tr>
<tr>
<td>Laboratory Technician</td>
<td>Mr L Curry</td>
<td>NHD (Electrical Engineering; Light Current)</td>
</tr>
<tr>
<td>Position</td>
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</tr>
<tr>
<td>Laboratory Technician</td>
<td>W C Daniels</td>
<td>BTech (Mechanical)</td>
</tr>
<tr>
<td>Laboratory Technician</td>
<td>M Jenkins</td>
<td>ND (Mechanical)</td>
</tr>
<tr>
<td>Laboratory Technician</td>
<td>Z Mlumiso</td>
<td>BTech (Mechanical)</td>
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<td>Laboratory Technician</td>
<td>F N Rust</td>
<td>NHD (Mechanical)</td>
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<td>Laboratory Technician</td>
<td>Z Sekeleni</td>
<td>ND (Mechanical)</td>
</tr>
<tr>
<td>I.T. Technician</td>
<td>C Komani (née Bakgane)</td>
<td>ND (Electrical: Light Current)</td>
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<tr>
<td></td>
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<td>BTech: Project Management</td>
</tr>
<tr>
<td>Laboratory Assistant</td>
<td>S Mabuwa</td>
<td>ND (Mechanical)</td>
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<td>Laboratory Assistant</td>
<td>M Gillion</td>
<td>National Technical Certificate</td>
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<tr>
<td>Laboratory Assistant</td>
<td>R Williams</td>
<td>Grade 12</td>
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<tr>
<td>Store Controller</td>
<td>A Abrahams</td>
<td>STD 6/Grade 8</td>
</tr>
<tr>
<td>General Worker</td>
<td>A. Cupido</td>
<td>STD 6/Grade 8</td>
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</table>

**QUALIFICATIONS OFFERED**

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<thead>
<tr>
<th>Qualification Type</th>
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<th>Minimum Duration</th>
<th>Maximum Duration</th>
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<tr>
<td>ND: Mechanical</td>
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<td>ND: Mechanical Extended</td>
<td>NDMECX</td>
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<td>7 years</td>
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<td>BTech: Mechanical</td>
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<td>2 years (part-time)</td>
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<tr>
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<tr>
<td>DTech: Mechanical</td>
<td>DTECME</td>
<td>2 years (part-time)</td>
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<tr>
<td>Mechanical Engineering (Mechatronics)</td>
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<td>ND: Engineering: Mechanical (Mechatronics)</td>
<td>NDMECH</td>
<td>3 years</td>
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<tr>
<td>ND: Engineering: Mechanical (Mechatronics) (Special Opportunity at Saldanha Site)</td>
<td>NDMECH</td>
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<tr>
<td>BTech: Engineering: Mechanical (Mechatronics)</td>
<td>BTMECH</td>
<td>1 year (full-time)</td>
<td>2 years (full-time)</td>
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</table>
ND: ENGINEERING: MECHANICAL

Course aim
Graduates will be able to integrate analytical and practical mechanical engineering techniques and mechanical engineering knowledge to solve engineering problems. They will also be able to use given criteria to assess mechanical processes and outcomes.

Purpose and rationale of the Qualification
Persons achieving this qualification will be able to, independently as well as under supervision, integrate analytical and practical engineering techniques and engineering knowledge to solve well-defined and open-ended engineering problems. They will also be able to select criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

Career opportunities
A graduate will be a member of a team, including engineers, designers, technologists and technicians in the design, construction, marketing, installation and maintenance of mechanical equipment. Mechanical Engineering students follow streams such as manufacturing, maintenance, design, research and development, and also complete the Government Certificate of Competency. These streams open up employment opportunities at mining companies, automotive plants, engineering and production companies, building service contractors and consulting engineers, and give students the knowledge and skills to become entrepreneurs.

Note: The ND Mechanical Engineering will be issued after completion of a minimum of 24 subjects, as well as the 12 months recognised experiential learning.

The 24 subjects must include the following:

- Applied Strength of Materials 3
- Communication Studies 1 and 2
- Computer and Programming Skills 1
- Fluid Mechanics 2 and 3
- Hydraulic Machines 3
- Mathematics 1
- Mechanical Engineering Design 2
- Mechanical Engineering Drawing 1
- Mechanics 1
- Strength of Materials 2 and 3

Professional Registration
The ND: Engineering: Mechanical is accredited by the Engineering Council of South Africa(ECSA). Graduates will comply with the academic requirements for registration as Professional Technicians.
Offering type and duration of course
Full-time: Three years, including 12 months of experiential learning.

Venues of Offering
Bellville

PART TIME STUDIES
The department does not officially offer a part time program in Mechanical Engineering, but may offer certain subjects on part time as required. The department does not undertake to provide tuition for a part time student through to completion of the diploma / degree. Applicants accepted or provisionally accepted for part time studies must contact the Department of Mechanical Engineering to check whether the subjects they require will be offered.
## ND: MECHANICAL ENGINEERING (NDMCHEN)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Compulsory or Elective</th>
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<th>NQF Exit Level</th>
<th>SAQA Credit</th>
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ND: ENGINEERING: MECHANICAL (EXTENDED)

Course aim
In the Extended Curriculum with Foundational Provision Programme, first-year subjects of the National Diploma are spread over two years, allowing a more supportive academic environment. The Extended Programme covers the same subjects as the mainstream programme but semester S1 and S2 are done over a period of one year each, as opposed to six months in the mainstream.

It leads to the same qualification, but it provides the student with the opportunity to receive additional support in all S1 and S2 subjects. On completion of the two year Foundational Programme, students will integrate with the normal programme.

Who qualifies for the Extended Programme?
Applicants who were placed on the waiting list in the mainstream program but who meet the entrance requirements. Applicants who were accepted in the mainstream program but are concerned about their background in Mathematics and Physical Science, and feel that they will benefit from the “Extended Programme”, may approach the department to be considered for this programme.

Students transferring from “Extended Program” elsewhere must have completed all their S1 extended subjects to be considered for S2 extended. Extended S2 students must complete all their S2 extended subjects to be considered for further studies.

Duration of course
Full-time: The four year programme comprises six academic semesters and two semesters of inservice training.

Venues of Offering
Bellville
## ND: MECHANICAL ENGINEERING (NDMCHEN)

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BTECH: ENGINEERING: MECHANICAL

Course aim
Graduates can apply mechanical engineering principles to determine appropriate ways of approaching mechanical engineering activities, as well as to establish and use criteria to assess processes and outcomes.

Purpose and rationale of the qualification
Persons achieving this qualification will be able to independently integrate mechanical engineering principles, apply these to determine appropriate ways of approaching activities and establish and use criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

Career opportunities
Graduates work with engineers, designers, technologists and technicians in the design, construction, marketing, installation and maintenance of mechanical equipment. The work is intellectual, demanding the capacity to think independently and to supervise technical and administrative staff. Students follow streams such as manufacturing, maintenance, design, research and they can complete the Government Certificate of Competency (GCC). These streams prepare graduates for employment by mining companies, automotive plants, engineering and production companies, building service contractors and consulting engineers. Graduates also have the knowledge and skills to become entrepreneurs.

Admission requirements
National Diploma Engineering: Mechanical, with an average pass mark of 60% in all subjects (or an equivalent qualification),
OR
National Higher Diploma in Mechanical Engineering

Professional registration
The BTech: Engineering: Mechanical is accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technologists.

Offering type and duration of course
Full-time: One year
Part-time: Two years

Venues offering
Bellville
New full-time students must register for Engineering Design Project 4 (Individual and Group) and three subjects in Semester 1, and the remaining three subjects in Semester 2. A total of one credit is required for the completion of the degree.

Part time students register for a maximum of two subjects in any semester. Part time students must complete Fluid Mechanics 4 and Strength of Materials 4 before registering for the Engineering Design Project (Individual and Group)

**BTECH: ENGINEERING MECHANICAL (BTMCHE)**

You must obtain a total of 1 credit (8 subjects), including all compulsory subjects, to be awarded the BTech Degree

* At least two of these three subjects must be completed for the degree.

† Part Time students are only allowed to register Engineering Design Project 4 (Individual and Group) in their second year. They must have registered for two of the following: Fluid Mechanics 4 / Strength of Materials 4 / Stress Analysis 4, before registering for Engineering Design Project, but do not have to have passed them.

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<tr>
<th>Period of Study</th>
<th>Year/Sem Subject</th>
<th>Subject Code</th>
<th>Subject Name</th>
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</table>
MTECH: ENGINEERING: MECHANICAL

Course aim
Graduates will make a contribution, through research, to understanding the application and evaluation of existing knowledge in a specialised area of technology. They will also demonstrate a high level of overall knowledge in that area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

This qualification is offered as either a research-based degree, for which students conduct supervised research in a specialised area of mechanical engineering and complete a dissertation, or a course driven degree, for which students attend classes and complete a research project and paper.

Purpose and rationale of the qualification
This qualification is intended for persons who will make a contribution, through research, to understanding the application and evaluation of existing knowledge in a specialised area of technology. They will also demonstrate a high level of overall knowledge in that area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

Career opportunities
Graduates follow a career in research and development in industry, and may be employed at research institutes. They are also employed in teaching and research positions at higher education institutions.

Admission requirements
A BTech Engineering: Mechanical (or an equivalent qualification) with a 60% average is required.

Offering type and duration of course
**Full-time:** Minimum of one year
**Part-time:** Two years, including 18 months of course work

Venues of Offering
Bellville
### Research-based degree
**MTECH: ENGINEERING MECHANICAL (MTMCHR)**

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### OR

### Course-driven Degree
**MTECH: ENGINEERING MECHANICAL (MTMCHC)**

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DEPARTMENT OF
MECHANICAL ENGINEERING

DTECH: ENGINEERING: MECHANICAL

Course aim
Graduates will make a significant and original contribution to knowledge in a specialised area of technology. They will have a high level of overall knowledge in that specialised area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

Purpose and rationale of the qualification
This qualification is intended for persons who will make a significant and original contribution to knowledge in a specialised area of technology. They will have a high level of overall knowledge in that specialised area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

Career opportunities
Graduates follow a career in research and development in industry and may be employed at research institutes. They are also employed in teaching and research positions at higher education institutions.

Admission requirements
MTech Engineering: Mechanical (or an equivalent qualification), is required.

Offering type and duration of course
Full-time: Minimum of two years

Venues of Offering
Bellville

QUALIFICATION CODE: DTECH: ENGINEERING MECHANICAL (DTMCHR)

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ND: ENGINEERING: MECHANICAL (MECHATRONICS)

Course aim
Mechatronics is an inter-disciplinary field, combining traditional electrical, electronic, mechanical, control and computer engineering skills, applied to solve problems that bridge the boundaries between these disciplines, requiring multi-skilled practitioners. Mechatronic engineering includes the study of electronics, software and mechanical engineering in the design and manufacture of products and processes. In addition, the wide and varying range of work involved requires the development of good transferable engineering skills to provide the basis for continuing professional development.

Purpose and Rationale of the qualification
Persons achieving this qualification will be able to, independently as well as under supervision, and integrate analytical and practical engineering techniques and engineering knowledge to solve well-defined and open-ended engineering problems. They will also be able to select criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

Career opportunities
Students will therefore follow a course of study that covers a broad range of different disciplines so that they can develop, manage, integrate, manufacture, and operate mechatronics systems and components. Graduates from the programme will follow a career in a multidisciplinary engineering environment in the printing, packaging, food processing, manufacturing, assembly, automation and automotive industries.

