STUDENT PROSPECTUS

2006 / 2007

University of Trinidad and Tobago

Point Lisas and O’Meara Campus Programmes
UTT MISSION STATEMENT

“To be an entrepreneurial university designed to discover and develop entrepreneurs, commercialise research and development, and spawn companies for wealth generation and sustainable job creation towards the equitable enhancement of the quality of life of all individuals, families and communities of the Republic of Trinidad and Tobago and the Caribbean.”
# TABLE OF CONTENTS

Message from the Board of Governors ................................................................................. 5
The Board of the UTT .............................................................................................................. 6
Background to the University of Trinidad and Tobago ................................................................. 7
Strategic Alliances .................................................................................................................... 7
The Role of UTT ..................................................................................................................... 8

**Department of Student Services**.................................................................................... 9

- Admissions Section ............................................................................................................... 9
- Examinations Section ............................................................................................................. 13
- Details of the Semester/Credit/GPA System ........................................................................ 13
- Progression ............................................................................................................................ 15
- Query of Results .................................................................................................................... 15
- Academic Dishonesty ........................................................................................................... 16
- Release of Student Information .......................................................................................... 17
- Student Support and Career Development Services .......................................................... 18
- Student Activities ................................................................................................................ 18
- Co-Op and Placement ......................................................................................................... 19
- Individual Career Counselling ............................................................................................ 19
- Academic Counselling ........................................................................................................ 20
- Student Health Services ..................................................................................................... 20
- Personal Accident Insurance ............................................................................................... 20
- UTT Housing ....................................................................................................................... 20
- Student Responsibilities ...................................................................................................... 20
- Shuttle Service .................................................................................................................... 21
- Students with Disabilities .................................................................................................... 21
- Student Financial Aid and Scholarships ............................................................................. 21
- Fees and Other Costs .......................................................................................................... 22
- Programme Articulation ....................................................................................................... 23
- Facilities ............................................................................................................................... 24
- Advisory Committees .......................................................................................................... 25
- Human Resources ............................................................................................................... 25
- Changes to Courses Offered .............................................................................................. 26
- Schedule for 2006-2007 Academic Year .......................................................................... 27
- UTT Locations for Programmes ......................................................................................... 28
- Programme Information ...................................................................................................... 29
- Programme Admission Requirements .................................................................................. 30

**UTT Academic Programmes** .......................................................................................... 32

- Certificate Programmes ....................................................................................................... 32
  - Process Operations ............................................................................................................... 32

**National Engineering Technicians Diploma Programmes** .................................................. 37
  - Petroleum Engineering Technology .................................................................................... 37
  - Process & Utilities Engineering Technology (Chemical Option) ....................................... 44
  - Process & Utilities Engineering Technology (Mechanical Option) .................................... 50
  - Process & Utilities Engineering Technology (Electrical & Electronics Option) ............... 56
  - Process & Utilities Engineering Technology (Industrial Instrumentation Option) .......... 63
  - Information and Comm. Technology (Computer Eng. Technology Option) ................. 69
<table>
<thead>
<tr>
<th>Program Area</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information and Comm. Technology (Communications Eng. Technology Option)</td>
<td>76</td>
</tr>
<tr>
<td>Information and Comm. Technology (Computing &amp; Information Systems Option)</td>
<td>83</td>
</tr>
<tr>
<td>Maritime Operations</td>
<td>90</td>
</tr>
<tr>
<td>Maritime Operations (Navigation Option)</td>
<td>91</td>
</tr>
<tr>
<td>Maritime Operations (Engineering Option)</td>
<td>93</td>
</tr>
<tr>
<td>Manufacturing Engineering Technology</td>
<td>95</td>
</tr>
<tr>
<td><strong>Bachelor of Engineering Programmes</strong></td>
<td>102</td>
</tr>
<tr>
<td>Applied Petroleum Technology (BAPET and BEAPT)</td>
<td>102</td>
</tr>
<tr>
<td>Applied Process &amp; Utilities Technology (Chemical Option)</td>
<td>111</td>
</tr>
<tr>
<td>Applied Process &amp; Utilities Technology (Mechanical Option)</td>
<td>117</td>
</tr>
<tr>
<td>Applied Process &amp; Utilities Technology (Electrical / Electronics / Instrumentation Option)</td>
<td>123</td>
</tr>
<tr>
<td>Applied Manufacturing Technology</td>
<td>129</td>
</tr>
<tr>
<td><strong>Bachelor of Applied Information Systems Technology</strong></td>
<td>134</td>
</tr>
<tr>
<td>Information Systems Development Option</td>
<td>134</td>
</tr>
<tr>
<td>Network Management (NTM) Option</td>
<td>140</td>
</tr>
<tr>
<td><strong>Bachelor of Science Programmes</strong></td>
<td>146</td>
</tr>
<tr>
<td>Petroleum Engineering</td>
<td>146</td>
</tr>
<tr>
<td>Process and Utilities Engineering</td>
<td>154</td>
</tr>
<tr>
<td>Information and Communications Technology</td>
<td>174</td>
</tr>
<tr>
<td>Manufacturing Engineering</td>
<td>199</td>
</tr>
<tr>
<td><strong>Master of Science Programmes</strong></td>
<td>207</td>
</tr>
<tr>
<td>Petroleum Engineering</td>
<td>207</td>
</tr>
<tr>
<td>Oil and Gas Exploration and Production</td>
<td>210</td>
</tr>
<tr>
<td>Process and Utilities Engineering</td>
<td>212</td>
</tr>
<tr>
<td>Information and Communications Technology</td>
<td>213</td>
</tr>
<tr>
<td>Industrial Innovation, Entrepreneurship and Management</td>
<td>218</td>
</tr>
<tr>
<td>Maritime Management</td>
<td>220</td>
</tr>
<tr>
<td><strong>Doctor of Philosophy Programmes</strong></td>
<td>221</td>
</tr>
</tbody>
</table>
MESSAGE FROM THE BOARD OF GOVERNORS

President's Message

The year 2005 will be a significant year in the second revolution of Tertiary Education.

The first revolution began when The University of the West Indies (UWI) was established in 1948 at Mona, Jamaica as the first Tertiary Education Institution in the English speaking Caribbean, its presence in Trinidad and Tobago occurred in 1961.

This second revolution is well on its way with its proactive support of the Government of Trinidad and Tobago and the private sector.

The National Budget for 2005/2006 promised the highest level of multi-year funding for post-secondary and tertiary education ever seen in Trinidad and Tobago.

Decisions on the Government Assistance for Tuition Expenses (GATE), tertiary education fees, support for post-graduate programmes and the expansion plans for both UWI and UTT exceeded all expectations.

We at UTT, while benefiting from these initiatives, must at the same time enhance our reputation as we strive after excellence and attract the best students. As a young institution, we face many challenges, but the opportunity to provide better tertiary education and meet the needs and fill the gaps of this rapidly growing nation are exciting.

In 2006, we have introduced several new programmes at the Bachelor’s and Masters level. Our Master of Science in Maritime Management and Industrial Innovation, Entrepreneurship and Management (IEM) programmes are just two (2) of our portfolio of new knowledge products for 2006.

Many challenges lie ahead, if we are to afford nationals of Trinidad and Tobago and others in the Caribbean quality education and training to allow our nations to compete effectively in the global knowledge economy. To achieve this we must provide a seamless tertiary education system that is affordable and available to all our young people.

One (1) initiative sponsored by UTT is the Transition Studies Programme, which is in its pilot stage. The country needs to capture all the available talent and provide an all embracing net for all who wish to pursue any of the Tertiary Education programmes.
2006 will see the opening of our O'Meara Campus at Arima, our Maritime Campus at Chaguaramas and construction of the core Campus at the Tamana InTech Park will begin in the third quarter of this year.

Our international alliances are working extremely well and we continue to generate active participation at all levels with our industrial partners.

We are actively pursuing international accreditation for several programmes and have applied for accreditation to the National Accreditation Council.

We have introduced a unique system of acquisition of knowledge and techniques for our students - Project Based Learning (PBL). The success of that particular effort will be a unique contribution of UTT to global training of engineers and technicians.

Looking ahead, I wish to impress upon you that the Board, Senior Management and our entire Faculty are committed to the pursuit of our vision and our mission. UTT while expanding in student numbers and its menu of programmes will at the same time ensure that its core activities – research, scholarships and community services – remain the priority.

I welcome our new and returning students and urge you to be an active part of the advance guard of this second revolution in Tertiary Education.

K. S. Julien, T.C. (Professor Emeritus)
President
THE BOARD OF THE UTT

A key mandate of the UTT is to meet the technological manpower needs of the Industrial Sector in Trinidad and Tobago, including those of the Energy Sector.

The Board of Governors of the UTT represents shareholders and comprises a broad cross section of Government and Industry representatives.

Board of Governors

- Prof. Kenneth S. Julien - Chairman and President
- Mr. Robert Riley - Integrated Energy
- Mr. Ian Welch - Process Industry
- Mr. Frank Look Kin - Natural Gas
- Ms. Gisele Marfleet - Manufacturing
- Mr. Errol Pilgrim - Ministry (STTE)
- Mr. Gervase Warner - Downstream Energy Products
- Mr. Jerome Sooklal - Business & Finance
- Ms. Allyson Ramkerrysingh - Law
- Prof. Dyer Narinesingh - Science
- Dr. René Monteil - Natural Gas
- Mr. Scott Hilton-Clarke - Human Resources
- Mr. Ravindra Nath Maharaj - Community
- Mr. Lincoln Warner - Tobago

Mr. Errol Ashby - Corporate Secretary

Administrative Staff

- Prof. K.D. Srivastava - Provost
- Mr. Dave Bhajan - Vice President, Planning & Capital Projects
- Mr. Oliver Flax - Vice President, Human Resources
- Prof. Doug Exall - Associate Provost, Teaching Programmes and Professor, Energy & Process Engineering Studies
- Dr. Pete Smith - Associate Provost R&D
- Dr. Cheryl Bennett - Associate Provost, Student Services
- Mr. Neal Alleyne - Executive Advisor, Staff Development
- Prof. Colin Stevenson - Professor, Maritime Studies
- Prof. Shahid Hussain - Professor, I.C.T. Studies
- Prof. Denise Thompson - Professor, Centre for Innovation, Development, Entrepreneurship and Strategies (C-IDEAS)
- Mr. Harris Khan - Director, Certificate, Diploma & Applied Degree Programmes
- Mr. Zameer Mohammed - Senior Manager, Industry Liaison and Continuing Education
BACKGROUND TO THE UNIVERSITY OF TRINIDAD AND TOBAGO

The underlying philosophy of the Government of Trinidad and Tobago with respect to tertiary education as articulated in its Vision 2020 Action Plan 2002 – 2007 is to embark on a radical programme in support of post-secondary and tertiary education. Government envisages enrolment in tertiary institutions tripling within the next five to seven years and has identified the need for new universities and post secondary institutions with a different focus to that of the University of the West Indies.

Accordingly, it is Government’s intention not only to triple the number of persons having access to tertiary education, but to facilitate the development of a tertiary education sector that will enable the population to meet and surmount the challenges of globalization and liberalization.

There is ample cognizance of the impact on the national labour force of the impending CARICOM Single Market and Economy and the need to develop the country’s knowledge capital and as a result its competitiveness in the regional job market.

The University of Trinidad and Tobago will provide a different focus to that which obtains at present. Drawing on the experiences of the various institutions which will fall under its ambit, and the maintenance of established partnerships and arrangements, the University will play its part in the development of a sophisticated society with the capacity for the application of cutting-edge information and knowledge.

STRATEGIC ALLIANCES

In order to attain a standard of excellence in a short time and to maintain such, the UTT will build on established strategic alliances with highly respected local and foreign institutions, with a view to meeting international standards and requirements and enlisting assistance for efficient and effective operations of the University. Regarding our foreign alliances in particular, UTT has in place agreements with North American and European institutions that ensure the delivery of high quality programmes – institutions which are highly regarded for the standard of their programmes and are accredited by the relevant authorities.

Through our continuing partnership agreements, UTT will benefit from appropriate curricula and from audits of the delivery of programmes and courses, in order to ensure conformance with the high standards of, and certification by, the partners. These arrangements apply to the Certificate programme, the Diploma programmes, some of the Bachelor Degree programmes and the Masters Programmes.

In effect, UTT is benefiting from decades of engineering programme education and training expertise and experience and, as a result, is providing local students with internationally recognized training and qualifications.
Our key international partners are the Southern Alberta Institute of Technology (SAIT), Calgary, Alberta, Canada; University of Texas (Austin), USA; Heriot-Watt University, Scotland; Instituto Superior de la Energia (Repsol ISE), Madrid, Spain; Southampton Solent University, Warsash Maritime Centre, UK; TATA Infotech, India; Cambridge University, Institute of Manufacturing, UK.

Our key local partner is the University of the West Indies (U.W.I.), which will supervise the delivery of, and will audit, certify and secure, accreditation for the Bachelor of Applied Engineering Technology degrees in Electrical and Mechanical Engineering.

THE ROLE OF UTT

The role of The University of Trinidad and Tobago is to meet the needs of Trinidad and Tobago for a highly trained and qualified engineering and technology manpower base. UTT is also setting up a non-teaching Academy for Arts, Culture and Public Affairs as an integral and important part of the new university.

As technology changed over the years to suit the evolving global environment, so too did the human resource needs of the country. In reviewing these needs, several distinct engineering functions are identified, with each function requiring its own set of specialized competencies and, by extension, education, training and qualification.
Department of Student Services

The Department of Students Services offers the following services:

- Admissions and Registration
- Examinations
- Student Records Management
- Student Support and Career Development Services
- Co-op/Placement

A UTT education should enable students to develop a set of life and learning skills that promote an ability and desire to learn and a set of technical and professional skills which support the academic programmes. The department functions in:

- Disseminating information on the University’s programmes and policies to the general public
- Facilitating on-site presentations to schools, training facilities and companies within the industrial sector
- Informing on admission and registration matters
- Delivering a comprehensive orientation programme
- Operating as a repository for, and maintaining, all student biodata and academic records
- Managing University examinations
- Advising on and managing student financial and academic awards
- Organizing university (students’) ceremonies
- Facilitating culturally sensitive non-academic programmes and services
- Providing career guidance counselling
- Advising and counselling on personal, financial, and performance issues
- Solving problems and handling grievances
- Providing specialized and customized services for those persons with disabilities or those with special needs
- Liaising with the Student Guild and other campus groups.

ADMISSIONS SECTION

The Admissions section is an important area of Student Services, providing the interface between the university and prospective students and the general public.

Orientation:

The Orientation programme, held during Week One of the academic year, is an important event that introduces students to faculty and staff, campus facilities and services, University policies and procedures. Faculty and staff counsel students on course selection within their programme of study; sensitize students to career options for each programme; review strategies for taking full advantage of the learning environment and support services; and outline academic policies and procedures affecting graduation requirements. Students will also be sensitized regarding the vision, mission, goals and strategies of the university. Orientation also includes activities for students to get to know their classmates, become members of student groups and meet with industry representatives.
How to Apply to University:
The offerings of the University are accessible to all who meet the entry requirements for the respective programmes, as specified in this UTT prospectus. These entry requirements are reviewed periodically.

After the Administration has determined, in consultation with stakeholders and on the basis of available labour market information, that a particular programme of education and/or training is to be offered, a sequence of procedures follows.

The Application Process
Applications are open to any applicant who has attained the minimum age of 17 years on or before the 1st September of the year of intake. The Invitation to Apply is advertised in the public media, at relevant institutions, workplaces, and other places, as determined by the Administration, to afford the widest possible opportunity for access.

The advertisement states, inter alia,
- the mode of application (e.g. prescribed application form which is also available from the website in pdf format);
- minimum entry requirements, and other conditions for acceptance;
- the required attachments (including original academic certificates as proof of qualifications, birth certificate and other relevant documents) to the application and
- the deadline for applications.

The advertisement also directs the prospective students to the university website: www.utt.edu.tt, from which they can obtain further information on course offerings. The specific academic, technical and experiential requirements for admission to the respective programmes are stated under the section on programme information in this prospectus.

Advertisements for applications for an academic year usually appear in the media early in the second semester of the preceding academic year to which the application relates.

The Selection Process
Once applications are received and checked for completeness (including submission of original and relevant supporting documentation), the selection process begins. Selection is based on a combination of academic merit and relevant work experience. Selection is competitive, especially where the number of qualified applicants exceeds available places. The selection process is premised on principles of objectivity, fairness, equality of opportunity and treatment. Entry to some programmes requires:
(a) submission of an original medical report from a UTT approved physician
(b) an interview by UTT programme staff

Acceptance & Notification
Selected candidates will be informed through a Letter of Offer that they have been offered a place in the particular programme. Students will receive this Letter usually late in Semester Two or early in Semester Three of the academic year preceding entry. Students will be advised that their admission will be subject to the completion of registration procedures by the stipulated deadline date and to their satisfying any other conditions, as determined by the Administration, that may apply. As an indication of acceptance of the offer of a place, selected candidates are required to complete and return the Acceptance Card which accompanies the Letter of Offer.
Pre-Engineering or Transition Studies Programme
Applicants who do not possess the required grades in the subjects acceptable for entry will be offered an opportunity to successfully complete the Transition Studies programme prior to selection for the Diploma programme of choice. The Transition Studies programme is delivered by the San Fernando Technical Institute and John S. Donaldson Technical Institute and is intended to strengthen foundation skills in English, Mathematics, Physics, Chemistry and Computer Literacy over a one-year period. Students must attain a minimum passing grade as determined by Administration to be eligible for selection to the Diploma programmes.

Unsuccessful applicants to UTT programmes will be advised of their non-selection.

Registration Procedures
Candidates who indicate acceptance of a place by submission of the completed Acceptance Card will be advised regarding payment of fees and other registration procedures. The student is also issued

- a student registration package comprising registration form
- fees deposit slip
- information on fees schedule
- course listing and
- a Student Information & Regulations Handbook.

On completion of these procedures, which include submission of the completed registration form signed off by the programme or course leader, two passport size pictures done on a navy blue background and other relevant documents as well as evidence of fees payment, the candidate is issued an enrolment package, which includes an academic calendar, a course time-table, a book list, Student Services brochure and the Student Council/Guild and clubs(?) information.

N.B.: A requirement for the finalization of registration is the completion and return, by the stipulated deadline date (which is usually two weeks after the start of registration) of the Student Registration form and evidence of payment of fees. The student’s signature on the Registration form is regarded by the University as a declaration of agreement to comply with the policies and regulations stated in the Handbook.

Transfer of Credits/Exemptions
Applicants may request credit and/or exemption in relation to courses to be taken, on the basis of prior learning/qualifications. Request forms, available from Admissions Section, Student Services Department, must be completed and submitted no later than three weeks after the start of the semester. These should be submitted along with information and documentation (e.g. curriculum details, examinations taken, original transcripts) on courses taken for which they are seeking credit/exemption. A fee must be paid for every course for which credit/exemption is requested. This fee may be waived in special circumstances as determined by the Department of Student Services.

The request will be considered based on the institution at which the programme was undertaken, on the grade obtained in the course(s) and on the learning/qualification’s being five (5) years or fewer before submission of the application.
If the application for credit/exemption satisfies the criteria the student may be granted credit and exemption or exemption only. If the latter is granted the student will be required to pursue a substitute course determined by the Course or Programme Leader. If:

- the credibility of certification or institution of learning has not been established;
- there is less than 80% of the required competencies;
- the candidate achieved less than a Grade C equivalent;
- the prior course was completed more than 5 years earlier;

the candidate will be required to register for and pass the course for which credit/exemption was requested.

**NOTE:** When credit/exemption is granted, the student is awarded status ‘CR’ against the particular course and the course is not factored into the GPA computation.

**Request for Transfer**

A student seeking a transfer from one programme to another or from Part-Time to Full-Time or vice versa must complete the *Request for Transfer* form and submit it to the Admissions Section, Student Services Department. The Request is forwarded to the Head of the programme to which the student requests a transfer, for academic evaluation and possible admission depending on space availability in the programme.

The student will receive a formal response from the Admissions section within two (2) weeks of submission of the request.

**NOTE:** Transfers must usually be submitted to the Admissions Office in advance of the start of the semester for which the transfer is requested.

**Leave of Absence**

A student who is experiencing medical, financial, work related or personal challenges which impinge on his or her ability to maintain the required level of class attendance must apply in writing to the Associate Provost, Student Services, for leave of absence for the semester. The student is required to supply certified documentation e.g. a medical certificate, a letter from the employer, in support of the request. Leave of absence requests must be submitted within 5 weeks of the start of semester.

If a student is seeking leave of absence during the examination period, the request must reach the Office of the Associate Provost (Student Services) no later than the morning of the Examinations Council meeting for it to be considered. If the request is accepted the student may be offered the opportunity to write an Alternative Examination. Any request received outside that period shall not be accepted and the student will not be afforded an Alternative Examination.

Leave of Absence will not exceed a period of one (1) academic year. Students will need to submit a new application for consideration of any leave of absence which exceeds the one year period.
Please note that the student will be expected to register on return to the university and will be subject to the university policies and regulations that would be in existence at the time of re-registration at the end of the leave of absence period.

Withdrawal/Abandonment of Course/Programme
A student who wishes to withdraw formally from a programme or course must do so by completing a Withdrawal Form obtained from the Admissions Section, Student Services and submitting no later than six weeks after the start of a semester. A student whose request is approved will be awarded withdrawal (W) status on his or her student record.

A student who applies for withdrawal from a course after the deadline date or who abandons a course, will be awarded status ‘Failed’ i.e. grade ‘F’ and a grade point of zero. This is regardless of the marks scored in any assessment exercises or assignments conducted up to the time of quitting the course.

Zero grade point will be used in the computation of the G.P.A. Such a student will be deemed to have utilized one attempt at the course and, subject to satisfying relevant criteria, will be allowed only one more attempt at the course.

Student ID Card
On completion of the registration process, the student will be advised of the dates and times for collection of their Student Identification Card. The student is expected to wear this student ID card, issued to and signed by him or her, at all times while on campus or on University-related events. This card indicates that the student is thereby admitted to, and authorized to participate in, the programme for which he or she has registered for the semester to which registration applies. Persons on the premises of the University or utilizing its services, are required to furnish proof of identity when requested.

EXAMINATIONS SECTION
The Examinations Section forms part of the Student Services Department and manages the examinations held by the university.

Examinations are held in the middle and at the end of each semester of the academic year of the programme. Eligibility criteria for writing mid semester and end of semester examinations are as follows:

1. The student must be fully registered for the course in the semester of the examination;
2. The student must have satisfied the 80% class attendance requirement for the course;
3. The student must not be in overdue possession of library material or be in default of outstanding overdue costs to the library;
4. The student must not have any pending disciplinary action against him/her;
5. The student will not be allowed entry to the examination room for the end-of-semester examination unless he/she is in possession of his/her student ID card (or permission slip) and examination card, obtainable from the Examinations Office;
6. The student must conform to the Regulations and Guidelines governing examinations that will be placed on the University’s notice boards at least one week prior to the commencement of end of semester examinations.

Absence from Examinations
See the Section on Leave of Absence above.

Details of the Semester / Credit / GPA System
  Note: any exceptions will be identified in the relevant Programme Section Semester:
A word meaning “academic term”. A UTT semester is normally 15 or 16 weeks.

Credit:
Every course is allocated a certain number of credits based on the number of contact hours per week. For example, if a course runs for 5 hours per week for 15 or 16 weeks, then that course is normally classified as a “5 credit” course.

Evaluation:
Typically, the evaluation of a course consists of quizzes, projects, assignments, a mid-term exam and a final exam. The course outline normally indicates the weighting of (i.e. percentage carried by) each component of evaluation.

Grade Points: The numerical score (mark) awarded by an instructor is converted to a letter grade. Each letter grade is associated with a quantum of grade points. The following table shows the association of numerical score, letter grade and Grade Points:

<table>
<thead>
<tr>
<th>Percentage Grade</th>
<th>Letter Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100</td>
<td>A+</td>
<td>4.0</td>
</tr>
<tr>
<td>85-89</td>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>80-84</td>
<td>A-</td>
<td>3.7</td>
</tr>
<tr>
<td>77-79</td>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>73-76</td>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>70-72</td>
<td>B-</td>
<td>2.7</td>
</tr>
<tr>
<td>67-69</td>
<td>C+</td>
<td>2.3</td>
</tr>
<tr>
<td>63-66</td>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>60-62</td>
<td>C-</td>
<td>1.7</td>
</tr>
<tr>
<td>55-59</td>
<td>D+</td>
<td>1.3</td>
</tr>
<tr>
<td>50-54</td>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>0-49</td>
<td>F</td>
<td>0.0</td>
</tr>
</tbody>
</table>

At the end of every semester, a Grade Point Average or GPA is computed for every student, and is included in the statement of results sent out to him/her. This GPA is calculated by first determining a grade point value for each course taken by the student (done by multiplying the grade points by the number of credits); the grade point values are then totalled for all the courses and divided by the total number of credits. The following example illustrates this computation.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Letter Grade</th>
<th>Grade Points</th>
<th>Credits</th>
<th>Grade Point Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMPP-301</td>
<td>B</td>
<td>3.00</td>
<td>10</td>
<td>30.00</td>
</tr>
<tr>
<td>COMM-348</td>
<td>C</td>
<td>2.00</td>
<td>5</td>
<td>10.00</td>
</tr>
<tr>
<td>COMP-202</td>
<td>F</td>
<td>0.00</td>
<td>4</td>
<td>0.00</td>
</tr>
<tr>
<td>MATH-322</td>
<td>A-</td>
<td>3.70</td>
<td>5</td>
<td>15.35</td>
</tr>
<tr>
<td>MGMT-300</td>
<td>D</td>
<td>1.00</td>
<td>4</td>
<td>4.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>28</td>
<td></td>
<td>59.35</td>
</tr>
</tbody>
</table>

\[
\text{GPA} = \frac{\text{Total Grade Points}}{\text{Total Credits}} = \frac{59.35}{28} = 2.12
\]

A Cumulative (or Running) GPA is also computed. This Cumulative GPA is calculated as above, except that it is based on all courses taken thus far in the programme.

The grading system for students registered for courses prior to 2005 will be retained for courses taken during that period.

**Progression**

**Good Academic Standing**
A student is considered to be in Good Academic Standing once the minimum stipulated cumulative grade point average for the semester for the particular programme has been achieved.

**Academic Probation**
At the end of the semester, if the student fails to attain the minimum stipulated cumulative grade point average of 2.0 for the particular programme he/she will be issued with a student performance report that indicates the status of Academic Probation.

A student on Academic Probation is required to consult with the relevant Programme Coordinator in order to discuss strategies to clear deficiencies and to return to the status of Good Academic Standing.

**Academic Suspension**
A student who:

i. fails to attain a minimum stipulated grade point average of 1.5 for the particular programme at the end of the semester examination

   or

ii. fails to bring the cumulative GPA up to 2.0 in the semester in which he or she is on academic probation

will be academically suspended from the programme and must stay out for at least one semester before re-entering. Academic Suspension will be stated in the student’s academic record.
Re-Admission
A student who is academically suspended and wishes to be readmitted to the University in the following semester must submit a letter to the Associate Provost, Student Services, requesting re-admission.

An appointment will be set up with the relevant Programme Coordinator to work out an action plan to clear deficiencies and return the student to Good Academic Standing.

The student must complete and submit a registration form and fulfil all the requirements for registration for the semester. If re-admitted, the student will automatically be placed on Academic Probation and his or her performance will be monitored.

Query of Results
There is no right of appeal by a student against the academic judgements of lecturing staff or of Assessment Committees. Rights of appeal in relation to Assessment Committee decisions are limited to the grounds listed below:

i. Where new, relevant, written, extenuating circumstances are presented, supported by appropriate evidence that, for good reason was not originally made available to the Assessment Committee, and therefore was not considered at the time of the decision against which the appeal is made;

ii. Where procedures were not conducted in accordance with current approved regulations or other irregularities concerned with the assessment process exist

iii. Where there has been a material and significant error in the recording and processing of assessments/results.

A student may make a formal appeal against the decision of an Assessment Committee by completing the Query Form available from the Examinations Section of the Student Services Department and submitting it to this Section within ten working days of notification of the decision of the Assessment Committee. This appeal should state, in full, the grounds for appeal and provide any necessary supporting evidence. A Query Fee must be paid and the receipt should be included with the submitted Query Form. The Query Fee is refunded to the student if the appeal is successful.

If there are no valid grounds for appeal, this shall be communicated in writing to the appellant. Where an appeal is valid the student shall be informed in writing of the date, time and place of the meeting of an Appeal Panel.

A student may query a mark/grade awarded in a Continuous Assessment exercise, within one week of the issue of the results. Such a query should be made informally to the instructor concerned. If the matter is not satisfactorily resolved with the instructor, the student may take the matter to the Programme Coordinator for a final decision. If the instructor concerned is the Programme Coordinator, the second level of appeal is to the Associate Provost, Teaching Programmes, who will determine the matter finally.

Queries will not be entertained after the stated deadline periods, except for extraordinary reasons and with the approval of the Associate Provost, Student Services.
Academic Dishonesty

The principles of truth and academic honesty are the basis of the search for knowledge and students must honour these principles. **UTT has a zero tolerance policy towards academic dishonesty.** Academic dishonesty is any misrepresentation by deception or by other fraudulent means and is considered to be an extremely serious academic offence. Academic dishonesty includes, but is not limited to:

- using unauthorized materials in examinations or other forms of evaluation;
- presenting the work or ideas of others as your own (plagiarism);
- submitting work done for another course or programme without instructor approval;
- falsifying data or documents; cheating or helping others cheat;
- using facts which compromise the integrity of the evaluation process.

Instances of academic dishonesty outside of mid-semester and end-of-semester examinations should be reported to the appropriate Programme Coordinator. The Programme Coordinator will investigate the matter and refer the case to a Disciplinary Committee, which will determine the appropriate action.

Instances of academic dishonesty occurring during mid-semester or end-of-semester examinations shall be reported in writing to the Manager, Examinations, by the persons appointed to invigilate the particular exam. In keeping with principles of natural justice, the student involved will be afforded an opportunity to respond to the allegation in the presence of a Panel on Academic Dishonesty.

If an Invigilator suspects that a student has committed an act of Academic Dishonesty in an examination, the Chief Invigilator will immediately submit a report, through the Student Services Department, to the Chairman of the Assessment Sub-Committee of the Programme involved. The script of the student involved is endorsed by the Chief Invigilator at the point at which the alleged infraction was suspected. In a practical examination, the Invigilator notes the stage reached when the alleged infraction was suspected. If a student is suspected of an act of Academic Dishonesty in an item of coursework, a course instructor for the course involved will prepare a report to the Chairman of the Assessment Sub-Committee of the Programme.

If the Chairman of the Assessment Sub-Committee, after reviewing the evidence, agrees that an infraction may have occurred, the matter is referred to an Inquiry Panel. This part of the process will be completed within ten (10) working days of receipt by the Chairman of the Assessment Sub-Committee of the allegation of an infraction.

The Chairman of the Assessment Committee will write to the student concerned within five (5) working days of receiving the notification of the alleged Academic Dishonesty, notifying the student of the allegation in a Statement of Case. The student will be asked to respond within seven (7) working days of the date of the letter with a Statement of Response.

The Inquiry Panel will schedule a hearing with the student concerned unless the student has signified in writing that he or she does not wish to attend, or if the student does not attend without good reason. The student may be accompanied by a friend/representative who will have the right to address the Panel. If this representative is legal counsel, notice of this will be supplied to the Panel at least five (5) working days before the hearing, and the Panel may then also have its legal counsel representative present at the hearing. The Inquiry Panel will normally interview the instructors/invigilators involved in making the allegation of Academic Dishonesty, and any other
person(s) whom the Panel believes may be able to provide relevant information, and will have available to it the Statement of Case and the Statement of Response.

If the allegation is confirmed, the penalty is determined by the Committee and is communicated in writing to the offending student.

The penalty for dishonesty in examinations will be as follows:
(1) failure of either the particular component of assessment or the entire course to which the allegation relates;
(2) failure of all courses of the programme taken by the student in that semester;
(3) failure of the entire programme taken by the student with no right to any form of re-assessment or re-entry to this programme;
(4) permanent withdrawal from the University.

In addition to any of the items (1) to (4) above, the Panel will normally recommend disbarment of the student from the University for a period of twelve months.

**Release of Student Information**

**Student Records Policy:**

The following categories comprise student directory information and the University has the authority to release this information to university staff without the consent of the student:

- Name
- Local address
- Telephone numbers
- E-mail address
- Programme & courses of study
- Enrolment status & dates
- Awards received
- Involvement in university clubs, sporting & other activities

Directory information is also available to the public through its inclusion in the University documents and other documents.

Students are entitled to request confidentiality of directory information by indicating this in writing to the Associate Provost (Student Services)

The Department of Student Services is not authorized to release student information to the general public (i.e. non-university personnel) without the express approval of the student concerned.

A student requiring the release of information to a third party must write a letter to the Associate Provost, Student Services, UTT, authorizing the release of information to the named third party. The letter of authorization must contain the name of the student, the student’s UTT identification number and the programme being attended at the University; and must also specify the information which the University is allowed to release to the third party.
Either the student or the third party must present the authorization letter along with the student’s UTT identification number before information will be released.

All information released by the Department of Student Services to third parties on behalf of a student will be sealed in envelopes/packages and stamped across the sealed opening of the envelope/package.

On receipt of the information, the third party will be required to sign the relevant logbook or register indicating receipt of information.

**Student Support and Career Development Services**
An important objective of UTT is to assist students in taking full advantage of the learning environment and support so that they may succeed in achieving their educational and career goals. Student Support and Career Development Services staff is available to help students when they need someone to turn to for:

- confidential support or advice regarding academic issues (such as class participation, student life adjustment, academic planning, or international student acculturation)
- personal concerns (such as stress management, time management, study techniques, crisis management, therapy referral, health maintenance, or relationship and family issues)
- non-academic counselling
- career advising and advising service
- preparation for entry to the work environment e.g. resume & curriculum vitae preparation, personal development & grooming seminars & techniques.