Offering type and duration of course
Full-time: Three years (Bellville)
Part Time: Six years (Saldahna)

Venues of Offering
Bellville and special offering in Saldahna
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<th>Period of Study</th>
<th>Year/Sem Subject</th>
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<td>3 S6</td>
<td>MIJ230S</td>
<td>Mechatronics Industrial Project 2 (Work Integrated Learning)</td>
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<td>MI0220S, EEE310S, MYS320S, STL3B0S, FLM3B0S</td>
<td>6 60 0.5 Project</td>
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BTECH: ENGINEERING: MECHANICAL (MECHATRONICS)

Course aim
A graduate at this level functions as a technologist who displays competence as a leader of a multidisciplinary engineering team in the execution of engineering projects. The theoretical aspects of the engineering principles covered in the diploma level will be further developed along with supporting skills such as project management and entrepreneurship to produce a well-equipped graduate for the modern competitive engineering environment.

Purpose and rationale of the qualification
Persons achieving this qualification will be able to independently integrate mechanical engineering principles, apply these to determine appropriate ways of approaching activities and establish and use criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

Career opportunities
The technological advancement towards automation especially in the manufacturing and processing sectors has resulted in an on-going need for personnel that are highly skilled in combining the traditional mechanical, electrical and electronics engineering fields with control and information technology. Graduates will apply proven techniques and procedures to the solution of practical multidisciplinary engineering problems requiring a high level of technical decisionmaking.

Admission requirements
National Diploma Engineering: Mechanical (Mechatronics), with an average pass mark of 60% (or an equivalent qualification),
OR National Diploma Engineering: Mechanical OR National Diploma Engineering: Electrical: Additional prerequisites apply, please contact the department.

Selection Procedure
Prospective students should note that the admission requirements are minimum requirements only. Admission is subject to strict selection procedures, thus meeting minimum requirements will not necessarily ensure admission.

Professional Registration
The BTech: Engineering: Mechanical (Mechatronics) is accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technologists.

Offering type and duration of course
**Full-time:** Minimum one year (two semesters)
**Part-time:** Two years

Venues of Offering
Bellville
### BTECH: ENGINEERING MECHATRONICS (BTMECH)

<table>
<thead>
<tr>
<th>Period of Study</th>
<th>Year/Sem</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>(C)ompulsory / (E)lective And Pre-requisites</th>
<th>NQF Level</th>
<th>SAQA Credit</th>
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PROMOTION CRITERIA & EXCLUSION RULES

Mechanical Engineering

The department applies the Faculty Exclusion Policy
SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for qualification purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

Subjects ending in an ‘X’ are Extended Curriculum subjects.
DEPARTMENT OF MECHANICAL ENGINEERING

NATIONAL DIPLOMA SUBJECTS
Mechanical Engineering

**APPLIED STRENGTH OF MATERIALS 3**

**Pre-requisites:** Strength of Materials 3

**Mode of delivery:** Lectures 3½ hours / week, 10 tutorials, 6 practicals.

**Subject outline:** Temperature stresses; strain energy; modulus of resilience and proof resilience; energy balance equations; instantaneous stress, deformation and strain energy; beam section properties; centroids, area moments of inertia, radii of gyration and section modulus of regular beam sections; bending moment and shear forces; bending stresses; short columns and struts; strengths and uses of reinforced concrete; shear stress in beams; long and intermediate struts; Euler formula; Rankine-Gordon formula; fatigue (stress concentration factors) and creep; pinjointed and simple framed structures; statically determinate and indeterminate 2D and 3D pinjointed structures

**Assessment:** All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

**COMMUNICATION STUDIES 1**

**Pre-requisites:** None

**Mode of delivery:** Lecturers 4 1/2 hours per week.

**Subject outline:** Information literacy; conducting research; understanding of the principles of citation; Harvard system of (in-text and bibliographic) referencing; definition and consequences of plagiarism; appropriate use of strategic reading, so as to summarise information effectively; evaluating information for accuracy, reliability and possible bias; presenting a researched topic in an objective, logical and coherent manner, portraying good sentence, paragraph and essay structure; demonstrate the ability to write professional, coherent, logical technical and investigative reports using appropriate style and structure, and appropriate referencing; producing and presenting information effectively and professionally to a group of people in an oral presentation

**Assessment:** All assessments are compulsory. Assignments, class tests, tutorials, poster, interview, oral presentation.
COMMUNICATION STUDIES 2

Pre-requisites: Communication Studies 1

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: Terminology and elements used in communication; barriers to communication; identifying, searching for and accessing a range of sources; selecting and justifying the selection of sources of information; analysing and synthesising information; reading text/s critically; extracting key concepts relevant to research task and summarising them; evaluating relevance of information; bias; integrating information from a range of sources; organising and structuring information logically and coherently; presenting information using appropriate style, tone and correct language; formal document writing (e.g. laboratory and technical design reports; covering letter/letter of application and CV); showing an awareness of plagiarism; delivering an oral report in a professional manner; demonstrating the ability to market oneself to a prospective employer through an application letter using the correct register and format, including a presentable, well-structured curriculum vitae, and a formal interview; effective group work and group roles, identifying, justifying and applying problem-solving strategies; understanding the influence of diversity and conflict on group dynamics; producing a well-structured professional poster.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, poster, interview, oral presentation.

COMPUTER AIDED DRAUGHTING 1

Pre-requisites: Mechanical Engineering Drawing 1, Computer and Programming Skills 1

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: Identifying and displaying the necessary procedures required to efficiently model a 3D component; creating 3D components using either of the two basic methods (extrude or revolve); the logical assembly of components that represent a functional unit; inserting standard fasteners into an assembly; creating a detailed, dimensioned 2D drawing of a 3D component; the ability to create a drawing data set from a 3D assembly; creating 3D sheet metal components; creating 3D weldment components.

Assessment: All assessments are compulsory. Assignments, class tests, Final Summative Assessment.
**COMPUTER AND PROGRAMMING SKILLS 1**

**Pre-requisites:** None

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: Identify and display knowledge of the functions of a computer system, use and application of various components and sub-components of a computer system; identify the function and uses of various storage devices; identify possible causes for failure of the power supply and solve problems when malfunctioning occurs; identify the operation and use of input and output devices; display ability to purchase a computer after determining required specifications; produce reports, documentation, assignments and laboratory reports using Microsoft Word; compute formulae in a spreadsheet to solve mathematical problems, and produce graphs using Microsoft Excel; macro programming; use PowerPoint as a visual aid for presentations.

Assessment: All assessments are compulsory. Assignments, class tests, Final Summative Assessment, group project.

**ELECTROTECHNOLOGY 1**

**Pre-requisites:** None

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: SI units, Newton's second law and torque, solving electrical input power questions, calculating electrical costs, solving electric circuits, Kirchoff's laws, electrostatics, electric fields, potential difference, current strength and resistance, describing electric effects, electromagnetism, induction, capacitors, applying measuring instruments, describing cells.

DP requirements: ?????

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

**ELECTROTECHNOLOGY 2**

**Pre-requisites:** Electrotechnology 1, Mathematics 1

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: Solving basic electrical calculations, resistivity, temperature coefficient of resistance, voltage division and current division, Kirchhoff, super position, Thevenin and Norton circuit theorems, computations of the conservation of energy principle as applied to real life electro-mechanical applications, energy meters, computing the electrical cost of systems, alternating current terminology, three phase power, calculating instantaneous values,
calculating RMS and average values of sinusoidal and non-sinusoidal waves, solving series and parallel RLC questions, solving series and parallel resonance questions, power factor and correcting the power factor, explaining various components and sketch symbols and diagrams, calculating the various energy losses in an induction motor, explaining the working and construction of various types of motors, computation of three phase systems, calculating the efficiency of transformers, completing the phasor diagrams of transformers with and without a load, explaining the processes used to generate power, explaining the distribution grid.

DP requirements:

Assessment: All Assessments are compulsory. Assignments; Class tests; Tutorials; Final Summative Assessment; Lab work; Int project.

**FLUID MECHANICS 2**

Pre-requisites: Mathematics 1, Mechanics 1

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: Applying dimensional analysis to derive the unit of any formula; properties of fluids; properties of fluids, pressure and pressure head; Pascal’s law and hydraulic jacks; forces on submerged bodies; buoyancy, draught, stability and metacentric height of an object; fluid dynamics and energy; experimentally determining flow rate using orifice and venturi meters; energy losses in pipe flow; function of basic hydraulic components.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

**FLUID MECHANICS 3**

Pre-requisites: Fluid Mechanics 2

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline:

- Classification of flows: Calculation and application of Reynolds number to determine the type of flow.
- Laminar flow in round pipes: Correctly apply equations to calculate pressure changes, velocities, flow rates and shear forces.
- Turbulent flow in round pipes: Moody chart; pressure changes in straight horizontal pipes; influence of pipe diameter on useful power transmitted, capital and operating costs of gravity and pump fed pipe systems.
- Laminar flow between parallel surfaces: Calculating pressure drop, velocities, flow rates and shear forces; dashpots; applications and operation of journal bearings.
- Pipe systems: Head loss coefficients; calculating pressure changes and flow rates in all
types of pipe systems, except those containing loops (siphons, single pipe, series pipe, parallel pipe, branched pipe systems and combinations).

- **Hydro-dynamics**: Forces acting on pipe components; forces on bends and changes in cross-sectional area; selection of pipe anchors/supports; forces exerted by a jet on flat and curved surfaces (stationary or moving); Pelton wheels.

- **Vortices**: Formation, properties and classification of forced and free vortices cylindrical vortices; how addition of radial flow to cylindrical flow results in a spiral free and forced vortices; pressure differences, velocities and radii; free and forced vortices in centrifugal pumps, fans and stirrers.

- **Dimensional Analysis**: Purposes and uses of dimensional analysis; application of Rayleigh’s method; Buckingham Pi method; awareness of the scaling laws, similarity and their application.

- **Water hammer**: Pressure changes due to slow and quick closure of a valve; calculating pressure rises, hoop and axial stresses in rigid and elastic pipes, anchored and nonanchored, due to quick closure of a valve; resonance; common methods of protecting pipes from damage.

- **Design of hydraulic circuits**: Appropriate selection of combinations of components to achieve specified motions and reliable operation; drawing circuits using standard symbols; correct sizing of components.

**Assessment**: All Assessments are compulsory. Assignments; Class tests; Tutorials; Final Summative Assessment; Lab work; Int project.

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**GLOBAL ENVIRONMENTAL STUDIES GES200S**

**Pre-requisites**: Fluid Mechanics 2

**Mode of delivery**: Lectures, group project, assignments, quizzes, oral presentation, site visits

**Subject outline**: The subject is divided into the following modules:

**Biodiversity**: This module aims to provide students with a general understanding of local, international and global biodiversity as well as its importance and its links to other environmental, social and cultural aspects. It covers the notion of an accelerating pace of the destruction of biodiversity and its effects, but also challenges and encourages students in not simply understanding biodiversity, but implementing personal or communal changes for its conservation.

**Land**: Covers in a general manner the land rights as well as some of the notions relating to this topic such as restitution of land. It also sets the scenario for the accelerating pace of the destruction of land, its effects, and the challenges humans will have to face in order to halt this devastation.