All consultations are totally confidential and information about a student can only be provided without a student’s express permission under circumstances where there is a clear danger to the student or to others, or in the case of court proceedings.

Student Support and Career Development Services staff liaise with the many student organizations in the University, help promote links with different sectors of the local community and are closely involved in the development of social life on campus.

**Student Activities**
**UTT Students’ Guild (UTTSG)**
UTTSG Steering Committee, with the assistance of Student Support and Career Development Services, plays an invaluable part in the organization of inter-class sport tournaments, cultural activities and social events. Opportunities for the development of leadership abilities, social skills and interpersonal relationships are available through participation in any registered campus organizations. UTT campus organizations include religious, ethnic, social, cultural, athletic groups, and special interest groups.

The InterVarsity Christian Fellowship and Catholic Charismatic Youths clubs offer regular workshop services, discussion groups, religious retreats and Bible study sessions. Various ethnic populations represented on campus have formed student organizations to promote programs that introduce their cultures to the campus community. Included among these programmes are the Divali, Eid-ul-Fitr and Emancipation activities. The Cricket and Football clubs organize several internal and intervarsity matches. Special interest groups include such pursuits as chess, computer programming, hiking, music and social dance. For more information about all student organizations, contact **Student Support and Career Development Services at Ext: 3063**.
CO-OP and Placement
The Placement Office represents one of the bridging points between the University and the wider industry, and has, as its main focus, the development of the student capital in the area of practical industry training, while the student is pursuing his or her academic advancement at the University.

This process is facilitated through what is known as the “CO-OP Programme” or Cooperative Education. The UTT CO-OP assignments are typically for four-month periods: January to April, May to August, September to December. The programme does not add to or reduce the amount of necessary coursework, but rearranges the academic course load. Approximately one year of additional time is necessary to participate in the practical training and to complete academic requirements. Students normally receive a stipend from employers during co-op period.

CO-OP students are well positioned to get permanent jobs after graduation with their CO-OP employers. The benefits of CO-OP are:
- Translation of classroom theory into practical work
- Enhancement of academic knowledge
- Improvement of written and oral communication skills
- Provision of partial funds for educational costs
- Improvement of career possibilities at graduation
- Establishment of professional contacts with employers
- Refinement of interpersonal skills.

Requirements for participation are:
- full-time student status
- part-time student status with special approval
- eligibility to work in Trinidad & Tobago
- attainment of minimum academic standards (as defined by the student’s specific programme of study).

Individual Career Counselling
The UTT Student Support & Placement Officers assist graduating students in developing realistic career goals in accordance with the existing economy and job market by offering a number of services. These include:
- notices of job vacancies in industry, on the Section notice board
- advice on advertised and unadvertised job vacancies
- access to the Internet for job searches, with links to a number of job sites
- access to Library resources which include information on effective job search techniques, current labour market statistics, international employment and starting-up a small business and model resumes & Curricula Vitae
- workshops on resume & curriculum vitae writing
- critiques on the résumé and the cover letter
- techniques on and preparation for the perfect interview.
Academic Counselling
All students have access to advice in their field of study. Lecturers are available during the week to
- counsel the student on curricular matters,
- monitor academic progress of assigned students,
- review academic policies and procedures when necessary,
- discuss and approve students' course selections prior to registration, and
- answer questions regarding their career and educational objectives.
Each student is encouraged to discuss with the lecturers registration for future courses, review academic progress, and deal with other matters of interest.

Student Health Services
There is a Sick Bay on campus at Point Lisas (1st Floor, North-west corner) where a student who feels unwell may rest. Some staff of UTT have been trained in First Aid and may give such care when necessary. UTT has also made arrangements with E999 Ambulance Service, Couva and Pointe-a-Pierre, and with the Couva Health Centre for access to their services.

Similar services will be provided at the O’Meara campus.

Personal Accident Insurance
All students of UTT are required to sign up for personal accident insurance during the Registration period. A student who is not insured will not be allowed into the laboratories. Further, each student is required to be insured before proceeding on workshop practice or co-op training.

A student who already possesses personal accident insurance will be required to provide the name of insurer and the policy number to the Department of Student Services, at the time of Registration, in order to be eligible for exemption.

UTT Housing
Currently, there is no housing accommodation on campus. Construction of on-campus housing accommodation will commence shortly for students at the Pt. Lisas, and the Tamana Intech Park in Wallerfield where our main campus will be located. Each students is responsible for making his or her own housing arrangements and physically inspecting rental properties before signing contracts. The University is in the process of developing approved criteria which will assist landlords in preparing adequate housing facilities in the areas surrounding UTT campuses (including the O’Meara campus). Once this is in place, a listing will be available of suitable accommodation for student use.

Student Responsibilities
Students are expected to conduct themselves in a mature and responsible manner, respect the opinions, rights and personal property of others and meet their financial obligations. Specific policies regarding student life and academic dishonesty are published in the Student Handbook available through the Department of Students’ Services or at [www.utt.edu.tt](http://www.utt.edu.tt). The responsibility for enforcing student life policies rests with the Associate Provost (Student Services), the campus security, and the University Academic Council. Disciplinary records are confidential and are not released to anyone off campus without the students’ written permission, unless subpoenaed.
Shuttle Service
A Shuttle Bus service, operated by a private independent contractor (not affiliated with UTT) provides transport between the following locations: the Security Guard Hut at UTT Point Lisas Campus; and the corner of Railway Road and California Main Road, Couva. A similar service will be provided at the other campuses once they become operational.

Students With Disabilities
Support provision for persons with disabilities is being developed to meet the needs of such students at the University.

Disabilities can include physical disabilities such as conditions that cause a person to use a wheelchair; sensory disabilities such as visual and hearing impairments and color blindness; and hidden disabilities such as learning impairment. Potential students who apply to the University, are asked to indicate their disability on their application form and outline any support needs. Most importantly, any conditions that may pose a barrier to employment for students must be discussed with the Associate Provost, Student Services, prior to registration. Where appropriate, applicants are encouraged to visit the campus to satisfy themselves that their needs can be met.

All information received from applicants is treated in a confidential manner. However, with agreement, academic departments are provided with information about disabled students' needs in order to assist in resolving any difficulties which students may encounter with course work arising from practical, disability related issues. This is particularly important when students are engaged on courses involving field trips, laboratory activities, and on-the-job training and to meet health and safety requirements, including evacuation procedures.

Student Financial Aid and Scholarships
It is the goal of the University to ensure that all students have the opportunity to attend UTT, regardless of their personal financial circumstances. To achieve this, the university is working with industry and a variety of other funding sources to provide greater access to financial aid to those of the student population in need. Scholarships and financial aid will fall into one of the following categories:

- Merit-based (scholarship) funding which recognizes and rewards students for their achievement, both academic and extra-curricular.
- Need-based funding (bursaries, awards, loans) which is disbursed to students on the basis of demonstrated financial need.

Student assistance is intended to supplement, not replace student and family resources or the free tuition fees facility afforded by the Government of the Republic of Trinidad & Tobago to its nationals.

On-line Services from Student Services
The Student Services Department is in the process of making several services accessible on line. These include:

- university application and registration processes
- personal students' performance reports
- submission of requests for
  - transfers
  - credits/exemptions
  - withdrawals

Students will be notified as these on-line services become available.
FEES AND OTHER COSTS
The fees shown below apply for citizens of Trinidad & Tobago and represent a subsidised charge. Foreign nationals will be required to pay the unsubsidised full cost which is twice the indicated tuition fee rate. From January, 2006, nationals of Trinidad & Tobago are eligible, with some conditions, for a full rebate of the tuition fees at UTT.

An Application Fee of TTS25.00 must accompany each application to UTT. The Application Fee which is not refundable, is applicable to that application only and is not transferable to any other application.

Full-time Programmes and Flexible (Evening / Weekend) Programmes:

Certificate and Diploma Programmes ($ TT)

<table>
<thead>
<tr>
<th>Fee Type</th>
<th>Fee Amount</th>
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<tbody>
<tr>
<td>Registration Fee per programme (New Students)</td>
<td>$50</td>
</tr>
<tr>
<td>Registration Fee per semester (Returning Students)</td>
<td>$25</td>
</tr>
<tr>
<td>Tuition fee per course credit</td>
<td>$200</td>
</tr>
<tr>
<td>Fee per Co-op Placement semester</td>
<td>$1,000</td>
</tr>
<tr>
<td>One-time refundable caution fee</td>
<td>$250</td>
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<tr>
<td>Insurance fee per academic year</td>
<td>$40</td>
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</tbody>
</table>

Bachelor of Engineering Degree Programmes ($ TT)

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<thead>
<tr>
<th>Fee Type</th>
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</thead>
<tbody>
<tr>
<td>UTT Registration Fee per programme (New Students)</td>
<td>$50</td>
</tr>
<tr>
<td>UTT Registration Fee per semester (Returning Students)</td>
<td>$25</td>
</tr>
<tr>
<td>Registration Fee per Academic Year (UTT/UWI BTech Registration)</td>
<td>$195</td>
</tr>
<tr>
<td>Tuition fee per course credit</td>
<td>$400</td>
</tr>
<tr>
<td>One-time refundable caution fee</td>
<td>$250</td>
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<tr>
<td>Insurance fee per academic year</td>
<td>$40</td>
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</tbody>
</table>

Bachelor of Science Degree Programmes ($ TT)

<table>
<thead>
<tr>
<th>Fee Type</th>
<th>Fee Amount</th>
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<tbody>
<tr>
<td>UTT Registration Fee per programme (New Students)</td>
<td>$50</td>
</tr>
<tr>
<td>UTT Registration Fee per semester (Returning Students)</td>
<td>$25</td>
</tr>
<tr>
<td>Tuition fee per year</td>
<td>$16,000</td>
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<tr>
<td>One-time refundable caution fee</td>
<td>$250</td>
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<tr>
<td>Insurance fee per academic year</td>
<td>$40</td>
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</table>

Includes fee for co-op semester, if applicable
Master of Science Thesis-based Degree Programmes ($TT)

<table>
<thead>
<tr>
<th>Fee Type</th>
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<tbody>
<tr>
<td>UTT Registration Fee per programme (New Students)</td>
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<tr>
<td>UTT Registration Fee per semester (Returning Students)</td>
<td>$25</td>
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<tr>
<td>UTT Tuition Fee per year</td>
<td>$16,000</td>
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<tr>
<td>One-time refundable caution fee</td>
<td>$250</td>
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<tr>
<td>Insurance fee per academic year</td>
<td>$40</td>
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</tbody>
</table>

Master of Science or Master of Engineering Coursework-based Degree Programmes ($TT)

Note that a different fee structure applies for the Petroleum Engineering MSc programme conducted in conjunction with Heriot-Watt University in Scotland. The tuition fee for this programme is TT$36,000.

The fee for the MSc programme in Industrial Innovation, Entrepreneurship & Management is also TT$36,000.

The fee for the ICT MSc coursework-based programme is $16,000.

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<th>Fee Type</th>
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<td>UTT Registration Fee per programme (New Students)</td>
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<tr>
<td>UTT Tuition Fee per course credit</td>
<td>$600</td>
</tr>
<tr>
<td>One-time refundable caution fee</td>
<td>$250</td>
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<tr>
<td>Insurance fee per academic year</td>
<td>$40</td>
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</table>

Doctor Of Philosophy Degree Programmes

These depend on the area of study. For more information, contact the Head of the relevant programme.

It should be noted that all students entering the BSc programmes will be required to buy their own laptop computer. UTT is negotiating a special option for purchase from a supplier of suitable laptop computers, with the required software, and various purchase options will be available to the students for this purchase.

PROGRAMME ARTICULATION

The three streams for the UTT academic programmes are shown in the diagram below. The more academic stream that can lead to a BSc, an MSc or a PhD contains more theory and mathematical treatments and is recommended for students who wish to build a career in academia, or work in more theoretical design, research and development, and process development. The more applied stream, leading to a Diploma, BEng or MEng is recommended for students wishing to work in industrial plants or operations and stresses applied technology, resource and project management, and optimization techniques. The two streams produce graduates with the same professional status, but with a different emphasis in the design of the programmes. The third stream, the one-year full-time Certificate programme, produces graduates wishing to work in industrial plants as plant operators – an example is the Chemical Plant Operator or CPO Programme.
Articulation is possible between the programmes, as shown, to allow for students to change their minds after some experience in either stream, and transferable credits are granted where the course contents are essentially equal. Students should, however, be aware that the BSc stream courses are more theoretical and mathematical, and related Diploma courses will often not contain enough material in this context to earn credit in the BSc stream. Also, the MEng is seen as a terminal degree and does not normally lead into a PhD programme. Note that Co-Op semesters are not included in the diagram below.

Facilities

The University of Trinidad and Tobago will be a multi-campus facility with major campuses located at Point Lisas (Energy, Process & Utilities programmes), O’Meara, Chaguaramas (Maritime Studies), and Wallerfield (Headquarters, Information Technology, C-IDEAS and other programmes). The San Fernando and John S. Donaldson Technical Institutes are also in the process of being incorporated as an integral part of UTT. All campuses will include modern laboratories to support the University's cutting edge programmes. These laboratories are intended to closely simulate the equipment and materials that graduates will encounter in the workplace as well as to provide facilities to conduct research and development. Having experience in such laboratories and systems, students are ready to be productive immediately upon entry into the workplace. The following well-equipped laboratories are in place at the Point Lisas and O’Meara Campuses.
<table>
<thead>
<tr>
<th>Programme</th>
<th>Laboratories</th>
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</thead>
<tbody>
<tr>
<td>Petroleum Engineering</td>
<td>Reservoir / Geology</td>
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<tr>
<td></td>
<td>Drilling / Production</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>Chemical / Process Engineering</td>
</tr>
<tr>
<td></td>
<td>Chemistry</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Materials and Metallurgy</td>
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<td></td>
<td>Fluids</td>
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<td></td>
<td>Machine Shop</td>
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<td></td>
<td>Welding</td>
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<tr>
<td>Electrical Engineering</td>
<td>Basic Electricity / Electronics</td>
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<tr>
<td></td>
<td>Power, Machines and Lighting</td>
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<tr>
<td></td>
<td>Programmable Logic Control</td>
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<td></td>
<td>Power System Simulator</td>
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<tr>
<td>Electronics Engineering</td>
<td>Computer / Digital / Simulation</td>
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<td></td>
<td>Communications</td>
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<tr>
<td>Telecommunications</td>
<td>Wireless / Microwave</td>
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<td></td>
<td>Transmission / Cable Administration</td>
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<td></td>
<td>EPABX</td>
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<tr>
<td>Information Technology</td>
<td>Programming / Networking</td>
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<tr>
<td>Instrumentation</td>
<td>Measurement Lab</td>
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<td></td>
<td>Analyzer Lab</td>
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<tr>
<td></td>
<td>Distributed Control Systems (DCS)</td>
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<tr>
<td></td>
<td>Instrument Fitting</td>
</tr>
</tbody>
</table>

**ADVISORY COMMITTEES**

UTT works very closely with Advisory Committees in order to ensure that its programme offerings are relevant to the needs of the energy and industrial sectors of the country. Working together with these Committees, the UTT administrators and instructors ensure that all curricula are stakeholder-driven. Through such extensive use of the Advisory Committees, UTT ensures that the workplace needs of the country and local industries are continuously monitored and appropriate modifications reflecting these needs and changes are made in the curricula.

**HUMAN RESOURCES**

UTT’s Academic Staff consists of individuals who are highly skilled, experienced and qualified in their areas of expertise. In order to teach in certificate and diploma level programmes, academic staff will normally have a minimum qualification of a Bachelor’s degree along with several years of relevant occupational/teaching experience. Senior academic staff who teach higher level courses must normally possess a Master’s degree or Doctorate along with significant relevant occupational/teaching and research experience.
UTT also maintains a large pool of qualified part-time instructors who are currently employed in their fields of specialization. The UTT approach with respect to qualifications and experience of instructors ensures that the academic staff are well prepared to bring to the classroom today’s solutions to the problems encountered in the world of work, today and in the future.

**CHANGES TO COURSES OFFERED**

It should be noted that the courses listed in this Prospectus and elsewhere for each Programme represent the curriculum plans to ensure industry-relevant degrees and diplomas for which local and international accreditation is being sought. UTT reserves the right to change any of these courses at any time as a result of changing requirements or advice from industry, accreditation bodies or professional institutions. In addition, if there is insufficient enrolment in a course, usually a minimum of 10 students, UTT reserves the right to postpone the offering of that course until a sufficient number of students has enrolled in it.
# SCHEDULE FOR 2006-2007 ACADEMIC YEAR

**TRI-SEMESTER SCHEDULE (15 weeks each semester)**  
(Certificate, Diploma and B. Eng Programmes)

<table>
<thead>
<tr>
<th></th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Semester 3</th>
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</thead>
<tbody>
<tr>
<td><strong>Duration</strong></td>
<td>September 11&lt;sup&gt;th&lt;/sup&gt;, 2006 –</td>
<td>January 8&lt;sup&gt;th&lt;/sup&gt;, 2007 –</td>
<td>May 7&lt;sup&gt;th&lt;/sup&gt;, 2007 –</td>
</tr>
<tr>
<td></td>
<td>December 23&lt;sup&gt;rd&lt;/sup&gt;, 2006</td>
<td>April 21&lt;sup&gt;st&lt;/sup&gt;, 2007</td>
<td>August 18&lt;sup&gt;th&lt;/sup&gt;, 2007</td>
</tr>
<tr>
<td><strong>Final Semester Examinations</strong></td>
<td>December 18 - 23, 2006</td>
<td>April 16 – 21, 2007</td>
<td>August 13 – 18, 2007</td>
</tr>
</tbody>
</table>

**BI-SEMESTER SCHEDULE (16 weeks each semester)**  
(All BSc, MSc and PhD Programmes)

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<tr>
<th></th>
<th>Semester 1</th>
<th>Semester 2</th>
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</thead>
<tbody>
<tr>
<td><strong>Duration</strong></td>
<td>September 4&lt;sup&gt;th&lt;/sup&gt;, 2006 –</td>
<td>January 8&lt;sup&gt;th&lt;/sup&gt;, 2007 –</td>
</tr>
<tr>
<td></td>
<td>December 22&lt;sup&gt;nd&lt;/sup&gt;, 2006</td>
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<td><strong>Mid-Semester Examinations</strong></td>
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<td>February – March, 2007</td>
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<td><strong>Final Semester Examinations</strong></td>
<td>December , 2006</td>
<td>April , 2007</td>
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</table>

**Note:** Some MSc and PhD programmes may have classes for courses between May and August. The dates for these will be advertised when they are available.

**Significant Days:**
- Emancipation Day: August 1<sup>st</sup>, 2006
- Independence Day: August 31<sup>st</sup>, 2006
- Republic Day: September 24<sup>th</sup>, 2006
- Divali: To be announced
- Eid-ul-Fitr: To be announced
- UTT Graduation: To be announced
- Christmas: December 25<sup>th</sup>, 2006
- Boxing Day: December 26<sup>th</sup>, 2006
- New Year’s Day: January 1<sup>st</sup>, 2007
- Carnival: February 19<sup>th</sup> & 20<sup>th</sup>, 2007
- Shouter Baptist Liberation Day: March 30<sup>th</sup>, 2007
- Good Friday: April 6<sup>th</sup>, 2007
- Easter Monday: April 9<sup>th</sup>, 2007
- Indian Arrival Day: May 30<sup>th</sup>, 2007
- Corpus Christi: June 15<sup>th</sup>, 2007
- Labour Day: June 19<sup>th</sup>, 2007
## UTT Locations for Programmes

**P. Lisas = Point Lisas Campus : O’Meara = O’Meara Campus**

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## Manufacturing

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### PROGRAMME INFORMATION - Programmes offered for 2006/2007

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<thead>
<tr>
<th>Certificate in Technology</th>
<th>Full time &amp; Part time</th>
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<tbody>
<tr>
<td>Certificate in Process Operations</td>
<td>Full time &amp; Part time</td>
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<td>Process &amp; Utilities Engineering Technology</td>
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<tr>
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<tr>
<td>- Mechanical Option</td>
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<tr>
<td>- Electrical &amp; Electronics Option</td>
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<tr>
<td>- Industrial Instrumentation Option</td>
</tr>
<tr>
<td>Information &amp; Communications Technology</td>
</tr>
<tr>
<td>- Computer Engineering Technology Option</td>
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<td>- Communications Eng. Technology Option</td>
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<tr>
<td>- Computing &amp; Information Systems Option</td>
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<td>- Engineering</td>
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| Manufacturing Engineering Technology | Full time & Part time |

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<td>Applied Petroleum Technology</td>
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<tr>
<td>Applied Process &amp; Utilities Technology</td>
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<td>- Mechanical Major</td>
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<tr>
<td>- Electrical/Electronics/Instrumentation Major</td>
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<td>- Network Management</td>
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<td>- Utilities Option</td>
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<td>- Telecommunications Engineering Option</td>
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<table>
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<th>Manufacturing Engineering</th>
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<th>Master of Science</th>
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<tbody>
<tr>
<td>Petroleum Engineering</td>
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<tr>
<td>Oil and Gas Exploration and Production</td>
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<tr>
<td>Process &amp; Utilities Engineering</td>
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<tr>
<td>Information &amp; Communications Technology</td>
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<tr>
<td>Industrial Innovation, Entrepreneurship &amp; Management</td>
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<td>Maritime Management</td>
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<th>Doctor of Philosophy</th>
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<tr>
<td>All areas</td>
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</table>

**Important Note:** The information given under respective programmes is subject to change during the academic year or beyond, as determined from time to time by the Administration, UTT, in collaboration with the relevant training partner, advisory body or accreditation body.
PROGRAMME ADMISSION REQUIREMENTS

The specific academic, technical and experience requirements for admission to respective programmes at the Certificate, Diploma and Bachelor levels are as follows:

For the Diploma programmes, four entry standards are required, depending on the area of study:

Requirement D1: Add Maths + 5 O-Level/CSEC passes including English Language/English A, Maths (Gr.1), Physics and Chemistry (one of which must be at Gr.1).

Applicants with 5 O-Level passes (or their equivalent) but not with the required grades or without Add Maths must have either:

a) written A-Levels in Maths and Physics or Chemistry, or
b) passed CAPE 1 in Maths and Physics or Chemistry

c) successfully completed the 'Transition Studies Programme' with a pass in all subjects, a 65% average in Maths and a 65% average in one of the required Science subjects.

Requirement D2: Add. Maths + 5 O-Level/CSEC passes, including English Language/English A and ...Maths (Gr. 1)

Applicants with 5 O-Level passes (or their equivalent) but not with the required grades or without Add Maths must have either:

a) written A-Levels on Maths and one other subject, or
b) passed CAPE 1 in Maths and one other subject, or

c) successfully completed the 'Transition Studies Programme' with a pass in all subjects, a 65% average in Maths and a 65% average in at least one other subject.

Requirement D3: 5 O-Levels (or their equivalent) including English Language and Maths

Requirement D4: 5 O-Level/CSEC passes, including English Language/English A, Maths and Physics
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<th>Qualification</th>
<th>Benchmark Entry Requirements</th>
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<tr>
<td>Diploma</td>
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<tr>
<td>Petroleum</td>
<td>Requirement D1</td>
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<td>P&amp;U : Chemical</td>
<td>Requirement D1</td>
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<td>P&amp;U : Industrial Instrumentation.</td>
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<td>Requirement D1</td>
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<tr>
<td>Bachelor of Engineering (BEng)</td>
<td>Relevant Technician’s Diploma (min. CGPA of 2.5) + work experience</td>
</tr>
<tr>
<td>Bachelor of Science (BSc) (except Maritime)</td>
<td>2 A-levels or CAPE II (Maths plus Physics or Chemistry), AND General Paper OR Communications Studies and Caribbean Studies PLUS O-Chemistry and O-Physics for all</td>
</tr>
<tr>
<td>Bachelor of Science (BSc) in Maritime Studies (not offered in 2006/2007)</td>
<td>Diploma in Maritime Navigation or Engineering, or STCW 95 Cert. of Competency at the Operational or Management Level</td>
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</table>

Qualifications equivalent to the above will also be considered. Applicants with previous degrees or diplomas should consult the relevant programme section in this Prospectus for additional information, or contact the Head of the programme.

<table>
<thead>
<tr>
<th>Master of Science</th>
<th>Minimum Entry Requirement</th>
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<tbody>
<tr>
<td>Petroleum Engineering</td>
<td>BSc in relevant Eng. programme or related discipline</td>
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<tr>
<td>Oil and Gas Exploration and Production</td>
<td>BSc in relevant Eng. programme or related discipline</td>
</tr>
<tr>
<td>Process &amp; Utilities Engineering</td>
<td>BSc in relevant Eng. programme or related discipline</td>
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<td>BSc in relevant Eng. programme or related discipline</td>
</tr>
<tr>
<td>Industrial Innovation, Entrepreneurship &amp; Management</td>
<td>BSc in relevant Eng. programme or related discipline</td>
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</tbody>
</table>
Maritime Management  |  BSc in relevant Eng. programme or related discipline

# UTT ACADEMIC PROGRAMMES

## CERTIFICATE PROGRAMMES

Certificate in Process Operations

### DURATION
This programme is offered as a one-year full-time programme comprising two (2) consecutive fifteen (15) week semesters at the UTT followed by an eight (8) week practicum in industry and a final four (4) week session back at the UTT. It is also offered as a part-time programme which can be completed in twenty (20) months. The four (4) week practicum is not offered in the part-time mode.

### CREDITS
Graduation from the programme requires successful completion of 72 academic credits with a Cumulative Grade Point Average (CGPA) of 2.0 or higher.

### INTAKE
September of each year.

### PROGRAMME OVERVIEW
This programme is intended to prepare graduates for operator positions in the process industries in particular. It provides a thorough understanding of process operations theory, processing equipment including functions and operations; an appreciation of the shift work environment and the responsibilities of process operators as well as a thorough grounding in plant safety.

### EMPLOYMENT OPPORTUNITIES
Graduates of this programme will be prepared for employment as Process Plant Operators in the petroleum refining and petrochemical sector as well as in food and beverage processing and other manufacturing processes.

### ADMISSION REQUIREMENTS
CSEC/GCE ’O’ Level passes or the equivalent in five (5) subjects including English Language, Mathematics and Chemistry or a recognized Journeyman Diploma in an engineering area.
### Certificate in Process Operations

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**Total Programme Credits:** 72 32 3.5 36.5
Certificate in Process Operations

First Semester (15 weeks)

CHEM-230M Chemistry/Corrosion (5.5 credits)
Course Content: An introduction to basic chemical concepts and industrial related chemistry based on common chemical process industries. Basic corrosion topics will be covered, including inhibitors, corrosion mechanisms, control of corrosion, process and buried pipe corrosion.

COMM-201 Industrial Communications (2 credits)
Course Content: Principles of effective communication, basic use of various methods and formats of instruction, reports, resumes, letters, oral presentations and interviews. Course time includes practice sessions.

ENVS-204 Safety and Environment (4 credits)
Course Content: Provides an introduction to safety problems and safe practices in the industry and an appreciation of the potential environmental impact of air, water, waste and noise. Some discussion of the handling of waste and perception of risk, environmental responsibility and sustainable development is included. A first aid course (all current Red Cross and St. John’s Ambulance First Aid include CPR) is offered as an optional extra as required.

PWEN-201 Plant Operations I – Basic (9 credits)
Course Content: Industrial legislation regarding boilers and pressure vessels; Boiler operation and maintenance; boilers and fittings; combustion and firing; Compressors; steam engines; turbines; internal combustion engines and pumps; Operation and maintenance of high pressure boilers; auxiliary equipment and instrumentation; steam and gas turbines, pumps; compressors, diesel engines.

INST-201 Instrumentation I and Electricity (4 credits)
Course Content: Measurement of pressure, temperature, flow and level. Basic control loops for boilers; boiler programming control and process computer applications. Basic electricity theory. Ohm’s law; power generation; AC and DC motors circuits protection. Lighting systems; distribution systems.

THRM-204 Applied Heat and Energy (4 credits)
Course Content: Force; work; energy; power. Elementary thermodynamics; use of steam tables.

Total: 29 credits
Second Semester (15 weeks)

**PROP-221 Process Operations Theory I (12 weeks) (3 credits)**
Course Content: This course provides an introduction to process operations and the theory related to equipment and operations that are required in gas processing, water treatment, petrochemical refining, and pollution control equipment.

**PROP-223 Process Operations Lab I (12 weeks) (2.5 credits)**
Course Content: Working in small groups, students will obtain hands-on operating experience by running the unit operations laboratory equipment. To obtain credit in this course each student must pass an exam.

**COMP-255 Process Operations Computer Skills (4 credits)**
Course Content: Computer fundamentals and skills training course utilizing IBM PC style microcomputers. Practical skills include Microsoft Windows disk and file management procedures, Internet, and E-mail. An emphasis is placed on the following: word processing, spreadsheet, database and presentation applications.

**PWEN-260 Plant Operations II – Basic (6 credits)**
Course Content: Low pressure boilers, operation, maintenance, fittings and combustion; refrigeration systems and their auxiliaries; air conditioning systems, their auxiliaries and heating systems and auxiliaries. Students are also introduced to operation and maintenance of low pressure boilers, refrigeration, air conditioning systems and heating systems.

**ENGD-205 Process Flow and Mechanical Drawing (3 credits)**
Course Content: drafting principles applied to process flow diagrams, isometric piping sketches for the oil production laboratory. Included are piping terminology and symbols; interpretation of flow system and piping diagrams.

**INST-261 Instrumentation II – Basic (2.5 credits)**
Course Content: Feedwater, operating and combustions controls for heating boilers; pneumatic, electric and electronic controls for heating systems; refrigeration cycle control and air conditioning system controls.

**CPRS-225 First Aid (1.5 credits)**
Course Content: This is a course in emergency care where CPR and other important skills are combined. Emphasis is on the development of the Primary and Secondary Skills of Patient Care.

**MACH-226 Workshop Practice (3 credits)**
Course Content: erforming the following procedures: instrument tube installation; Fisher control valves; welding flanging, drilling and tapping; threading pipe; valve and pump packing.

Total: 25.5 credits
Industry Training

**PRAC-203 Industrial Training (10 credits)**
Course Content: Students will do 12 weeks of “hands-on” experience in an industrial environment. This unit is an in-plant work session, in which students will receive training in the maintenance and process operations department of a typical chemical process industry.

*Total: 10 credits*

Post Session (4 weeks)

**BSYS-225 Mechanical Maintenance Lab (3.5 credits)**
Course Content: Students will learn the procedures to perform maintenance on the following types of systems: electrical; heating systems; refrigeration systems; air handing systems; controls; security and fire systems; pumping and drainage; general mechanical preventative maintenance.

**PROP-271 Process Operations Theory II (2.5 credits)**
Course Content: An introduction to process operations and the theory related to equipment and operations that are required in gas processing, water treatment, petrochemical refining, and pollution control equipment.

**PROP-273 Process Operations Lab II (2 credits)**
Course Content: Students will operate additional pieces of laboratory processing equipment with special emphasis on computer control of distillation equipment.

*Total: 8 credits*
DURATION
This programme is offered on both a full-time and part-time basis. The full time programme will have a duration of seven 4-month semesters comprising four (4) academic semesters and three Co-Op semesters. The part-time programme will have a duration of 10 academic semesters or three and one third (3 1/3) years.

CREDITS
Petroleum Engineering Technology: 122 Credits with a minimum cumulative GPA of 2.0 required for graduation.

INTAKE
September of each year

PROGRAMME OVERVIEW
This programme is designed to meet the needs of the upstream petroleum industry where the graduates will be prepared to enter at the trainee and technician level, having covered the relevant theoretical concepts and gained some valuable experience in Co-Op work training in the sector. The Petroleum Engineering Diploma will focus on guiding students towards a sound understanding of drilling, production and reservoir engineering as well as environmental safety and process control engineering. Exposure to well log interpretation, preparation and presentation of technical reports and projects as well as computer applications will also enhance the students’ suitability for employment.

EMPLOYMENT OPPORTUNITIES
Graduates will work as drilling, production, reservoir engineering or geological technicians in the industry service sector or the mainstream oil and gas companies. Opportunities may also be available as environmentalists, industry inspectors or as drilling and production equipment service and sales representatives.

ADMISSION REQUIREMENTS
Additional Maths plus 5 CSEC or GCE 'O' Level passes including English A/English Language, Mathematics (Grade 1 or A), Physics and Chemistry (one of which must be at Gr. 1 or A) Applicants with 5 O-Level passes but not with the required grades or without Add Maths must have either:

- written A-Levels in Maths, and Physics or Chemistry, or
- passed CAPE 1 in Maths, and Physics or Chemistry, or
f) successfully completed the 'Transition Studies Programme' with a pass in all subjects, a 65% average in Maths and a 65% average in one of the required Science subjects.
## Diploma in Petroleum Engineering Technology

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Diploma in Petroleum Engineering Technology

1st YEAR COURSES : SEMESTER 1

MATH-235 Mathematics for Technology I (5 credits)
Course Content: This course enables the student to obtain a level of proficiency in differential calculus and integral calculus, to use as a mathematical tool to solve scientific and technological problems. Applications include linear motion, areas under curves, work, hydrostatic pressure and others.

COMM-238 Technical Communication (4 credits)
Course Content: This communications course for engineering technologists includes skill development in technical writing and speaking to small groups. The techniques of technical style are practiced in exercises and short assignments. Both individual and group projects are assigned.

COMP-220 Computer Fundamentals (4 credits)
Course Content: This is an engineering technology related computer course. Practical skills include Microsoft Windows disk and file management, Internet usage, email usage and training in the following applications: word processing, spreadsheet, database, and presentation software. Theoretical components include computer terminology with an emphasis on hardware components.

CHEM-221 Introduction to Petroleum Chemistry (3 credits)
Course Content: Topics include organic chemistry, corrosion, field water chemistry, gas laws, phase diagrams, material balance, combustion and field testing techniques.

PETR-215 Petroleum Engineering Science I (7 credits)
Course Content: introduction to the physical sciences that support petroleum engineering; topics include physics, fluid mechanics and thermodynamics. Students will complete an applied project.

DRLG-205 Petroleum Industry Overview / Introduction to Drilling (2 credits)
Course Content: Overview of the upstream petroleum industry, introduction to conventional oil and gas well drilling; topics include legal survey systems, land sales, mineral rights, components used in the drilling of a well.

GEOL-225 Physical Geology (5 credits)
Course Content: An introduction to basic geological principles; topics include geologic time, internal configuration of the earth and geologic processes, identification of hand specimens of common minerals and rocks, and basic map contouring.
1st YEAR COURSES : SEMESTER 2

PETR-315 Petroleum Engineering Science II (4 credits)
**Prerequisite:** none
Course Content: An introduction to statics and mechanics of materials for selection and design of equipment.

CHEM-231 Applied Petroleum Chemistry (3 credits)
**Pre-requisite:** CHEM-221
Course Content: Applications of petroleum chemistry; topics include corrosion control and prevention, scaling, oil treating, gas dehydration, as well as petroleum refining and sales.

SAFE-252 Cluster: Safety in the Petroleum Industry (2 credits)
**Prerequisite:** None
Course Content: training in safe work practices, safety requirements for the petroleum industry, agencies and jurisdiction; certification in H2S Alive, First Aid and CPR, and Petroleum Safety Training (PST).

COMP-254 Petroleum Computer Applications (4 credits)
**Prerequisite:** COMP-220
Course Content: Advanced topics in word processing and spreadsheet design, presentation software and petroleum applications software.

GEOL-226 Petroleum Geology (4 credits)
**Prerequisite:** GEOL-225
Course Content: Concepts and procedures for the exploration of oil and gas within geological contexts and settings, including characterization of reservoir rocks, migration and trapping.

DRLG-210 Drilling Fluids and Hydraulics (3 credits)
**Prerequisites:** DRLG-205, PETR-215, COMP-220
Course Content: Fluids used to drill a well; topics include safety requirements, well control procedures, selection and design of drilling fluid systems.

PTPR-210 Oil and Gas Surface Production (5 credits)
**Prerequisite:** PETR-215
Course Content: Gathering, field handling and processing of oil and gas; topics include technical sketching and drawing, instrumentation and controls, surface equipment and pipeline design and selection. Students will operate production equipment and complete a design project.

RESR-234 Basic Reservoir Engineering Technology (5 credits)
**Prerequisites:** CHEM-221, PETR-215, COMP-220
Course Content: Principles of reservoir engineering technology; topics include rock and fluid properties, phase behaviour, volumetric calculations, material balance, recovery mechanisms, fluid flow and core analysis.
2nd YEAR COURSES: SEMESTER 1

**MATH-285  Mathematics for Technology II (5 credits)**
**Prerequisite:** MATH-235
Course Content: This course contains the following topics: applications of integration including volumes of revolution; centroids and moments of inertia, differentiation of transcendental functions, integration of transcendental functions, methods of integration including integration by parts, by trigonometric substitution, and by use of tables. Applications may include linear motion, areas under curves, volumes, centroids, moments of inertia, work, hydrostatic pressure, electrical theory and others.

**EVAL-305  Log Analysis Fundamentals (5 credits)**
**Prerequisite:** GEOL-226
Course Content: Open and cased hole logging technology; log responses to petrophysical characteristics; well log analysis and interpretation methods.

**DRLG-305  Advanced Drilling Technology (4 credits)**
**Prerequisites:** DRLG-210, COMP-254, PETR-315
Course Content: Design principles, practices used during the drilling of a well; optimization methods; drilling program preparation; government regulations and reporting requirements.

**PTPR-310  Subsurface Oil and Gas Production (5 credits)**
**Prerequisites:** DRLG-210, COMP-254, PETR-315
Course Content: Completions, workovers and abandonments; downhole equipment selection, well testing, programming, stimulations, artificial lift design.

**RESR-334  Intermediate Reservoir Engineering Technology (5 credits)**
**Prerequisites:** RESR-234, COMP-254, GEOL-226
Course Content: Gas processing, marketable gas and by-products estimation, waterflooding analysis, EOR, oil material balance methods, basic pressure build-up and drawdown, gas well deliverability analysis.

**ENVS-310  Petroleum Environmental Issues (3 credits)**
**Prerequisite:** None
Course Content: Government agencies and jurisdiction; environmental issues relating to exploration, drilling and development of oil and gas opportunities; environmental impact studies.

**PROJ-305  Interdisciplinary Project (3 credits)**
**Prerequisites:** PTPR-210, DRLG-210, GEOL-226, RESR-234, COMM-238
Course Content: Project management theory, group project; research and analysis of an interdisciplinary technical problem; students will complete and present a final report.

**GEOL-310  Historical Geology (2 credits)**
**Prerequisite:** GEOL-226
Course Content: Development and evolution of local Sedimentary Basin with respect to stratigraphy, sedimentation and tectonics with emphasis on hydrocarbon bearing units.
2nd YEAR COURSES : SEMESTER 2

PETR-320  Deviated Well Technology (4 credits)
Prerequisites:  DRLG-305, RESR-334, PTPR-310
Course Content: Design, drilling, production and reservoir management of deviated, directionally drilled and horizontal wells.

ECON-310  Petroleum Project Economics (5 credits)
Prerequisites:  COMP-254, RESR-334, PTPR-310
Course Content: Principles and procedures to evaluate exploration and development projects; oil and gas marketing; project screening; risk analysis; incremental economics.

DRLG-372  Drilling Project (4 credits)
Prerequisites:  DRLG-305, COMP-254
Course Content: Planning, design and management of a drilling project; program development; daily reports; cost control.

PTPR-315  Advanced Production Technology (5 credits)
Prerequisites:  PTPR-310, EVAL-305
Course Content: Advanced topics include integrated field studies, production operational planning, advanced artificial lift design and optimization, new advances in production technology.

PETR-325  Production Optimization (5 credits)
Prerequisites:  PTPR-210, PTPR-310, RESR-334
Course Content: Reservoir performance and nodal analysis; computer applications; complex reservoir and production problems.

CNTR-252  Instrumentation for Process Measurement and Control (4 credits)
Prerequisites:
Course Content: An introduction to process measurement and control, explaining how instrumentation and processes interact. These processes could be in any area of study, such as the oil/gas sector, chemical manufacture, agriculture, mining, building systems or utilities. Areas of study will include measurement and control of variables such as fluid flow, level and pressure, as well as how instruments should be installed for maximum accuracy. Specific applications will be studied so that the student can apply the knowledge to design, operate and troubleshoot measurement and control systems.

PROJ-310  Petroleum Industry Project (3 credits)
Prerequisites:  PROJ-305, PTPR-310, RESR-334, EVAL-305, DRLG-305, GEOL-310
Course Content: Under the supervision of an industry advisor, students will research and analyze a technical problem, complete and present a final report.
Diploma
in
Process and Utilities Engineering Technology

Chemical Option

DURATION
This programme is offered on both a full-time and a part-time basis. The full-time programme will have a duration of seven-four-month semesters (28 months total) comprising 4 academic semesters and 3 Co-Op semesters. The part-time programme will be based on students taking a maximum of about 12 credits per academic semester.

CREDITS
Chemical option - 120 credits, with a minimum cumulative GPA of 2.0, are required for graduation.

INTAKE
September of each calendar year.

PROGRAMME OVERVIEW
The Process & Utilities Engineering Technology programme is designed to meet the needs of the Petroleum, Petrochemical, Chemical, Fertilizer and Allied Industries for trained personnel in the areas of production, process operations, maintenance and environmental control. The Chemical Option major will focus on developing a sound understanding of chemical engineering fundamentals, process design technology, operations and process control, safety and environmental engineering.

EMPLOYMENT OPPORTUNITIES
Graduates of the Process and Utilities Engineering Technology programme will be able to assume positions such as Engineering Technical Assistants, Technicians or Operators or, in the case of those with suitable work experience, promotion to supervisory level positions.

ADMISSION REQUIRMENTS
Additional Mathematics and 5 CSEC/GCE 'O' Level passes including English A/English Language, Mathematics (Grade 1), Physics and Chemistry (one of which must be at Grade 1). Applicants with 5 O-Level passes but not with the required grades or without AddMaths must have either:

a) written A-Levels in Maths, and Physics or Chemistry, or
b) passed CAPE 1 in Maths, and Physics or Chemistry, or
c) successfully completed the 'Transition Studies Programme' with a pass in all subjects, a 65% average in Maths and a 65% average in one of the required Science subjects.
## Diploma in Process & Utilities Engineering Technology

### Chemical Option

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**Total Programme Credits:** 120 69.5 22.5 28
Diploma
in
Process and Utilities Engineering Technology

Chemical Option

1st YEAR COURSES : SEMESTER 1

**MATH-235  Mathematics for Technology I (5 credits)**
Course Content: This course enables the student to obtain a level of proficiency in differential calculus and integral calculus to use as a mathematical tool to solve scientific and technological problems. Applications include linear motion, areas under curves, work, hydrostatic pressure and others.

**COMM-238  Technical Communications (4 credits)**
Course Description: This communications course for engineering technologists includes skill development in technical writing and speaking to small groups. The techniques of technical style are practiced in exercises and short assignments. Both individual and group projects are assigned.

**COMP-220  Computer Fundamentals (4 credits)**
Course Content: This is an engineering technology related computer course. Practical skills include Windows/DOS disk and file management, Internet usage, email usage and training in the following applications: word processing, spreadsheet, database, and presentation software. Theoretical components include computer terminology with an emphasis on hardware components.

**PHYS-235  Engineering Physics (3 credits)**
Course Content: This course takes an engineering approach to dealing with the physics of technology and problem solving, while meeting national reference standards. The following topics will be covered: friction, rotational motion, temperature and heat, wave theory and sound, thermal and mechanical properties of matter, wave optics, and geometric optics.

**CHEM-210  Engineering Chemistry (4 credits)**
Course Content: The emphasis is placed on the practical, day to day calculations and relevant theory performed by practicing Engineering Technologists. A partial list of topics covered includes: redox chemistry, electrochemistry, galvanic cells, corrosion, water treatment chemistry, phase diagrams, basic organic chemistry, hydrocarbon chemistry, material balances, combustion chemistry and analysis, basic laboratory techniques.

**INRY-200  Industry Overview (5 credits)**
Course Content: This course provides students with an overview of industrial technology, processes and equipment. Special emphasis is given to the upstream petroleum industry.

**ENVS-202  Safety and Environment (3 credits)**
Course Content: This course will provide an introduction to safety problems and safe practices in the workplace, and an appreciation of the potential environmental impact of air, water, waste and noise. Some discussion on the handling of waste and perception of risk, environmental
responsibility and sustainable development will be included. Students will spend time in lab learning safety processes as they relate to high pressures and temperatures in vessels.

**LIFE 100  Life Skills (1 credit)**
Course Content: This course will provide some basic skills relating to the working environment, personal development, personal and work interests.

**1st YEAR COURSES : SEMESTER 2**

**MATH-285  Mathematics for Technology II (5 credits)**
**Pre-requisite:** MATH-235
Course Content: This course contains the following topics: applications of integration including volumes of revolution, centroids, and moments of inertia, differentiation of transcendental functions, integration of transcendental functions, and methods of integration including integration by parts, by trigonometric substitution, and by use of tables. Applications may include linear motion, areas under curves, volumes, centroids, moments of inertia, work, hydrostatic pressure, electrical theory and others.

**CNTR-252  Instrumentation for Process Measurement and Control (4 credits)**
Course Content: An introduction to process measurement and control, explaining how instrumentation and processes interact. These processes could be in any area of study, such as the oil/gas sector, chemical manufacture, agriculture, mining, building systems or utilities. Areas of study will include measurement and control of variables such as fluid flow, level and pressure as well as how instruments should be installed for maximum accuracy. Specific applications will be studied so that the student can apply the knowledge to design, operate and troubleshoot measurement and control systems.

**ELEC-234  Electrical Principles (5 credits)**
Course Content: The student will become conversant with electrical terms and apply electrical principles, concepts and relationships that are fundamental to many technical applications. The course is conceptual while working towards problem solving and applications in industry. General topics include circuit analysis, safety and applications.

**ENGD-225  Flow Diagram Development and AutoCAD (4 credits)**
Course Content: This course emphasizes the interpretation and development of flow diagrams using ISA instrumentation symbols. Topics include: freehand drafting, lettering and linework; AutoCAD theory, special features and syntax; 2-D geometry insertion, manipulation, editing, text, layers, colours, and line type; use of AutoFLOW package.

**FLDS-253  Industrial Fluid Systems (5 credits)**
Course Content: The course will provide the future engineering technologist with an understanding of industrial flow systems and instrumentation. The application of theory in viscosity, buoyancy, pressure, general energy calculations, NPSH, pump efficiency laws and specifications, pump power required and power added to fluids, will be emphasized in the laboratory (16 hours). Lab topics may include pump performance evaluation, pump and piping system analysis, flow measurements, head losses, viscosity measurement, and level measurement using head and/or displacement techniques. A major design report on an industrial scale system in the production laboratory or in industry; is required.
**THRM-254 Thermodynamics (5 credits)**
Course Content: This course consists of the following subject areas: heat and temperature, phase changes, calorimetry; gas laws; work done by gases; thermodynamic laws; steam table use; steam calculations; heat engines; heat transfer; thermodynamics; expansion and contraction. Theory presented will be supported by laboratory experiments and tests.

**ENVS-305 Chemical and Environmental Safety (2 credits)**
Course Content: Survey of legislation and regulations: emphasizing Hazardous Waste and EPA; safety programmes, audits, confined space entry, clean-up of chemical spills, H2S, HAZOP and electricity; ethics and liability associated with the regulations are also addressed.

**2nd YEAR COURSES: SEMESTER 1**

**CHEM-304 Process Chemistry (5 credits)**
Course Content: This course provides learners with the necessary background to understand the chemistry and chemical principles relevant to industrial process chemistry. Some specific chemical processes are studied from an individual standpoint, including raw materials, material production and reaction products. A 16-hour lab will demonstrate the chemical principles relevant to industrial process chemistry.

**CHEN-301 Chemical Engineering Calculations (7 credits)**
Course Content: Stoichiometry in engineering calculations; material balances involving chemical reactions, recycle streams, bypass streams and purge streams; vapour pressures in gas mixtures; multi-component phase behaviour; energy balances; mixing or dissolution of solutions; use of engineering software; HYSYS simulation program.

**CHEN-302 Unit Operations Lab (3 credits)**
Course Content: Heat transfer and mass transfer labs to support CHEN-303, CHEN-306, and THRM-254.

**CHEN-303 Mass Transfer (3 credits)**
Course Content: Mass transfer operations; McCabe-Thiele method for binary distillation; short cut multicomponent distillation problems; trays and packings; reboilers and condensers for columns; absorbers and strippers; leaching and extraction.

**CHEN-306 Heat Transfer (4 credits)**
Course Content: Steady state conduction; natural and forced convection; film heat transfer coefficients; film and drop condensation; radiation. Students will identify and rate heat exchangers; calculate and apply appropriate mean temperature differences; describe the major features of heat exchangers;

**MNFG-214 Materials & Processes (Metals) (5 credits)**
Course Content: Classification, structure, properties and applications of metals; manufacturing processes and materials for metalworking; pressworking, casting, rolling, steelmaking, forging, powder metallurgy, metal removal processes; thermal processes for metals.

**ROTE-203 Rotating Equipment (3 credits)**
Course Content: Design of pumps, compressors, turbines, electrical motors; failure modes; inspection and testing; maintenance procedures; vibration analysis and correction
2nd YEAR COURSES : SEMESTER 2

**CHEN-304 Chemical Process Design (3 credits)**
Course Content: Basic economic evaluations and estimation of process equipment capital and operating costs; carry out a small design project complete with PFD and P&ID material and energy balances; learn computer applications; develop process flow diagrams; develop process and instrumentation (P&I) diagrams; size process equipment (pipelines, two and three phase separators, compressors, heat exchangers, distillation towers, pumps); develop process control logic and address safety issues, including sizing of control valves and pressure safety valves.

**CHEN-305 Analytical and Process Instrumentation (6 credits)**
Course Content: Basic instrumentation techniques for chemical analysis in the chemical process industries; analytical equipment in both an analytical and process laboratory setting using on-line equipment; techniques covered: ultraviolet/visible and infra-red spectrophotometry, atomic absorption, gas and liquid chromatography; basic principles of QA/QC.

**CHEN-307 Physical Chemistry and Thermodynamics (5 credits)**
Course Content: First, second and third laws of thermodynamics; entropy; heat engines; refrigeration and heat pumps; efficiencies; phase and chemical equilibrium; kinetic theory of gases; real gases; compressibility factors; empirical equations; phase behaviour; Raoult's and Henry's laws; colligative properties; reaction rates and simple mechanisms; adsorption and catalysis; surface tension; laboratory.

**MTCE-204 Design and Maintenance of Plant Systems and Services (4 credits)**
Course Content: Design and maintenance of heat exchangers, boilers, compressed air systems, air conditioning systems

**ENVS-307 Environmental Engineering I (5 credits)**
Course Content: Application of design principles to industrial and municipal wastes to achieve current environmental standards. Design and sizing of air and water pollution control equipment for industrial and municipal application. Pollution control technologies with respect to efficiencies, effects and impacts on the environment are evaluated.

**OPMT-306 Project Management (3 credits)**
Course Content: **Prerequisite:** COMP-220 Computer Fundamentals
Code of ethics; consultant's contracts; legal relationship between the engineer and the client; networks and arrow diagrams; CPM diagrams; bar charts; precedence diagrams; resource profiles; project cash-flow diagrams; cost control charts.

**CHEN-311 Technical Project (5 credits)**
**Prerequisite:** CHEN-303 Mass Transfer
Course Content: A project chosen by teams of students will be the basis of a formal technical report. Projects will come from local industries and the students will conduct their studies in the industry environment during the first week of the fifth semester.
Diploma in 
Process and Utilities Engineering Technology

Mechanical Option

DURATION
This programme is offered on both a full-time and a part-time basis. The full-time programme will have a duration of seven 4-month semesters (28 months total) comprising 4 academic semesters and 3 Co-Op semesters. The part-time programme will have a duration of 10 academic semesters or a minimum of 3½ years.

CREDITS
Mechanical option: 122 credits, with a minimum cumulative GPA of 2.0, are required for graduation.

INTAKE
September of each year.

PROGRAMME OVERVIEW
This programme is designed to meet the needs of the Petroleum, Petrochemical, Chemical, Fertilizer and Allied Industries for trained personnel in the areas of production, process operations, maintenance and environmental control. The Mechanical Option major will focus on mechanical engineering fundamentals, rotating equipment and mechanical engineering design.

EMPLOYMENT OPPORTUNITIES
Graduates of the Process and Utilities Engineering Technology programmes will be able to assume positions such as Engineering Technical Assistants, Technicians or Operators or, in the case of those with suitable work experience, promotion to supervisory level positions.

ADMISSION REQUIREMENTS
Additional Mathematics and 5 CSEC/GCE 'O' Level passes including English A/English Language, Mathematics (Grade 1), Physics and Chemistry (one of which must be at Grade 1). Applicants with 5 O-Level passes (or their equivalent) but not with the required grades or without AddMaths must have either:

a) written A-Levels in Maths, and Physics or Chemistry, or
b) passed CAPE 1 in Maths, and Physics or Chemistry, or
c) successfully completed the 'Transition Studies Programme' or ‘Pre-Engineering Programme’ with a pass in all subjects, a 65% average in Maths and a 65% average in one of the required Science subjects.
# Diploma in Process & Utilities Engineering Technology

## Mechanical Option

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**Total 1st Year, 1st Semester:** 30

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**Total 2nd Year, 1st Semester:** 31 19 3 9

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**Total 2nd Year, 2nd Semester:** 31 16 2 13

**Total Programme Credits:** 122
Diploma in

Process and Utilities Engineering Technology

Mechanical Option

1st YEAR COURSES : SEMESTER 1

**MATH-235 Mathematics for Technology I (5 credits)**
Course Content: This course enables the student to obtain a level of proficiency in differential calculus and integral calculus to use as a mathematical tool to solve scientific and technological problems. Applications include linear motion, areas under curves, work, hydrostatic pressure and others.

**COMM-238 Technical Communications I (4 credits)**
Course Content: This communications course for engineering technologists includes skill development in writing sentences and paragraphs and in speaking to small groups. The techniques of technical style are practised in exercises and short assignments. Both individual and group projects are assigned.

**COMP-220 Computer Fundamentals (4 credits)**
Course Content: This is an engineering technology related computer course. Practical skills include Microsoft Windows disk and file management, Internet, e-mail usage and training in the following applications: word processing, spreadsheet, database, and presentation software. Theoretical components include computer terminology with an emphasis on hardware components.

**PHYS-235 Engineering Physics (3 credits)**
Course Content: This course takes an engineering approach to dealing with the physics of technology and problem solving, while meeting national reference standards. The following topics are covered: friction, rotational motion, temperature and heat, wave theory and sound, thermal and mechanical properties of matter, wave optics, and geometric optics.

**CHEM-210 Engineering Chemistry (4 credits)**
Course Content: The emphasis is placed on the practical, day to day calculations and relevant theory required by practising Engineering Technologists. A partial list of topics covered would include: redox chemistry, electrochemistry, galvanic cells, corrosion, water treatment chemistry, phase diagrams, basic organic chemistry, hydrocarbon chemistry, material balances, combustion chemistry and analysis, basic laboratory techniques.

**GRAP-103 Engineering Graphics (3 credits)**
Course Content: The development of abilities in freehand sketching; isometric projections; plan and elevation views; the golden mean; reading technical drawings; guided practice in skill development.

**ENVS-202 Safety and Environment (3 credits)**
Course Content: This course will provide an introduction to safety problems and safe practices in the workplace, and an appreciation of the potential environmental impact of air, water, waste and noise. Some discussion on the handling of waste and perception of risk, environmental
responsibility and sustainable development will be included. Students will spend time in the lab learning safety processes as they relate to high pressures and temperatures in vessels.

**STAT-240 Statistics and Probability (3 credits)**
Course Content: This course provides an introduction to the statistical methods used in quality assurance, process control and other numerical industrial applications. Topics covered include organizing, presenting, and summarizing data; basic probability distributions; sampling and inferences about means and proportions; inferences using t, Chi-Squared, and F distributions; linear and non-linear curve fitting and regression analysis; entering and processing data using a computer statistical package.

**LIFE-100 Life Skills I (1 credit)**
Course Content: This course provides some basic skills relating to the working environment, personal development, personal and work interests.

**1st YEAR COURSES: SEMESTER 2**

**CADD-211 AutoCAD 2D (3 credits)**
Course Content: This course covers all of the basic AutoCAD features and commands. It will teach the student to produce drawings on a Computer Aided Design and Drafting (CADD) microcomputer using AutoCAD software. Description of hardware, software, introduction to MS-Windows, AutoCAD theory, syntax, special features, inserting 2D geometry. Also included are editing, measuring and verifying, manipulating screen graphics, text, layers, colour, line types, crosshatching, dimensioning, library parts/blocks, utility commands and an introduction to architectural applications. Lectures combined with hands-on lab exercises give the student the opportunity to use and experiment with the commands.

**DSGN-202 Piping Design (2 credits)**
Course Content: Piping standards; piping representations; piping calculations; manufacturing processes; design of piping systems

**MATH-285 Mathematics for Technology II (5 credits)**
Prerequisite: MATH-235
Course Content: This course contains the following topics: applications of integration including volumes of revolution; centroids and moments of inertia; differentiation of transcendental functions; integration of transcendental functions; and methods of integration including integration by parts, by trigonometric substitution, and by use of tables. Applications may include linear motion, areas under curves, volumes, centroids, moments of inertia, work, hydrostatic pressure, electrical theory and others.

**ELEC-244 Electrical Principles (8 credits)**
Course Content: An introductory course in electrical principles, concepts and relationships. The course covers resistance, current and voltage relationships; power and energy; circuit analysis; capacitance, magnetism and inductance. The theory is supplemented with numerous hands-on labs.

**CORR-200 Corrosion Control (3 credits)**
Course Content: The corrosion principles; monitoring, inspection and testing; failure analysis; corrosion control; risk management.

**INRY-200 Industry Overview – (Processes) (4 credits)**
Course Content: This course provides students with an overview of industrial technology, processes and equipment. Special emphasis is given to the upstream petroleum industry.

**THRM-315 Thermodynamics (5 credits)**
**Prerequisite:** PHYS-235
Course Content: The study of energy in its many forms involves thermodynamic principles. Topics include fluid states, physical laws governing energy transfers, thermal efficiencies and heat engine principles. Application of the principles of heat transfer focusing on refrigeration cycles, heat pumps, gas mixtures and psychrometry will be thoroughly addressed.

**2nd YEAR COURSES : SEMESTER 1**

**FDYN-304 Fluid Dynamics (4 credits)**
Course Content: Hydrostatics and hydrodynamics; rheological models; Newtonian and non-Newtonian fluids; laminar and turbulent flows; boundary layers; flow through pipes, conduits, channels, valves, fittings; flow control in hydraulic systems; pump curves; pneumatic systems; gas Z-factors; compressed air systems; introduction to multiphase flow effects.

**EMEC-105 Engineering Mechanics I (5 credits)**
Course Content:Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr’s stress circle; pressure vessels.

**MNFG-214 Materials & Processes (Metals) (5 credits)**
Course Content: Classification, structure, properties and applications of metals; manufacturing processes and materials for metalworking; pressworking; casting; rolling; steelmaking; forging; powder metallurgy; metal removal processes; thermal processes for metals.

**MNFG-205 Workshop Technology (5 credits)**
Course Content: Machining processes; welding; sheet-metal working; metal cutting theory; tolerances, limits and fits; metrology; fasteners; process planning.

**THRM-370 Thermodynamics II (3 credits)**
**Prerequisite:** THRM-315
Course Content: Application of thermodynamic principles to internal combustion engines; engine testing and cycle tracing. It includes the evaluation of engine parameters leading to efficiency and performance improvements.

**ROTE-203 Rotating Equipment (3 credits)**
Course Content: The design of pumps, compressors, turbines, electric motors; failure modes; inspection and testing; maintenance procedures; vibration analysis and correction.

**ACCT-303 Principles of Accounting and Economics (3 credits)**
Course Content: Accounting systems; ledgers; postings; balance sheets; income statements; cash flows; budgets. Introduction to economic problem solving and decision-making in industry. It also teaches capital sources and costs; discounted cash flow analysis; equivalent annual cost; present worth; rate of return comparisons; investment alternatives; replacement analysis; business finance and decision-making; depreciation, taxes and inflation.
**CNTR-253 Instrumentation for Process Measurement and Control (3 credits)**
Course Content: An introduction to process measurement and control, explaining how instrumentation and processes interact. Areas of study will include measurement and control of variables such as fluid flow, level and pressure as well as how instruments should be installed for maximum accuracy. Specific applications will be studied so that the learner can apply the knowledge to design, operate and troubleshoot measurement and control systems.

**2nd YEAR COURSES : SEMESTER 2**

**SMTL-300 Strength of Materials I (5 credits)**
**Prerequisite:** EMEC-105
Course Content: The concepts of stresses and strains in axial and torsional loading. Properties of plane and composite sections are analyzed from basic principles. Components are scrutinized under combined loading, including bending. Investigation of transformation of stress, beam deflections, critical buckling loads for columns, and end connection effects. Stresses in systems (e.g. thin-walled pressure vessels) are determined.

**DSGN-350 Final Project (5 credits)**
Course Content: This project will require the student to apply problem-solving techniques and solution strategies to resolve technological problems. Students work in groups and plan the project, provide regular status reports and prepare a formal final report and make a presentation.

**DSGN-315 Design of Pneumatic and Hydraulic Systems (5 credits)**
**Prerequisite:** FDYN-304
Course Content: Elements of pneumatic and hydraulic systems; pneumatic and hydraulic circuit design; electro-pneumatic and electro-hydraulic control; maintenance procedures.

**MNFG-224 Materials & Processes (Non-Metals) (4 credits)**
Course Content: Classification, structure, properties and applications of polymers, ceramics and concrete. Manufacturing processes and materials for polymers and ceramics.

**DSGN-306 Design of Machine Elements (5 credits)**
Course Content: Design of machine elements; manufacturing methods; kinematics of mechanisms; inspection and testing.

**PROJ-405 Project Management (3 credits)**
Course Content: Project management and control techniques; cost control; contract management; use of computer software; critical path methods; Gantt charts; scheduling; contracts; manpower management; labour issues; materials management.

**MTCE-204 Design and Maintenance of Plant Systems and Services (4 credits)**
Course Content: Design and maintenance of heat exchangers, boilers, compressed air systems, air conditioning systems, steam generation systems.
Diploma in Process and Utilities Engineering Technology

Electrical & Electronics Option

DURATION
This programme is offered on both a full-time and a part-time basis. The full-time programme will have a duration of 7 four-month semesters (28 months total) comprising 4 academic semesters, and 3 Co-Op semesters. The part-time programme will have a minimum duration of 10 academic semesters.

CREDITS
120 credits are required for graduation with a minimum GPA of 2.0.

INTAKE
September of each year.

PROGRAMME OVERVIEW
The EEET Diploma is a unique programme providing graduates with a sound background in the two disciplines – Electrical and Electronics. The programme was developed in response to a need identified by industry for a multi-skilled technician in this area, to meet the continuing changes in the electrical and control technology areas.

Through the availability of well equipped laboratories and Co-Op training, students of this programme will have the opportunity to build their theoretical and practical competences in both heavy current and light current applications and equipment, analog and digital communication systems, automation and control systems, computer systems and microelectronics.

EMPLOYMENT OPPORTUNITIES
The EEET graduate will be suitable for Engineering Technical Assistant or Technician positions in the first instance and, with suitable experience, promotion to positions of increasing responsibilities in the technical or supervisory line.

ADMISSION REQUIREMENTS
Additional Maths and 5 CSEC or GCE 'O' Level passes including English A/English Language, Mathematics (Grade 1), Physics and Chemistry (one of which must be at Grade 1). Applicants with 5 O-Level passes (or their equivalent) but not with the required grades or without Add Maths must have either:
  a) written A-Levels in Maths, and Physics or Chemistry, or
  b) passed CAPE 1 in Maths, and Physics or Chemistry, or
  c) successfully completed the 'Transition Studies Programme' with a pass in all subjects, a 65% average in Maths and a 65% average in one of the required Science subjects.
Diploma in Process & Utilities Engineering Technology

Electrical & Electronics Option

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- 60 -
Diploma in Process and Utilities Engineering Technology

*Electrical & Electronics Option*

**SEMESTER 1**

**MATH-235  Mathematics for Technology I (5 credits)**

**Prerequisite:** EET Entrance Requirements

Course Content: This course enables the student to obtain a level of proficiency in differential calculus and integral calculus to use as a mathematical tool to solve scientific and technological problems. The course includes the following topics: limits, rates of change, delta process, definition of a derivative, rules of differentiation of algebraic functions, higher derivatives, applications of differentiation including related rates, maximum and minimum problems, and curve sketching. It also includes integration of algebraic functions, definite integrals, and numerical methods of integration. Applications include linear motion, areas under curves, volumes, centroids of areas, moments of inertia for areas, work, hydrostatic pressure and others.

**COMM-238 Technical Communications I (4 credits)**

**Prerequisite:** EET Entrance Requirements

Course Content: This communication course for engineering technologists includes skill development in sentences, paragraphs, and speaking to small groups. The techniques of technical style are practiced in exercises and short assignments. Both individual and group projects are assigned.

**COMP-261  Computer Fundamentals (3 credits)**

**Prerequisite:** EET Entrance Requirements

Course Content: This is an engineering technology related computer course. Practical skills include Windows/DOS disk and file management, Internet usage, e-mail usage and training in the following applications: word processing, spreadsheet and presentation software. Theoretical components include computer terminology with an emphasis on hardware components.

**COMP-263 MS-Project (1 credit)**

**Prerequisite:** COMP-261

Course Content: This course introduces the learner to project management through the use of MS Project.

**ELEC-244  Electrical Principles (8 credits)**

**Prerequisite:** EET Entrance Requirements

Course Content: An introductory course in electrical principles, concepts and relationships. The course covers: current and voltage relationships; circuit analysis; voltage and current sources; resistance, capacitance and inductance; steady state and transient response. The labs supplement the theory by using basic circuitry and computer to illustrate operational and analytical concepts. Circuit simulation software is used in an e-lab.
**CNTR-217  Process Control and Measurement (3 credits)**
**Prerequisite:** EET Entrance Requirements
Course Content: An introduction to process measurement and control, explaining how instrumentation and processes interact. These processes could be in any area of study, such as the oil/gas, chemical, mining, utilities and building systems sectors. This course involves instrument and PID controller applications.

**ENVS-247  Safety and Environmental Ethics (2 credits)**
**Prerequisite:** EET Entrance Requirements
Course Content: This course focuses on safe working practices as they pertain to the Electrical Industry. The course will cover the OHS act and WHIMS. Case studies will be covered in the context of electrical safety.

**DIGI-207  Introduction to Digital Electronics (4 credits)**
**Prerequisite:** EET Entrance Requirements
Course Content: An introduction to digital logic and sequential logic. Topics include conversion between, and the arithmetic manipulation of, the various numbering systems, logic gates, combinational logic circuits, Boolean algebra, the design and implementation of combinational logic circuits, and the study of latches, flip-flops and applications.

**SEMESTER 2**

**MATH-285  Mathematics for Technology II (5 credits)**
**Prerequisite:** MATH-235
Course Content: This course contains the following topics: differentiation of transcendental functions, and their application in scientific and technological areas. It also includes integration of transcendental functions including definite integrals, integration using tables, and numerical integration. Applications may include linear motion, areas under curves, volumes, centroids, moments of inertia, work, hydrostatic pressure and others.