**Fresh water resources**: Explores critical water management issues as well as an understanding of different water systems, water needs, water pollution, water scarcity and the effects of water privatisation using a range of case studies.

**Marine and coastal resources**: Aims to provide students with a general understanding of the rich and valuable coastal and marine resources in the oceans. The module introduces the different ways in which humans are using coastal and marine resources for tourism, fishing, etc., as well as appropriate management systems.
Energy: Introduces global energy supply and demand, including the different sources of energy and their environmental impacts, costs and efficiencies. The shifts of resource usage and strategies for conservation and enhanced efficiency are discussed.
Climate change and air pollution: Aims to provide students with a general understanding of the causes of and mechanisms of climate change in the local, international and global context as well as its importance and links to other environmental, social, economic and political factors.
Assessment: Project, assignments, quizzes, class test, final summative assessment.

HYDRAULIC MACHINES 3

Pre-requisites: Fluid Mechanics 3
Mode of delivery: Lecturers 4 1/2 hours per week.
Subject outline: Turbo machines; turbines, pumps/fans/compressors; dimensional analysis; similarity and affinity laws to predict performance changes, especially in models/prototypes; operation of axial and radial flow machines (pumps, fans, turbines); velocity triangles for radial and axial flow machines; calculations using Euler equation, blade geometries, efficiencies; identifying losses and efficiencies; characteristic curves of single, series and parallel connected pumps/fans; system curves, duty points, and variations for different operating conditions; hydropower, micro-hydropower and pumped-storage.
Assessment: All assessments are compulsory. Assignments, class tests, tutorials, group work, laboratory work, Final Summative Assessment.

MAINTENANCE ENGINEERING 1

Pre-requisites: None
Mode of delivery: Lecturers 4 1/2 hours per week.
Subject outline:
- Selection of a suitable maintenance strategy for an engineering organisation: Emergency/corrective, routine, preventive, predictive, proactive, modification; advantages and disadvantages of various strategies; RCM process and FMEA process.
- Drawing up an asset (plant) register for an engineering organisation: Purpose, asset hierarchy, numbering system, physical fixing methods, asset information.
- Maintenance planning, scheduling and authorisation principles and documents: Work request and order documents, work/service scheduling documents, spares and stores, purchase requisitions, priority systems, backlog management.
- Equipment life cycle costing: Functions and purpose, graphs used, factors involved in purchasing new equipment.
- Explaining the principles of turning a maintenance department into a profit centre: Direct and indirect maintenance costs; sources and methods for generating maintenance revenue.
DEPARTMENT OF MECHANICAL ENGINEERING

- Carrying out basic maintenance tasks physically in an engineering workshop: Dismantling a gearbox and pump and carrying out an inspection; preparing a machine service schedule and performing a service; alignment and tensioning of sprockets, pulleys, belts and chains.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

MANAGEMENT SKILLS 1

Pre-requisites: None

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: On completion of the subject the students should be able to define, name, list, describe, explain and discuss any of the following relevant topics: Effective theories on time management and delegation; “positive” and “negative” body language gestures and postures; the dynamic new workplace in an extremely competitive environment; management in the context of globalisation, ethical behaviour and social responsibility; the four main functions of management, namely planning, organising, leading and controlling; strategic management, operations management and entrepreneurship; organisational structures, design and work processes; motivation, rewards, individual performance and job design; communication and interpersonal skills; teams and teamwork.

Assessment: All Assessments are compulsory. Assignments; Class tests; Integrated Project; Final Summative Assessment.

MATHEMATICS 1

Pre-requisites: None

Mode of delivery: Lecturers 4 1/2 hours per week

Subject outline:
Curve Sketching: the straight line, parabola, hyperbola, circle, exponential and logarithmic curves.
Complex Numbers: Define the different forms of a complex number: polar, rectangular. Convert between the various forms. Represent complex numbers on an Argand diagram in the complex plane. Do elementary operations on complex numbers: addition, subtraction, multiplication and division. Define the different forms of a complex number: polar, rectangular. Convert between the various forms. Represent complex numbers on an Argand diagram in the complex plane. Do elementary operations on complex numbers: addition, subtraction, multiplication and division.
Mensuration: Define and use radian measure. Convert between degrees and radians. Calculate lengths of circular arcs and areas of sectors and segments of circles.
Indices and Logarithms: Manipulate indices and logarithms, including natural logarithms. Change the subject of the formula.
Binomials: Use Pascal’s triangle and Binomial theorem to expand binomials. Limits: Calculate the limits of functions. 
Use the principles of differentiation to aid in graph sketching. Use derivatives to calculate gradients and tangents. Use principles of differentiation in solving velocity and acceleration problems. 
Integral Calculus: Relate the integral as an anti-derivative. Use table of standard integration formulae to calculate indefinite integrals of functions. Calculate definite integrals for polynomial functions. 

Assessment: Formative & Summative Assessments & Final Integrated Summative Assessment.

MATHEMATICS 2

Pre-requisites: Mathematics 1

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: Use tables and rules to calculate derivatives of functions; apply the principles of differentiation in the solution of equations and optimisation problems; use tables and rules to calculate partial derivatives of functions; apply partial differentiation in calculating errors in measurement and related rates of change problems; use tables and standard integration techniques to integrate functions; use tables and standard integral formulae and techniques to integrate more complicated functions; apply integration to find areas and volumes; use matrices to perform various matrix operations.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment

MATHEMATICS 3

Pre-requisites: Mathematics 2

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline:
- Fourier analysis: Periodic functions; analytical representation of a periodic function; Fourier’s theorem; odd and even functions and products of odd and even functions; halfrange Fourier series; numerical harmonic analysis.
- Differential equations (first-order DEs): Use direct integration; use the method of separating the variables; use the method for linear DEs; use method for the Bernoulli type of DEs; Practical applications.
DEPARTMENT OF MECHANICAL ENGINEERING

- Differential equations (higher-order DEs): Use tables of Laplace transforms to find
  transforms and inverse transforms of given elementary functions; use Laplace transforms
  of derivatives; use Laplace transforms of special functions (Heaviside step functions and
  the Dirac delta function); use Laplace transforms in solving second order DEs; use Laplace
  transforms to solve mechanical systems.
- Differential equations (higher-order DEs): Use the method of D-operators; use D-operators
  to solve free systems; use D-operators to solve forced systems; use D-operators to solve
  mechanical systems.
- Simultaneous differential equations: Use direct differentiation and integration so solve
  simultaneous DEs; use D-operators to solve simultaneous DEs; use Laplace transforms to
  solve simultaneous DEs.

Assessment: All assessments are compulsory. Assignments, class tests, Final Summative
Assessment.

MECHANICS 1

Pre-requisites: None

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline:
- Units and measurement: Display understanding of the SI system of units (Systeme
  Internationale d’Unites). Range: Units include length, mass, time, force, torque and
  pressure; scalar, vector.
- Forces: Define vectors and scalars and demonstrate the ability to apply vectors and
  scalars to calculate various forces acting on components in different planes. Range:
  Forces include co-planar, concurrent, resultant, equilibrant and reaction forces.
- Moments: Define moments and calculate resultant moments about a point on a body,
  showing the reaction forces for various beam or frame supports. Range: Frame or beam
  supports include fixed and sliding supports.
- Centroids: Calculate the centroid or centre of gravity of any area, volume, solid with
  uniform density or composite objects. Range: Areas include squares, rectangles, triangles,
  circles. Volumes include prisms, cylinders, cones, pyramids and spheres.
- Axes: x,y,z
- Friction: Solve friction problems involving single bodies or coupled systems on level or
  sloped surfaces.
- Linear motion: Solve problems involving relative motion of two bodies. Range: Motion
  includes only linear motion.
- Angular motion: Solve angular motion problems. Range: Motion includes only constant
  acceleration.
- Work, power, energy: Use the principle of “conservation of energy” to solve problems
  where energy is converted. Tractive forces, frictional resistance, work done by external
  source.
- Momentum and impulse: Solve problems involving momentum and impulse. Range:
  Solids; Straight line and angled impacts.
- Accelerating systems: Apply Newton’s second law to determine the (constant) acceleration
  of a mass acted on by several forces (inertia of accelerating systems). Range: Flat; inclined
plane; vertical applications, with and without friction, one and two body connected by light cord.

- Simple lifting machines: Calculate mechanical advantage, load, effort, efficiency and velocity ratio for a variety of lifting machines.
- Range: Lever, inclined plane, screw jack, pulley block, differential pulley and axle, geared winch.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

MECHANICAL MANUFACTURING ENGINEERING 1

Pre-requisites: None

Mode of Delivery: 1 full day per week

Subject Description: The aim of the course is to: enable the student to perform elements of manufacturing and fabrication in an engineering organization; supply the learner with necessary basic hand skills needed to manufacture components; develop the ability of learners to solve practical problems; enhance the ability of learners to read and exercise communication skills.

Safety: General workshop safety, safety measures when using machines and hand tools, colour coding, fire control and prevention. 80% is required in the Safety Exam in order to gain access to the workshop.

Selection and use of marking out equipment: Marking out equipment, including steel rule, tape measure, scriber, dividers, engineers square, centre punch, hammer, surface table & angle plate.

Selection and use of hand-tools: Files, hacksaw, taps and dies, reamers, pliers, wrenches, sockets, screw drivers, hammers & spanners etc.

Selection of appropriate materials: Production of steels, properties of alloys, ferrous and non-ferrous metals, Heat treatment of carbon steels, Identification and uses of various steel profiles, ie angle-iron, tubing, solid bars, beams, etc.

Selection and use of metrology equipment: Vernier calliper, vernier height gauge, outside & depth micrometers, dial test indicator, etc.

Operation and different methods of joining metals: Arc welding equipment, oxy-acetylene gas welding equipment & safety procedures.

Functions of different types of fasteners: Understand the purpose and use of these fasteners and keys and keyways.

Functions of different parts of a machine: Techniques and safety procedures and for lathes and drilling machines; work-holding techniques, hand power tools.

Assessments: Safety Test, class tests, lathe practical, hand-skills practical, workshop project, integrated project.
MECHANICAL MANUFACTURING ENGINEERING 2

Pre-requisites: Mechanical Manufacturing Engineering 1

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: Recognise and describe safe working practices as well as safety legislation in an engineering environment including risk control management; analyse and understand the operation and application of MIG and TIG welding processes; analyse materials to determine manufacturing processes e.g. plastics/polymers and powder metallurgy; investigate and describe different processes and applications of hot and cold metal forming; investigate and describe selected machining and finishing operations such as milling and grinding, as well as calculating machining costs; use interpersonal skills to obtain and provide information for use by and in collaboration with others in a technological environment.

Assessment: All assessments are compulsory. Assignments, class tests, project, tutorials, Final Summative Assessment.

MECHANICAL MANUFACTURING ENGINEERING 3

Pre-requisites: Mechanical Manufacturing Engineering 2

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: Coding of CNC milling and turning programs for parts, production of CNC milled and wire cut parts from a CAM program.

Assessment: All assessments are compulsory. CNC tasks; class tests, integrated project, Final Summative Assessment.