**ELTR-294  Semiconductor Devices and Circuits (9 credits)**
**Prerequisite:** ELEC-244
Course Content: This course covers the operation and application of the most common semiconductor devices, including diodes, bipolar junction transistors (BJTs), field effect transistors (FETs), and differential amplifiers. In addition, various circuits that use these devices, including power supplies will be analysed. Lab exercises allow the student to verify concepts studied and to apply the theory to practical applications.

**DIGI-290  Digital Electronics II (5 credits)**
**Prerequisite:** DIGI-207
Course Content: This course covers the advanced concepts of digital logic which include the following topics: TTL, MOS, and ECL logic families, interfacing between different logic families, the operation and application of the various multivibrator circuits, the design and implementation of both asynchronous and synchronous sequential circuits, digital display circuits, including LEDs, LCDs, and seven segment displays.

**ENGD-226  Electrical Diagrams and AutoCad (4 credits)**
**Prerequisite:** COMP-261
Course Content: The student begins to acquire the drafting knowledge and skills for the electrical design courses to follow. Topics include: freehand lettering, use of instruments, scales, applied geometry, technical sketching, multi-view projection, basic dimensioning, and selected AutoCAD commands.

**ELEC-291  Electrical Analysis (4 credits)**
**Prerequisites:** COMP-261, ELEC-244
Course Content: A study of circuit analysis and network theorems applied to practical AC and three-phase circuits. Full analysis of 3-phase systems would include capacities and energy and power relations in balanced and unbalanced loading configurations. Equivalent circuits and equipment modelling are introduced.

**INST-222 Instruments (3 credits)**
**Prerequisites:** ELTR-244, MATH-235
**Co-requisite:** MATH-285
Course Content: This course provides the student with a working knowledge of some basic test equipment used in the electronics industry. Instruments such as the digital voltmeter, oscilloscope, and function generator are taught at the block diagram level to enable the student to become competent in the selection of test equipment and with testing procedures.

**SEMESTER 3**

**ELCM-367  Principles of Communication (6 credits)**
**Prerequisite:** ELTR-294
Course Content: Core concepts of filtering, mixing and modulation are emphasized and applied to systems. It includes a detailed study of transmission lines, antennas, FM transmitters and receivers. An introduction to systems such as mobile communication, trunking plus basic microwave theory are also studied. Appropriate laboratory work is included.

**ELEC-299  Electrical Practices (4 credits)**
**Prerequisites:** COMP-261, ELEC-244
Course Content: Introductory concepts dealing with the principles of series, parallel and series parallel control circuits are verified. Pushbuttons, relays and timers will be used to achieve sequential and combinational control circuits. Circuits containing various combinations of resistors, capacitors and inductors are analyzed for both single-phase and three-phase circuits. Motor starters and control circuits with devices such as limit switches, zero-speed switches and indicating lights are studied. In this course students perfom experiments to illustrate principles developed in the theory course and continue to develop the “hands-on” skills required of an Electrical Engineering Technician.

**DIGI-390  Digital Electronics III (4 credits)**
**Prerequisite:** DIGI-290
Course Content: This course introduces the student to the effects of sampling and the Nyquist Theorem, analog to digital conversion and memory systems. An in-depth analysis to analog devices and digital-signal processing is presented. Lab exercises support the theory.

**ELEC-352  Rotating Machines (7 credits)**
**Prerequisites:** ELEC-291, ELEC-299, MATH-285
Course Content: A study of the theory of operation, control, performance, and characteristics of induction motors and their associated starting methods, synchronous motors, generators, variable
speed drives and DC motors. The labs are an application of theory to the operation, control and performance characteristics of three-phase synchronous and induction machines, single-phase induction motors, variable speed drives and DC machines.

**CMPH-265 Microcontroller Theory and Lab (4 credits)**
**Prerequisite:** ELTR-292, DIGI-290
Course Content: The course deals with the architecture, instruction set and I/O capabilities of microcontrollers. The Motorola 68HC11 is used as the learning model. Flowcharting and assembly language programmes are studied. The general concept of interfacing common peripheral devices such as analog-to-digital converters, LEDs, seven segment displays, relays, transistors, receivers and transmitters will be studied.

**CNTR-347 Programmable Logic Controllers (4 credits)**
**Prerequisites:** CNTR-217, DIGI-290
**Co-requisite:** ELEC-299
Course Content: Provides the student with the necessary information and resources required for PLC hardware installation as well as the entering and editing of basic instructions used by the PLC-5 Allen Bradley system. Topics covered are: I/O connections, memory organization, program files, forcing, searching, descriptors, timers, counters and relay instructions. This course uses the RS-Logic-5 software and the PLC-5/20 processor. The student will design, connect, program and troubleshoot the operation of many practical industrial control systems.

**ELEC-353 Transformer Applications (4 credits)**
**Prerequisites:** ELEC-291, ELEC-299, MATH-285
Course Content: A study of the construction and of the theory of operation, performance, and characteristics of single phase and three phase transformers and their applications.

**ELCM-350 Industrial Networks (4 credits)**
**Prerequisites:** DIGI-207, MATH-285
Course Content: A study of a basic computer network using both OSI model and the internet model. The basics of data communication systems will be studied. A case study of a wide area network will be completed. The concepts of two major power systems communications protocols will be covered: DNP and ModBus.

**CNTR-397 PLC Control and HMI (5 credits)**
**Prerequisite:** CNTR-347
Course Content: A continuation of the previous PLC course incorporating the more advanced PLC instructions. Topics covered are instructions for: compare, compute, and program control, subroutine, block transfer read/write, PID and message. Man-Machine-Interface (MMI/HMI) software packages called PanelView and RSVIEW are used with the PLC to animate operator control screens. Practical process control loops are simulated, animated and controlled.

**ELEC-367 Power Systems (9 credits)**
**Prerequisites:** ELEC-352, ELEC-299, ELEC-291
Course Content: This course is a study of the protection and control of utility and industrial power systems. Major topics include: power system equipment and performance characteristics, print reading, revenue metering, calculation of short circuit currents, application and coordination of protective devices and testing of protective relays. The student makes use of computer programs as applied in the industry.
**PROJ-399 Technical Project (4 credits)**
Course Content: The report is a culmination of the Electrical Engineering Technology program as students combine their skills to present a technical report. Peers, industry practitioners and faculty are used as consultants and evaluators.

**DSGN-396 Industrial Electrical Design (5 credits)**
**Prerequisites:** ELEC-291, ELEC-299
Course Content: Provides theoretical and practical electrical design concepts for commercial and industrial applications. The concepts are explored in the context of the National Electrical Code and enhanced using AutoCAD as a drafting and design aid. State of the practice design techniques are analyzed. This course incorporates an introduction to the National Electrical Code. The selection and the protection of electrical conductors will be covered. The calculation of branch circuits, feeders and services for commercial electrical installations will be introduced. Lighting in hazardous locations and motor control are also studied.
Diploma
in
Process and Utilities Engineering Technology

Industrial Instrumentation Option

DURATION
This programme is offered on both a full-time and a part-time basis. The full-time programme will have a duration of 7 four-month semesters (28 months total) comprising 4 academic semesters, and 3 Co-Op semesters. The part-time programme will have a duration of 10 academic semesters.

CREDITS
120 credits are required for graduation with a minimum GPA of 2.0

INTAKE
September of each calendar year.

PROGRAMME OVERVIEW
The IET Technology Diploma is a specialized programme providing graduates with a sound background in Instrumentation. The programme was developed in response to a need identified by industry for a multi-skilled technician in this area to meet the continuing changes in the process measurement and control technology areas.

Through the availability of well equipped laboratories and Co-Op training, students of this programme will have the opportunity to build their theoretical and practical competences in automation and control systems, computer systems and microelectronics, distributed control systems (DCS), supervisory control and data acquisition (SCADA) and programmable logic controllers (PLCs), amongst other skills.

EMPLOYMENT OPPORTUNITIES
The IET graduate will be suitable for Engineering Technical Assistant or Technician positions in the first instance and, with suitable experience, promotion to positions of increasing responsibilities in the technical or supervisory line.

ADMISSION REQUIREMENTS
Additional Maths and 5 CSEC or GCE 'O' Level passess including English A/English Language, Mathematics (Grade 1), Physics and Chemistry (one of which must be at Grade 1). Applicants with 5 O-Level passes (or their equivalent) but not with the required grades or without Add Maths must have either:
  d) written A-Levels in Maths, and Physics or Chemistry, or
  e) passed CAPE 1 in Maths, and Physics or Chemistry, or
  f) successfully completed the 'Transition Studies Programme' with a pass in all subjects, a 65% average in Maths and a 65% average in one of the required Science subjects.
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Diploma in Process and Utilities Engineering Technology

Industrial Instrumentation Option

1st Year Courses: Semester 1

COMP-257 Industrial Computing Basics (3 credits)
Course Content: Introduction to PC operation, terminology, hardware and keyboarding. Includes spreadsheet, word processing, database and the Internet, e-mail and presentation software applications as required by Instrumentation technology.

ELEC-244 Electrical Principles (8 credits)
Course Content: An introductory course in electrical principles, concepts and relationships. The course covers resistance, current and voltage relationships; power and energy; circuit analysis; capacitance, magnetism and inductance. The theory is supplemented with numerous hands-on labs.

ENGD-212 Engineering Drawing (2 credits)
Course Content: This course focuses on the identification, interpretation and creation of instrumentation drawings. Examples of these include P&IDs and loop drawings. Drawings will be created using sketching techniques, instrumentation templates, and VISIO.

INST-231 Process Instruments I (7 credits)
Course Content: Design application, operation and maintenance of instrument air systems, pneumatic and electronic instruments. Selection and applications of calibration standards, as well as calibration and maintenance procedures for industrial measurement instruments and final control devices.

MATH-235 Mathematics for Technology I (5 credits)
Course Content: This course enables the student to obtain a level of proficiency in differential calculus and integral calculus to use as a mathematical tool to solve scientific and technological problems. Applications include linear motion, areas under curves, work, hydrostatic pressure and others.

APSC-215 Science for Instrumentation I
Course Content: Fundamentals of fluid dynamics and thermodynamics. Includes physical fluid properties; flow characteristics and principles; buoyancy; pressure; energy calculations; pump/compressor fundamentals; heat and temperature; phase changes; gas laws and processes.

1st Year Courses: Semester 2

APSC-220 Science for Instrumentation II (6 credits)
Course Content: Introductory course that includes fundamental science; chemistry; material science; physical science and applied mechanics. Focus provides introduction to process measurement.
SAFE-251  Industrial Safety (4 credits)
Course Content: This is a cluster of courses covering industry-relevant training and certification in Occupational Health and Safety, Transportation of Dangerous Goods, Off-Highway Driving, Petroleum Safety Training, WHMIS, First Aid/CPR and Electrical Code for hazardous Locations. A combination of traditional classroom theory, hands-on training and self-study techniques will be used as learning techniques.

COMM-238  Technical Communications I (4 credits)
Course Content: This communications course for engineering technologists includes skill development in sentences, paragraphs, and speaking to small groups. The techniques of technical style are practised in exercises and short assignments. Both individual and group projects are assigned.

INST-331  Process Instruments II (6 credits)
Prerequisite: INST-231
Co-requisite: APSC-200
Course Content: Includes principles of operation and selection of pressure, level, flow and temperature measurement instruments as applied to industrial processes; standards and related drawings used to specify instruments. Emphasis on design and selection of electronic, digital and smart instruments.

MATH-285  Mathematics for Technology II (5 credits)
Course Content: This course contains the following topics: applications of integration including volumes of revolution, centroids, and moments of inertia, differentiation of transcendental functions, integration of transcendental functions, and methods of integration including integration by parts, by trigonometric substitution, and by use of tables. Applications may include linear motion, areas under curves, volumes, centroids, moments of inertia, work, hydrostatic pressure, electrical theory and others.

MNTN-230  Instrument Maintenance (2 credits)
Course Content: Safe use and selection of hand and power tools to accomplish a variety of instrumentation related workshop tasks.

PROP-257  Industrial Process Technology (3 credits)
Course Content: A study of the process operations conducted within industrial processing plants. The industries covered will include oil and gas (processing and transportation), pulp and paper manufacturing, mining (and associated processing), chemical manufacturing, food processing industries, and water treatment.

2nd Year Courses: Semester 1

ANLS-320  Industrial Analyzers I (4 credits)
Course Content: This course involves the process parameters that affect product quality, quantity and overall efficiencies in an industrial process. Analytical measurement techniques such as: chromatography, spectrometric analysis (IR, UV, chemiluminescence) are applied to processes to provide efficient process control. Laboratory projects support theoretical concepts and provide the student with hands-on training.

CMPN-320  Distributed Control Systems I (6 credits)
Course Content: Distributed control systems (DCS) fundamentals, applications, architecture, interfaces, data communications, data highways and industrial LANs. Lab emphasis on token ring-based systems.

**CMPP-320 Instrumentation Programming I (2 credits)**
Course Content: Fundamental “C” programming language with respect to engineering applications.

**CNTR-320 Process Systems I (6 credits)**
Course Content: Introduction to process control including feedback control loop architecture, feedback control loop component behavioural characteristics and effects, loop algorithms and stability, feedback controllers and their applications.

**DIGI-207 Introduction to Digital Electronics (4 credits)**
Course Content: An introduction to digital logic concepts. The topics include: conversion between, and the arithmetic manipulation of, the various numbering systems commonly used in digital electronics, digital representation using binary codes, Boolean algebraic theorems and postulates, combination logic gates and the design, analysis and implementation of combination logic circuits, and the study of latches, flip flops and counters.

**ELTR-220 Instrumentation Electronics (4 credits)**
**Prerequisite:** ELEC-244
Course Content: Semiconductors and their applications; use of diodes in regulated power supplies, filters, transistors and op-amps. The theory will be supported in a hands-on lab environment.

**PROJ-320 Industrial Project Management (3 credits)**
Course Content: Includes leadership, communications, problem-solving, time management, administration, reports, budgeting, cost control/monitoring, cost-benefit analysis, financial reporting, project assessment, project execution, planning, scheduling and control. Leads into Instrumentation Project course.

**2nd Year Courses : Semester 2**

**ANLS-325 Industrial Analyzers II (4 credits)**
Course Content: This course involves the process parameters that affect product quality, quantity and overall efficiencies in an industrial process. Analytical measurement techniques involving humidity, turbidity, toxic and explosive gases are applied to processes to provide efficient and safe industrial environments. Design of sampling systems is critical to obtain representative samples and accurate analytical measurements. This course will highlight the main components in a sampling system, and review the regulations governing emissions. Laboratory projects support theoretical concepts and provide the student with hands-on training.

**CMPN-330 Distributed Control Systems (7 credits)**
**Prerequisite**: CMPN-320
Course Content: Distributed Control Systems (DCS) with lab emphasis on Ethernet systems. Foundation Fieldbus and SCADA fundamentals, architecture, interfaces, data communications and applications.

**CMPP-322 Programming for Instrumentation II (3 credits)**
Course Content: Advanced “C” programming language with respect to instrumentation applications.

**CNTR-325  Process Systems II (6 credits)**
**Prerequisite**: CNTR-320
Course Content: Principles of single loop control applied to more advanced process control schemes with multiple controlled variables. Includes cascade, override, feedforward and interactive control loops, boiler and fractionation column controls.

**ELCM-313  PLC and Ladder Logic (4 credits)**
Course Content: Topics include: I/O connections, memory organizations, program files, forcing, searching, descriptors, timers, counters and relay instructions. The student will design, connect, program and troubleshoot many practical industrial control systems using PLCs commonly used in industry..

**INST-325  Instrumentation Software (3 credits)**
Course Content: Instrumentation engineering software packages for instrument index databases, and the selection of flow meters, valves, and similar equipment.

**PROJ-325  Instrumentation Project (3 credits)**
Course Content: Includes: problem solving and assessment; design, planning, interpretation of engineering narratives; procurement; instrumentation applications; valve sizing; preparation and presentation of an industrial control design and P&ID
Diploma in Information & Communications Technology

Computer Engineering Technology Option

DURATION
This programme is offered on both a full-time and a part-time basis. The full-time programme will have a duration of seven (7) four-month semesters comprising four (4) academic semesters and three (3) Co-op semesters. The part-time programme will take approximately 10 semesters over 3½ years and does not include Co-Op.

CREDITS
120 credits with a minimum cumulative GPA of 2.0 are required to graduate.

INTAKE
September of each year.

PROGRAMME OVERVIEW
This programme is focused on preparing graduates for careers in the rapidly expanding ICT (Information and Communication Technologies) field. The theoretical and practical skills acquired will equip the graduates to function in a wide range of areas within the information and communications engineering field. These areas include: information systems installation, computer hardware maintenance and configuration; local and wide area network installation and maintenance; computer system configuration, programming and systems sales and support; wireless communications.

ADMISSION REQUIREMENTS
Additional Maths and 5 GCE 'O' Level/CSEC passes including English Language/English A, Mathematics (Grade 1), Physics and Chemistry (one of which must be at Grade 1). Applicants with 5 O-Level passes (or their equivalent) but not with the required grades or without Add Maths must have either:
   a) written A-Levels in Maths, and Physics or Chemistry, or
   b) passed CAPE 1 in Maths, and Physics or Chemistry, or
   c) successfully completed the 'Transition Studies Programme' with a pass in all subjects, a 65% average in Maths and a 65% average in one of the required Science subjects
# Diploma in Information & Communications Technology

## Computer Engineering Technology Option

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Diploma in Information & Communications Technology

Computer Engineering Technology Option

1st Year Semester 1

COMM-238 Technical Communications I (4 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: This communication course for engineering technicians includes skill development in sentences, paragraphs, and speaking to small groups. The techniques of technical style are practised in exercises and short assignments. Both individual and group projects are assigned.

COMP-202 Computer Fundamentals (4 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: This is an engineering technology-related computer course. Practical skills include Windows disk and file management, Internet, e-mail and training in the following applications: word processing, spreadsheet, database, and presentation software.

DIGI-240 Digital Electronics (5 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: An introduction to digital logic concepts. Topics include: conversion between and the arithmetic manipulation of the various numbering systems commonly used in digital electronics, digital representations using binary codes, Boolean algebraic theorems and postulates, combinational logic gates, the design and implementation of combinational logic circuits, and the study of lathes and flip-flops. Extensive use of a software-based simulation tool (Electronics Workbench) will provide support for the theory concepts, and breadboarding circuits in lab will supplement the theory and simulations by using basic logic circuitry to illustrate operational and analytical concepts.

ELTR-244 Electrical Circuit Analysis (8 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: An introductory course in electrical/electronic principles, concepts and relationships. The course covers: current, voltage and impedance relationships; circuit analysis; DC and AC circuits; voltage and current sources; resistance, capacitance and inductance; steady state and transient response; complex number operation; R-L-C networks. The labs supplement the theory by using basic circuitry to illustrate operational and analytical concepts.

EFAB-305 Electronic Fabrication (3 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: Electronic Shop Techniques includes basic care and use of hand tools, high reliability soldering and desoldering techniques for both standard components and surface mount components. ESD techniques and handling of PCBs will be taught. A variety of connectors and wiring applications, PCB construction as well as a student constructed final project will be included in this course.

**MATH-235 Mathematics for Technology I (5 credits)**

*Prerequisite(s):* None  
*Co-requisite(s):* None

Course Content: This course enables the student to obtain a level of proficiency in differential calculus and integral calculus to use as a mathematical tool to solve scientific and technological problems. The course includes the following topics: limits, rates of change, delta process, definition of a derivative, rules of differentiation of algebraic functions, higher derivatives, applications of differentiation including related rates, maximum and minimum problems, and curve sketching. It also includes integration of algebraic functions, definite integrals, and numerical methods of integration.

1st Year Semester 2

**DIGI-290 Digital II Theory & Lab (5 credits)**

*Prerequisite(s):* DIGI-240 – Digital I  
*Co-requisite(s):* CMPP-228 Computer Hardware Fundamentals

Course Content: Covers the advanced concepts of digital logic which include the following topics: TTL, MOS and ECL logic families, interfacing between the different logic families, the operation and application of the various multivibrator circuits, the design and implementation of both asynchronous and synchronous sequential circuits, digital display circuits, including LEDs, LCDs and seven segment devices.

**CMPP-228 Computer Hardware Fundamentals (4 credits)**

*Prerequisite(s):* None  
*Co-requisite(s):* None

Course Content: This hands-on course will teach the techniques needed to diagnose PC problems, configure PC components and replay defective parts. The student will learn how to install adapter cards, configure multiple hard drives and peripherals devices and modify a CMOS setup.

**CMPP-260 C++ Programming I (5 credits)**

*Prerequisite(s):* None  
*Co-requisite(s):* None

This course introduces the student to problem solving and structured programming using C++ with a strong emphasis on proper program design. Topics include selection and repetition structures, arrays, strings and an introduction to basic object-oriented concepts which can be developed further in subsequent Object-Oriented Programming courses.

**ENGD-227 Electrical/Electronic & Diagramming Applications (3 credits)**

*Prerequisite(s):* ELTR-244  
*Co-requisite(s):* None

Course Content: This course provides an introduction to diagramming and schematic capture tools for Computer/Electronics/Network engineering.

**ELTR-297 Electronics Devices – Theory & Lab (8 credits)**
**Prerequisite(s):** ELTR-244 Electric Circuit Analysis  
**Co-requisite(s):** None  
Course Content: This course focuses on operation and application of the most common active devices generally found in industry is discussed. Devices such as diodes, Zener diodes, bipolar transistors, field effect transistors, and circuits such as power supplies, transistor amplifiers, oscillators, op-amps, and voltage regulators are presented.

**MATH-285 Mathematics for Technology II (5 credits)**  
**Prerequisite(s):** MATH-235 Mathematics for Technology I  
**Co-requisite(s):** None  
Course Content: This course contains the following topics: Differentiation of transcendental functions, and their application in scientific and technological areas. It also includes integration of transcendental functions including definite integrals, integration using tables, and numerical integration.

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**2nd Year Semester 1**

**CMPH-320 Microprocessor Architecture and Interfacing (6 credits)**  
**Prerequisite(s):** DIGI-290 Digital II  
**Co-requisite(s):** None  
Course Content: Microprocessor and microcomputer architecture concepts will be explored, using the Microsoft Macro Assembler programming environment. The Intel family of CPU’s will be studied within the DOS/Windows platform, where both the software and hardware organization will be explored. Writing programs in assembly language, students will learn the proper use of Pseudo-Ops, DOS Interrupts, BIOS Services, and how software controls the hardware devices. Interfacing a variety of devices to the PC, programs designed, written, debugged and tested will demonstrate how assembly language/machine code controls external devices. Some of these lab activities will be performed with an emphasis on collaborative (teamwork) project assignments. Students will make group presentations of their projects.

**CMPN-370 Networks I (7 credits)**  
**Prerequisite(s):** None  
**Co-requisite(s):** ELCM-345 Data Communication  
Course Content: The ISO/OSI model serves as a platform for the study of computer Local Area Networks and Wide Area Networks. Wiring and configuration of networks is discussed and practiced. Commonly used protocols for Local Area Networks such as Ethernet, Token Ring, TCP/IP, and SPX/IPX are discussed. Network hardware topics such as routers, repeaters, gateways, hub/repeaters and terminal servers are included. Windows server, Linux and Novell Netware are the platforms used in the laboratory for network implementation. Students will use a project management model on a semester project which involves network evaluation, design and implementation. Students will also work in groups or as individuals on labs and assignments that examine and implement cabling, network operating systems, protocol stacks and general network administration.

**CMPP-370 C++ Programming II (6 credits)**  
**Prerequisite(s):** CMPP-260 C++ Programming I  
**Co-requisite(s):** None  
Course Content: A further course in solving engineering problems using structured and object-oriented computer programming tools.
ELCM-345  Data Communications  (6 credits)
Prerequisite(s): None
Co-requisite(s): CMPN-370 Networks I
Course Content: Provides an overview of the public telecommunication voice and data networks. The nature of data signals and their propagation over transmission lines as well as data signal impairments are studied. Topics also include network topologies, communication codes, terminal equipment and terminal emulation, asynchronous transmission, error detection and correction and serial interface standards.

DIGI-390 Digital III  (4 credits)
Prerequisite(s): DIGI-290 Digital II
Co-requisite(s): None
Course Content: Covers more advanced concepts of digital circuits and devices including D/A and A/D converters; timers etc.

2nd Year Semester 2

CMPH-373 Peripheral Systems  (6 credits)
Prerequisite(s): DIGI-390 Digital III
Co-requisite(s): ELTR-297 Electronic Devices Theory & Lab
Course Content: Introduces the students to the most common peripheral sub systems found on PCs and workstations. Coverage of each peripheral system includes detailed theory of operation of the hardware, installation practices, hardware and software configuration as well as troubleshooting and maintenance techniques. The peripheral sub systems include all types of hard disk drives (IDE, EIDE, ESDI, SCSI, RAID, etc.), floppy disk drives, optical storage devices, (such as CD-ROM, CDR, DVD, WORM, M.O. etc.), video systems, power control systems, DMP and ink-jet printers, tape storage systems (nine track, 8mm, DAT, QIC formats, etc.) and more. Includes detailed coverage of Electro-Static Discharge (ESD) control practices and products. Other topics include cost comparisons, justification and defence of the troubleshooting process, role-playing. Laboratory activities are performed in teams.

CMPN-380 Networks II  (6 credits)
Prerequisite(s): CMPN-370 Networks I
Co-requisite(s): None
Course Content: This advanced networking course focuses on inter-connectivity within wide area networks. Students study concepts of ETHERNET switching, routing, bridging, and administration of wide area networks. Advanced UNIX network administration is also studied. Students will use a project management model for projects. The first half of this course emphasizes individual work. In the second half, students work in teams.

CMPS-367 POSIX Operating Systems (5 credits)
Prerequisite(s): CMPP-370 C++ Programming II
Co-requisite(s): CMPH-228 Computer Hardware Fundamentals
Course Content: This course provides an introduction to computer operating systems including process management, storage management, auxiliary storage management, performance evaluation
and security. The emphasis is on POSIX compliant operating systems and key concepts are reinforced through lab assignments.

**COMM-288  Technical Communications II (3 credits)**

*Prerequisite(s):* COMM-238 Technical Communications I  
*Co-requisite(s):* None  

Course Content: The focus of this course is a team project report. The process approach involves students in all aspects of the management of communication tasks, both oral and written. The final products are a formal report and an oral presentation of the content.

**PROJ-350  Computer System Project Management (3 credits)**

*Prerequisite(s):* None  
*Co-requisite(s):* PROJ-379 System Design Project  

Course Content: Introduces engineering project management: principles, techniques and tools used in the design, development and installation of computer systems. Topics include different project management methodologies and software tools; preparation and use of a project plan; identifying project tasks and deliverables; estimating (present-value analysis); resources and task priorities; scheduling and assigning tasks, developing and managing the project schedule; bringing the project to closure. This course also covers environmental, safety, ethic and regulatory issues and miscellaneous other practices.

**MGMT-301  Introduction to Management and Accounting (4 credits)**

*Prerequisite(s):* None  
*Co-requisite(s):* None  

Course Content: This introductory course involves analysis of the managerial functions of planning, organizing, strategic planning, leading and controlling. It also provides an introduction into financial statements, accounting for cash, accounts receivables, sales, marketing and inventories. Students will enhance their business practices, communication and problem solving skills through exercises and case studies.

**PROJ-379  System Design Project (6 credits)**

*Prerequisite(s):* None  
*Co-requisite(s):* PROJ-350 Computer System Project Management  

Course Content: This project-oriented course allows students to bring together skills acquired during the two year CNT program into a sophisticated project which entails software and hardware design. Students work in teams, and manage their project using the skills they learn in the PROJ-350 course. Upon completion, the students are required to make a formal presentation of their project, submit a formal report, and set up a Web site describing the project. The projects must employ proper design and analysis methodology to hone the student’s technical design, management, organization and presentation skills.
Diploma in Information & Communications Technology

Communications Engineering Technology Option

DURATION
This programme is offered on both a full-time and a part-time basis. The full-time programme will have a duration of seven (7) four-month semesters comprising 4 academic semesters and 3 Co-Op semesters. The part-time programme will have a duration of 10 academic semesters and does not include Co-Op.

CREDITS
The credit total will number 120 for the Communications Engineering Technology programme and 120 for the Computer Engineering Technology programme. A minimum GPA of 2.0 is required to graduate.

INTAKE
September of each year.

PROGRAMME OVERVIEW
This programme is focused on preparing graduates for careers in the rapidly expanding ICT (Information and Communication Technologies) field. The theoretical and practical skills acquired will equip the graduates to function in a wide range of areas within the information and communications engineering field. These areas include: information systems installation, communications hardware maintenance; network installation and maintenance; computer system configuration, programming and systems sales and support; wireless communications and telephony.

ADMISSION REQUIREMENTS
Additional Maths plus 5 GCE ‘O’ Level/CSEC passes including English Language/English A, Mathematics (Gr.1), Physics, Chemistry (one of which must be Gr.1)
Applicants with 5 O-Level passes (or their equivalent) but not at the required grades or without Add Maths must have either:
   a. Written A-Level Maths and Physics or Chemistry, or
   b. Passed CAPE 1 in Maths and Physics or Chemistry
   c. Successfully completed the 'Transition Studies Programme' with a pass in all subjects, a 65% average in Maths and a 65% average in one of the required Science subjects
## Diploma in Information & Communications Technology

### Communications Engineering Technology Option

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**Total 1st Year, 1st Semester:** 29 Lect, 16 Tut, 2 Lab, 11 Lab

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**Total 1st Year, 2nd Semester:** 30 Lect, 16 Tut, 1 Lab, 14 Lab

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**Total 2nd Year, 1st Semester:** 30 Lect, 18 Tut, 0 Lab, 15 Lab

**Total Programme Credits:** 120
Diploma
in
Information & Communications Technology

Communications Engineering Technology Option

1st Year Semester 1

COMM-238 Technical Communications I (4 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: This communication course for engineering technician includes skill development in sentences, paragraphs, and speaking to small groups. The techniques of technical style are practised in exercises and short assignments. Both individual and group projects are assigned

COMP-202 Computer Fundamentals (4 credits)
Pre-requisite(s): None
Co-requisite(s): None
Course Content: This is an engineering technology-related computer course. Practical skills include Windows disk and file management, Internet, e-mail and training in the following applications: word processing, spreadsheet, database, and presentation software.

DIGI-240 Digital Electronics (5 credits)
Pre-requisite(s): None
Co-requisite(s): None
Course Content: An introduction to digital logic concepts. Topics include: conversion between, and the arithmetic manipulation of, the various numbering systems commonly used in digital electronics, digital representations using binary codes, Boolean algebraic theorems and postulates, combinational logic gates, the design and implementation of combinational logic circuits, and the study of lathes and flip-flops. Extensive use of a software-based simulation tool (Electronics Workbench) will provide support for the theory concepts, and breadboarding circuits in lab will supplement the theory and simulations by using basic logic circuitry to illustrate operational and analytical concepts.

ELTR-244 Electrical Circuit Analysis (8 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: An introductory course in electrical/electronic principles, concepts and relationships. The course covers: current, voltage and impedance relationships; circuit analysis; DC and AC circuits; voltage and current sources; resistance, capacitance and inductance; steady state and transient response; complex number operation; R-L-C networks. The labs supplement the theory by using basic circuitry to illustrate operational and analytical concepts.

EFAB-305 Electronic Fabrication (3 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: Electronic Shop Techniques includes basic care and use of hand tools, high reliability soldering and desoldering techniques for both standard components and surface mount components. ESD techniques and handling of PCBs will be taught. A variety of connectors and wiring applications, PCB manufacturing as well as a student constructed final project will be included in this course.

MATH-235 Mathematics for Technology I (5 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: This course enables the student to obtain a level of proficiency in differential calculus and integral calculus to use as a mathematical tool to solve scientific and technological problems. The course includes the following topics: limits, rates of change, delta process, definition of a derivative, rules of differentiation of algebraic functions, higher derivatives, applications of differentiation including related rates, maximum and minimum problems, and curve sketching. It also includes integration of algebraic functions, definite integrals, and numerical methods of integration.

1st Year Semester 2

CMPH-228 Computer Hardware Fundamentals (4 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: This hands-on course will teach the techniques needed to diagnose PC problems, configure PC components and replace defective parts. The student will learn how to install adapter cards, configure multiple hard drives and peripherals and modify CMOS setup.

DIGI-291 Advanced Digital Concepts and Devices (5 credits)
Prerequisite(s): DIGI-240 Digital I
Co-requisite(s): None
Course Content: Covers the advanced concepts of digital logic which include the following topics: TTL, MOS and ECL logic families, interfacing between the different logic families, the operation and application of the various multivibrator circuits, the design and implementation of both asynchronous and synchronous sequential circuits, digital display circuits, including LEDs, LCDs and seven segment devices.

MATH-285 Mathematics for Technology II (5 credits)
Prerequisite(s): MATH-235 Mathematics for Technology I
Co-requisite(s):
This course contains the following topics:
Differentiation of transcendental functions, and their application in scientific and technological areas. It also includes integration of transcendental functions including definite integrals, integration using tables, and numerical integration.

ELCM-290 Electronic Transmission Principles (5 credits)
Prerequisite(s): DIGI-240 – Digital I
Co-requisite(s): None
ELTR-244 Electrical Circuit Analysis
MATH-234 Mathematics for Electronics I
Course Content: Provides a solid, fundamental background in communication concepts for students in a diverse range of electronic technologies. It provides the basic concepts required for further studies in the areas of analog and digital transmission, radio, and data communications. Major topics include transmission media, amplitude modulation (AM) transmission and reception and frequency modulation (FM).