MECHANICAL ENGINEERING DRAWING 1

Pre-requisites: None

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline:
- Freehand sketching: Sketch any mechanical component from which an accurate drawing can be produced; produce a freehand drawing showing required orthographic and sectional views with sufficient detail for manufacture.
- Basic geometric constructions: Produce CAD drawings using geometric construction; tangent arc construction, parallel lines; ellipses.
- Detailed dimensioned 2D drawing of a component: Produce CAD drawings on the correct sheet size and containing the required orthographic, sectional views and dimensions; with sufficient detail for manufacture.
- Assembly drawing of all manufactured parts of the assembly: Produce such a drawing, with ballons, bill of materials.
Basic layout and schematic drawings: Produce such drawings, with piping layouts, pneumatic schematics.

Assessment: All assessments are compulsory. Assignments, class tests, drawing pack project, Final Summative Assessment.

MECHANICAL ENGINEERING DESIGN 3

Pre-requisites: Mechanical Engineering Design 2, Strength of Materials 2

Mode of delivery: Lecturers 4 1/2 hours per week.

The student will gain the aptitude to: Recognise and apply elements of the design process and investigation analogy in case studies; gather and interpret information about a technical need; formulate and select appropriate designs which satisfy the mechanical engineering need; design and report successfully on the product; produce documents in a technological environment; use interpersonal skills to facilitate co-operative decision-making and to provide information.

Subject outline: Shafts in torsion and bending, belt-drive selection, wire ropes, chain drives, determining buckling in columns, design for fatigue strength, design of toothed gearing of spur, helical, bevel and worm and worm-wheel drives, lubrication and journal bearings, ball and roller bearing selection, determining geometric parameters of helical springs. Design project (S4 Group and Individual Project): The ability to use the knowledge to collate a design project in the format of a design pack in which calculations and drawings are combined applying the design process.

Assessment: All assessments are compulsory. Assignments, class tests, individual project, oral presentation, Final Summative Assessment.

MECHANICS OF MACHINES 2

Pre-requisites: Mechanics 1, Mathematics 1

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline:
- Lifting machines: Load, effort, efficiency, velocity ratio, mechanical advantage; effortload and efficiency-load graphs.
- Moving objects: Relative velocity, velocity diagrams, real and relative paths.
- Centripetal forces: How centripetal forces cause centripetal acceleration and circular motion; free body diagrams of objects with circular motion; velocity, distance, bend radius or road bank angle of vehicle travelling around bends on horizontal or banked roads; sliding condition and rolling condition of any vehicle travelling with circular motion.
- Simple harmonic motion: Defining period, frequency and amplitude of simple harmonic motion; graphs.
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- Mass moments of inertia: Radius of gyration; composite shapes; torque and acceleration of rotating objects.
- Accelerating systems (especially vehicles dynamics and hoists): Mechanics behind the simplified power train; application of the equation of equilibrium to solve hoist problem.
- Belt drives: types of belt drives; pulley speeds; belt tension; power transmitted; open belt and crossed belts.
- Band brakes and block brakes and clutches: Different types of brakes; operating forces; moments about a fulcrum.
- Mechanics laboratory: Ability to conduct simple experiments that illustrate the principles dealt with in class, and produce lab reports.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, projects, laboratory work, Final Summative Assessment.

MECHANICS OF MACHINES 3

Pre-requisites: Mechanics of Machines 2

Mode of Delivery: 4 1/2 hours/week lectures, tutorial sessions and oral presentations.

Subject Description: Velocity diagrams, instantaneous centres (three-centres-in line-method), spur gears and gear boxes, balancing of rotating masses, slider crank mechanisms, vehicle dynamics, energy systems (torque-crank angle diagrams).

Assessments: All assessments are compulsory: Assignments, class tests, tutorials and final summative assessment.

PRODUCTION ENGINEERING 1 (MECHANICAL)

Pre-requisites: None

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: To equip students with knowledge and understanding of operations management techniques and principles, which include productivity calculations, facility layout, forecasting and short-term scheduling. On completion of the subject students should be able to define, describe, explain and discuss the relevant matter and be able to: do productivity calculations; apply appropriate techniques when designing goods and services; use the tools of TQM; design process control charts; apply forecasting methods; use the EOQ and POQ models; compute reorder points; identify optional strategies for developing an aggregate plan, and prepare a graphical aggregate plan; develop a product structure (BOM) and build a MRP plan; apply appropriate short-ter scheduling techniques.

Assessment: All assessments are compulsory. Class tests, tutorials, Final Summative Assessment.
STRENGTH OF MATERIALS 2

Pre-requisites: Mathematics 1, Mechanics 1

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: Stress and strain diagrams; identifying unknown information and proper solving approach; tensile tests of various materials (perform, record results, analyse and explain); torsion; torsion testing on solid and hollow shafts; close-coiled helical springs; compression, tension and bending spring theory; thin- and thick-walled cylinders; free-body diagrams; loaded beams; shear force and bending moment diagrams; points of contra-flexure; 2D-frameworks; free-body diagrams.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work; projects, Final Summative Assessment.

THERMODYNAMICS 2

Pre-requisites: Fluid Mechanics 2

Exposure: Maths 2

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline:
- Heating and expansion of gases: Enthalpy, entropy and the thermodynamics and gas laws; calculations involving these laws; thermometers, barometers and manometers.
- Generation of steam: Properties of steam wet, dry and superheated steam and the idea of dryness; calorimeter; the role of steam in a power plant; Mollier charts and steam tables to find the specific enthalpy and entropy of wet, dry and superheated steam; throttling calorimeter.
- The steam power plant: Basic layout of a steam plant; functions of the different components and describing how they relate with one another; efficiency and safety of the plant.
- Combustion of fuels: Experiments using a bomb calorimeter; higher and lower calorific value of a fuel; definition and use of atomic mass, molecular mass in chemical combustion calculations; mass/volumetric analysis.

Assessment: All assessments are compulsory. Assignments, quizzes, class tests, tutorials, Final Summative Assessment, laboratory work.
THERMODYNAMICS 3

Pre-requisites: Thermodynamics 2

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: Thermodynamic renewable energy sources: Solar thermal collectors, concentrated solar power systems, photovoltaics, geothermal energy systems; exergy; thermodynamic systems and associated equations; thermodynamics of compressible flow and its applications in nozzles and diffusers; roto-dynamic machines and applications in aircraft engines and power plants; reciprocating machines and applications in vehicular transport and industry; reversed engines and applications in refrigerators and heat pumps; heat transfer basics and simple applications in heat exchangers and furnaces.

Assessment: All assessments are compulsory. Assignments, quizzes, class tests, tutorials, laboratory work, Final Summative Assessment.

BTECH SUBJECTS

Mechanical Engineering

Note that the details below are summarised - refer to the individual Subject Guides for more detail.

ENVIRONMENTAL ENGINEERING

Pre-requisites: None

Mode of delivery: Lectures 3 ½ hours / week, 10 tutorials, 6 practicals.

Subject outline: This is an important field that students need to have an appreciation of and have specific competencies and skills in. Students who pass through a programme that is largely technical (such as mechanical engineering) by default become technocrats, and are frequently unable to make decisions in industry when broader issues must be taken into account. In particular, issues of the environment such as the social, economic, institutional and legal contexts need to be considered. The subject aims to present a broad coverage, examining practice and development in a holistic way, so as to assist graduates to deal with environmental problems and offer solutions more meaningfully. Topics include coastal areas, management tools, energy, water, air quality and wastes. Information literacy is infused into the curriculum and assessed implicitly throughout the subject. Specific introductory skills in project management, environmental impact assessment (EIA), water and energy audits are covered.

Specialist lecturers present the different modules, and assessments are assigned to all of the topics, including a group project culminating in a final report and oral presentation. The UNDP/GEF DLIST (Distance Learning and Information Sharing Tool) website (http://www.dlist.org) contains all the core subject material in open-source format.
Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

ENGINEERING DESIGN PROJECT 4 (Individual - IPR400S / Group - IPR401S)

Pre-requisites: Applied Strength of Materials 3, Mechanical Engineering Design 3

Mode of delivery: Project work (individually and in groups)

Subject outline: Design is a process that culminates in the solution to a problem that was defined from an identified need. In our highly technological and extremely competitive world it is imperative that new products, processes and methods be developed at the lowest possible cost and risk to the entrepreneur, while at the same time contributing the maximum possible advantage to the undertaking as well as ensuring the greatest possible customer satisfaction. To ensure this competitive edge the design process must take a systematic approach that is effectively managed by considering all sections of the undertaking.

The aims of this subject are:

• To expose aspiring technologists to a real life environment where research and the design of components, machines and systems are undertaken to satisfy the needs of industry and commerce.
• To simulate a work situation.
• To guide the student to acquire the knowledge and skills necessary for successful completion of a mechanical engineering design and/or research project.
• To develop problem-solving abilities, and especially skills in observation, analysis and drawing of logical conclusions.
• To develop innovative thinking.
• To develop confidence in the application of engineering skills.
• To encourage a multi-disciplinary approach to problem solving.
• To report a design solution in an acceptable written and oral format and, where possible to be involved with the manufacture, testing and commissioning thereof.
• For the student to function individually and as a member of a design team.
• For students to recognise when they need guidance and feedback, as well as to make successful use of the supervision provided.

The subject consists of two modules, both consisting of a project. IPR400S is an individual project and IPR401S is a group project. All projects will include mechanical design, costing and project planning. Some or all of the following could also be included: manufacture, testing/commissioning, computer modelling, experimentation.

Assessment: Projects; manufacture, testing or commissioning, computer modelling, experimentation.
### FLUID MECHANICS 4

**Pre-requisites:** Hydraulic Machines 3, Thermodynamics 2

**Mode of delivery:** Lecturers 4 1/2 hours per week.

**Subject outline:**
- **Pipe networks:** Ring feed supply and the analysis of the system in order to obtain estimated results of flow and pressure distribution.
- **Boundary layer theory:** The analysis of flow due to boundary layer formation and how it affects the flow over or inside objects; flow over various shaped objects and drag calculations; aerodynamics.
- **Compressible flow:** Analysis of compressible mediums and its flow through nozzles; shock wave prediction and behaviour in compressible mediums.
- **Dimensional analysis:** Use in experimental analysis and modelling.

**Assessment:** Projects; manufacture, testing or commissioning, computer modelling, experimentation.

### MANUFACTURING ENGINEERING 4

**Pre-requisites:** None

**Mode of delivery:** Lecturers 4 1/2 hours per week.

**Subject outline:**
The description “world class” conveys the recognition of an organisation as a benchmark by its industry sector and, for some aspects, by other industry sectors. World-class organisations consistently deliver exceptional performance, frequently in excess of expectations.

The final essential characteristic of a world-class organisation is that it is continuously improving its performance.

Lean manufacturing, also called the Toyota production system, is derived from the methods of the successful Japanese automobile manufacturer, Toyota. Lean manufacturing became internationally recognised as a result of the book *The Machine That Changed The World*, by James Womack and Dan Jones. The focus at Toyota, according to Taiichi Ohno, was “the absolute elimination of waste”, where waste is anything that prevents the value-added flow of material from raw material to finished goods. A firm’s customers are the final judges as to whether or not the firm has created value. The Lean approach leads its practitioners to improve their organisations by focusing on the elimination of any and all waste. Lean focuses on improvement and advocates techniques to control the flow of material on the shop floor. In recent years many South African organisations have introduced new approaches such as Lean manufacturing. Organisations that have successfully implemented these approaches
have been able to significantly improve their organisational performance. However, these approaches are also known to be reputedly difficult to implement and most organisations that attempt it do not derive the full potential benefit. The aim of this subject is: To equip you on how to implement Lean manufacturing effectively, and to equip you with the tools of Lean manufacturing.