**ELTR-297 Electronics Devices – Theory & Lab (8 credits)**

**Prerequisite(s):** ELTR-244 Electric Circuit Analysis  
**Co-requisite(s):** None

Course Content: This course focuses on operation and application of the most common active devices generally found in industry. Devices such as diodes, Zener diodes, bipolar transistors, field effect transistors, and circuits such as power supplies, transistor amplifiers, oscillators, op-amps, and voltage regulators are presented.

**ENGD-227 Electrical/Electronic & Diagramming Applications (3 credits)**

**Prerequisite(s):** None  
**Co-requisite(s):** None

Course Content: This course provides an introduction to diagramming and schematic capture tools for Computer/Electronics/Network engineering.

**2nd Year Semester 1**

**CMPP-260 C++ Programming I (5 credits)**

**Prerequisite(s):** None  
**Co-requisite(s):** None

Course Content: This course introduces the student to problem solving and structured programming using C++ with a strong emphasis on proper program design. Topics include selection and repetition structures, arrays, strings and an introduction to basic object-oriented concepts which can be developed further in subsequent Object-Oriented Programming courses.

**CMPN-310 Local Area Networks (5 credits)**

**Prerequisite(s):** ELCM-340 - Data Communications  
**Co-requisite(s):** None

Course Content: The student will study concepts of LAN’s using protocols and the connectivity of networks in today’s environment. Topics to be included are network operating systems, network devices, LAN and WAN protocols, OSI model, backup routines and disaster planning.

**ELCM-310 Electronic Transmission Principles (5 credits)**

**Prerequisite(s):** ELTR-297 Electronics Devices Theory & Lab  
ELCM-290 Electronic Communications  
**Co-requisite(s):** None

Course Content: Transmission is a field of study that deals with the problems and solutions of moving energy from a source to a load. Important transmission topics such as power levels, noise, delay, return loss, characteristic impedance and propagation theory will be studied as well as the use of transmission test equipment. Laboratory sessions complement the theory.

**ELCM-327 Cabling Management (3 credits)**

**Prerequisite(s):** ENGD-227 Electrical/Electronic & Diagramming Applications  
EFAB-305 Electronic Fabrication  
**Co-requisite(s):** None
Course Content: Cabling Management addresses a clearly defined industry requirement for individuals who possess knowledge of: building cabling standards, cabling installation skills and building cabling management skills. Focus is on EIA/TIA building cabling and management standards. Lab activities revolve around cabling installation and administration using industry standards.

**MGMT-301 Introduction to Management and Accounting (3 credits)**
Prerequisite(s): None  
Co-requisite(s): None  
Course Content: This introductory course involves analysis of the managerial functions of planning, organizing, strategic planning, leading and controlling. It also provides an introduction into financial statements, accounting for cash, accounts receivables, sales, marketing and inventories. Students will enhance their business practices, communication and problem solving skills through exercises and case studies.

**ELCM-330 Radio Communications (5 credits)**
Prerequisite(s): ELTR-297 - Electronics Devices Theory & Lab  
Co-requisite(s): None  
Course Content: The principles of analog and digital cellular systems are studied. The use of communications analyzers to measure system performance is practiced in the lab.

**ELCM-340 Data Communications (4 credits)**
Prerequisite(s): DIGI-291 Advanced Digital Concepts & Devices  
Co-requisite(s): ELCM-310 Electronic Transmission Principles  
Course Content: Data Communications is often referred to as computer communications owing to the increasing use of computers. It is a process of communicating information in binary form between two or more points. Topics in this course include communication codes, asynchronous/synchronous transmission, error detection and correction, serial interfaces, communication software, breakout boxes and modems.

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**2nd Year Semester 2**

**CMPH-367 Introduction to Microprocessors (including PICS) (4 credits)**
Prerequisite(s): DIGI-291 Advanced Digital Concepts & Devices  
Co-requisite(s): None  
Course Content: This course presents details of the microcomputer system including interfacing and detailed examination of system hardware. General concept of some common peripheral devices such as interfacing using the 68HC11 analog to digital converter, interfacing to LEDs, 7 segment LEDs, relays, generating waveforms, and terminals will be studied.

**ELCM-305 Switching Principles (7 credits)**
Prerequisite(s): ELTR-297 Electronics Fundamentals Theory & Lab  
DIGI-291 Advanced Digital Concepts  
Co-requisite(s): None  
Course Content: Designed to introduce the student to the principles of voice switching. Fundamentals include telephone set operation, subscriber loop design, trunk interfaces and an overview of the PSTN. Also includes a study of the principles, advantages and features of typical private branch exchanges (PBXs) currently in use in North America.
**ELCM-351  Digital Transmission Systems (4 credits)**  
Prerequisite(s): ELCM-340 - Data Communications  
Co-requisite(s): None  
Course Content: In this course the student will study a variety of transmission systems used to interconnect nodes in telecommunication networks. Topics will include pulse code modulation, intelligent multiplexers, D4 and extended superframe, line regenerators and the digital hierarchy. Line impairments associated with digital transmission will be covered in depth. Laboratory sessions complement the theory.

**PROJ-380  Communication Project (4 credits)**  
Prerequisite(s): Completion of Semester 3  
Co-requisite(s): None  
Course Content: This project-oriented course allows students to bring together skills acquired during the two-year TNT program into a sophisticated project which entails the design of a communications device or application.

**ELCM-371  Wide Area Networks (5 credits)**  
Prerequisite(s): ELCM-351 - Digital Transmission Systems  
Co-requisite(s): None  
Course Content: A wide area network is an integrated network that operates over a large geographical region and uses many of the carrier facilities studied in the digital transmissions course (ELCM 351). Topics in this course include high level data link control, packet switching, frame relay, integrated services digital network and asynchronous transfer mode (ATM). The synchronous optical network (SONET) used to transport many of the new services such as ATM will be studied in detail.

**ELCM-380  Wideband Communications (6 credits)**  
Prerequisite(s): ELCM 330 - Radio Communications  
Co-requisite(s): None  
Course Content: The basics of microwave radio systems are taught in this course. Included are topics such as propagation at microwave frequencies, waveguides, passive and active devices, and microwave antennas. Digital microwave communications and basic satellite system principles are discussed. The fundamentals of fibre optics are studied with a concluding study of link budgets.
Diploma in
Information & Communications Technology
Computing & Information Systems Option

DURATION
This programme is offered on both a full-time and a part-time basis. The full-time programme will have a duration of seven (7) four-month semesters comprising four (4) academic semesters and three (3) Co-Op semesters. The part-time programme will take approximately 10 semesters over 3½ years and does not include the Co-Op semester.

CREDITS
120 credits with a minimum cumulative GPA of 2.0 are required to graduate.

INTAKE
September of each year.

PROGRAMME OVERVIEW
This programme is offered both full-time and part-time. It focuses on analysis, design and implementation of computer software. It goes beyond basic programming to help students develop the flexibility and problem-solving skills needed to understand various user applications and meet the needs of a rapidly changing industry.

Applicants should view this programme as a means of entering the information technology industry. The Computing and Information Systems programme aims to provide students with an opportunity to study computer technology subjects, up-skilling, and/or upgrading their current qualifications and applying the knowledge and skills to support the operation and enhance the development of information technology and computer networks.

This programme meets a pressing need within the business, industrial and research communities for information technology specialists who can perform installation, maintenance, networking, programming and design of computer applications. It focuses on training in the design, implementation, installation and maintenance of a variety of applications and computer devices. Graduates of this programme may also enter into further studies and research in the Bachelor of Applied Information System Development (BA ISD) Programme-Systems Development Option.

ADMISSION REQUIREMENTS
Additional Maths and 5 GCE 'O' Level/CSEC passes including English Language/English A, Mathematics (Grade 1). Applicants with 5 O-Level passes (or their equivalent) but not with the required grades or without Add Maths must have either:
  c) written A-Levels in Maths, and one other subject, or
  d) passed CAPE 1 in Maths, and one other subject, or
  c) successfully completed the 'Transition Studies Programme' with a pass in all subjects, a 65% average in Maths and a 65% average in one of the required Science subjects
Diploma in Information & Communications Technology

Computing & Information Systems Option

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| 1B   | CMPN-269| Computer Networking I                | 5      | 3      | 0      | 2      |
| 1B   | CMPP-260| C++ Programming                      | 5      | 3      | 0      | 2      |
| 1B   | COMM-344| User Documentation / Project         | 4      | 0      | 0      | 4      |
| 1B   | MATH-235| Mathematics for Technology I         | 5      | 4      | 1      | 0      |
| 1B   | CMPP-230| Fourth Generation Languages          | 5      | 2      | 1      | 2      |
| 1B   | CMPS-368| Operating Systems                    | 4      | 4      | 0      | 0      |
|      |         | **Total 1st Year, 2nd Semester:**    | 28     | 16     | 2      | 10     |

| 2A   | CMPP-223| Object Oriented Programming I         | 6      | 6      | 0      | 0      |
| 2A   | CMPS-321| Human-Computer Interaction           | 4      | 0      | 0      | 4      |
| 2A   | CMPP-367| Fourth Generation Languages II        | 4      | 0      | 0      | 4      |
| 2A   | CMPS-300| Information Systems I                | 8      | 0      | 0      | 8      |
| 2A   | CMPS-371| Distributed Systems Development      | 4      | 0      | 0      | 4      |
| 2A   | CMPN-375| Computer Networking II               | 5      | 5      | 0      | 0      |
|      |         | **Total 2nd Year, 1st Semester:**    | 31     | 11     | 0      | 20     |

| 2B   | CMPP-263| Object Oriented Programming II        | 6      | 3      | 1      | 2      |
| 2B   | CMPP-368| Business Programming                 | 4      | 0      | 0      | 4      |
| 2B   | CMPN-385| Computer Networking III              | 6      | 0      | 0      | 6      |
| 2B   | CMPH-373| Peripheral Systems                   | 6      | 0      | 0      | 6      |
| 2B   | CMPS-350| Information Systems II               | 11     | 7      | 0      | 4      |
|      |         | **Total 2nd Year, 2nd Semester:**    | 33     | 10     | 1      | 22     |

**Total Programme Credits:** 120
Diploma in Information & Communications Technology
Computing and Information Systems Option

1st Year, Semester 1

COMM-248 Technical Communications I (4 credits)
Course Content: The techniques of presenting technical information to a reader or listener are the focus of this course. The emphasis is on patterns of organization, technical language and visuals, research skills, oral delivery skills, written and oral presentation techniques. The practice is through short, program and career related assignments.

COMP-202 Computer Fundamentals (4 credits)
Prerequisite(s): None
Co-requisite(s): None
Course Content: This is an engineering technology-related computer course. Practical skills include Windows disk and file management, Internet usage, e-mail usage and training in the following applications: word processing, spreadsheet, database, and presentation software.

MATH-222 Linear Algebra (5 credits)
Course Content: The course provides a general study of Matrices and their properties. It shows how to solve systems of equations using Gauss-Jordan, inverse matrix and Cramer’s Rule. Determinants and their properties are discussed in detail. Vectors are introduced along with the properties of dot product and cross product. Vector spaces and linear combinations are included as well. Applications are done in the fields of cryptography, assignment problems, computer graphics, forest management and economics.

LOGC-100 Logic for Computing (4 credits)
Course Content: Algorithms; pseudo code; decision tables; structured English; flowcharts, etc.

CMPH-228 Computer Hardware Fundamentals (4 credits)
Course Content: This course will introduce the student to computer hardware and operation fundamentals. Students will have an opportunity to inspect the inside of computers and gain hands-on experience of the various sub-assemblies. Students will also be exposed to hardware troubleshooting coupled with the installation and configuration of a popular Windows Operating System as well as a popular UNIX based operating system.

MGMT-301 Introduction to Management and Accounting (3 credits)
Course Content: This introductory course involves analysis of the managerial functions of planning, organizing, strategic planning, leading and controlling. It also provides an introduction into financial accounting including generally accepted accounting principles, understanding financial statements, accounting for cash, accounts receivable, sales, marketing and inventories. Students will enhance their business practices, communications and problem-solving skills through exercises and case studies.

DIGI-241 Digital Logic and Design (4 credits)
Course Content: An introduction to digital logic concepts. Topics include: conversion between and the arithmetic manipulation of the various numbering systems commonly used in digital electronics, digital representations using binary codes, Boolean algebraic theorems, combinational logic gates, the design and implementation of combinational logic circuits. Extensive use of a software-based simulation tool (Electronics Workbench) will provide support for the theory concepts, and bread boarding circuits in lab will supplement the theory and simulations by using basic logic circuitry to illustrate operational and analytical concepts. One final design project will be worked on in teams of two.

1st Year, Semester 2

CMPN-269  Computer Networking I  (5 credits)
Prerequisite:  COMP-202
Co-requisite:  CMPP-260
Course Content: Introduces the student to computer networking concepts, tools and techniques. Topics include: network fundamentals, OSI protocol layers, TCP/IP protocol and services, introduction to selected Internet tools, and related topics. The UNIX operating system is used for concept demonstrations and exercises.

CMPP-260  C++ Programming (5 credits)
Prerequisites:  LOGC-100, COMP-202
Course Content: This course introduces the student to problem-solving and structured programming using C++ with a strong emphasis on proper program design. Topics include: selection and repetition structures; arrays, strings; and an introduction to basic object-oriented concepts which are expected to be developed further in subsequent object-oriented programming courses.

COMM-344  User Documentation / Project  (4 credits)
Prerequisite:  COMM-248
The course focus is on a major project, from definition of the problem for investigation, through research, data collection, drafting, editing, and producing user documentation. A written proposal and a progress report are included in this process-oriented approach to report writing. Project progress/proposals/ are reported in short oral presentations.

MATH-235  Mathematics for Technology I  (5 credits)
Course Content: This course enables the student to obtain a level of proficiency in differential calculus and integral calculus to use as a mathematical tool to solve scientific and technological problems. Applications include linear motion, areas under curves, work, hydrostatic pressure and others.

CMPP-230  Fourth Generation Languages I  (5 credits)
Course Content: The student will learn how to use a fourth generation software system. Topics include: relational database concepts, a data retrieval and manipulation language (SQL) and forms generation. ORACLE and MySQL will be used for programming assignments and course projects.

CMPS-368  Operating Systems  (4 credits)
Course Content: An introduction to computer operating systems including process management, storage management, auxiliary storage management, performance evaluation and security. The emphasis is on POSIX compliant operating systems and key concepts are reinforced through lab assignments.
2nd Year, Semester I

**CMPP-223 Object Oriented Programming I (6 credits)**  
**Prerequisite:** CMPP-260  
Course Content: Introduces the student to problem solving and object-oriented programming using Java with a strong emphasis on proper program design. Topics include object-oriented design concepts (e.g. classes, attributes, methods), selection and repetition structures, arrays, strings and an introduction to advanced object-oriented concepts.

**CMPS-321 Human-Computer Interaction (4 credits)**  
**Prerequisite:** CMPP-230  
Course Content: The student studies the concepts related to designing modern software-users interfaces. Topics include steps in designing interfaces, human factors in interfaces, software design considerations and use of interface development tools. The design of effective screens and menus and the development of effective interactive routines are emphasized.

**CMPP-367 Fourth Generation Languages II (4 credits)**  
**Prerequisite:** CMPP-230  
Course Content: This 64 hour course is a continuation of CMPP-230. Topics include: a review of SQL and advanced SQL operations; use of the data dictionary; database constraints; PL/SQL; database triggers, procedures, functions and packages; conversion to the latest available version of ORACLE forms if necessary; advanced forms design; an introduction to ORACLE reports.

**CMPS-300 Information Systems I (8 credits)**  
**Prerequisite:** CMPP-230  
Course Content: This course introduces learners to the methods of object-oriented analysis and design as applied to Information computer systems. Topics covered include planning and feasibility, cost benefit analysis, requirement analysis, specification, systems life cycle, prototyping, structured design, documentation and modeling tools. A substantial project such as the development of an information storage and retrieval system will be undertaken by the students working in teams. This project will be completed in CMPS-350, Information Systems II.

**CMPS-371 Distributed Systems Development (4 credits)**  
**Prerequisite:** CMPN-269  
Course Content: Introduces the student to the technology of multiple computer systems using the Java programming language. Topics covered include network communication between computers, HTML, multi-tiered system configurations, RMI, JDBC, XML, servlets, client-server applications.

**CMPN-375 Computer Networking II (5 credits)**  
**Prerequisite:** CMPN-269  
Course Content: The ISO/OSI serves as a platform for the study of computer LANs and Wide Area Networks (WANs). Wiring and configuration of networks is discussed and practiced. Commonly used protocols for LAN networks such as Ethernet, Token Ring, TCP/IP, and SPX/IPX are discussed in detail. Network hardware topics such as routers, repeaters, gateways, hub/repeaters, and terminal servers are included. Windows 2000, Linux and Novell Netware are the platforms used in the lab for network implementation. Students will use a project management model on a semester project, which involves network evaluation, design, implementation (setting up of user accounts, use of and the management of LANs, creating and managing user accounts, setting up servers, and other Client/Server topics.
Students will also work in groups, or as individuals labs and assignments that examine and implement cabling, network operating systems, protocol stacks, and general network administration. Project management principles, techniques and tools will be used in the design, development and installation of computer systems. Topics include project management methodologies, and software tools, preparation and use of a project plan, identifying project tasks and deliverables, estimating) present value analysis), resources and task priorities, scheduling and assigning tasks, developing and managing the project schedule, bringing the project to closure. This also covers environmental safety, ethic and regulatory issues, and miscellaneous other practices.

2nd Year, Semester 2

CMPP-263  Object Oriented Programming II  (6 credits)
Course Content: This course is designed to enhance the student's problem solving and program design abilities. This is a continuation of CMPP-223 Object Oriented Programming I, using the same language but a second operating system is used as the development environment. It introduces interaction and batch techniques, threads, recursion, some concepts related to data structures and algorithms for sorting and searching.

CMPP-368  Business Programming (4 credits)
Prerequisites: CMPP-230, CMPS-321
This course enhances the student's problem solving and program design abilities. The course focuses on current business programming tools such as Access and Visual Basic. The student is introduced to solving business problems with typical determination, process flow, data flow, entity relationships, data analysis, and database development. In addition, the role of the Information Systems professional in the business project will be studied.

CMPN-385  Computer Networking III (Enterprise Systems, WAN)  (6 credits)
Prerequisite: CMPN-375
Course Content: This advance-networking course focuses on inter-connectivity within wide area networks. Students study concepts of Ethernet switching, routing, bridging, and administration of wide area networks. Advanced UNIX network administration is also studied. Students will use a project management model for projects. The first half of the course emphasized individual work. In the second half, students work in teams. Emphasis is on acquiring the practical knowledge required to implement bridges and routers, checking network interface and protocols, testing cables, fault diagnostics, and preventative measures. Students will be exposed to the technologies used to transport data over wide area networks. Topics include packet switching, frame relay, cell relay, bridges, routers, T1/T3 networking, public and private networking. Connection and connectionless-oriented services are also studied.

CMPH-373  Peripheral Systems  (6 credits)
Course Content: Introduces the student to the most common peripheral sub-systems found on PCs and workstations. Coverage of each peripheral system includes detailed theory of operation of the hardware, installation practices, hardware and software configuration as well as maintenance and troubleshooting techniques. The peripheral system includes all types of hard disk drives (IDE, EIDE, ESDI, SCSI, RAID, etc.), floppy disk drives, optical storage devices, (such as CD-ROM, CDR, DVD, WORM, M.O. etc.), video systems, power control systems (such as UPSs, SPSs, etc), DMP and ink-jet printers, tape storage systems, (nine track, 8mm, DAT, QIC formats, etc) and more. Includes detailed coverage of Electro Static Discharge (ESD) control practices and products. Other topics include cost comparisons, justification and defence of the troubleshooting processes.
and role-playing. Laboratory activities are in teams.

**CMPS-350 Information Systems II (11 credits)**

**Pre-requisite:** CMPS-300

Course Content: In this course, the designed system is developed, tested and documented. A system acceptance test is conducted. Topics covered include project management and teamwork, system presentations, backup and audit controls, special purpose system structures, reliability and maintenance, and system documentation.
Diploma in Maritime Operations

*Navigation or Engineering Options*

**DURATION**

This programme has two pathways: one for those wishing to follow a navigational path and the second for those wishing to follow an engineering path. These are offered as a two-year, full-time programme comprising 6 consecutive, 16 week semesters. Semesters 1, 3, 4 and 6 will be at the UTT and semesters 2 and 5 will be training periods on-board ship. At the completion of the two years, students will be required to complete the balance of the one-year mandatory sea training period required by international legislation. UTT will assist students in obtaining placements on-board ship for the sea training phases.

**CREDITS**

At the completion of the programme, students will receive a Diploma in Maritime Operations that will act as a sufficient prerequisite to enter the BSc in Maritime Operations programme.

**INTAKE**

September of each calendar year.

**PROGRAMME OVERVIEW**

This programme is intended to prepare students for a career as a shipboard officer in either the Navigation or Engineering disciplines while introducing them to the wider maritime industry. Lectures will be delivered at a UTT campus while the practical elements will be delivered at the Maritime Institute of UTT at Chaguaramas.

**EMPLOYMENT OPPORTUNITIES**

Graduates of this programme will, on completion of the one-year sea training period, be prepared sufficiently to sit the examination for competency at the Maritime Services Board. Success in this examination will result in the awarding of a Certificate of Competency for an officer in charge of a Navigation or Engineering watch at sea.

**ADMISSION REQUIREMENTS**

**Navigation Option:** ‘O’ Level CSEC passes or their equivalent in 5 subjects including English Language/English A & Mathematics.

**Engineering Option:** ‘O’ Level CSEC passes or their equivalent in 5 subjects including English Language/English A, Mathematics & Physics.

Professional experience in a related position may be accepted in lieu of academic requirements.
Diploma in Maritime Operations

Navigation Option

This programme is designed for those persons wishing to follow a seafaring career as a ship’s navigating officer. It is a two-year course of three 15-week semesters each year. The course combines the academic knowledge required by international maritime legislation, an introduction to shore-based maritime operations and sea experience. Successful passing of the university assessments will result in the awarding of a Diploma in Maritime Operations - Navigation. A further assessment from the Maritime Services Division will result in the obtaining of a Certificate of Competency as a navigating officer.

The main areas of study include:

- **Celestial Navigation** - Instruments; Observation of celestial bodies; Ship’s position
- **Chartwork** – Charts and publications; Mercator Charts; Chartwork Techniques
- **Tides and Sailings** - Navigational terms; Calculating courses and distances; Tidal terminology and calculating times and heights of tides worldwide
- **Meteorology** – Meteorological observing methods, Meteorological processes; Weather; General circulation - Features of surface and upper air charts; Meteorological and climatological data; Oceanographic data
- **Bridge Watchkeeping and Management** – Regulations and systems for the safe movement of vessels; Bridge watchkeeping; Manoeuvres; Magnetic and gyro compasses
- **Emergency Response, Communications and Planning** – Contingency plans in the event of emergencies; Response to distress signals; Procedures; Visual signalling; Damage control plans; damage control procedures; Search and rescue operations
- **Cargo Work** – Dry cargoes; Oil, gas and chemical cargoes; Cargo watch; Pollution; Passenger operations
- **Ship Stability** – Hydrostatics; Static stability; Transverse stability; Longitudinal stability; Stability and trim; Stability at angles of heel; Stability/stress diagrams and equipment
- **Ship Construction** – Ship’s structure; Ship Types; Ship stresses
- **Marine Law and Management** – The relationship between law; codes and other forms of guidance; The law; codes and guidance relating to ship and crew safety and operations; Personnel management; UK and international legislation; Commercial law
• **Passage Planning** – Appraising the intended passage; Preparing and documenting the passage plan; Evaluating the completed passage plan; Command decisions

• **Structures and Maintenance** – Structural requirements; Maintenance; Survey of hull; fittings and equipment

• **Shipboard Management** – Personnel management; Management theory; Employment law; quality assurance and safety management systems legislation

• **Marine Engineering Systems** – Marine power plants; auxiliary machinery; control systems
Diploma in Maritime Operations

Engineering Option

This course is designed for those persons wishing to follow a seafaring career as a ship’s navigating officer. It is a two-year course of three 15-week semesters each year. The course combines the academic knowledge required by international maritime legislation and an introduction to shore-based maritime operations and sea experience. Successful passing of the university assessments will result in the awarding of a Diploma in Maritime Operations - Engineering. A further assessment from the Maritime Services Division will result in the obtaining of a Certificate of Competency as an engineer officer.

The main areas of study include:

- **Business Management techniques** – Managing work activities; Costing systems and techniques; Financial planning and control; Project planning and scheduling
- **Engineering Science** – Static engineering systems; Dynamic engineering systems; DC and AC theory
- **Analytical Methods for Engineers** – Algebraic methods; trigonometric methods; the Calculus; Statistics and probability
- **Plant and process Principles** – Thermodynamic systems; Power transmission; Static and fluid systems; Combustion processes
- **Engineering design** – Design specification; Design report; Computer-based technology
- **Naval Architecture** – Trim and stability; watertight sub-division and effects of compartment flooding; Ship construction; Forces on ship structures; Resistance to ship motion
- **Applications of Pneumatics and Hydraulics** – Fluid power; Pneumatic and hydraulic components; equipment and plant; Pneumatic and hydraulic circuits; Industrial applications
- **Instrumentation and Control Principles** – Instrumentation systems; Process and control systems; Regulating units
- **Marine Electrical Systems** – Three phase circuits; Transformers and AC synchronous generators; Three phase AC motors and starters; Circuit diagrams and conventions
- **Marine Engineering Thermodynamics** – Internal combustion engine performance; Air compressors; Steam and gas turbines; Refrigerator and heat pumps
• **Marine Diesel Propulsion and Power Systems** – Design and application; Constructional methods; Operational parameters; Maintenance

• **Marine Turbine Propulsion and Power Systems** – Marine boilers; Marine turbines; Marine power transmission systems; Operational and maintenance parameters

• **Marine Engineering Mechanics** – Complex loading systems; Loaded beams and cylinders; Dynamics of multi-link systems; Dynamics of rotating systems

• **Operation and Maintenance of Electrical Plant** – Electrical power distribution; Electrical equipment in hazardous areas; Low and high voltage environments

• **Marine Auxiliary Plant** – Marine pumps and pumping systems; Shipboard hotel services equipment; Fire safety; Maintenance procedures

• **Marine Engineering Management** – Marine legislation; Managerial roles; Management systems
Diploma in Manufacturing Engineering Technology

DURATION
This programme is offered on both a full-time and a part-time basis. The full-time programme will have a duration of seven 4-month semesters (28 months total) comprising 4 academic semesters, and 3 Co-Op semesters. The part-time programme will have a minimum duration of 10 academic semesters or 3½ years.

CREDITS
120 credits with a minimum cumulative GPA of 2.0 are required to graduate.

INTAKE
September of each year.

PROGRAMME OVERVIEW
The programme prepares graduates to undertake a broad range of Engineering functions in Manufacturing. In response to Industry needs for a multi-skilled technician, the program provides graduates with broad-based skills, not only in the mechanical field but also in the electrical and process control areas. Students who complete the Co-Op component receive a certificate endorsed to that effect.

EMPLOYMENT OPPORTUNITIES
Graduates of this programme will be suitable for Technician or Engineering Technical Assistant positions in the first instance and, with suitable experience, promotion to positions of increasing responsibilities in the technical or supervisory line.

ADMISSION REQUIREMENTS
Additional Maths plus 5 GCE ‘O’ Level/CSEC passes including English Language/English A, Mathematics (Grade 1 or A), Physics and Chemistry (one of which must be at Gr. 1 or A) Applicants with 5 O-Level passes (or their equivalent) but not with the required grades or without Add Maths must have either:
   a) written A-Levels in Maths, and Physics or Chemistry, or
   b) passed CAPE 1 in Maths, and Physics or Chemistry, or
   c) successfully completed the ‘Transition Studies Programme’ or ‘Pre-Engineering Programme’ with a pass in all subjects, a 65% average in Maths and a 65% average in one of the required Science subjects.
Diploma in Manufacturing Engineering Technology

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<th>Year</th>
<th>Code</th>
<th>Subject</th>
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**Total 1st Year, 1st Semester:** 31 19 4 8

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**Total 1st Year, 2nd Semester:** 30 18 3 9

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**Total 2nd Year, 1st Semester:** 29 20 4.5 4.5

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**Total 2nd Year, 2nd Semester:** 30 20 2 8

**Total Programme Credits:** 120
Diploma
in
Manufacturing Engineering Technology

1st Year: Semester 1

ELEC-245 Electrical Principles (5 credits)
Course Content: An introductory course in electrical principles, concepts and relationships. The course covers resistance, current and voltage relationships; power and energy; circuit analysis; capacitance, magnetism and inductance. The theory is supplemented with numerous hands-on labs.

CHEM-203 Engineering Chemistry (3 credits)
Course Content: The emphasis is placed on the practical, day-to-day calculations and relevant theory required by practising engineering technologists. A partial list of topics covered includes: redox chemistry, electrochemistry, galvanic cells, corrosion, water treatment chemistry, phase diagrams, basic organic chemistry, hydrocarbon chemistry, material balances, combustion chemistry and analysis, basic laboratory techniques.

COMM-238 Technical Communications I (4 credits)
Course Content: This communications course for engineering technologists includes skill development in sentences, paragraphs, and speaking to small groups. The techniques of technical style are practised in exercises and short assignments. Both individual and group projects are assigned.

COMP-220 Computer Fundamentals (4 credits)
Course Content: This is an engineering technology related computer course. Practical skills include Windows disk and file management, Internet usage, e-mail usage and training in the following applications: word processing, spreadsheet, database, and presentation software. Theoretical components include computer terminology with an emphasis on hardware components.

GRAP-103 Engineering Graphics (3 credits)
Course Content: Development of freehand sketching abilities; isometric projections; plan and elevation views; the golden mean; reading technical drawings; guided practice in skill development.

MATH-235 Mathematics for Technology I (5 credits)
Course Content: This course enables the student to obtain a level of proficiency in differential calculus and integral calculus, to use as a mathematical tool to solve scientific and technological problems. Applications include linear motion, areas under curves, work, hydrostatic pressure and others.

PHYS-235 Engineering Physics (3 credits)
Course Content: This course takes an engineering approach to dealing with the physics of technology and problem solving, while meeting national reference standards. The following topics are covered: friction, rotational motion, temperature and heat, thermal and mechanical properties of matter.
**STAT-240  Statistics and Probability (4 credits)**

Course Content: This course provides an introduction to the statistical methods used in quality assurance, process control and other numerical industrial applications. Topics covered include organizing, presenting, and summarizing data; basic probability distributions; sampling and inferences about means and proportions; inferences using t, Chi-Squared, and F distributions; linear and non-linear curve fitting and regression analysis; entering and processing data using a computer statistical package.

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**1st Year : Semester 2**

**CADD-211  AutoCAD 2D (4 credits)**

Course Content: This course covers all of the basic AutoCAD features and commands. It teaches the student to produce drawings on a Computer Aided Design and Drafting (CADD) microcomputer using AutoCAD software. Included are a description of hardware, software; introduction to MS-Windows, AutoCAD theory, syntax, special features, inserting 2D geometry; editing, measuring and verifying, manipulating screen graphics, text, layers, colour, line types, crosshatching, dimensioning, library parts/blocks, utility commands and an introduction to architectural applications. Lectures combined with hands-on lab exercises give the student the opportunity to use and experiment with the commands.

**EMEC-105  Engineering Mechanics I (5 credits)**

**Prerequisite:** PHYS-235

Course Content: Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity, bending; torsion; beams; failure modes; Mohr's stress circle; pressure vessels.

**LIFE-100  Life Skills I (1 credit)**

Course Content: This course provides some basic skills relating to the working environment; personal development, personal and work interests.

**THRM-315  Thermodynamics (5 credits)**

**Prerequisite:** PHYS-235

Course Content: The study of energy in its many forms involves thermodynamic principles. Topics include fluid states, physical laws governing energy transfers, thermal efficiencies and heat engine principles. Application of the principles of heat transfer focusing on refrigeration cycles, heat pumps, gas mixture and psychrometry will be thoroughly addressed.

**EMTL-232  Materials Technology I (5 credits)**

Course Content: A study of the classification, structure, properties, application and selection of common materials used in engineering applications. Other topics include casting and working of metals; heat treatment of ferrous and non-ferrous alloys; effect of microstructure on properties; properties of polymers, ceramics and composites.

**MATH-285  Mathematics for Technology II (5 credits)**

**Prerequisite:** MATH-235

Course Content: This course contains the following topics: applications of integration including volumes of revolution, centroids, and moments of inertia, differentiation of transcendental functions, integration of transcendental functions, and methods of integration including integration.
by parts, by trigonometric substitution, and by use of tables. Applications may include linear motion, areas under curves, volumes, centroids, moments of inertia, work, hydrostatic pressure, electrical theory and others.

**MNFG-205  Workshop Technology (5 credits)**
Course Content: Machining processes; welding; sheet-metal working; metal cutting theory; tolerances; limits and fits; metrology; fasteners; process planning.

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### 2nd Year : Semester 1

**CNTR-252  Instrumentation for Automation (5 credits)**
Course Content: An introduction to process measurement and control, explaining how instrumentation and processes interact. These processes could be in any area of study, such as the oil/gas sector, chemicals manufacturing, agriculture, mining, building systems or utilities. Areas of study will include measurement and control of variables such as fluid flow, level and pressure, as well as how instruments should be installed for maximum accuracy. Specific applications will be studied so that the learner can apply the knowledge to design, operate and troubleshoot measurement and control systems.

**ECON-209  Engineering Economics (3 credits)**
Course Content: An introduction to economic problem solving and decision-making in industry. Topics include the organization’s capital sources and costs, discounted cash flow analysis, equivalent annual cost, present worth, rate of return comparisons, replacement analysis, business finance and decision-making, depreciation, taxes and inflation.

**FDYN-304  Fluid Dynamics (4 credits)**
**Prerequisite:** PHYS-235
Course Content: Hydrostatics and hydrodynamics; rheological models; Newtonian and non-Newtonian fluids; laminar and turbulent flows; boundary layers; flow through pipes, conduits, channels, valves, fittings; flow control in hydraulic systems; pump curves; pneumatic systems; gas Z-factors; compressed air systems; introduction to multiphase flow effects.

**MNFG-206  Manufacturing Processes I (4 credits)**
**Prerequisite:** MNFG-205
Course Content: Training is provided in the most common manufacturing processes including: technologies and equipment used in inspection and quality control; casting processes; metal forming processes; metal removal processes; finishing and joining processes; production of plastics; jigs and fixtures; CNC and CAM.

**QUAL-403  Quality Assurance and Management (4 credits)**
Course Content: This course will examine the principles and practices of Quality Assurance and investigate the techniques and strategies associated with Engineering Project Management, including a brief introduction to Cost Estimating. Case studies will be utilized to reinforce the application of course material. Computer software will be introduced and utilized as required throughout the course.

**SMTL-300  Strength of Materials (5 credits)**
**Prerequisite:** EMEC-105
Course Content: This course concerns the concepts of stresses and strains in axial and torsional loading. Properties of plane and composite sections are analyzed from basic principles. Components are scrutinized under combined loading including bending. It further includes investigation of transformation of stress, beam deflections, critical buckling loads for columns, and end connection effects. Stresses in systems (e.g. thin-walled pressure vessels) are determined.

**THRM-370  Thermodynamics II (3 credits)**
**Prerequisite:** THRM-315
Course Content: The course involves the application of thermodynamic principles to internal combustion engines, engine testing and cycle tracing. It also involves the evaluation of engine parameters leading to efficiency and performance improvements.

**LIFE-200  Life Skills II (1 credit)**
Course Content: This course expands on the concepts in the LIFE-100 course, providing the student with useful skills and techniques to succeed in the modern world of work.

2nd Year: Semester 2

**COMM-288  Technical Communications II (3 credits)**
Course Content: The focus of this course is a team project report. The process approach involves students in all aspects of the management of communications tasks, both oral and written. The final products are a formal report and an oral presentation of the content.

**DSGN-306  Design of Machine Elements (6 credits)**
**Prerequisite:** SMTL-300
Course Content: Students will study the procedures involved in the design process as applicable to traditional mechanical equipment. Design details will be analyzed and practised for shafts, couplings, roller bearings, belt and chain drives, gears, fasteners, clutches and brakes.

**DSGN-350  Final Project (5 credits)**
Course Content: This project will show the student how to apply problem-solving techniques and solution strategies to resolve technological problems. Students work in groups and plan the project, provide regular status reports and present a formal final report and presentation.

**EMTL-282  Materials Technology II (3 credits)**
**Prerequisite:** EMTL-232
A continuation of Materials technology I with emphasis on non-ferrous, non-metallic as well as advanced materials. Non-ferrous, polymeric, ceramic and composite materials play an increasingly important role in engineering sciences. This course focuses on the study of their fabrication, properties, strengthening techniques, manufacturing, recycling/disposal and cost. Laboratory work includes the manufacturing and testing of composite materials.

**DSGN-315  Design of Pneumatic and Hydraulic Systems (5 credits)**
**Prerequisite:** FDYN-304
Course Content: Elements of pneumatic and hydraulic systems; pneumatic and hydraulic circuit design; electro-pneumatic and electro-hydraulic control; maintenance procedures.

**MNFG-305  Manufacturing Processes II (5 credits)**
Course Content: This course focuses on the integration of computer aided design (CAD) into the computer aided manufacturing (CAM) process and investigates the principles of tool function and design utilizing CAD.

**ENVS-202 Safety and Environment (3 credits)**

Course Content: This course will provide an introduction to safety problems and safe practices in the workplace, and an appreciation of the potential impact on the environment (air, water, others) of waste and noise. Some discussion on the handling of waste and perception of risk, environmental responsibility and sustainable development will be included. Students will spend time in the lab learning safety processes as they relate to high pressures and temperatures in vessels.
BACHELOR OF ENGINEERING PROGRAMMES

Bachelor of Engineering in Applied Petroleum Technology (BEAPT)

DURATION
In the past, a Bachelor of Applied Petroleum Engineering Technology (BAPET) programme has been offered and has consisted of the equivalent of 2 full-time semesters of coursework after a completed diploma, followed by a supervised credit work experience in industry with a final report and presentation to an examining panel. For students currently in this programme, it may be completed in that format. After August, 2006, however, a Bachelor of Engineering degree will be offered in Applied Petroleum Technology (BEAPT) and will consist of the equivalent of 4 full-time semesters of coursework after the diploma.

This programme is offered only on a part-time basis as a post-diploma degree. The BAPET academic part consists of seven consecutive part-time semesters followed by a minimum of six months industry experience and an industry project. Students starting after August, 2006 will be required to complete a minimum of 120 credits of new coursework learning after the diploma without a work term credit component.

CREDITS
BAPET Programme:
Academic courses - 71 Credits with a minimum cumulative GPA of 2.0
Credit Work Experience - 25 Credits
Industry Project - 25 Credits

BEAPT Programme:
Academic courses - 120 credits with a minimum cumulative GPA of 2.0

INTAKE
The programme may be started in any semester of the year, depending on the courses offered.

PROGRAM OVERVIEW
Both programmes are aimed at Engineering Technicians who hold a Petroleum or other relevant diploma and are currently working in the Upstream Oil and Gas Industry. It is designed to upgrade them to the level of the U.K. Incorporated Engineer in the Petroleum area. It provides in-depth training that allows graduates to function as highly skilled members of an engineering team in exploration, drilling, well systems, reservoir engineering and oil and gas production and transmission.

EMPLOYMENT OPPORTUNITIES
Graduates who are already in the industry will find that the increased technical knowledge will enhance their opportunities for further career advancement. Students who enter from full-time academic programmes are encouraged to seek employment early so that successful completion of the programme can be achieved with evening courses while continuing to work.

ADMISSION REQUIREMENTS
A recognized diploma in one of the following engineering technologies – Petroleum, Mechanical or Chemical - is required with a minimum cumulative GPA of 2.5. Current employment in the upstream industry is also required.

The BAPET Program is as follows and contains many common courses with the new BEAPT programme.

**Bachelor of Applied Petroleum Engineering Technology (BAPET)**

<table>
<thead>
<tr>
<th>Level</th>
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<td>MATH-403</td>
<td>Mathematics I</td>
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<tr>
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<td>SAFE-412</td>
<td>Safety in the Petroleum Industry</td>
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<td>PETR-453</td>
<td>Introduction to the Petroleum Industry</td>
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<tr>
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<td>Refining and Petrochemical Technology</td>
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<td>Project Management</td>
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<td>EVAL-464</td>
<td>Evaluation of Oil and Gas Projects</td>
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<td>Team Skills</td>
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<td><strong>Total Minimum Programme Credits Required:</strong></td>
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**Note:** Students entering the BAPET or BEAPT programme must have completed an appropriate Diploma in Technology prior to entry into the programme.

Classes are conducted on a flexible schedule to facilitate attendance by working students.
The new programme for entries after August, 2006 is as follows: some course exemptions are made for students coming from a petroleum Diploma programme (DRLG-412, PTPR-412, RESR-412, GEOL-412):
Bachelor of Engineering in Applied Petroleum Technology (BEAPT)

<table>
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<td>RESR-408</td>
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<td>VBAP-403</td>
<td>VBA and C++ Programming</td>
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Total Credits 1st Level (70 possible, 60 required) : 70(60) 46 13 11

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<td>DRLG-453</td>
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<td>DSGN-413</td>
<td>Engineering Design and Materials Selection</td>
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<td>Evaluation of Oil and Gas Projects</td>
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<td>EPMM-403</td>
<td>Personnel Management and Motivation</td>
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<td>International Petroleum Operations</td>
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<td>Professional Practice, Safety and the Environm.</td>
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<td>PTPR-464</td>
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<td>RESR-424</td>
<td>Advanced Reservoir Engineering Studies</td>
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<td>RESR-464</td>
<td>Heavy Oil Recovery</td>
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Total 2nd Level : 60 29 24 7

Total Minimum Programme Credits Required : 120
Bachelor of Engineering
in
Applied Petroleum Technology

Note: This is a part-time programme and the courses are shown as Level 1 or Level 2 courses that correspond to Year 1 or Year 2 of a full-time programme. Some of the courses without pre-requisites can be done at either Level.

Level 1 Courses

**ADMN-411 Team Skills (2 credits)**
Course Content: Much of today's business is accomplished more through teamwork than individual effort. This course presents current concepts of teams and team skills through the following topics: team performance and improvement, commitment, painting the vision, leadership in today's business, obstacles and trouble, achievement celebration, teams in changing organizations, quick change organizations and coaching the team. Students participate as team members and will complete four team projects.

**BFIN-430 Financial Control, Budgets, and Planning (3 credits)**
Course Content: Beginning the financial plan with goals, this course will touch on forecasts and estimates, financing, and cash flow. The processes of budgeting and financial control involving authorization, feedback and analysis will be covered in more detail. Student workshop exercises will simulate real business situations.

**CORR-404 Materials and Corrosion Option (4 credits)**
Course Content: The properties of materials, iron, steel, stainless steels, alloys, composites; metallurgical considerations; heat treating and hardening; stress-strain relationships; yield stress; plasticity, creep. Corrosion of metals; pitting; chemistry of corrosion.

**DRLG-412 Drilling (2 credits)**
Course Content: This course will provide the student with an overview of the drilling operation, including hardware and operational technologies, drilling rig components, drillstring properties and components, BOP and other safety system fundamentals, kick detection, mud formulation and property determination and adjustment, pressure drop calculations in the drillstring and annulus, and casing systems.

**DSGN-413 Engineering Design and Materials Selection (3 credits)**
Course Content: The principles of engineering design will be introduced and include choice of materials, metals, plastics, composites, other materials, joining and construction methods, corrosion protection and coatings considerations. Effects of high temperature and pressure will be examined, including pressure vessel design.

**EBUS-302 Business Principles (2 credits)**
Course Content: This course contains the following topics: requirements for setting up a business; market survey; legal requirements; contracts; partnerships; financing methods; payrolls; accounting requirements; cash flow management; marketing and advertising; cost controls; tax issues; liability issues.

**EECN-302 Engineering Economics (2 credits)**
Course Content: This course is about: time value of money; discounted cash flows; net present value; payout time; return on investment; risk analysis; economies of scale; capital cost estimation for plants; operating costs.

ENVS-402 Environmental Considerations (3 credits)
Course Content: This course is a comprehensive introduction to contaminated site investigation, remediation and auditing. Topics cover investigative procedures and sampling techniques, implementation of remedial measures, legislative aspects, risk analysis and case studies. Students learn to identify key players in this field, how they interrelate and what bottlenecks can occur.

ENVS-470 Advanced Environmental Considerations (3 credits)
Course Content: This course will emphasize design, equipment sizing criteria, and application to mitigate contaminant release. Topics covered will include air and noise emission pollution control, reuse of produced water from heavy oil, biological wastewater treatment, contaminant hydrogeology, site remediation, and well abandonment.

ETHR-303 Engineering Thermodynamics (3 credits : 2L, 1T, 0B)
Course Content: Topics for this course are: thermodynamic equilibrium; multicomponent systems and activity coefficients; first, second and third laws; enthalpy and entropy; equations of state; acentric factors; vapour-liquid equilibria; Gibbs free energy, fugacity and the phase rule; compression and expansion; heat engine cycles.

EVAL-403 Well Logging (3 credits)
Prerequisite : RESR-412
Course Content: This course will provide an introduction to well log analysis, introducing the major types of logs used in oil and gas exploration and evaluation. The specific responses of the logging methods to different types of reservoirs will be discussed, including how to distinguish oil, gas and water zones, the reliability of the various methods, and quantitative analysis of well logging parameters. Prospect generation, structure mapping and cross-section evaluation, formation pay mapping and ACCUMAP usage will be introduced.

GEOL-412 Petroleum Geology (2 credits)
Course Content: This course covers basic physical geology, identification of sedimentary rocks, physical processes acting on the earth's surface (i.e. erosion/deposition), and the concept of geological time. Emphasis will be placed on the characteristics of reservoir rock, types and origin of hydrocarbon traps, and petroleum exploration techniques.

MATH-403 Intermediate Engineering Mathematics (3 credits)
Course Content: This course builds on previous engineering mathematics courses to provide capabilities in manipulation of matrices and determinants, more advanced integration and differentiation topics, series and vectors problems, ordinary differential equations, and an introduction to the use of numerical techniques in solving engineering problems. Where possible, the mathematical concepts are related to practical engineering applications, and emphasis is placed on becoming familiar with methods of solving engineering problems in the real world with the most useful mathematical techniques.

MATH-404 Advanced Engineering Mathematics (4 credits)
Prerequisite : MATH-403
Course Content: This course provides more advanced mathematical methods that are needed in many other petroleum industry applications. The solution of partial differential equations, including
the use of Laplace Transforms and numerical methods such as the Runge-Kutta method are treated. Complex numbers are discussed: these techniques are particularly useful in areas such as process control and process stability analysis. Statistics and regression analysis are applicable to process modeling and analysis, and optimization techniques can be applied in areas such as refinery or production engineering.

**MMBE-405  Mass, Momentum and Energy Balances (5 credits)**
Course Content: The principles of modelling mass, momentum and energy flow systems will be introduced and their use in solving engineering problems will be shown. Steady and unsteady state situations will be investigated and methods of solving the resulting balance equations will be treated.

**MNTN-415  The Maintenance Revolution (2 credits)**
Course Content: This course presents the optimization of maintenance as a strategic business process. Along with other valuable techniques, reliability-centred maintenance will be discussed at some length. The following topics will be presented: maintenance - what it is; current approaches to maintenance: TPM, TQM, condition based, proactive and others; maintenance programme optimization using reliability-centred maintenance; reliability and maintainability: standards and methods; beginning the process of change - a workshop project.

**PERS-402  Seven Habits of Successful People (2 credits)**
Course Content: Based on Steven Covey's bestseller *The Seven Habits of Highly Effective People*, this course teaches important skills of personal and interpersonal effectiveness. Students learn the self-mastery habits to move from dependence to independence, then on to interdependence through teamwork, cooperation and good communication habits. They also learn to develop renewal habits to “keep their edge”.

**PROJ-421  Project Management (3 credits)**
Course Content: Beginning with project planning methods and tools, this course concentrates on schedule and cost control from inception to completion of a project, overcoming obstacles to success, measurement of progress, and quality control. The use of software tools will be included, reviewed and discussed as available.

**PTPR-412  Production Operations (3 credits)**
Course Content: This course deals with the procedures involved in placing a well on production, including completion methods, well stimulation by acidizing or fracturing, wellheads, chokes, artificial lift methods, valves and surface lines. Methods of analyzing an oil well pressure buildup test are handled with example problems to determine the reservoir permeability and skin factor on the well. Problem areas such as hydrate formation, corrosion, emulsion problems and phase measurement are discussed. Surface facilities such as separators, treaters, dehydration systems and metering are introduced, with calculation methods for sizing two and three phase separators, and pressure drop estimation methods in surface lines and fittings.

**RESR-408  Conventional Oil and Gas (8 credits)**
**Prerequisite:** RESR-412
Course Content: Natural gas and condensate reservoirs, reserves estimation, retrograde condensation and production scenarios will be investigated. Conventional oil reservoirs; waterflooding and pressure maintenance; production methods. Enhanced oil recovery processes;miscible flooding; rate of production effects.

**RESR-412  Reservoir (3 credits)**
Course Content: The course will be an introduction to types of reservoirs, drive mechanisms, absolute and effective porosity, behaviour of hydrocarbon gas and fluids, perfect and real gas laws, PVT relationships, gas deviation factor, phase diagrams, Darcy's Law and an introduction to inflow performance relationships. The course will also introduce reserve calculations.

SAFE-412 Safety in the Petroleum Industry (3 credits)
Course Content: The following topics are covered in this course: building a safety programme, safety and environmental law, general industrial safety, process safety management, hazard identification and control, worksite inspections, contractor control, emergency response planning, incident investigation and analysis, and safety programme audits. WHMIS and TDG certificates may be earned if time permits.

VBAP-403 VBA and C++ Programming (4 credits)
Course Content: Visual Basic for Applications programming for use with spreadsheets will be introduced and macros for spreadsheet operation will be developed for a number of applications. The second part of the course will introduce C++ programming and apply these techniques to several engineering problems.

Level 2 Courses

DRLG-453 Advanced Drilling Technology (5 credits)
Prerequisite: DRLG-412
Course Content: This is an overview of basic drilling practices followed by advanced drilling technology, planning, bit selection, hydraulics, blowout control and mud technology. Drilling of deviated wells, multil wells, horizontal wells and well completions are also covered, in addition to recent advances in drilling such as underbalanced drilling, coiled-tubing drilling, and slim hole drilling.

DSGN-415 Design Project (15 credits)
Course Content: A major engineering design project that is done near the end of the programme that is meant to include much of the materials learned in the foregoing courses and studies. As such, this capstone project will cover engineering, economic, safety and environmental components.

ENUM-304: Numerical Techniques in Mathematics (4 credits: 2L, 0T, 2B)
Course Content: Iterative solution of equations; splines; Newton-Raphson, Gauss methods; round-off and error propagation; finite difference techniques; Euler and Runge-Kutta techniques for differential equations; use of Matlab.

EPMM-403: Personnel Management & Motivation Option (3 credits: 2L, 1T, 0B)
Course Content: Management styles; theories of management; strategic planning; Maslow, Herzberg, Drucker, Kaplan and Norton; motivation, innovation and leadership theories.

EVAL-463 Evaluation of Oil and Gas Projects (3 credits)
Prerequisites: RESR-412, EECN-302
Course Content: The course will examine reserves determination methods including volumetric and material balances, production decline analysis for various unrestricted and restricted cases, price forecasting and cost estimating, profitability analysis, and the application of the economic evaluation software programme to both oilfield and gasfield cases.
PETR-413 International Petroleum Operations (3 credits)
Course Content: The course will provide data on international petroleum operations that will consider some of the differences from operations in Trinidad & Tobago, from the perspective of a local company. The topics will include consideration of the choice of country, onshore and offshore operations, dealing with risk, insurance and liability, foreign tax systems and business practices, cultural and security matters, international agreements relating to production sharing, cost recovery, profit sharing and service fees, different fiscal systems, tax and petroleum legislation, personal tax issues, and repatriation of funds.

PETR-461 Advanced Exploration Technology (5 credits)
Prerequisites: GEOL-412, RESR-412
Course Content: This comprehensive course consists of the following components: risk management in the upstream oil industry; sequence stratigraphy methodologies in geological basin analysis; exploration prospecting in Trinidad and Tobago; integration of 2D and 3D data in history analysis of the Venezuelan Basin; geophysics and seismic reflection theory; practical exploration seismology; synthesis of gravity, aeromagnetic and seismic acquisition techniques; seismic reflection survey processing (including a possible case study); seismic ties to well data (convolution techniques); seismic velocity interpretation in field development; seismic and other geophysical methods (such as remote satellite sensing, aeromagnetic and gravity surveys); seismic stratigraphy interpretation; seismic structural interpretation; and advanced interpretation case studies. This final segment of the course is configured in team workshops: students define a play, interpret existing seismic data, develop land strategies and drilling programmes, interpret logs, and make land and drilling decisions.

PPSE-403 Professional Practice, Safety & The Environment (3 credits : 3L, 0T, 0B)
Course Content: The responsibilities of a professional engineer; ethics; engineering legal issues and liabilities; public and worker safety and health issues; sustainable development; environmental issues and responsibilities; role of professional organizations.

PTPR-464 Advanced Production Engineering (4 credits)
Prerequisite: PTPR-412
Course Content: This course will cover the following topics: nodal analysis and production optimization, identification of production bottlenecks; emulsion-breaking and treater operations, types of chemicals used, use of combined thermal and chemical treatments; selected topics in artificial lift methods, pump selection, sucker rod pump dynamometer tests, gas lift design; cementing operations; acidizing and fracturing workover treatment design, additives used, proppant selection, application to vertical and horizontal wells; completion methods for horizontal wells; corrosion and control methods in downhole and surface equipment.

RESR-434 Reservoir Simulation (4 credits)
Prerequisite: RESR-412
Course Content: This course will introduce students to several types of reservoir simulators used to model production of oil and gas from a reservoir. Grid size and grid orientation effects, 1-D, 2-D and 3-D models, black oil, compositional and thermal models will be handled, together with history matching and model validation methods.

RESR-424 Advanced Reservoir Engineering Studies (4 credits)
Prerequisite: RESR-412
Course Content: Introduction to waterflooding; Buckley-Leverett shock front; Welge technique;
Dykstra-parsons and Stiles methods in layered reservoirs; chemically assisted waterflooding, including polymers and surfactants. Reservoir simulation will be included (Eclipse, CMG, Utchem) and comparisons between simulation results and conventional analytical techniques.

RESR-464 Heavy Oil Recovery (4 credits)
Prerequisite: RESR-412
Course Content: This course deals with the latest production methods used for recovery of heavy oil using horizontal, vertical and multilateral wells, cold production, thermal techniques with steam flooding, CSS, SAGD, VAPEX, in-situ combustion, waterflooding and EOR techniques. Methods of predicting well and field productivities will be examined for the major recovery processes. The course will examine heavy oil PVT and analytical techniques, geology, field projects both within Trinidad & Tobago and internationally, production problems, regulatory and fiscal issues. Comparisons with light oil production methods will be made, and differences in refining, upgrading, pipelining and transportation requirements for heavy oil will be highlighted.

Additional Courses Offered Only in the BAPET Programme

HURM-402 Human Resource Management (2 credits)
Course Content: This course familiarises students with Human Resource Management issues and the responsibilities of the line manager/supervisor in the Human Resources functions, including recruitment and selection, training and development, performance management and compensation.

CORR-200 Corrosion Control (2 credits)
Course Content: The contents of this course are: basic corrosion chemistry; solution to corrosion problems; corrosion mechanisms; materials selection; coatings; inhibition.

PROP-455 Advanced Gas Processing (7 credits)
Course Content: The contents of this course are: gas processing from receipt at a processing plant; dew point control; fractionation; NGL recovery; cryogenics; transmission and storage. Gas compression and refrigeration, water-hydrocarbon systems; in-depth study of calculations using industrial examples.

PETR-409 Refining and Petrochemicals (3 credits)
Course Content: This course is about the main oil refining processes; distillation, cracking, isomerization, alkylation, hydrogenation, desulfurization. It includes petrochemical production; polyethylene; polypropylene, PVC; acetic acid and other common petrochemicals; thermoplastics; resins; fibres; foams.

PETR-453 Introduction to the Petroleum Industry (2 credits)
Course Content: Systems of units; phases of petroleum field development; basic reservoir concepts of porosity and permeability; flow in pipes; Reynolds number; energy and material balances; VBA for Excel programming; technical communications; reports; meetings; presentations; job search and interview skills. RESR-452 Conventional Oil and Gas Technology (7 credits)
Prerequisite: RESR-412
Course Content: Students will learn characterization of oils; mathematics of flow in petroleum reservoirs; fluid and rock properties; gas well pressure buildup tests; skin factors and rate dependent skin; waterflooding; Buckley-Leverett and Welge techniques; stable and unstable displacement; stratified reservoirs; Stiles and Dykstra-Parsons methods; effects of well spacing and patterns: EOR processes; polymers; solvents; review of well logging techniques; horizontal and deviated wells; introduction to reservoir simulation techniques.
Bachelor of Engineering

in

Applied Process and Utilities Technology

Chemical Option

DURATION:
This programme is offered in an evening delivery mode only. It is equivalent to two years of full-time study but, taken in the evenings, will take a minimum of around 10 semesters. With three semesters being offered per year, this translates into \(3\frac{1}{3}\) years of evening courses.

CREDITS:
To graduate, students must successfully complete 120 credits of new learning coursework with a minimum cumulative GPA of 2.0. Where no course exemptions are allowed, which will be the case for applicants who graduated more than five years previously from a diploma programme, additional credits must be completed in those courses which would be exempt for recent graduates. These possible exemptions for a Chemical Engineering Diploma graduate are shown in the table below as the shaded courses.

INTAKE:
Students may start in any of the semesters during the year, subject to the required course(s) being offered in that semester.

PROGRAMME OVERVIEW:
This programme is designed to cater for the graduates from a 2-year Diploma programme who, usually working in industry, wishes to upgrade their academic qualifications and managerial skills to revitalise their careers. The Chemical Option covers the process engineering operations that involve chemical transformation and reactions, as well as providing managerial type courses and broadening Humanities options. It has been designed to meet international standards for accreditation at a professional level and such accreditation will be sought as soon as possible.

EMPLOYMENT OPPORTUNITIES:
Graduates from this programme may expect to progress from a technical role in the process industries to a supervisory role. Employment will often be in a chemical plant producing ammonia, methanol or other chemicals, or in a petroleum processing operation such as a refinery or LNG facility.

ADMISSION REQUIREMENTS:
A completed 2-year Diploma in one of the following areas with a minimum GPA of 2.5 is the normal entrance requirement: Chemical, Electrical, Instrumentation, Mechanical or Petroleum Technology. Some course exemptions are allowed for applicants who graduated from these programmes during the previous five years but, in any case, 120 credits of new learning are required for completion of this programme. Where no exemptions are allowed, the possible exemption courses (non-options) must all be completed in addition to the 120 credits required, and the applicant should consult the Head of the programme to discuss possible course exemptions.

Courses are grouped into two Levels, corresponding to the first and second years of a full-time study programme.
Bachelor of Engineering in Applied Process & Utilities Technology

Chemical Option

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**Total 1st Level:** 72

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**Total 2nd Level:** 67

**Total Minimum Programme Credits Required:** 120

**Note:** Some exemptions from the above courses are granted for students who completed the Diploma programme within the last 5 years. The exemptions depend on the particular Diploma completed.
Bachelor of Engineering
in
Applied Process and Utilities Technology

Chemical Option

Note: This is a part-time programme and the courses are shown as Level 1 or Level 2 courses that will correspond to Year 1 or Year 2 of a full-time programme.

Level 1 Courses (Note: 3h/week lectures, 1h/week tutorial, 2h/week lab = 3L, 1T, 2B)

EMAT-306 Engineering Mathematics E1 (6 credits : 4L, 2T, 0B)
Course Content: The course consists of differential equations and examples of how they arise in engineering analyses; solution of ordinary and partial differential equations; solution of the diffusion equation for heat conduction; linearisation and simplification; standard solutions; Bessel functions.

ENUM-304 Numerical Techniques in Mathematics (4 credits : 2L, 0T, 2B)
Course Content: Iterative solution of equations; splines; Newton-Raphson, Gauss methods; round-off and error propagation; finite difference techniques; Euler and Runge-Kutta techniques for differential equations; use of Matlab.

ECHE-304 Organic and Physical Chemistry (4 credits : 2L, 1T, 1B)
Course Content: Alkanes, alkenes, alkynes, alcohols, aldehydes, ketones, ethers, esters, aromatics and typical reactions; Grignard reagents; important industrial organic chemistry processes. Surface chemistry and adsorption/desorption; contact angles; wettability; interfacial tension; capillary action; diffusion processes.

ESTP-304 Statistics and Probability (4 credits : 3L, 1T, 0B)
Course Content: Topics for this course are: data analysis, average and spread; permutations and combinations; random variables; probability distributions; mean and variance; normal and other distributions; random sampling; confidence levels; quality control; goodness of fit; regression and correlation analysis.

EMEC-305 Engineering Mechanics (5 credits : 4L, 1T, 0B)
Course Content: Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr’s stress circle; pressure vessels.

ECFE-304 Chemistry for Engineers II (4 credits : 2L, 1T, 1B)
Course Content: Organic chemistry in industry; substitution, halogenation, oxidation and nitration of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry; formaldehyde, urea; thermosetting and thermoplastic resins.

ETHR-303 Engineering Thermodynamics (3 credits : 2L, 1T, 0B)
Course Content: thermodynamic equilibrium; multicomponent systems and activity coefficients; first, second and third laws; enthalpy and entropy; equations of state; acentric factors; vapour-liquid equilibria; Gibbs free energy, fugacity and the phase rule; compression and expansion; heat engine cycles.

**EWCS-303 Advanced Writing & Communications Skills** (3 credits : 1L, 2T, 0B)
Course Content: The preparation of proposals for senior management; effective organisation of text and data in documents; adjusting writing style depending on target audience; more effective presentations; improving speaking skills; practice in effective presentations.

**EHUM-304 Humanities Option 1** (4 credits : 3L, 1T, 0B)
Course Content: This can be chosen from a list of acceptable Humanities courses which could include The History of the Caribbean; Engineering and Society; Caribbean Music; Caribbean Art; Political Science and Government.

**EHUM-303 Humanities Option 2** (3 credits : 1L, 0T, 2B)
Course Content: This will be a foreign language such as Spanish, French, German or Russian.

**ECAT-305 Catalysts and Catalytic Processes** (5 credits : 3L, 2T, 0B)
Course Content: homogeneous and heterogeneous catalysts; reaction mechanisms; catalyst types; deactivation and regeneration; applications including ammonia and methanol production processes; catalyst choice; reactor types; modeling catalytic processes; mechanisms including adsorption and chemisorption; diffusion controlling; catalyst characterization; catalytic offgas and waste water cleanup for environmental protection.

**EECN-302 Engineering Economics** (2 credits : 2L, 0T, 0B)
Course Content: Time value of money; discounted cash flows; net present value; payout time; return on investment; risk analysis; economies of scale; capital cost estimation for plants; operating costs.

**EBUS-302 Business Principles** (2 credits : 2L, 0T, 0B)
Course Content: Requirements for setting up a business; market survey; legal requirements; contracts; partnerships; financing methods; payrolls; accounting requirements; cash flow management; marketing and advertising; cost controls; tax issues; liability issues.

**EPCN-306 Process Control** (6 credits : 3L, 1T, 2B)
Course Content: Various types of control loops; interaction of process and control systems; PID controllers and tuning; stability; cascade control; ratio control; multiloop control.

**EPIN-305 Plant Instrumentation Systems** (5 credits : 2L, 1T, 2B)
Course Content: types of plant instrumentation used; measurement techniques for the main process variables; pneumatic, electronic controllers; digital and analogue systems; safety; signal transmission; SCADA systems; programmable logic controllers; distributed control systems; fail safe design.

**ERKN-302 Reaction Kinetics** (2 credits : 1L, 1T, 0B)
This course consists of chemical reactor design; kinetics of homogeneous reactions; reaction and reactor design dependence on temperature, pressure and flow rate; heterogeneous reaction systems.

**ETPH-303 Transport Phenomena** (3 credits : 2L, 1T, 0B)
Course Content: Application of mass, momentum and heat transfer processes to industrial processes; formulation of equations for typical catalytic reactions; further process modeling; analytical solution by the lumped, integral and differential techniques.

**ECMH-303 Introduction to Computer Modelling & Hysys** (2 credits : 1L, 0T, 1B)
Course Content: This is an introduction to the use of computer modelling software such as Hysys; fluid property packages; static and dynamic models; examples of simple process models.

**EMAT-304 Engineering Mathematics E2** (4 credits : 2L, 2T, 0B)
Prerequisite: EMAT-306
Course Content: Optimisation techniques; constrained and unconstrained optima; linear programming; complex numbers; regression and curve fitting techniques; Lagrangian interpolation.

**Level 2 Courses**

**EGPC-407 Gas Processing and Conversion** (7 credits : 4L, 3T, 0B)
Course Content: Sas dehydration; glycol process and regeneration; gas sweetening; DEA/TEA process; feedstock separation; conversion processes; synthesis gas process; production of hydrogen; ammonia and methanol production processes; cryogenic separation and LNG; conversion of natural gas to other products; polyethylene and PVC production.

**EPDC-407 Process Design and Computer Simulation** (7 credits : 1L, 0T, 6B)
Course Content: Use of computer simulator (Hysys); equation of state packages; reactant properties; steady state and dynamic modeling of processes; controller tuning on the dynamic model; application to several typical unit operations including distillation; specification of pump, compressor, column, and process piping.

**EPMC-405 Process Modelling and Control** (5 credits : 3L, 2T, 0B)
Course Content: Development of a mathematical model for the overall process; investigation of feedstock composition variation, flow rate variation; sensitivity to other process variables, advanced process control topics.

**EREF-404 Refinery Processes** (4 credits : 3L, 1T, 0B)
Course Content: Oil refining processes; cracking; reforming; alkylation; hydrogen production; fuel blending and octane ratings; product mixes; component purification; catalytic processes; waste treatment and environmental issues.

**EHUM-403 Humanities Option 3** (3 credits : 1L, 0T, 2L)
Course Content: This can be a language such as Spanish, German, French or Russian, or a Management subject.

**EPMM-403 Personnel Management & Motivation Option** (3 credits : 2L, 1T, 0B)
Course Content: Management styles; theories of management; strategic planning; Maslow, Herzberg, Drucker, Kaplan and Norton; motivation, innovation and leadership theories.

**EMET404 Materials and Metallurgy** (4 credits : 3L, 1T, 0B)
The course consists of the following: properties of materials, plastics, metals, alloys, composites; compositional effects; testing methods; analysis of test results; production methods; forming, extrusion, casting; crystal structures; joining, welding, annealing, tempering; failure analysis; introduction to corrosion; costs and choice of materials for the process industry.
**ECOR-403  Corrosion Option  (3 credits : 2L, 0T, 1B)**
Course Content: Mechanism of corrosion; choice of materials of construction; coatings; cathodic and sacrificial anode protection; safety and environmental concerns; economic analysis; maintenance management.

**EDES-412  Design Project  (12 credits : 0L, 12T, 0B)**
An extensive design project will draw together, during the final semester, most of the Course Content: subjects studied in this programme. A complete design will be performed for a chosen industrial process, including a technical analysis of the process, component specifications; a P&I diagram, a cost estimate and economic analysis, an environmental impact analysis, an analysis of operating flexibility at different production rates, and startup and shutdown recommendations.