Assessment: All assessments are compulsory. Assignments, class tests, Final Summative Assessment.

MAINTENANCE MANAGEMENT

Pre-requisites: None

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: The subject is primarily directed at medium sized, profit-orientated manufacturing concerns, but non-profit driven enterprises, such as state hospitals, are also addressed. The inescapable involvement of people in the operation and maintenance of production facilities has been approached by introducing the student to the writings and thinking of some of the original researchers on the topic. In this way the concepts postulated by Maslow, McGregor, Herzberg and Fayol are considered.

The necessity of sound administrative systems in successful undertakings creates the need for the student to appreciate the difference between “management” and “administration”, per se. The inherent functions of management are covered, as well as the different types and constructs of management systems. Tools such as the organogram and the principles of delegation and incentives are covered in the subject.

Managed maintenance is impossible without planning. The purpose and direction of planning are covered, as are planning tools such as critical path analysis and “manpower” graphs. The fact that maintenance has to be financed results in the subject containing sections on budgets, budgeting and budget comparisons.

The meaning and origin of profit are addressed by covering the classical “break-even” graph in some detail. The effect of the cost of maintenance is clearly illustrated in this section. As finances are an integral part of activities and undertakings, basic financial instruments such as simple and compound interest, the former fixed balance loan, depreciating balance annuities and appreciating balance annuities are covered in the subject. The concepts of present and future value are also dealt with.

The stark reality of inflation makes it necessary to introduce students to its effects. In the same way the business practice of depreciating assets is covered. The concept of an asset register is covered.

The fact that there is specific legislation covering occupational health and safety is addressed. The students are provided with a brief, basic course on legal knowledge and are then introduced to the Occupational Health and Safety Act and two or three chapters of the regulations framed in terms of the Act.
In conclusion, the students are presented with an overview of the four “traditional” categories of maintenance and a technique for prioritising maintenance work.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

PROJECT RESOURCES 4

Pre-requisites: None

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: The need for project engineering organisational structures and techniques arise from the complex nature of projects in engineering. A project could be described as a collection of activities which are performed only once, with a distinctive start and completion activity. The activities relate to each other technologically and indirectly via restricted resources. The main purpose of project engineering is to complete the project in the shortest possible time, at the lowest possible cost and at expected quality levels.

To meet these objectives, the activities of a project should be scheduled subject to their technological and resource constraints, and strict time and cost control should be exercised throughout the lifetime of the project.

A high percentage of the daily work in which engineers, managers and supervisors are involved, will fit the definition of a project. The purpose of this subject is therefore also to help people to manage their daily work more effectively. The subject covers the various aspects of project engineering from the idea stage to the termination stage of a project.

Assessment: All Assessments are compulsory. Assignments; Class tests; Final Summative Assessment.

REFRIGERATION & AIR-CONDITIONING 4

Pre-requisites: Thermodynamics 3

Mode of delivery: Lecturers 4 1/2 hours per week.

Subject outline: This subject is about two major fields of engineering practice, both using refrigeration. Refrigeration systems are mostly used for making things cold, but can also be used for heating when a refrigeration system is used as a heat pump. A conventional refrigeration system uses a compressor to compress a refrigerant through a condenser (the hot part of the system) and then expand it through a valve into the evaporator (the cold part of the system). Refrigeration systems are used in domestic refrigerators, for commercial food storage (fruit, vegetables, meat), for ice-making machines and in many industrial processes where air-drying and liquid cooling or freezing is necessary.
Air-conditioning systems are used for maintaining air at a constant temperature and humidity, usually for human comfort inside buildings or vehicles. An air-conditioning system usually includes the refrigeration, heating and humidifying of air.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.

**STRESS ANALYSIS 4**

**Pre-requisites: Applied Strength of Materials 3**

**Mode of delivery:** Lecturers 4 1/2 hours per week.

Subject outline: The finite element method is a numerical method for solving problems in engineering and mathematical physics. This subject provides an introduction to the finite element method applied to engineering structural problems and continuum solids. The subject is intended for undergraduates without the usual prerequisites that most finite element courses require. Emphasis is placed on learning the fundamentals of the finite element method. Furthermore, students will be exposed to various commercial FE software programs for the evaluation of structural problems in mechanical engineering.

Assessment: All assessments are compulsory. Assignments, class tests, projects, computer simulations.

**TURBO MACHINES 4**

**Pre-requisites: Fluid Mechanics 4**

**Mode of delivery:** Lecturers 4 1/2 hours per week.

Subject outline: This subject covers the theory of compressible flow turbo machines and then provides an introduction to the use of wind turbines for power generation. Some examples of compressible flow turbo machines are turbo-charge units in motor vehicles, steam turbines in coal power stations, gas turbines in gas power stations, refrigerant compressors in motor vehicle airconditioning units and axial flow compressors in jet engines, high-speed ship engines and gas power stations.

Compressible flow turbine theory includes: basic equations and dimensional analysis; centrifugal compressors and fans; axial flow compressors and fans; axial flow steam and gas turbines; radial flow gas turbines. The global wind energy market has grown rapidly due to concern over reliance on finite energy sources (oil and coal) and more recently due to the global drive to reduce CO2 (greenhouse gas) emissions. Coverage of wind turbines includes: the wind energy market; wind turbine design; wind energy systems; wind power calculation/estimation; wind turbine blade aerodynamics; construction, installation and commissioning; safety.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment, laboratory work.
NATIONAL DIPLOMA SUBJECTS
Mechatronics

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

APPLIED STRENGTH OF MATERIALS 3

Pre-requisites: Strength of Materials 3

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline:
• Deflection of beams: Ability to derive and apply the differential equations for beams, use Macaulay’s method and Mohr’s moment-area method, and to apply the principle of superposition;
• Complex stress systems: For isotropic materials subjected to applied loads, determining stresses acting on any inclined plane, principal stresses and maximum shear stresses, as well as planes on which they act; combined bending, twisting and axial loadings of shafts: displaying the ability to use techniques to resolve the interaction of bending moments, torques, thrusts and tensile loads in terms of the Rankine and Guest theories of failure.
• Complex strain, 3-D strain and strain gauges: Techniques to determine linear, area, and volumetric strains induced by applied stresses as well as usage of 60 and 90 degree strain gauges.
• Strains in thin-walled vessels subjected to fluid pressure: Application of 3-D strain to both vessels and liquids in order to determine volume changes and shell stresses with variations in internal and external pressures.
• Thick cylinders: Ability to apply Lame’s theory to shafts and thick-walled cylinders to determine circumferential, longitudinal and radial stresses as well as allowances for shrink fits.
• Failure theories: Ability to apply the relevant failure theories, such as Guest, Von Mises, Rankine and Mohr’s modified theory.
• Advanced stainless steel course: An in-depth study of stainless steel as one of the materials that is commonly used in industry.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, Final Summative Assessment.

COMMUNICATION STUDIES 1

Pre-requisites: None

Mode of delivery: Lectures 5 hours / week, tutorials, projects, assignments, formative assessments and summative assessments.

Subject outline:
• Read with comprehension: Read interactively and critically; interpret graphic information;
demonstrate understanding of text and context of reading; apply process approach to reading.

- Write clearly: Use verbal and visual language appropriate to context and purpose; understand and apply the principle of written structures; understand and apply the principle of visually structured information; link information logically in both verbal and visual texts; use style, register and tone appropriate to context and audience.
- Speak and listen to others: Organise and undertake group discussions; deliver a formal oral presentation appropriate to the audience and purpose; present relevant and logically organised content; prepare and integrate relevant and appropriate presentation aids; interact with an audience and respond appropriately to questions; listen actively, attentively and purposefully; use body language to convey a message; use voice and language effectively.
- Present information or produce a portfolio of evidence: Produce a portfolio which includes all written work including: drafts and final versions, spot tests, preparation for oral presentations (e.g. presentation outlines) and weekly and monthly reflections on the work done; present the information as a written document that has a professional appearance and meets an acceptable standard; present the information orally to a given audience.
- Collect and analyse information: Apply reading strategies to access the information; sift the information to select what is relevant to the task; extract relevant information with reference to the task; identify the main ideas in a text and summarise the information; record the information in the form of notes; interpret the information from different perspectives; evaluate the information for accuracy, reliability and possible bias; use critical thinking and argumentation skills for analysis.
- Organise information: Organise the information from multiple sources into a coherent and logical structure within a given format; organise information systematically using mind mapping techniques; source different texts from a library; apply the appropriate layout and writing conventions required by the task; acknowledge sources through in-text referencing and bibliographies; understand plagiarism and how to avoid it; make inferences from the information; express one’s own point of view in relation to the information; justify that point of view with reference to the information.
- Professional practices: Develop teamwork and problem-solving skills; practise effective time- and project management techniques; develop engineering general knowledge.
- Use information and communication technologies (ICTs): Develop confident use of the MS Office suite, primarily Word, Excel, PowerPoint, Visio; navigate the Internet effectively in developing information literacy practices; make use of social networking platforms to enable learning.

Assessment: All assessments are compulsory. Individual portfolio, oral presentation – group and individual, conceptual design report, individual project, class test, Final Summative Assessment

COMPUTER AIDED MANUFACTURING 2

Pre-requisites: Mechanical Engineering Drawing 1

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline: Describe traditional mechanical manufacturing processes; use CAD software
to produce 3D models for computer-aided manufacturing; manually code CNC milling programs for parts; manually code CNC turning programs for parts; produce CNC milled parts from a CAM program; produce CNC wire cut parts from a CAM program.

Assessment: All Assessments are compulsory. Assignments; Major individual assessment portfolio.

COMPUTER AND PROGRAMMING SKILLS 1

Pre-requisites: None

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline:
Introduction to C, comments variables, identifiers, data types, including directive inputs and outputs; history of programming language (classification); C basics; user design input and output function.
- Operators, flowcharts, expressions and statements making decisions: How decisions are made in a computer; conditional operators; using “if” statements to make decisions in programs; creating and reading basic flowcharts; “if … else” statements; check box controls; logical operators. Loops: “Do while” and “do until” loops; input box function; application. “do events” statement; nested loops.
- Function: Declaring an objective-c function; calling an objective-C function; static variables in functions.
- Arrays: Declaring an array; entering information into an array; accessing the information in an array; using loops with arrays; MATLAB introduction workspace; MATLAB introduction; entering and leaving MATLAB; variables and the workspace; Mathematical functions.
- Vectors and matrices: Scripts and functions; declaration of matrix and vector.
- MATLAB plot using GUI toolbox: Creating a plot in GUI toolbox; defining the user-define UI controls; applying MATLAB GUI toolbox to engineering applications.

Assessment: All assessments are compulsory. Assignments, class tests, laboratory work, project, Robotino individual assessment, tutorials, Final Summative Assessment.