**EPUD-405  Process and Utilities Design  (5 credits : 4L, 1T, 0B)**
Course Content: Methods of design for typical industrial processes; P&I diagrams; material choices; pump, compressor, condenser specification; vessel design and support systems; costing methods, effluent treatment processes; environmental considerations.

**EMEM-402  Membrane Separation Processes Option  (2 credits : 2L, 0T, 0B)**
Course Content: Types of membrane separation processes; types of polymers used; mechanisms of separation; adsorption/absorption-diffusion model; separation of impurities from water; gas separation processes; hydrocarbon separation processes; possible future developments.

**EPPS-403  Professional Practice, Safety and The Environment  (3 credits : 3L, 0T, 0B)**
This course teaches the responsibilities of a professional engineer; ethics; engineering legal issues and liabilities; public and worker safety and health issues; sustainable development; environmental issues and responsibilities; role of professional organizations.

**ETES-402  Team Skills  (2 credits : 1L, 1T, 0B)**
Course Content: Effective team participation and management; team motivation and team building techniques; disruptive influences and how to handle them; negotiating skills; the identification of strengths and weaknesses why eams faiai and why teams succeed group practice.

**EPMT-403  Plant Maintenance  (3 credits : 2L, 1T, 0B)**
Course Content: Planned maintenance; maintenance scheduling; plant shutdowns; mean time between failures; economic balance between maintenance costs and rate of replacement; problem areas.

**EBIO-404  Biochemical Engineering Processes  (4 credits : 3L, 1T, 0B)**
Course Content: Elements of bioactive organisms; fermentation processes; sugars and yeasts; beer and rum production processes; other potential fermentation processes of interest.
Bachelor of Engineering
in
Applied Process and Utilities Technology

Mechanical Option

**DURATION:**
This programme is offered in an evening delivery mode only. It is equivalent to two years of full-time study but, taken in the evenings, will take a minimum of around 10 semesters. With three semesters being offered per year, this translates into 3½ years of evening courses.

**CREDITS:**
Students graduate upon successful completion of 120 credits of new learning coursework with a minimum GPA of 2.0. Where no course exemptions are allowed, which will be the case for applicants who graduated more than five years previously from a diploma programme, additional credits must be completed in those courses which would be exempt for recent graduates. These possible exemptions are shown in the following table as the shaded courses for a graduate from the Mechanical Engineering Technology Diploma programme.

**INTAKE:**
Students may start in any of the semesters during the year, subject to the required course(s) being offered in that semester.

**PROGRAMME OVERVIEW:**
This programme is designed to cater for the graduates from a 2-year Diploma programme who, usually working in industry, wishes to upgrade their academic qualifications and managerial skills to revitalise their careers. The Mechanical Option covers the process engineering mechanical operations that do not normally involve chemical transformation and reactions, such as filtration, heat transfer, mixing, sizing, separations. It also provides managerial type courses and broadening Humanities options. It has been designed to meet international standards for accreditation at a professional level and such accreditation will be sought as soon as possible.

**EMPLOYMENT OPPORTUNITIES:**
Graduates from this programme may expect to progress from a technical role in the process industries to a supervisory role. Employment will often be in a chemical plant producing ammonia, methanol or other chemicals, or in a petroleum processing operation such as a refinery or LNG facility. Employment could also be in another industry such as the sugar industry where most of the operations are of a mechanical nature.

**ADMISSION REQUIREMENTS:**
The normal entrance requirement is a completed 2-year Diploma in one of the following areas with a minimum cumulative GPA of 2.5: Chemical, Electrical, Instrumentation, Mechanical or Petroleum Technology. Some course exemptions are allowed for graduates from these programmes during the previous five years but, in any case, 120 credits of new learning are required for completion of this programme. Where no exemptions are allowed, the possible exemption courses (non-options) must all be completed in addition to the 120 credits required, but applicants should consult the Head of the programme to discuss possible course exemptions.
### Bachelor of Engineering in Applied Process & Utilities Technology
#### Mechanical Option

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**Total 2nd Level:** 63

**Total Minimum Programme Credits Required:** 120

**Note:** Some exemptions from the above courses are granted for students who completed the Diploma programme within the last 5 years. The exemptions depend on the particular Diploma completed.
Bachelor of Engineering
in
Applied Process and Utilities Technology

Mechanical Option

Note: This is a part-time programme and the courses are shown as Level 1 or Level 2 courses that correspond to Year 1 or Year 2 of a full-time programme.

Level 1 Courses  (Note: 3h/week lectures, 1h/week tutorial, 2h/week lab = 3L, 1T, 2B)

**EMAT-306 Engineering Mathematics E1** (6 credits : 4L, 2T, 0B)
Course Content: Differential equations and examples of how they arise in engineering analyses; solution of ordinary and partial differential equations; solution of the diffusion equation for heat conduction; linearisation and simplification; standard solutions; Bessel functions.

**ENUM-304 Numerical Techniques in Mathematics** (4 credits : 2L, 0T, 2B)
Course Content:: Iterative solution of equations; splines; Newton-Raphson, Gauss methods; round-off and error propagation; finite difference techniques; Euler and Runge-Kutta techniques for differential equations; use of Matlab.

**ECHE-304 Organic and Physical Chemistry** (4 credits : 2L, 1T, 1B)
Course Content: Alkanes, alkenes, alkyens, alcohols, aldehydes, ketones, ethers, esters, aromatics and typical reactions; Grignard reagents; important industrial organic chemistry processes. Surface chemistry and adsorption/desorption; contact angles; wettability; interfacial tension; capillary action; diffusion processes.

**ESTP-304 Statistics and Probability** (4 credits : 3L, 1T, 0B)
Course Content: Data analysis, average and spread; permutations and combinations; random variables; probability distributions; mean and variance; normal and other distributions; random sampling; confidence levels; quality control; goodness of fit; regression and correlation analysis.

**EMEC-305 Engineering Mechanics** (5 credits : 4L, 1T, 0B)
Course Content: Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr's stress circle; pressure vessels.

**ECFE-304 Chemistry for Engineers II** (4 credits : 2L, 1T, 1B)
Offered here are organic chemistry in industry; substitution, halogenation, oxidation and nitration of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry; formaldehyde, urea; thermosetting and thermoplastic resins are also part of this course.

**ETHR-303 Engineering Thermodynamics** (3 credits : 2L, 1T, 0B)
Course Content: Thermodynamic equilibrium; multicomponent systems and activity coefficients; first, second and third laws; enthalpy and entropy; equations of state; acentric factors; vapour-liquid
equilibria; Gibbs free energy, fugacity and the phase rule; compression and expansion; heat engine cycles.

**EWCS-303 Advanced Writing & Communications Skills** *(3 credits : 1L, 2T, 0B)*
Course Content: The preparation of proposals for senior management; effective organisation of text and data in documents; adjusting writing style depending on target audience; more effective presentations; improving speaking skills; practice in effective presentations.

**EHUM-304 Humanities Option 1** *(4 credits : 3L, 1T, 0B)*
Course Content: This could be chosen from a list of acceptable Humanities courses which could include The History of the Caribbean; Engineering and Society; Caribbean Music; Caribbean Art; Political Science and Government.

**EHUM-303 Humanities Option 2** *(3 credits : 1L, 0T, 2B)*
Course Content: This will be a foreign language such as Spanish, French, German or Russian.

**EECN-302 Engineering Economics** *(2 credits : 2L, 0T, 0B)*
Course Content: Time value of money; discounted cash flows; net present value; payout time; return on investment; risk analysis; economies of scale; capital cost estimation for plants; operating costs.

**EBUS-302 Business Principles** *(2 credits : 2L, 0T, 0B)*
Course Content: Requirements for setting up a business; market survey; legal requirements; contracts; partnerships; financing methods; payrolls; accounting requirements; cash flow management; marketing and advertising; cost controls; tax issues; liability issues.

**EHCP-305 Heating and Cooling Processes** *(5 credits : 3L, 2T, 0B)*
Course Content: Refrigeration; refrigerants; compression and expansion; thermodynamic considerations; Joule-Thompson effect; air liquefaction; cryogenic and other processes; space cooling; air conditioning; humidity adjustment; cooling towers; air cooled heat exchangers; sizing of units.

**EPCN-306 Process Control** *(6 credits : 3L, 1T, 2B)*
Course Content: Various types of control loops; interaction of process and control systems; PID controllers and tuning; stability; cascade control; ratio control; multiloop control.

**EPIN-305 Plant Instrumentation Systems** *(5 credits : 2L, 1T, 2B)*
Course Content: Types of plant instrumentation used; measurement techniques for the main process variables; pneumatic, electronic controllers; digital and analogue systems; safety; signal transmission; SCADA systems; programmable logic controllers; distributed control systems; fail safe design.

**EMPE-304 Mechanical Plant Equipment** *(4 credits : 2L, 2T, 0B)*
Course Content: Pumps of various types; pump curves; turbines; power requirements; abrasion and wear on equipment; compressor types; compression; choice of materials; piping and sizing of pipes; pressure vessels and vessel construction; joining techniques; inspection techniques.

**EMUO-303 Mechanical Unit Operations** *(3 credits : 2L, 1T, 0B)*
Course Content: Separation techniques; cyclones, centrifuges, filtration, flocculation, settling and sedimentation, particle size effects; size reduction and particle agglomeration techniques; membrane separation processes; crystallisation; electrostatic separators; multiphase flow effects.
ECMH-303 Introduction to Computer Modelling & Hysys (2 credits : 1L, 0T, 1B)
Course Content: An introduction to the use of computer modelling software such as Hysys; fluid property packages; static and dynamic models; examples of simple process models.

EMAT-304 Engineering Mathematics E2 (4 credits : 2L, 2T, 0B)
Prerequisite: EMAT-306
Course Content: Optimisation techniques; constrained and unconstrained optima; linear programming; complex numbers; regression and curve fitting techniques; Lagrangian interpolation.

Level 2 Courses

EPDC-407 Process Design and Computer Simulation (7 credits : 1L, 0T, 6B)
Course Content: Use of computer simulator (Hysys); equation of state packages; reactant properties; steady state and dynamic modeling of processes; controller tuning on the dynamic model; application to several typical unit operations including distillation; specification of pump, compressor, column, and process piping.

EPMC-405 Process Modelling and Control (5 credits : 3L, 2T, 0B)
Course Content: Development of a mathematical model for the overall process; investigation of feedstock composition variation, flow rate variation; sensitivity to other process variables, advanced process control topics.

EREF-404 Refinery Processes (4 credits : 3L, 1T, 0B)
Course Content: Oil refining processes; cracking; reforming; alkylation; hydrogen production; fuel blending and octane ratings; product mixes; component purification; catalytic processes; waste treatment and environmental issues.

EHUM-403 Humanities Option 3 (3 credits : 1L, 0T, 2B)
Course Content: This could be a language such as Spanish, German, French or Russian, or a Management subject.

EPMM-403 Personnel Management & Motivation Option (3 credits : 2L, 1T, 0B)
Course Content: Management styles; theories of management; strategic planning; Maslow, Herzberg, Drucker, Kaplan and Norton; motivation, innovation and leadership theories.

EMET-404 Materials and Metallurgy (4 credits : 3L, 1T, 0B)
Course Content: Properties of materials, plastics, metals, alloys, composites; compositional effects; testing methods; analysis of test results; production methods; forming, extrusion, casting; crystal structures; joining, welding, annealing, tempering; failure analysis; introduction to corrosion; costs and choice of materials for the process industry.

ECOR-403 Corrosion Option (3 credits : 2L, 0T, 1B)
Course Content: Mechanism of corrosion; choice of materials of construction; coatings; cathodic and sacrificial anode protection; safety and environmental concerns; economic analysis; maintenance management.

EDES-412 Design Project (12 credits : 0L, 12T, 0B)
Course Content: An extensive design project will draw together during the last semester most of the subjects studied in this programme. A complete design will be performed for a chosen industrial process, including a technical analysis of the process, component specifications; a P&I diagram, a cost estimate and economic analysis, an environmental impact analysis, an analysis of operating flexibility at different production rates, and startup and shutdown recommendations.

**EPUD-405  Process and Utilities Design  (5 credits : 4L, 1T, 0B)**
Course Content: Methods of design for typical industrial processes; P&I diagrams; material choices; pump, compressor, condenser specification; vessel design and support systems; costing methods, effluent treatment processes; environmental considerations.

**EMEM-402  Membrane Separation Processes Option  (2 credits : 2L, 0T, 0B)**
Course Content: Types of membrane separation processes; types of polymers used; mechanisms of separation; adsorption/absorption-diffusion model; separation of impurities from water; gas separation processes; hydrocarbon separation processes; possible future developments.

**ECFD-403  Introduction to Computational Fluid Dynamics Option  (3 credits : 3L, 0T, 0B)**
Course Content: The basis for CFD software modelling packages; main areas of application; limitations and weaknesses; application to real world problems.

**EHPT-404  High Pressure / Temperature Engineering  (4 credits : 4L, 0T, 0B)**
Course Content: Pressure vessels and high pressure piping; codes and inspections; centrifugal and reciprocating compressors, valve fittings, safety; instrumentation and process control; choice of materials; heating methods; plant startup and shutdown; maintenance.

**EPPS-403  Professional Practice, Safety and The Environment  (3 credits : 3L, 0T, 0B)**
Course Content: Responsibilities of a professional engineer; ethics; engineering legal issues and liabilities; public and worker safety and health issues; sustainable development; environmental issues and responsibilities; role of professional organizations.

**ETES-402  Team Skills  (2 credits : 1L, 1T, 0B)**
Course Content: Effective team participation and management; team motivation and team building techniques; disruptive influences and how to handle them; negotiating skills; identification of strengths and weaknesses; why do teams fail?; why do teams succeed?; group practice.

**EPMT-403  Plant Maintenance  (3 credits : 2L, 1T, 0B)**
Course Content: Planned maintenance; maintenance scheduling; plant shutdowns; mean time between failures; economic balance between maintenance costs and rate of replacement; problem areas.
Bachelor of Engineering
in
Applied Process & Utilities Technology

*Electrical / Electronics / Instrumentation Option*

**DURATION:**
This programme is offered in an evening delivery mode only. It is equivalent to two years of full-time study but, taken in the evenings, will take a minimum of around 10 semesters. With three semesters being offered per year, this translates into $3\frac{1}{3}$ years of evening courses.

**CREDITS:**
Students graduate upon successful completion of 120 credits of new learning coursework with a minimum cumulative GPA of 2.0. Where no course exemptions are allowed, which will be the case for applicants who graduated more than five years previously, additional credits must be completed in those courses which would be exempted for recent graduates. These possible exemptions are shown in the table below as the shaded courses for graduates from an Electrical or Instrumentation Diploma programme (the Plant Instrumentation Systems course is the only exemption for the recent Electrical Diploma graduates).

**INTAKE:**
Students may start in any of the semesters during the year, subject to the required course(s) being offered in that semester.

**PROGRAMME OVERVIEW:**
This programme is designed to cater for the graduates from a 2-year Diploma programme who, usually working in industry, wish to upgrade their academic qualifications and managerial skills to revitalise their careers. The Chemical Option covers the process engineering operations that involve chemical transformation and reactions, as well as providing managerial type courses and broadening Humanities options. It has been designed to meet international standards for accreditation at a professional level and such accreditation will be sought as soon as possible.

**EMPLOYMENT OPPORTUNITIES:**
Graduates from this programme may expect to progress from a technical role in the process industries to a supervisory role. Employment will often be in a chemical plant producing ammonia, methanol or other chemicals, or be in a petroleum processing operation such as a refinery or LNG facility.

**ADMISSION REQUIREMENTS:**
A completed 2-year Diploma in one of the following areas with a minimum cumulative GPA of 2.5 is the normal entrance requirement: Chemical, Electrical, Instrumentation, Mechanical or Petroleum Technology. Some course exemptions are allowed for graduates from these programmes during the previous five years but, in any case, 120 credits of new learning are required for completion of this programme. Where no exemptions are allowed, the possible exemption courses (non-options) must all be completed in addition to the 120 credits required, but the applicant should consult the Head of the programme to discuss possible course exemptions.
Bachelor of Engineering in Applied Process & Utilities Technology

Electrical / Electronics / Instrumentation Option

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**Total 2nd Level:** 65

**Total Minimum Programme Credits Required:** 120

Note: Some exemptions from the above courses are granted for students who completed the Diploma programme within the last 5 years. The exemptions depend on the particular Diploma completed.
Bachelor of Engineering
in
Applied Process & Utilities Technology

Electrical / Electronics / Instrumentation Option

Note that this is a part-time programme and the courses are shown as Level 1 or Level 2 courses that correspond to Year 1 or Year 2 of a full-time programme.

**Level 1 Courses** (Note: 3h/week lectures, 1h/week tutorial, 2h/week lab = 3L, 1T, 2B)

**EMAT-306  Engineering Mathematics E1 (6 credits : 4L, 2T, 0B)**
Course Content: Differential equations and examples of how they arise in engineering analyses; solution of ordinary and partial differential equations; solution of the diffusion equation for heat conduction; linearisation and simplification; standard solutions; Bessel functions.

**ENUM-304  Numerical Techniques in Mathematics (4 credits : 2L, 0T, 2B)**
Course Content: Iterative solution of equations; splines; Newton-Raphson, Gauss methods; round-off and error propagation; finite difference techniques; Euler and Runge-Kutta techniques for differential equations; use of Matlab.

**ECHE-304  Organic and Physical Chemistry (4 credits : 2L, 1T, 1B)**
Course Content: Alkanes, alkenes, alkynes, alcohols, aldehydes, ketones, ethers, esters, aromatics and typical reactions; Grignard reagents; important industrial organic chemistry processes. Surface chemistry and adsorption/desorption; contact angles; wettability; interfacial tension; capillary action; diffusion processes.

**ESTP-304  Statistics and Probability (4 credits : 3L, 1T, 0B)**
Course Content: Data analysis, average and spread; permutations and combinations; random variables; probability distributions; mean and variance; normal and other distributions; random sampling; confidence levels; quality control; goodness of fit; regression and correlation analysis.

**EMEC-305  Engineering Mechanics (5 credits : 4L, 1T, 0B)**
Course Content: Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr's stress circle; pressure vessels.

**ECFE-304  Chemistry for Engineers II (4 credits : 2L, 1T, 1B)**
Course Content: Organic chemistry in industry; substitution, halogenation, oxidation and nitration of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry; formaldehyde, urea; thermosetting and thermoplastic resins.

**ETHR-303  Engineering Thermodynamics (3 credits : 2L, 1T, 0B)**
Course Content: Thermodynamic equilibrium; multicomponent systems and activity coefficients; first, second and third laws; enthalpy and entropy; equations of state; acentric factors; vapour-liquid equilibria; Gibbs free energy, fugacity and the phase rule; compression and expansion; heat engine cycles.

**EWCS-303 Advanced Writing & Communications Skills** *(3 credits : 1L, 2T, 0B)*
Course Content: The preparation of proposals for senior management; effective organisation of text and data in documents; adjusting writing style depending on target audience; more effective presentations; improving speaking skills; practice in effective presentations.

**EHUM-304 Humanities Option 1** *(4 credits : 3L, 1T, 0B)*
Course Content: This could be chosen from a list of acceptable Humanities courses which could include The History of the Caribbean; Engineering and Society; Caribbean Music; Caribbean Art; Political Science and Government.

**EHUM-303 Humanities Option 2** *(3 credits : 1L, 0T, 2B)*
Course Content: This would be a foreign language such as Spanish, French, German or Russian.

**EECN-302 Engineering Economics** *(2 credits : 2L, 0T, 0B)*
Course Content: Time value of money; discounted cash flows; net present value; payout time; return on investment; risk analysis; economies of scale; capital cost estimation for plants; operating costs.

**EBUS-302 Business Principles** *(2 credits : 2L, 0T, 0B)*
Course Content: Requirements for setting up a business; market survey; legal requirements; contracts; partnerships; financing methods; payrolls; accounting requirements; cash flow management; marketing and advertising; cost controls; tax issues; liability issues.

**EHCP-305 Heating and Cooling Processes** *(5 credits : 3L, 2T, 0B)*
Course Content: Refrigeration; refrigerants; compression and expansion; thermodynamic considerations; Joule-Thompson effect; air liquefaction; cryogenic and other processes; space cooling; air conditioning; humidity adjustment; cooling towers; air cooled heat exchangers; sizing of units.

**EPCN-306 Process Control** *(6 credits : 3L, 1T, 2B)*
Course Content: Various types of control loops; interaction of process and control systems; PID controllers and tuning; stability; cascade control; ratio control; multiloop control.

**EPIN-305 Plant Instrumentation Systems** *(5 credits : 2L, 1T, 2B)*
Course Content: Types of plant instrumentation used; measurement techniques for the main process variables; pneumatic, electronic controllers; digital and analogue systems; safety; signal transmission; SCADA systems; programmable logic controllers; distributed control systems; fail safe design.

**EMPE-304 Mechanical Plant Equipment** *(4 credits : 2L, 2T, 0B)*
Course Content: Pumps of various types; pump curves; turbines; power requirements; abrasion and wear on equipment; compressor types; compression; choice of materials; piping and sizing of pipes; pressure vessels and vessel construction; joining techniques; inspection techniques.

**EMUO-303 Mechanical Unit Operations** *(3 credits : 2L, 1T, 0B)*
Course Content: Separation techniques; cyclones, centrifuges, filtration, flocculation, settling and sedimentation, particle size effects; size reduction and particle agglomeration techniques; membrane separation processes; crystallisation; electrostatic separators; multiphase flow effects.

**EMAT-304 Engineering Mathematics E2 (4 credits : 2L, 2T, 0B)**
**Pre-requisite:** EMAT-306
Course Content: Optimisation techniques; constrained and unconstrained optima; linear programming; complex numbers; regression and curve fitting techniques; Lagrangian interpolation.

**Level 2 Courses**

**EEDS-404: Electrical Distribution Design (4 credits : 4L, 0T, 0B)**
Course Content: Design methods for electrical systems in the process industries; grid requirements; overload detection and response; power, voltage and amperage limitations; economic considerations; instrumentation and process control requirements.

**EPMC-405: Process Modelling and Control (5 credits : 3L, 2T, 0B)**
Course Content: Development of a mathematical model for the overall process; investigation of feedstock composition variation, flow rate variation; sensitivity to other process variables, advanced process control topics.

**EHUM-403 Humanities Option 3 (3 credits : 1L, 0T, 2B)**
Course Content: This could be a language such as Spanish, German, French or Russian, or a Management subject.

**EPMM-403 Personnel Management & Motivation Option (3 credits : 2L, 1T, 0B)**
Course Content: Management styles; theories of management; strategic planning; Maslow, Herzberg, Drucker, Kaplan and Norton; motivation, innovation and leadership theories.

**ESEG-407 Steam and Electricity Generation and Distribution (7 credits : 4L, 3T, 0B)**
Course Content: Boiler designs; feed water preparation and treatment; superheaters; oil or gas firing fuel; coal-fired boilers; boiler control systems; safety systems; steam turbines; cogeneration; electric generators; control systems and data management; transformers; transmission lines; substations; rectification; maintenance management.

**EPSS-404 Power Supply Systems in the Plant (4 credits : 3L, 1T, 0B)**
Course Content: Types of power required in the process plant; control and monitoring systems; power factors; load controlling; peak load handling; power shutdowns and failures; instrumentation requirements; computer control systems.

**EWWT-405 Water and Waste Treatment (5 credits : 4L, 1T, 0B)**
Course Content: Water purification processes; filtration; reverse osmosis; distillation; desalination; ion exchange processes; other membrane separation processes; oxygen and biodegradation; environmental considerations. Sewage treatment processes; waste disposal; health issues; environmental issues.

**EMET-404 Materials and Metallurgy (4 credits : 3L, 1T, 0B)**
Properties of materials, plastics, metals, alloys, composites; compositional effects; testing methods; analysis of test results; production methods; forming, extrusion, casting; crystal structures; joining,
welding, annealing, tempering; failure analysis; introduction to corrosion; costs and choice of materials for the process industry.

**ECOR-403 Corrosion Option (3 credits : 2L, 0T, 1B)**
Course Content: Mechanism of corrosion; choice of materials of construction; coatings; cathodic and sacrificial anode protection; safety and environmental concerns; economic analysis; maintenance management.

**EDES-412 Design Project (12 credits : 0L, 12T, 0B)**
Course Content: An extensive design project will draw together during the last semester, most of the subjects studied in this programme. A complete design will be performed for a chosen industrial process, including a technical analysis of the process, component specifications; a P&I diagram, a cost estimate and economic analysis, an environmental impact analysis, an analysis of operating flexibility at different production rates, and startup and shutdown recommendations.

**EPUD-405 Process and Utilities Design (5 credits : 4L, 1T, 0B)**
Course Content: Methods of design for typical industrial processes; P&I diagrams; material choices; pump, compressor, condenser specification; vessel design and support systems; costing methods, effluent treatment processes; environmental considerations.

**EMEM-402 Membrane Separation Processes Option (2 credits : 2L, 0T, 0B)**
Course Content: Types of membrane separation processes; types of polymers used; mechanisms of separation; adsorption/absorption-diffusion model; separation of impurities from water; gas separation processes; hydrocarbon separation processes; possible future developments

**EPPS-403 Professional Practice, Safety and The Environment (3 credits : 3L, 0T, 0B)**
Course Content: Responsibilities of a professional engineer; ethics; engineering legal issues and liabilities; public and worker safety and health issues; sustainable development; environmental issues and responsibilities; role of professional organizations.

**ETES-402 Team Skills (2 credits : 1L, 1T, 0B)**
Course Content: Effective team participation and management; team motivation and team building techniques; disruptive influences and how to handle them; negotiating skills; identification of strengths and weaknesses; reasons why teams fail and why teams succeed; group practice.

**EPMT-403 Plant Maintenance Option (3 credits : 2L, 1T, 0B)**
Course Content: Planned maintenance; maintenance scheduling; plant shutdowns; mean time between failures; economic balance between maintenance costs and rate of replacement; problem areas.
Bachelor of Engineering
in
Applied Manufacturing Technology

PROGRAMME OVERVIEW
This programme is offered only on a part-time basis as a post-Technician degree based on the UTT Diploma in Manufacturing Engineering Technology. It consists of the equivalent of four full-time semesters of study which translates into at least 10 semesters of evening courses. With 3 semesters being offered per year, this corresponds to 3⅓ years of part-time study. It is designed to upgrade Engineering Technicians who are currently working in the Manufacturing Industry to the level of an Engineering professional. It provides an in-depth training that allows graduates to function as highly skilled members of an engineering team in a wide spectrum of engineering functions.

EMPLOYMENT OPPORTUNITIES
Graduates of this programme will be able to function at senior levels in the Manufacturing Industry, in areas of production, maintenance, design, marketing and management.

ADMISSION REQUIREMENTS
A UTT Diploma in Manufacturing Engineering Technology with a minimum cumulative GPA of 2.5 is required. Candidates with other recognized Technician qualifications may be required to take some additional courses.

INTAKE
September of each year.

CREDITS
120 credits with a minimum cumulative GPA of 2.0 are required to graduate.
# Bachelor of Engineering in Applied Manufacturing Technology

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- 136 -
Bachelor of Engineering in Applied Manufacturing Technology

1st Level : 1st Semester

ENGL-203 English Composition (3 credits)
Course Content: Students explore the differences between speech and writing. They analyse writing characteristics, conventions and principles for a variety of writing functions in a range of personal and public situations.

MATH-303 Mathematics for Technology III (3 credits)
Course Content: Complex numbers; conformal mapping; Laplace equation application to heat and fluid flow; Fourier analysis and partial differential equations; Fourier transform; application to heat conduction and diffusion equations.

DSGN-213 Design Using AutoCAD 3D (3 credits)
Course Content: Use of Computer Aided Design software in the design and engineering of machinery, machine components, and mechanical systems.

HIST-203 History of the West Indies (3 credits)
Course Content: The Course traces the history of the Caribbean region since the 1830’s including the abolition of slavery, post slavery experiments and economic developments.

COMP-206 C++ Programming (3 credits)
Course Content: Introduction to C++ programming techniques; file structures; data manipulation; subroutines and functions; efficiency of code.

DSGN-215 Design Using Solidworks (4 credits)
Course Content: Use of parametric Computer Aided Design software in the design and engineering of machinery, machine components, and mechanical systems. Introduction to Finite Element Analysis and Animation.

SOCY-203 Behavioural Science (3 credits)
Course Content: Nature and principles of sociology, interrelationships of personality, culture, and society, social pressures, organizations, and functions. Developing emotional intelligence.

FINC-303 Financial Management and Economics (3 credits)
Course Content: Principles of Economics; Costing methods; Activity based costing; Working Capital management; manufacturing systems economics; techno-economic analysis of capital investment projects; Financing mechanisms; Company law

EMEC-215 Engineering Mechanics II (3 credits)
Course Content: Centroids and CG; friction; vector analysis; relative velocity and projectile motion; dynamics of mechanisms; vibration analysis.
1st Level : 2nd Semester

**INTR-203 International Relations** (3 credits)
Course Content: Analytical tools of International Relations with their strengths and weaknesses. Relationship between International Relations theory and practices. New issues in IR.

**MNFG-314 Materials & Processes (Electronic)** (4 credits)
Course Content: Electrical components and interconnections; PCB Manufacture; Electronic component manufacture; Automatic Assembly; Soldering and Cleaning; Inspection and Testing.

**ELEC-204 Electrical Technology** (4 credits)
Course Content: Characteristics and operation of dc and ac motors, generators, and transformers. Basic motor control principles. Load calculations. Distribution and Transmission.

**DRMA-203 Drama** (3 credits)
Course Content: Introduction to elements of Drama. Use of drama to impart individual and group behavioural modification techniques.

**CTRM-203 Contracts Management (CR 3.0)**
Course Content: To provide students with an understanding of the key concepts, skills and issues involved in Contract Management.

**SMTL-204 Strength of Materials II (CR 4.0)**
Course Content: Two and three dimensional stresses; Combined stress systems; nonsymmetrical loadings; fatigue and impact applications; stresses due to rotation; analysis of thick cylinders; bending of curved beams, applications of strain gauge circuitry; fatigue. Behaviour of prismatic bars, thin plates and shells. Thermal stresses. Fracture mechanics.

**ETHS-203 Ethics (CR 3.0)**
Course Content: Exposure to the knowledge and life skills necessary to think through difficult ethical decisions encountered in organizational situations and to make responsible decisions. Development of standards of professionalism to allow the practitioner to identify, analyse and resolve ethical issues in business decision making.

**PROD-403 Production Management (CR 3.0)**
Course Content: Production Systems; Decision making tools; forecasting; aggregate planning, inventory management and JIT tactics; scheduling; production control systems; Plant Layout and Material Handling.

**ELEC-313 PLC Control** (3 credits)
Course Content: PLC design and applications.

2nd Level : 1st Semester

**MKTG-403 Sales and Marketing** (3 credits)
Course Content: Marketing orientation of the political, social, legal, and economic environments. Development of marketing programmes incorporating these perspectives. Formulation of strategies for the design, pricing, channels, and promotion of products/services. Basic concepts of selling. Concepts and strategies in international marketing, negotiation skills and buying behavior, electronic commerce.
ELEC-323 Microprocessor Control (CR 3.0)
Course Content: Architecture and operation of microprocessor-based systems, including basic hardware and software.

DSGN-405 Finite Element Analysis (CR 4.0)
Course Content: Finite Element methods; Matrix techniques, eigenvalue problems, equations of elasticity, plane stress, plane strain, 3D problems, variation methods, element types, element stiffness, mass matrices and load vectors, assemblage of elements, boundary conditions, Application of Method for Stress, Flow and Thermal solutions

MGMT-413 Human Resource Management (CR 3.0)
Course Content: Principles and practice of Human Resource Management

MNFG-324 Robotics and Automated Manufacture (CR 6.0)
Course Content: Automated manufacturing Systems; Robotics; AS/RS Systems; Automated Process control systems.

MGMT-405 Manufacturing Systems Management (CR 4.0)
Course Content: Strategic Planning; Manufacturing systems, including layout, maintenance, material handling and controls. Lean manufacturing, cost analysis, and manufacturing economics.

DSGN-304 Product Design and Innovation (CR 3.0)
Course Content: Synthesis of materials, design and processes into final products. Lateral thinking and innovative approaches. Concurrent Engineering; Design techniques such as QFD, DFA, FMEA etc.; Rapid Prototyping; Human Factors and Ergonomics.

INDR-403 Industrial Relations (CR 3.0)
Course Content: Industrial Relations Act; Industrial Relations Practice; Negotiation; Disciplinary Procedures;

2nd Level: 2nd Semester

HSEE-403 HSE Engineering (CR 3.0)
Course Content: HSE standards; Safety problems and safe practices in industry; Safety systems for industry Environmental impact of air, water, waste and noise. Handling of waste and perception of risk, environmental responsibility and sustainable development; Environmental health and safety issues. Systems for environmental control.

ENTR-403 Entrepreneurship (CR 3.0)
Course Content: An overview of entrepreneurship including innovation, business opportunities; concept generation and development; development of a business plan for entrepreneurs. Financial Instruments. Case studies in innovation.

PROJ-426 Final Project 1 (26 credits)
Course Content: Comprehensive Project encompassing all stages from conception to implementation plan, utilizing substantial elements of technology tools, such as design, manufacture, management, planning, finance and marketing.
Bachelor of Applied Information Systems Technology

*Information Systems Development Option*

**DURATION**
This programme consists of the equivalent of four (4) full-time semesters. The programme is run in a part-time mode only, however, and will require approximately 10 part-time semesters or 3⅓ years for completion.

**CREDITS**
121 credits of new learning with a minimum cumulative GPA of 2.0 are required to graduate.

**INTAKE**
September of each year.

**PROGRAMME OVERVIEW**
*Information Systems Development (ISD)* concentrates on the advanced skills required to manage the process of computer information systems development using the most current methodologies and tools.