ELECTRICAL ENGINEERING AND ELECTRONICS 1

Pre-requisites: Mechatronics Project 1

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals

Subject outline: The purpose of this subject is to teach basic fundamental electrical and electronics theoretical concepts and practical skills. The students are introduced to concepts at the basic components and circuits levels, practical skills are coupled to theoretical concepts through the use of relevant practical experiments and individual project work. Use of SI units and engineering notation: conversions to engineering notation; concepts of significant figures correctly applied.
- Demonstrate laboratory skills: Breadboard / drawing a circuit accurately; correct set-up of
a voltage supply; basic resistance, current and voltage measurements using appropriate lab instruments, i.e. oscilloscope, multimeter, signal generator, DC power supply; basic waveform measurements.

- Model passive electrical components: Modelling a capacitor, an inductor and resistor; identifying components’ values, tolerance and power ratings using colour codes and data books; calculating passive component values using parameters and physical dimensions.
- Analyse circuits: Applying basic electrical engineering laws (Ohm, Kirchhoff) to circuits correctly; analysis of DC, AC and magnetic circuits; applying network theorems (superposition, mesh and Thevenin).
- Diagnose and trace problems in electrical engineering networks: Identifying short and open circuits; identifying loading effects in a circuit.
- Apply physical concepts of science to electrical engineering: Calculating heat produced in an electrical component; calculating power dissipation, energy conversion and efficiency; applying the theory of magnetism and electrostatics.
- Communicate effectively in written and oral form: Producing an accurate project describing an electrical device; writing reports, following set language criteria.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory practicals, Final Summative Assessment.

ELECTRICAL ENGINEERING AND ELECTRONICS 2

Pre-requisites: Electrical Engineering and Electronics 1

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline: Identify, analyse and solve problems in electrical network; use the system of units employed in electrical engineering; perform basic network analysis; use test and measurement equipment; analyse and compare data to theoretical values; perform effectively as a member of a team; communicate effectively using written techniques; use appropriate software packages for the subject e.g. MATLAB, Eagle, PSim or PSpice.

- Electricity basics: AC theory, reactance and impedance (inductive and capacitive), reactance and impedance (RLC).
- Polyphase AC circuits: Three-phase power, power factor and power factor correction, resonance, transformers
- Electrical motors: Alternating current motors, DC motors
- Electrical wiring and safety of electrical lines: Wiring and switchgear, electrical machines wiring
- Electrical power: Power generation and distribution
- Signal amplification: Operation amplifier
- Electrical signal regulation: Regulators
- Digital logic circuits: Logic gates
- Instrumentation: Electrical instrumentation signal
- Electrical sequences: Relays
- Harmonics: Analyse simple networks with complex waveforms, Understand the concept of complex waveforms, determine selective resonance in networks with complex sources.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory practicals, electrical drawings, Final Summative Assessment.
ELECTRICAL ENGINEERING AND ELECTRONICS 3

Pre-requisites: Electrical Engineering and Electronics 2

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline:

- Listing and differentiating common industrial control methods and techniques: Identifying, analysing and modelling problems in control system engineering; doing basic simulations using computer simulation software and methods such as Excel, C++, MATLAB. (The subject mainly will focus on MATLAB.)
- Analysing simulation data and comparing to actual values: Identifying, describing and applying sensors for distance and displacement; visualising a problem in an engineering context and recommending solutions to assist decision-making; gathering and interpreting information about the control systems; communicating effectively in a technological environment; introduction to control system and automation systems in general and control system terminology.
- Signals and systems: Laplace transform; Laplace for the derivatives and anti derivatives; systems input signals (pulse, step, ramp, parabola, exponential, sine and cosine) in time domain and Laplace domain; linearity; inverse Laplace transform; Laplace transform properties; partial fractions; control systems and input /output characteristics.
- Mathematical modelling of dynamics systems: Convolution integral technique (signal decomposition); differential equations; transfer functions (system identification, series, parallel and feedback); common system models (electrical, mechanical and electro mechanical systems); MATLAB tutorial (capturing transfer functions, interconnection and plotting poles and zeros).
- Dynamics and response of control systems: Introduction to differential equations solution (free and forced responses); steady state error (type number and error constant); transient response (introduction, poles influence, zeros influence, more insight into the effect of the poles and zeros with more examples, first order system, second order system, system order reduction, system mode and system with dead time).
- Principles of the feedback control systems (compensations): Proportional control; proportional + integral (PI) control (formulation); proportional +integral + derivative (PID) control (formulation); proportional + derivative (PD) control (formulation); lead compensation (formulation and implementation); lag compensation (formulation and implementation); internal mode (Smith predictor) control; minor loop control (two loops); multiplicative cancellation; feed forward control; cancellation and internal stability; process dynamics and PID controller tuning.
- Simulink graphical simulation, PID controller design and simulation using SISO
- MATLAB tools: Introduction to Simulink; Simulink tutorial; PID control design and simulation tutorial; PID controller tuning using Simulink.
- Process control: Basic process control strategies; process dynamic and PID controller tuning.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, presentations, laboratory work, practical test, Final Summative Assessment.
FLUID MECHANICS 2

Pre-requisites: Mechanics 1

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline:

- Hydrostatics: Define and describe basic concepts in fluid dynamics; recognise the theory that applies to daily engineering applications; correctly apply appropriate theory in engineering situations; draw sketches which illustrate the applications of these concepts to engineering situations; distinguish between fluids and solids; describe the properties and types of fluids; define the terminology of hydrostatic, pressure, head, absolute and measured pressures, centre of pressure (CP), centre of gravity (CG), buoyancy and stability; determine different pressures on objects at different depths; describe the characteristics, limitations and workings of pressure gauges; describe hydrostatic machines and their operations; evaluate static pressure at a point in fluid; determine the forces, pressures and stroke in hydrostatic machines; determine the stability of floating and submerged bodies in water. Incompressible fluid flow: redefine problems in fluid mechanics as basic diagrams; draw a suitable diagram of the problem which focuses only on the required information; successfully transfer useful values from the problem description to the diagram; show the unknown information required to solve the problem.

- Fluid flow and measurement: Take the correct approach to solving fluid problems; identify the appropriate concepts involved in the problem; choose from a variety of well defined approaches to well defined problems; explain why you chose a particular approach to solve the problem; define and describe Bernoulli’s, Reynolds’s and Torricelli’s theorems; describe the different ways and types of equipment to measure fluid flow; identify the advantages and limitations of each of these types of equipment; correctly measure the flow rate in the laboratory using a variety of instruments; apply the idea of Bernoulli’s law, flow rates, coefficient of discharge and Torricelli’s theorem to measure flow rate in the calculations.

- Fluid flow in pipelines: Describe a problem with relatively few variables and mathematically using standard formulae; identify the variables in the problem; break the problem down into its component parts; select the correct formulas for the parts of the problem; link the correct formula together into an expression; describe the shock losses in a pipeline; describe energy losses of a fluid in closed conduit; define D’Arcy’s formula and explain its application; apply the ideas of Bernoulli’s law, flow rates, coefficient of discharge, Torricelli’s theorem, D’Arcy’s formula for head loss and shock loss, to do calculations which predict flow rate in pipelines.

- Basic pneumatics: Characteristics and applications of pneumatics; components of pneumatics; symbols and standards in pneumatics; methods for the development of pneumatic systems; development of single actuator circuits; development of multiple actuator circuits; troubleshooting of pneumatic systems; fundamentals of pneumatics; air generation and distribution; actuators and output devices; directional control valves; non-return, flow and pressure valves, valve combinations; systems; list of standards.

- Basic hydraulics: Tasks of hydraulic installation; fundamental physical principles of hydraulics; hydraulic fluid; components of hydraulic system; graphic and circuit symbols; design and representation of a hydraulic system; components of power supply section; valves; pressure valves; directional control valves; non-return valves; flow control valves; hydraulic cylinders; hydraulic motors; accessories.

- Thermodynamics: Introduction to thermodynamics; thermodynamics laws; isentropic process.
Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, practical tests, Final Summative Assessment.

FLUID MECHANICS 3

Pre-requisites: Fluid Mechanics 2

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline:

- Bernoulli and energy equations: Bernoulli’s theorem; practical application of Bernoulli’s theorem; Venturi tube; velocity of approach; head loss in metering devices.
- Pipe systems: Applying continuity, Bernoulli’s and head loss equations to solve problems in the following systems: siphon, single, series, parallel, branch and combinations of these, for both for gravitational and pump/fan powered systems; understanding the influence of pipe diameter on useful power transmitted, capital and operating costs of gravity and pump-fed pipe systems.
- Flow classification – Reynolds number: Understanding Reynolds’s colour band experiment, the classification and nature of the different types of flow (laminar, turbulent and transition); deriving the Reynolds number analytically; calculating the Reynolds number for pipe flow and using it to determine the type of flow. Laminar flow in round pipes: Deriving and applying equations for the velocity at any point in a round pipe, the average and maximum velocities in the pipe, the volume flow rate and the shear force; rewriting the above-mentioned equations to form the Hagen-Poiseuille equation; the pressure drop due to laminar flow; obtaining equations for the Darcy friction factors for laminar flow.
- Turbulent flow in round pipes: Deriving the equation for head loss; understanding the dimensionless groupings that have an effect on the Darcy friction factor; understanding the Moody’s pipe friction experiments; using the Moody chart and associated equations to obtain relevant friction factors and thereby head loss and pressure drop for pipe flow calculations.
- Laminar flow between parallel surfaces: Deriving equations for the velocity at any point between the surfaces, the average and maximum velocities in the pipe, the volume flow rate and shear force; explaining how the equations can be applied to flows between slightly curved surfaces (including dashpots) and to radial flows; describing the applications and operation of journal bearings.
- Vortices: Understanding the formation, properties and classification of forced, free and combined vortices; understanding the effect of radial flow added to vortices; understanding vortices in centrifugal pumps and fans.
- Water hammer: Explain pressure changes due to slow and quick closure of a valve; explaining the effect of gas in the fluid; understanding how water hammer can produce resonance; common methods of protecting pipes from water hammer and explaining their working principles.
- Electro-pneumatics: Introduction; fundamentals of electrical technology; components and assemblies in the electrical signal control section; electrically actuated directional control valves; developing an electro-pneumatic control system; documentation for an electropneumatic control system; safety measures for electro-pneumatic control systems; relay control systems; design of modern electro-pneumatic control systems.
CURRICULUM INFORMATION

- Electro-hydraulics: Introduction; fundamentals of electrical technology; components and assemblies in the electrical signal control section; solenoid-actuated directional control valves; design of an electro-hydraulic control system; documentation of an electro-hydraulic control system; safety measures for electro-hydraulic control systems; relay control systems.
- Thermodynamics: Heat transfer; heating and expansion of ideal gases; non-flow energy equations; processes, cycles and systems; introduction to and application of refrigeration and air-conditioning.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, practical tests, Final Summative Assessment.

HYDRAULIC MACHINES 3

Pre-requisites: Fluid Mechanics 3

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline:
- The main types of hydraulic turbo-machines: Turbines, pumps/fans/compressors; functioning of the main kinds of turbo-machines and their components; difference between electro-pneumatics and advanced electro-pneumatics.
- Dimensional analysis: Applying dimensional analysis to physical problems, particularly the use of affinity laws for pumps, fans and turbines; use of dimensional analysis and similitude; applying the Rayleigh method and Buckingham Pi theorem to problems not exceeding 3 groups; similarity and affinity laws to predict performance changes, especially in models or prototypes.
- Pumps and fans: Explaining the operation of axial and radial flow machines (pumps, fans); sketching and identifying radial and axial flow machines; understanding the Euler equation from first principles; identifying losses and efficiencies; drawing characteristic curves of single, series and parallel connected pumps and fans; drawing system curves, determining duty points and variations for different operating conditions.
- Turbines: Pelton wheel; radial flow turbines; axial flow turbines; cavitation in turbines.
- Compressors: Radial compressors; axial compressors; fundamental theories of pumps, fans and turbines in practical situations; conducting a performance test on a pump, interpreting the results and reporting these in an acceptable written format; basic concepts of thermodynamics, as well as properties of thermodynamics; first law of thermodynamics; designing, testing and installing advanced electro-pneumatic systems; designing, testing and optimising the settings of proportional hydraulics.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, laboratory work, practical test, Final Summative Assessment.
MATHEMATICS 1

Pre-requisites: None

Mode of delivery: Lectures 5 hours / week, tutorials, projects, assignments, formative assessments, summative assessments and final integrated summative assessment (FISA)

Subject outline:
- Matrices: Introduction (definition and classification): using MATLAB to perform arithmetic operations (addition, subtraction and multiplication); using MATLAB to solve simultaneous equations.
- Vectors: Scalar and vector (definition and representation): unit vectors and components of a vector; arithmetic operations; dot product; cross product.
- Complex numbers: Algebraic operations (addition, subtraction, multiplication and division).
- Differential calculus (explicit functions): Derivatives (first principle and formula); differentiation techniques (product rule, quotient rule and chain rule); successive differentiation (second order).
- Application of differential calculus: Velocity and acceleration problems; minima and maxima problems (optimisation).
- Integral calculus: Integration as anti-derivative; integration technique (algebraic substitution).
- Solving first order ordinary differential equations: Definition and classification of differential equations by the methods require to solve them; obtaining general solutions to first-order ordinary differential equations using the methods of direct integration and separation of variables.

Assessment: All assessments are compulsory. Assignments, class tests, MATLAB projects, Final Summative Assessment.

MATHEMATICS 2

Pre-requisites: Mathematics 1

Mode of delivery: Lectures 5 hours / week, tutorials, projects, assignments, formative assessments, summative assessments and final integrated summative assessment (FISA).

Subject outline:
- Ordinary differentiation: Review of differentiation techniques; differentiating implicit functions; logarithmic differentiation; using the principle of differentiation to find solutions to equations numerically using the Newton-Raphson method.
- Partial differentiation: Derivatives of functions with two or more independent variables; using partial derivatives to prove partial differential equations; using partial derivatives to determine the rate at which related variables change at specific times in engineering processes (rates of change); using partial derivatives to calculate errors and percentage errors obtained in the measurement of quantities (small increments); critical/stationary points for functions of two variables; optimisation of functions of two variables.
- Integration: Review of the use of table of standard integrals to obtain definite/indefinite integrals of functions; integration by parts; integration by partial fractions; integration of trigonometric functions.
• Application of integration: Using integration to obtain area between curves; using integration to determine volumes of solids of revolution.
• Ordinary differential equations: Solving first-order differential equations using the methods of direct integration, separation of variables, integrating factor integration; solving second order differential equations using the methods of D-operator and Laplace transforms techniques.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, Final Summative Assessment.

MECHANICAL ENGINEERING DESIGN 2

Pre-requisites: Strength of Materials 3

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline: Recognising and applying elements of the design process in case studies; selecting engineering materials suitably for an application according to a set of criteria; demonstrating the fundamentals of mechanical engineering design; shaft sizes and types for power transmission under different loading conditions; using design calculations to join shafts and rods using couplings; selecting appropriate joining and fastening materials; calculations on journal bearings, lubrication theory, belt drives and conveyors; actuators (electric, pneumatic and hydraulic drives) and their usage for engineering design needs; selecting controller devices, sensors and adequately incorporating them in engineering automation needs. Using the knowledge to collate a design project in which calculations and drawings are combined applying the design process.

Assessment: All assessments are compulsory. Assignments, class tests, practicals, projects, Final Summative Assessment.

MECHANICAL ENGINEERING DRAWING 1

Pre-requisites: Communication Studies 1

Mode of delivery: Lectures 5 hours / week, tutorials, projects, assignments, formative assessments, summative assessments and final integrated summative assessment (FISA)

Subject outline: Produce a freehand sketch of a component from which an accurate drawing can be produced; produce basic geometric constructions; produce a detailed dimensioned 2D drawing of a component; produce an assembly drawing of all the parts of the assembly; identify and display the necessary procedures required to efficiently model a 3D component; create 3D components using either of the two basic methods (extrude or revolve); produce a logical assembly of components that represent a functional unit; create a detailed, dimensioned 2D drawing of a 3D component; create a drawing data set from a 3D assembly; produce basic layout and schematic drawings.

Assessment: All assessments are compulsory. Assignments, class tests, projects, Final Summative Assessment.
MECHANICS 1

Pre-requisites: None

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline:
• Units and measurement: Display understanding of the SI system of units (Systeme Internationale d’Unites). Range: Units include length, mass, time, force, torque and pressure; scalar, vector.
• Forces: Define vectors and scalars and demonstrate the ability to apply vectors and scalars to calculate various forces acting on components in different planes. Range: Forces include co-planar, concurrent, resultant, equilibrant and reaction forces.
• Moments: Define moments and calculate resultant moments about a point on a body, showing the reaction forces for various beam or frame supports. Range: Frame or beam supports including fixed and sliding supports.
• Centroids: Calculate the centroid or centre of gravity of any area, volume, solid with uniform density or composite objects. Range: Areas include squares, rectangles, triangles, circles. Volumes include prisms, cylinders, cones, pyramids and spheres; axes: x,y,z.
• Friction: Solve friction problems involving single bodies or coupled systems on level or sloped surfaces.
• Linear motion: Solve problems involving relative motion of two bodies. Range: Motion includes only linear motion.
• Angular motion: Solve angular motion problems. Range: Motion includes only constant acceleration
• Work, power, energy: Use the principle of “conservation of energy” to solve problems where energy is converted; tractive forces, frictional resistance, work done by external source.
• Momentum and impulse: Solve problems involving momentum and impulse. Range: Solids; straight line and angled impacts.
• Accelerating systems: Apply Newton’s second law to determine the (constant) acceleration of a mass acted on by several forces (inertia of accelerating systems). Range: Flat; inclined plane; vertical applications; with and without friction; one and two body connected by light cord.
• Simple lifting machines: Calculate mechanical advantage, load, effort, efficiency and velocity ratio for a variety of lifting machines. Range: Lever, inclined plane, screw jack, pulley block, differential pulley and axle, geared winch.

Assessment: All assessments are compulsory. Assignments, class tests, practicals, projects, Final Summative Assessment.

MECHATRONICS PROJECT 1

Pre-requisites: None

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline: The electronic technician combines practical and theoretical skills in the realisation of complex electrical and electronic systems. Use of hand tools, an understanding
of the properties of materials, displaying working knowledge of safety systems and project management skills are part of the make-up of a well-rounded electronics technician. It is divided into two sections:

- **Section A (Electrical Manufacturing):** Show competence in the use of light engineering hand tools; have an understanding of the role of workplace safety systems and the responsibility of the employer and employee in the context of workplace safety; identify a range of common electronic and electrical components; understand data relating to common electrical and electronic components; draw and interpret simple electronic schematic symbols; show competence in the use of soldering and de-soldering tools; build and understand the operation of a simple electronic project such as DC power; use acquired skills to work as a team member and perform specific tasks dedicated to supporting the collective idea of the team.

- **Section B (Microcontrollers):** Use the Microchip Integrated Development Environment; understand basic digital concepts and the use of logic functions to understand the Boolean logic functions; understand and identify the basic components, concepts and terminology involved in microprocessor and microcontroller technology; understand the architecture of microcomputer systems; understand the memory organisation of a microcontroller system; use the Matrix Multimedia PIC development board; write a basic program for a PIC microcontroller; program a PIC microcontroller; demonstrate the functionality of the program using the development board.

**Assessment:** All assessments are compulsory. Assignments, class tests, tutorials, practicals, Programming, Final Summative Assessment.

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**MECHATRONICS INDUSTRIAL PROJECT 1 - COMPUTER INTEGRATED MANUFACTURING**

**Pre-requisites:** Mechanical Engineering Design 2, Electrical Engineering & Electronics 3, Mechatronic Systems 3, Applied Strength of Materials 3, Hydraulic Machines 3

**Mode of delivery:** Lectures 5 hours / week, tutorials, projects, practicals.

This is a practically oriented subject requiring students to work in groups on various work stations. The students are expected to do oral presentations and demonstrate that their respective stations work as per assignment brief. In addition, the students should produce reports of all the work undertaken on each work station. The assessment criteria are provided on the each assignment brief.

**NB:** Safety precautions should be taken when working on stations. The safety aspect must include the safety of others working in the vicinity and the safety of the machinery and equipment. Any student who damages tools and equipment as a result of negligence will be required to replace them.

**Subject outline:** Upon successful completion of the subject, the student will have gained the following competencies, skills and knowledge: The ability to apply the knowledge and skills gained in the previous manufacturing and industrial technology subjects toward the design,
programming, analysis, and manufacturing of specific products; describe fully the concepts of CIM subsystems CAD and CAM; describe the relationships of CAD geometry, CAM software and machine path data to produce parts using CNC machines; understand the evolution of technologies (prior to current) related to CNC machines; discuss the PLC with reference to its architecture, related programming languages and how it is used as part of CIM; discuss industrial robot movements including associated control programs to complete series of operations; identify sensors that are used in robotics; discuss industrial robot applications; wiring and controlling of traffic lights; wiring of motor panel

Assessment: All assessments are compulsory. CNC mill evaluation, robotic station evaluation, traffic light station evaluation, motor panel station evaluation.

MECHATRONICS INDUSTRIAL PROJECT 1 - ENGINEERING PROFESSIONAL STUDIES


Mode of delivery: Lectures 5 hours / week, tutorials, projects, assignments, formative assessments, summative assessments and oral presentations.

Subject outline:

- Dealing with policies and procedures: Assignment briefs; project briefs; meetings, agendas and minutes; self-assessment test and discussion; matching skills, interests and jobs; preparing to sell yourself.
- Project management: Identifying industries and areas; research teams and planning; selection of target companies; sector research; compiling research: structure; visual aids. Presentations: Oral presentation guidelines – using graphics; body language, gesticulation. Time management: Project management planning.
- Stress management: (project deadlines, personalities teamwork, management etc.). Listening and its importance, particularly in the workplace, grasping task completion, teamwork; industry survey presentations and discussion.
- Job Interviews: Simulated interviews; teamwork seminar discussion: Teamwork and its importance in the workplace; dealing with conflict, conflict management and its importance in the work place. Design report: Review; IP feedback.
- Work place regulations: Workplace learning guidelines and assessments; completion of WIL documentation.
- Preparation for customer presentations: Tips for compiling good PowerPoint presentations; controlling nerves when presenting.
- Documentation: Log and time sheets; compiling a good CV; industry survey; covering letter; email; memorandum.
- Seminars: Safety (Occupational Health and Safety Act, OHSA) (Compensation for Occupational Injuries and Diseases Act, COIDA); manufacturing methods; lean manufacturing; six sigma and improvement methods; process control; software; organisational structures; communication systems; labour relations; ethics and standards; workplace learning.
Assessment: All assessments are compulsory. Assignments, class tests, Presentations, projects.

MECHATRONICS INDUSTRIAL PROJECT 1 - PROCESS CONTROL


Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Purpose: To generally introduce students who will be sent in the industry for their internship to control in process industries, and particularly to basic concepts of process control; explain why control is important and also help them identify different ways in which precise control is ensured; to help bridge the gap between theoretical acquired knowledge and practical apprenticeship by relating the theory learned in class to the practice as it is done in the process industries.

Subject outline: Define a process and process control; describe the importance of process control in terms of variability, efficiency, and safety; define control loop and determine needed control loop components in specific process control applications; define basic process control concepts such as process variable, feedback loop, controlled or measured variable, manipulated variable, set point, sensors, transducers, converters, controllers, programmable logic controllers (PLCs), error signal, correction signal, transmitters; list at least five process variables that are commonly controlled in process measurement industries; describe the three main tasks necessary for process control to occur which are: measuring, comparing and adjusting; define different elements in a control loop and describe the basic function of and, where appropriate, the basic method of operation for different control loop components; differentiate at a high level the following types of control: manual versus automatic feedback control; closed-loop versus openloop control. know and familiarise themselves with the International Society of Automation (ISA), symbology and system documentation so that they are able, given a piping and instrumentation drawing (PandID), to correctly label the instrument symbols (e.g. control valves, pumps, transmitters etc); identify, read, and differentiate electrical, pneumatic circuit diagrams; accurately interpret instrument letter designations used on PandIDs.

Assessment: All assessments are compulsory. Class attendance, individual written assignments, individual and group evaluation based on the work book, continuous practical evaluation: individual and group practical work, final major individual assessment (written test), and presentation on each work station.
MECHATRONIC SYSTEMS 2

Pre-requisites: Computer and Programming Skills 1

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

A mechatronic system is concerned with a field of study that combines the fundamentals of mechanical, electrical, and computer engineering. It is a science that integrates mechanical devices with electronic controls. Furthermore, mechatronics systems is an interdisciplinary field of engineering dealing with the design of products whose function relies on the combination of mechanical and electronic components co-ordinated by a control architecture that assists the mechatronics engineer in the design of enhanced products and automated manufacturing processes.

Subject outline: The working of basic electrical circuits and electronic devices; using semiconductor devices in electronic circuits; applying the basics of digital electronics; describing the theoretical and practical aspects of measurement system design; describing the basics of sensor and actuator theory, design, and application; interfacing sensors and actuators with mechatronic systems; becoming proficient in the use of laboratory instrumentation and building basic circuits; designing and constructing basic mechatronic systems.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, practicals, projects, Final Summative Assessment.

MECHATRONIC SYSTEMS 3

Pre-requisites: Mechatronic Systems 2

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

This subject should supply the students with the necessary understanding to design, debug and commission a PLC program for sequentially operated plants and machinery. The emphasis will be on ladder diagram (LD) and sequential function chart (SFC) programming in accordance with IEC 61131-3. The Siemens Logo software is used as a simple tool for programming and simulation of the designed ladder diagram software.

Subject outline: Introduction to programmable logic controllers (PLCs); PLC hardware; logical sensors; logical actuators; Boolean design; PLC operation; latches, timers and counters; structured logic design; flowchart-based design; numbers and data; PLC memory; ladder logic functions; advanced ladder logic functions; open controllers; instruction list programming; structured text programming; function block programming.

Assessment: All assessments are compulsory. Assignments, projects.
STRENGTH OF MATERIALS 2

Pre-requisites: Mechanics 1

Mode of delivery: Lectures 5 hours / week, tutorials, projects, practicals.

Subject outline: To develop an analytical understanding of strength of materials.

- Axial structural members: Basic stress and strain; definition of axial structural member; classification of stress and strain; mechanical properties of materials; analysis of axial members (bars, rods) in series and parallel.
- Torsion of circular members: Definition of torsion; analysis of circular torsional members in series (shear stress and angle of twist in shafts, shaft dimensions, etc.); analysis of circular torsional members in parallel (shear stress and angle of twist in shafts, shaft dimensions, etc.);
- Close-coiled helical springs: Definition, classification and application of springs; analysis of close-coiled helical springs in series and parallel (shear stress, strain energy and deflection).
- Beams: Shear force and bending moment, software analysis application; definition, classification and application of beams; nature of equilibrium, static determinacy and free body diagrams; shear force and bending moment diagrams for beams.
- Trusses or frameworks (2D), software analysis application: Definition, classification and application of trusses; analysis of trusses (reaction at supports, internal forces and stresses).
- Thin-walled pressure vessel and its applications and software analysis: Distinguishing between thin- and thick-walled pressure vessels; determining stresses and thicknesses in pressure vessels (cylinders and spheres).

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, practical, Final Summative Assessment.
BTECH SUBJECTS
Mechatronics

Note that the details below are summarised - refer to the individual Subject Guides for more detail.

AUTOMATIC CONTROL 4

Pre-requisites: None

Mode of delivery: Lectures 5 hours/week; tutorials, projects, practicals, assignments.

Subject outline: This subject is intended to extend the fundamentals of control systems introduction that was part of Electrical and Electronics Engineering 3 to the mechatronics engineering systems. Students learn how to model electrical, mechanical, pneumatics and hydraulics systems as relevant constituent components of mechatronics and robotics systems. Understanding and mathematically modelling the physical systems under consideration using fundamental physics laws such as Kirchhoff’s laws, Newton’s laws etc. before analytically solving the model is the method employed in this subject. Constant coefficient ordinary differential equations, transfer functions and state-space model representations are studied. MATLAB/ Simulink as a technically powerful modelling and simulation tool is used in the subject to reduce the handling effort of the mathematics involved, but to better understand the dynamics of the system under consideration, as mechatronics are complex systems comprising more than one engineering discipline interacting to perform vital functions adaptably and flexibly.

Assessment: All assessments are compulsory. Class tests, simulation laboratory sessions, practical evaluation report, Final Summative Assessment.

MANUFACTURING MANAGEMENT 4

Pre-requisites: None

Mode of delivery: Lectures 5 hours/week; tutorials, projects, practicals, assignments.

Engineering project management has become central to operations in every engineering and new product development, as well as many other diverse applications. This subject aims to simultaneously embrace the general principles, tools and methodologies of engineering management, while addressing specific examples across the wide spectrum of its applications.

This subject takes an integrated approach to managing projects, exploring both technical and managerial challenges. Therefore it not only emphasises individual project implementation, but also provides a strategic perspective on how to manage projects at the programme and portfolio levels. Also, the student learns the mechanics of developing a detailed and comprehensive project plan, including scope, scheduling, risk assessment, budgeting, cost estimations, resource allocations, monitoring, information systems, auditing and termination.
Subject outline: Understand the several functions of project management; develop the role and responsibilities of a project manager; develop and analyse organisational types and structures for projects; critically analyse the dynamics of a project charter; understand the essential strategies for collaborative engineering projects to enhance competitiveness; identify, analyse and evaluate risks in engineering projects; detail the various performance measures appropriate for the engineering projects and understand budget estimating techniques; detail the engineering project plan, scheduling and resource management; understand engineering project evaluation and control; understand engineering project closeout and termination; learn lessons from previous engineering projects; understand a step-by-step process for managing engineering projects and why each step is necessary.

Assessment: All assessments are compulsory. Assignments, class tests, projects, Final Summative Assessment.

MECHANICS OF MACHINES 4

Pre-requisites: None

Mode of delivery: Lectures 5 hours/week; tutorials, projects, practicals, assignments.

The design of machines requires so many considerations, including the power ratings of prime movers and the dimensions of power or torque transmitting elements. Machines are an assembly of members that move relative to one another. These movements transfer forces from input members to output members. Hence developing a relationship between the geometry and motion of parts of a machine or mechanism and the forces which produce these motions is paramount.

This subject covers the mechanical power transmission elements such as belts and ropes and chains. In view of the fact that inertia forces are generated as a result of unbalanced masses, the designer must eliminate these effects by ensuring that rotating and reciprocating elements are properly balanced. In some cases the presence of inertia forces will lead to the failure of machine elements. Furthermore, vibrations are produced in machines that have unbalanced masses. These vibrations will be transmitted to the foundation upon which the machines are installed. In order to diminish the transmitted forces, the machines are usually mounted on springs or dampers, or some other vibration isolating material.

The study of this subject will provide relevant information that designers must account for when designing and installing machines.

Subject outline: Dynamics; mechanisms and machines; velocity analysis; accelerations analysis; belts, ropes and chains; balancing; vibration.

Assessment: All assessments are compulsory. Assignments, class tests, tutorials, projects, Final Summative Assessment.
THERMODYNAMICS 4

Pre-requisites: None

Mode of delivery: Lectures 5 hours/week; tutorials, projects, practicals, assignments. The aim of the subject is to introduce the student to engineering thermodynamics, so as to understand the concept of heat energy and work and be able to apply the laws of thermodynamics to any system.

Subject outline:
- The thermodynamic system: Analyse and solve a thermodynamic system problem; define and identify the following concepts: property, state of a system, process, cycle and cyclic devices; define and apply equilibrium and the zeroth law of thermodynamics; temperature and thermometers; energy efficiency.
- Work heat and reversibility: Analyse and solve problems related to: work; power; heat; reversibility; the equivalence of work and heat; types of systems; the forms of energy.
- Conservation of mass and the first law of thermodynamics: Apply the conservation of mass, the conservation of energy, the first law of thermodynamics for a closed system, an isolated system, and an open system.
- Processes: Understand and explain the following processes of perfect gases: Adiabatic processes of perfect gases; processes of compressible gases; processes of incompressible gases; processes of solids.
- Heat engines and the second law of thermodynamics: Define the following concepts: Heat engines and cyclic devices, the Carnot engine and entropy, thermal efficiency, the second law of thermodynamics, entropy and reversibility, entropy changes, the isentropic process, the third law of thermodynamics.
- Internal combustion engine: Understand and solve problems related to internal combustion engine: The ideal Otto cycle and air standard analysis, Otto cycle efficiency, the diesel engine and air standard analysis, the Diesel-Otto comparison, the dual cycle gas turbines jet propulsion and the Brayton cycle; understand and solve problems related to gas turbine: The ideal Brayton cycle and the gas turbine engine; the gas turbine.
- Steam power generation and the Rankine cycle: Demonstrate an understanding of the Rankine cycle; analyse steam power generation cycles.
- Refrigeration and heat pumps: Demonstrate an understanding of the reversed Carnot cycle, the vapour compression cycle, analysis of vapour compression refrigeration systems.
- Heat transfer: Demonstrate an understanding of the three modes of heat transfer: Conduction, convection; radiation; formulate and select the appropriate design of heat exchangers.

Assessment: All Assessments are compulsory. Assignments; Class tests; Tutorials; Projects; Final Summative Assessment.
CONSOLIDATION OF FACULTY

As a result of the merger between the former Cape and Peninsula Technikons, the information contained in this publication is subject to change. Applicants will be advised of any changes on application to the Cape Peninsula University of Technology.

Over the next few years the Faculty of Engineering will be consolidated on the Bellville Campus.

Prospective students will be notified before registration and, in some instances, pipeline students may be able to complete their qualification on the campus of first registration.