This degree programme integrates theory and practice in management and advanced technical skills to help graduates succeed in the demanding field of information technology. To ensure the training is relevant to today’s business needs, the curriculum has been designed in cooperation with leading business and industry partners. The programme can be customized to meet students’ specific career objectives. Students take core studies, to provide a common background in management principles and then choose a technical major, which includes theory, lab and project courses and work experience terms.

The programme is primarily designed to upgrade the education of Technology diploma graduates, but is sufficiently flexible to accommodate a variety of educational backgrounds.

**EMPLOYMENT OPPORTUNITIES**
Graduates of this programme will be prepared for employment as Systems Architects, Designers, Project Managers, Project / Team Lead, DB Analysis, Administrators and Programmer/Requirement Engineer/Tester

**ADMISSION REQUIREMENTS**
This requires the successful completion of the Diploma in Technology with a minimum cumulative GPA of 2.5 or a National Technician’s Diploma (with a minimum 65% average) or equivalent in the relevant discipline. Employment in the field is preferable. Applicants who completed their Diploma in Technology or National Technician’s Diploma more than five years previously will be required to successfully complete one (1) semester of bridging courses.
Bachelor of Applied Information Systems Technology

*Information Systems Development (ISD) Option*

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*Total 2nd Level:* 62 23 9 30

*Total Minimum Programme Credits Required:* 121 55 20 46
Bachelor of Applied Information Systems Technology

Information Systems Development (ISD) Option

[Note that this is a part-time programme and the courses are shown as Level 1 or Level 2 courses that would correspond to Year 1 or Year 2 of a full-time programme.]

Level 1:

**APSM-420 Project Management for IT Professionals (4 credits)**
Course Content: This course will focus on the investigation and application of appropriate project management skills for those in supervisory, leadership and/project leadership management positions in the information systems technology profession.

**APST-501 Requirements Engineering (4 credits)**
Course Content: Upon successful completion of this course, the learner will be able to define, document and exploit a process by which the functionality and behavior of a complex IT system may be determined and documented. They will apply this process to produce a specification that would be part of the analysis and design of a system.

**APST-404 Business Communication Improvement (3 credits)**
Course Content: This course provides learners with the concepts, tools, and techniques necessary to create business documents, make presentations, and conduct meetings.

**APSE-401 Software Engineering Life Cycles (4 credits)**
Course Content: This course presents the learner with an overview of methodologies to the engineering of software lifecycles as well as the standards that have emerged to ensure that quality is preserved throughout those lifecycles.

**APSE-502 Software Testing and Maintenance (4 credits)**
Course Content: In this course learners examine the design, management and implementation of software testing environments. Learners practice the continuous improvement process using a variety of techniques: test-first design, unit testing, continuous integration and refactoring. Tools such as knowledge management software, automated testing, build tools and revision control systems are used in both the UNIX and Windows environments.

**APSD-406 Object Oriented Information Engineering (4 credits)**
Course Content: Upon successful completion of this course, the learner will be able to apply object-oriented methodologies in the determination of an optimal Information Technology System's structure (its "architecture"). They will have a basic understanding of the technologies that make alternative architectures possible (eg. middleware).

**APSM-430 Business Management for IST Professionals (4 credits)**
Course Content: The student will be able to describe and evaluate the computer network as part of an organization's strategic plan, identify and describe the wide range of network applications in business, explain what the Internet is and how it can be used for business applications in a competitive environment, apply tools and techniques for analyzing and assessing computer network opportunities, analyze opportunities and formulate strategies for sustaining organizational success, analyze network opportunities and formulate strategies for achieving personal goals in a business
setting, evaluate the computer network requirements for a business, evaluate alternative network solutions and select the most appropriate, and discuss emerging and future network applications, and their implications for business opportunities.

**APSD-405 Database Design (4 credits)**
Course Content: This course investigates the design issues which Distributed Database Systems (DDBS) and Component Database Management Systems (CDBMS) present to the IT developer, and explores techniques and principles which lead to effective data distribution and transaction processing strategies. The learners research, analyze and assess using asymptotic complexity various algorithms of data distribution, allocation, query optimization, transaction concurrency control and recovery. Modern topics of distributed multimedia and temporal databases are also investigated.

**APSR-409 Computer Architecture (4 credits)**
Course Content: The course covers the basic organizations of computer systems including instruction-set architecture, execution pipeline, memory hierarchy, and I/O subsystem. It also addresses advanced processor micro architecture issues such as dynamic instruction scheduling, branch prediction, lock-up free caches, instruction-level parallelism, multiple instruction fetch/issuing, speculative execution, etc. to improve computer processor performance. Shared-memory multiprocessor systems with coherent caches to reduce memory access latency are also covered.

**APSE-503 Embedded Systems Programming (4 credits)**
Course Content: The course covers programming at the microprocessor level using C and assembly programming languages. Topics include programming in a real time operating system environment, device drivers, boot loading, remote debugging, and real time communications.

**APSE-506 Middleware Technologies (4 credits)**
Course Content: The course covers middleware technologies; CORBA, DCOM, COM+, JAVA RMI, EJB and their applications in distributed environment.

**APSD-407 Algorithm Analysis and Design (4 credits)**
Course Content: This course focuses on the design and analysis of algorithms. A variety of different algorithm design techniques are explored, and example problems and algorithms are worked through in class. The time-complexities of algorithms are analyzed using asymptotic analysis (big-O and its relatives) and compared, with an emphasis on finding fast and efficient algorithms.

**APEM-450 Engineering Mathematics (5 credits)**
Course Content: The course covers propositional logic, set theory, relations, graph and transformation. Topics are treated with particular emphasis on application to the computer engineering discipline.

**APTS-407 Team Skills (3 credits)**
Course Content: Identify the stages of team development in your own work teams. Evaluate your interpersonal skills as both a team member and a team leader, and enhance relationships within your work teams. Apply a range of tools to manage individual and team performance. Evaluate, apply and refine your team skills in the workplace. Give and receive feedback with greater confidence and effectiveness.
Recognize the indicators of high performing teams.

**APFC-408 Financial Control and Budgets** *(4 credits)*
Course Content: Course covers finance management, accounting, types of budget, cost structures and practical approaches to budgeting.

**Level 2:**

**APNM-403 Network Databases** *(4 credits)*
Course Content: Distributed information systems present a wide variety of challenges to system architects and network managers. This course examines the variety of topologies available to distributed databases, the technology used to connect these distributed entities, and the network bandwidth characteristics associated with each topology. On completion, given a specific network bandwidth pattern, the learner will be able to predict likely underlying database topologies.

**APST-530 Adopting Emerging Technologies in IST** *(4 credits)*
Course Content: The focus in this course will be on the importance of the identification of emerging technologies for those in supervisory and/or management positions in the Information Systems technology profession. Topics may include identifying sources of information relating to emerging technologies; the importance of understanding and projecting major vendor strategies; evaluation of emerging technologies and proposals based on technology standards; recommending technology standards; selecting technology and/or emerging technologies for a business need; and adapting to emerging technologies. A cost benefit analysis of adapting a number of current emerging technologies to different case circumstances will be discussed. Some or all of the skills covered in this course are expected to be practiced in both the advanced systems courses and the credit work experience.

**APSD-502 Systems Development Design Project** *(4 credits)*
Course Content: This course has been designed to be an effective bridge between the classroom and the work experience components of the BAI program. Working in teams, the learners will produce a distributed information system architectural design for a real world client of their own choosing. It is expected that the client will have been secured during the prerequisite APSM 430 course.

**APSD-501 Database Administration Concepts** *(4 credits)*
Course Content: This course explains the features and expectations of relational database management. It provides an in-depth examination of the Oracle database system followed by comparisons with SQL server and DB2.

**APSD-525 Introduction to Multimedia** *(4 credits)*
Course Content: To provide an overview of the techniques and technology required for the design, storage and delivery of multimedia material in distributed information systems, and through coursework to provide practical experience of the hardware and software co-design issues in developing multimedia technology.

**APSE-425 Introduction to Compiler** *(4 credits)*
Course Content: Introduction to Compiler theory; Syntactical specifications, grammar and languages; Terminology in programming analysis, Lexical analysis; Top-down and bottom down techniques; table techniques optimization and organization; Regular expression and finite state
techniques; Storage organization and dynamic storage allocation; Symbol tables, semantic routines, error recovery, interpreters and load optimization; Intermediate code generation and optimization.

**APSE-535 Data Mining and Warehousing (4 credits)**
Course Content: This course will present the current state of research in strategies for enterprise-access to data for decision support and knowledge discovery. The course will cover both research and industrial practice in business intelligence, spanning the following three processes:
Data Warehousing – extracting, cleaning, and organizing data from transactional databases
Data Mining – taking warehouse data and extracting patterns and relationships
Decision Support – taking the patterns extracted from the data and making management decisions.

**APSE-504 Internet Software Techniques (4 credits)**
Course Content: The concepts and issues of enterprise Web development and the current technologies in the area are discussed during the course. The learners will build a set of simple but real-life program/applications based on a mix of different tools on different tiers of distributed Web systems. Preference is given to covering basic Web technologies, HTTP client/server middleware, SQL and Call-Level Interfaces (including ODBC and JDBC). Learners will use shell scripts, Java and XHTML in their applications, and learn how to use a J2EE (Enterprise Edition) and applications servers for deployment. An overview of .NET platforms will be given. They will also practice writing document type definitions and schemas for XML applications, manipulating and linking XML data, and interchanging document fragments.

**APEB-556 eBusiness (5 credits)**
Course Content: This course provides an introduction to eBusiness or business that takes place online. Online business is increasingly important in our networked world of global transactions and global competition. This course will examine five major topic areas: (1) Introduction to eBusiness; (2) Electronic Retailing; (3) Introduction to eCommerce; (4) eBusiness Marketing; and (5) eBusiness Infrastructures. (6) Internet Security

**LDSH-520 Leadership Development Studies (4 credits)**
Course Content: The central focus of this course is to provide emerging and existing leaders the opportunity to explore the concept of leadership and to develop and improve their leadership skills. This course and its instructors have been certified by the PHI THETA KAPPA International Honour Society of the Two-Year College in the U.S.

**APIS-507 Industrial Strategic and Business Planning (3 credits)**
Course Content: Course demonstrates a knowledge of the concepts of Integrated Logistics Management, identifies opportunities for the implementation of Integrated Logistics Management design or modifies an infrastructure to support and develop an Integrated Logistics Management program.

**APM-555 Introduction to Sales and Marketing (3 credits)**
Course Content: The course includes case studies in marketing and sales—real-life examples of marketing problems related to IT—to give students practice in decision making and to improve their communication skills.

**PRAC-559 ISD Work Experience/Project (15 credits)**
Course Content: Allows the student to be placed in an approved industry supervised advanced work experience appropriate to the student’s chosen major. The skills covered in the academic semesters
of the Applied Degree are expected to be practised in this credit work experience. Completion criteria will be assessed by a team with representation from the employer, and UTT.
Bachelor of Applied Information Systems Technology

Network Management (NTM) Option

DURATION
This programme consists of the equivalent of four (4) full-time semesters of study. However, it is run in a part-time mode only and will require approximately 10 semesters or 3 ⅓ years for completion.

CREDITS
121 credits of new learning with a minimum cumulative GPA of 2.0 are required to graduate.

INTAKE
September of each year.

PROGRAMME OVERVIEW
Network Management (NTM) focuses on the design, implementation, optimization and maintenance of data network infrastructures. It provides familiarity with local and wide area network architectures and the system management requirements in complex multi-protocol, multi-vendor environment.

This degree programme integrates theory and practice in management and advanced technical skills to help graduates succeed in the demanding field of information technology. To ensure the training is relevant to today’s business needs, the curriculum has been designed in cooperation with leading business and industry partners. The programme can be customized to meet students’ specific career objectives. Students take core studies, to provide a common background in management principles and then choose a technical major, which includes theory, lab and project courses and work experience terms.

The programme is primarily designed to upgrade the education of technology diploma graduates, but is sufficiently flexible to accommodate a variety of educational backgrounds.

EMPLOYMENT OPPORTUNITIES
Graduates of this programme will be prepared for employment as Network Architects / Analysts, Network Managers, IT Infrastructure Managers, IT Help Desk Managers and Networking Team Leaders/Network Security Advisors.

ADMISSION REQUIREMENTS
Successful completion of the Diploma in Technology with a minimum cumulative GPA of 2.5 or a National Technician’s Diploma (with a minimum 65% average) or equivalent in the relevant discipline. Employment in the field is preferable. Applicants who achieved their Diploma in Technology or National Technician’s Diploma more than five years ago will be required to successfully complete one (1) semester of bridging courses.
Bachelor of Applied Information Systems Technology

Network Management (NTM) Option

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Total 2nd Level: 62 24 9 29

Total Minimum Programme Credits Required: 121 55 19 47
Bachelor of Applied Information Systems Technology

Network Management (NTM) Option

[Note that this is a part-time programme and the courses are shown as Level 1 or Level 2 courses that would correspond to Year 1 or Year 2 of a full-time programme.]

Level 1:

**APSM-420 Project Management for IT Professionals** *(4 credits)*
Course Content: This course will focus on the investigation and application of appropriate project management skills for those in supervisory, leadership and/project leadership management positions in the information systems technology profession.

**APST-501 Requirements Engineering** *(4 credits)*
Course Content: Upon successful completion of this course, the learner will be able to define, document and exploit a process by which the functionality and behavior of a complex IT system may be determined and documented. Students will apply this process to produce a specification that would be part of the analysis and design of a system.

**APST-404 Business Communication Improvement** *(3 credits)*
Course Content: This course provides learners with the concepts, tools, and techniques necessary to create business documents, make presentations, and conduct meetings.

**APNM-401 Operating Systems for Networking** *(4 credits)*
Course Content: This course covers the UNIX operating system and basic Solaris Operating Environment commands. Fundamental command line features of the Solaris Operating Environment including file system navigation, file permissions, the vi text editor, command shells, and basic network use will be covered. Learners are introduced to the Practical Extraction and Report Language (PERL) programming language. The course covers PERL semantics and syntax including scalars, arrays, associative arrays, regular expressions, file handles, conditional and looping constructs, the UNIX system interface, subroutines and report writing.

**APNM-402 Network Architecture I** *(4 credits)*
Course Content: This course introduces the learner to the design, configuration and maintenance of Local Area Networks (LANs) and Wide Area Networks (WANs). The OSI model and Ethernet protocol, as essential elements in understanding LAN technology, are covered in detail. Practical experience is achieved in cabling, routing, IP addressing, routing protocols and network troubleshooting.

**APSM-430 Business Management for IST Professionals** *(4 credits)*
Course Content: The student will be able to describe and evaluate the computer network as part of an organization's strategic plan, identify and describe the wide range of network applications in business, explain what the Internet is and how it can be used for business applications in a competitive environment, apply tools and techniques for analyzing and assessing computer network opportunities, analyze opportunities and formulate strategies for sustaining organizational success, analyze network opportunities and formulate strategies for achieving personal goals in a business setting, evaluate the computer network requirements for a business, evaluate alternative network
solutions and select the most appropriate, and discuss emerging and future network applications, and their implications for business opportunities.

**APSR-409 Computer Architecture (4 credits)**
Course Content: The course covers the basic organizations of computer systems including instruction-set architecture, execution pipeline, memory hierarchy, and I/O subsystem. It also addresses advanced processor micro architecture issues such as dynamic instruction scheduling, branch prediction, lock-up free caches, instruction-level parallelism, multiple instruction fetch/issuing, speculative execution, etc. to improve computer processor performance. Shared-memory multiprocessor systems with coherent caches to reduce memory access latency are also covered.

**APNM-501 Network Operating Systems (4 credits)**
Course Content This course provides an in-depth look at network management, Unix operating system, network and server performance and security.

**APNM-502 Network Management Techniques (4 credits)**
Course Content The course provides learners with practical experience utilizing the skills learned in the prerequisite courses. Project teams will be formed to work on IT design projects. The learners are expected to demonstrate their proficiency in their technical areas and project management and also their understanding of the system development methodology. The course starts with the system requirement phase and ends with the conceptual or technical design phase and a business case. The focus of this course is on understanding problem/opportunity, identifying alternatives, recommending and justifying the recommended solution.

**APNM-503 Network Architecture II (4 credits)**
Course Content: This course extends the learner's knowledge and practical experience with the design, configuration and maintenance of switches, Local Area Networks (LANs), Wide Area Networks (WANs) and Virtual local-area networks (VLANs).

**APEM-450 Engineering Mathematics (5 credits)**
Course Content: The course covers propositional logic, set theory, relations, graph and transformation. Topics are treated with particular emphasis on application to the computer engineering discipline.

**APAM-545 Advanced Microprocessors (4 credits)**
Course Content: The course covers architecture, programming and interfacing concept of latest micro process of Intel, Motorola and Zilog families and their application in real environment.

**APTS-407 Team Skills (3 credits)**
Course Content: The course will cover the following topics:
- Identify the stages of team development in your own work teams.
- Evaluate your interpersonal skills as both a team member and a team leader, and enhance relationships within your work teams.
- Apply a range of tools to manage individual and team performance.
- Evaluate, apply and refine your team skills in the workplace.
- Give and receive feedback with greater confidence and effectiveness.
- Recognize the indicators of high performing teams.

**APFC-408 Financial Control and Budgets (4 credits)**
Course Content: The course covers finance management, accounting, types of budget, cost structures and practical approaches to budgeting.

**APNM-404 Network Management Research Project (4 credits)**
Course Content: Network management entails monitoring and controlling various network devices on today's networks in order to provide a more reliable, secure and efficient network environment. This course covers the basic concepts and techniques used in network management. Learners will develop a prototype network management system.

**Level 2:**

**APST-530 Adopting Emerging Technologies in Information Systems Technology (4 credits)**
Course Content: The focus in this course will be on the importance of the identification of emerging technologies for those in supervisory and/or management positions in the information systems technology profession. Topics may include identifying sources of information relating to emerging technologies; the importance of understanding and projecting major vendor strategies; evaluation of emerging technologies and proposals based on technology standards; recommending technology standards; selecting technology and/or emerging technologies for a business need; and adapting to emerging technologies. A cost benefit analysis of adapting a number of current emerging technologies to different case circumstances will be discussed. Some or all of the skills covered in this course are expected to be practiced in both the advanced systems courses and the credit work experience.

**APNM-403 Network Databases (4 credits)**
Course Content: Distributed information systems present a wide variety of challenges to system architects and network managers. This course examines the variety of topologies available to distributed databases, the technology used to connect these distributed entities, and the network bandwidth characteristics associated with each topology. On completion, given a specific network bandwidth pattern, the learner will be able to predict likely underlying database topologies.

**APNM-556 Advanced Mathematics for Communications (3 credits)**
Course Content: This course covers selected topics of mathematics applicable for communications.

**APNM-557 Wireless, Fiber Optics and Broadband Communication (5 credits)**
Course Content: The course covers an overview of wireless communications, optical communication systems, the characteristics of optical fibers, optical waveguides, optical sources and transmitters, optical detectors and receivers, optical amplifiers, noise and detection, dispersion in optical communication systems and introduction to broadband communication.

**APNM-558 Network Security (4 credits)**
Course Content: The course covers sources of security threats: hackers, crackers and "script kiddies", detecting and dealing with viruses security, encryption methods, and firewalls: TCP/IP and Internet security, building secure networks, sources of leaks in LANs and WANs.

**APNM-559 Convergent Networks for Voice and Data (4 credits)**
Course Content: The course covers industry standards, protocols and infrastructure for convergent networks, telephony concepts and fundamentals, voice over convergence, challenges of integrating circuit-switched and packet-switched networks and troubleshooting.
APSD-525  Introduction to Multimedia (4 credits)
Course Content: To provide an overview of the techniques and technology required for the design, storage and delivery of multimedia material in distributed information systems, and through coursework to provide practical experience of the hardware and software co-design issues in developing multimedia technology.

APEB-556  eBusiness (5 credits)
Course Content: This course provides an introduction to eBusiness or business that takes place online. Online business is increasingly important in our networked world of global transactions and global competition. This course will examine five major topic areas: (1) Introduction to eBusiness; (2) Electronic Retailing; (3) Introduction to eCommerce; (4) eBusiness Marketing; and (5) eBusiness Infrastructures. (6) Internet Security

LDSH-520  Leadership Development Studies (4 credits)
Course Content: The central focus of this course is to provide emerging and existing leaders the opportunity to explore the concept of leadership and to develop and improve their leadership skills. This course and its instructors have been certified by the PHI THETA KAPPA International Honour Society of the Two-Year College in the U.S.

APNM-535  Digital Signal Processing (4 credits)
Course Content: This course covers channels and information capacity, concept of resolution, sampling, commanding, digital modulation, coding, decoding, filtering and other concepts of digital signal processing.

APIS-507  Industrial Strategic and Business Planning (3 credits)
Course Content: The course demonstrate a knowledge of the concepts of Integrated Logistics Management, identify opportunities for the implementation of Integrated Logistics Management design or modify an infrastructure to support and develop an Integrated Logistics Management program.

APM-555  Introduction to Sales and Marketing (3 credits)
Course Content: The course includes case studies in marketing and sales - real-life examples of marketing problems related to IT - to give students practice in decision making and to improve their communication skills.

PRAC-558  NTM Work Experience/Project (15 credits)
Course Content: Allows the student to be placed in an approved and supervised industry advanced work experience appropriate to the student's chosen major. The skills covered in the academic semesters of the Applied Degree are expected to be practised in this credit work experience. Completion criteria will be assessed by a team with representation from the employer, and the educational institution.
BACHELOR OF SCIENCE PROGRAMMES

Bachelor of Science
in
Petroleum Engineering

DURATION
This is a 4-year full-time programme consisting of two 16-week academic semesters per year with a third work term semester each year in the summer.

CREDITS
Graduation from the programme requires successful completion of 232 credits in prescribed courses with a minimum cumulative GPA of 2.0.

INTAKE
September of each year.

PROGRAMME OVERVIEW
This programme prepares graduates to enjoy a career in the energy industry or to enter and continue the practice of engineering at a professional level. In addition, qualified graduates may pursue graduate study in petroleum engineering and related fields. Over a four-year period, students undertake:

- Mathematics, basic science and geology plus engineering topics that develop a working knowledge of fluid mechanics, strength of materials, transport phenomena, material properties, phase behaviour, and thermodynamics.
- Petroleum engineering topics that develop competence in: (1) design and analysis of well systems and procedures for drilling and completing wells; (2) characterization and evaluation of subsurface geological formations and their resources using geoscientific and engineering methods; (3) design and analysis of systems for producing, injecting, and handling fluids; (4) application of reservoir engineering principles and practices to optimize resource development and management; and (5) use of project economics and resource valuation methods for design and decision making under conditions of risk and uncertainty.
- A major capstone project that prepares students for working in teams and applying the knowledge and skills acquired in earlier coursework and incorporating engineering standards and realistic constraints.

The programme is designed to meet the academic requirements for international accreditation as a professional engineering qualification.

ADMISSION REQUIREMENTS
The normal admission requirement is a pass in CAPE II or in the Cambridge General Paper (or the CAPE Communication Studies and Caribbean Studies), and the ALevel subjects: Mathematics and either Chemistry or Physics, plus O-Level/CSEC Physics and Chemistry. Graduates from a 2-year engineering Diploma programme with a minimum GPA of 3.0 will be considered with some credit being given for Diploma courses which are substantially equivalent to the BSc courses. This is done on a case by case basis, but should generally result in a requirement of about three additional years of study to earn the BSc degree after the engineering Diploma. Other previous tertiary level qualifications will be considered, and any additional academic upgrading courses required to enter the programme will be identified.
Bachelor of Science in Petroleum Engineering

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**Total 2nd Year: 1st Semester/ 2nd Semester:** 30/28 18/13 7/0 5/15

**Total Programme Credits:** 232
Bachelor of Science  
in  
Petroleum Engineering

1\textsuperscript{st} Year Courses

**CHEM-106 Chemistry for Engineers I (6 h/week: 3L, 1T, 2B)**  
Course Content: Basic atomic and molecular structure; chemical bonding and kinetics; acid-base and solubility equilibria; electrochemistry and REDOX phenomena; chemical examples from industrial applications.

**COMM-103 Communications (3 h/week: 2L, 1T, 0B)**  
Course Content: Report and presentation preparation; format, audience and location identification; preparation; use of presentation materials and software/hardware; practice with peer groups; good and bad presentation techniques; how to ensure the message is received; practice in preparing written technical reports, memos, e-mails and letters; appropriate formats for written materials.

**COMP-105 Introduction to Computing (5 h/week: 1L, 0T, 4B)**  
Course Content: Visual Basic for Applications (VBA) programming for spreadsheet manipulation of data; programme elements such as variable types, data storage, looping, branching, conditional tests, subroutines and functions; practice in writing programmes to carry out typical mathematical operations on spreadsheet data.

**MATH-110 Mathematics I (10 h/week: 7L, 3T, 0B)**  
Course Content: Functions, limits; derivatives; partial derivatives; integrals; matrices; vectors; determinants; systems of equations, eigenvalues and eigenvectors.

**PHYS-105 Physics for Engineers (5 h/week: 3L, 1T, 1B)**  
Course Content: Fundamentals of electricity and magnetism; resistance, capacitance and induction; circuit theory; magnetic fields and conductors; electric motors; transformers; semiconductors.

**CHEM-116 Chemistry for Engineers II (6 h/week: 3L, 1T, 2B)**  
Course Content: Physical chemistry; surface phenomena; capillary action; surface and interfacial tension; wetting and contact angles; adsorption, desorption; organic chemistry; alkanes, alkenes, alkynes, alcohols, ethers and typical reactions; substitution, halogenation, oxidation and nitration of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry.

**ENGD-108 Engineering Design I (8 h/week: 4L, 4T, 0B)**  
Course Content: A problem-based learning (PBL) course. Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr’s stress circle; pressure vessels. Development of freehand sketching abilities; isometric projections; plan and elevation views; the golden mean; reading technical drawings; guided practice in skill development.
**ELEC-106 Electrical and Electronic Systems and Circuits (6 h/week : 4L, 1T, 1B)**
Course Content: Application of electrical and electronic components in typical circuits; diodes, amplifiers, rectifiers, gating devices; electrical equipment design; motors and starters; fundamentals of wireless communication; frequency and amplitude modulation; digital systems.

**MATH-119 Mathematics II (9 h/week : 6L, 3T, 0B)**
Pre-requisite: MATH-110
Coordinate systems; multiple integrals; vector calculus; grad; div; curl; line and surface integrals;
Course Content: series; power, Taylor and Maclaurin series.

### 2nd Year Courses

**COMP-206 Computer Programming (6 h/week : 2L, 0T, 4B)**
Course Content: Introduction to C++ programming techniques; file structures; data manipulation;
subroutines and functions; efficiency of code.

**GEOL-204 Geology of Engineering (4 h/week : 2L, 0T, 2B)**
Course Content: This course introduces the geological processes, conditions, materials, and history,
and their importance in engineering problems.

**MBAL-206 Mass, Momentum and Energy Balances (6h/week: 4L, 2T, 0B)**
Course Content: Laws of Conservation; mechanical energy equation; Bernoulli’s theorem; simple
mixing and flow examples; combined mass and energy balances; application to industrial
processes.

**MATH-208 Mathematics III (8 h/week : 5L, 3T, 0B)**
Pre-requisites: MATH-110, MATH-119
Course Content: This course covers ordinary and partial differential equations; solution methods;
series solutions; Laplace transforms; convolution; systems of equations; Bessel functions.

**STAT-204 Statistics and Probability (4h/week: 3L, 1T, 0B)**
Course Content: Data analysis, average and spread; permutations and combinations; random
variables; probability distributions; mean and variance; normal and other distributions; random
sampling; confidence levels; quality control; goodness of fit; regression and correlation analysis.

**PROD-204 Introduction to Production and Completions (4h/week: 3L, 1T, 0B)**
Course Content: Well completion methods; sand control; inflow relationships; wellbore and tubing
hydraulics; flow control; chokes; multiphase flow; wax and hydrate problems; methods of artificial
lift.

**NUMT-204 Numerical Techniques in Mathematics (4h/week: 3L, 1T, 0B)**
Course Content: Iterative solution of equations; splines; Newton-Raphson, Gauss methods; round-
of and error propagation; finite difference techniques; Euler and Runge-Kutta techniques for
differential equations.

**PETR-206 Petrophysics (6h/week: 3L, 0T, 3B)**
Course Content: Properties of rocks; measurement and interpretation of petrophysical properties;
application of petrophysics to subsurface engineering problems; interaction of resident fluids with
rocks; extensive written reports required.
**CHBF-203  Physical and Chemical Behaviour of Fluids I** (3 h/week : 3L, 0T, 0B)
Course Content: Principles of organic chemistry; phase behaviour; properties of hydrocarbon gases and liquids and oil field waters; overview of laboratory phase behaviour measurements; material balance calculations.

**GEOL-208  Sedimentary Rocks** (8h/week: 3L, 1T, 4B)
Course Content: Description and interpretation of sedimentary rocks in hand specimen and thin section; characteristics of sedimentary rocks deposited in different environments. Introduction to seismic survey systems; seismic data interpretation; exploration methods.

**STML-205  Strength of Materials** (5 h/week : 3L, 1T, 1B)

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**3rd Year Courses**

**DRLL-306  Drilling and Well Completions I** (6 h/week : 3L, 0T, 3B)
Course Content: Elements of rock mechanics, drilling fluids, factors affecting rate of penetration, and well completions, including casing and tubing design.

**FFPM-304  Fluid Flow in Porous Media** (4h/week: 3L, 1T, 0B)
Course Content: Darcy flow and Darcy’s Law; single phase and multiphase flow; relative permeability; non-Darcy flow; skin effects and apparent skin; rock wettability; steady state and unsteady state flow.

**GSTA-304  Introduction to Geostatistics** (4 h/week : 3L, 1T, 0B)
Course Content: Application of probability and statistics in petroleum engineering, study of correlated variables, statistical interpolation and simulation, and global optimisation. Emphasis is on how these procedures are related to geology and fluid flow.

**LITR-303  Literature and History** (3h/week: 3L, 0T, 0B)
Course Content: Masterworks of Caribbean and world literature; history of the Caribbean; government structure.

**GEOL-303  Petroleum Geology: Basin and Trend Analysis** (3h/week: 3L, 0T, 0B)
Course Content: Attributes of the subsurface environment; fundamentals of petroleum generation, migration, entrapment, and producibility; and interpretation methods used in petroleum exploration

**PROD-304  Production Technology and Design** (4h/week: 3L, 1T, 0B)
Course Content: Sizing of tubulars; multiphase flow problems. Artificial lift systems; rod pumping; electric submersible pumps; phase separation; gas lift; intermittent lift; plunger lift; unloading; wax problems; design of lift systems.

**THRM-304  Thermodynamics and Multicomponent Systems** (4 h/week: 3L, 1T, 0B)
Course Content: Applications of classic thermodynamics to the behaviour of fluids, with emphasis on phase behaviour of multi-component mixtures in permeable media.
**INST-303  Local and International Institutions (3h/week: 3L, 0T, 0B)**
Course Content: Local government operations and regulations; unitization; production regulation; interaction with the petroleum industry and reporting requirements; international treaties; international bodies; OPEC, United Nations; national offshore boundaries.

**NGAS-404  Natural Gas Engineering (4h/week: 3L, 1T, 0B)**
Course Content: Production, transportation, and storage of natural gas; flow rate metering; performance of wells; estimation of gas reserves; prevention of waste and utilization of natural gas.

**RESV-307  Reservoir Engineering I (4 h/week: 3L, 1T, 0B)**
Course Content: Classification of subsurface reservoirs by type and recovery mechanism; reserve estimates based on volumetric, material balance and decline curve techniques; aquifer models; transient fluid flow theory applied to predicting production rates; introduction to displacement processes.

**EVAL-304  Resource Economics and Valuation (4 h/week : 3L, 1T, 0B)**
Course Content: Derivation of profitability criteria for earth resource investments, project analysis in terms of the interrelation of technical and economic factors, investment analysis in the presence of uncertainty, and project planning.

**PCBF-306  Physical and Chemical Behaviour of Fluids II (6 h/week : 3L, 0T, 3B)**
Course Content: Applications of thermodynamics and physical chemistry to petroleum and geosystems engineering.

**WLOG-304  Well Logging (4h/week: 3L, 1T, 0B)**
Course Content: Introduction to well logging methods; conductivity, spontaneous potential, neutron, gamma, sonic logs; correlation with rock properties; identifying log features for oil, water, gas presence; extensive analysis of actual logs for typical situations.

**WTST-305  Well Testing (5h/week: 4L, 1T, 0B)**
Course Content: An introduction to well testing methods and analysis; single rate and multiple rate tests; effect of boundaries; interference; buildup and drawdown tests; derivative curves; skin factors in oil wells and gas wells; vertical, deviated and horizontal well tests.

**4th Year Courses**

**CORR-403  Corrosion (3 credits : 2L, 0T, 1B)**
Course Content: Mechanism of corrosion; choice of materials of construction; coatings; cathodic and sacrificial anode protection; safety and environmental concerns; economic analysis; maintenance management.

**DSGN-435  Design Project I (5h/week: 2L, 0T, 3B)**
Course Content: A series of lectures to highlight the methodology of the design process, combined with preparations for the capstone design project in the final semester. Allocation of the capstone design project subject and initial data gathering and planning. Identification of additional information or skills required and planning and initial steps to acquire them.

**DRLG-404  Drilling and Well Completions II (4h/week: 3L, 1T, 0B)**
Course Content: Steering and directional control; MWD systems; integrated logging systems; deviated wells; horizontal wells; completion techniques for deviated wells; drilling abnormally pressured reservoirs.

**PROD-414 Production Engineering II** *(4h/week: 3L, 1T, 0B)*
Course Content: Separator design; vertical and horizontal separators; offshore and onshore considerations; operating problems; treaters; chemicals; metering of single-phase or multiphase flow; disposal of waste and environmental issues.

**EPMM-403 Personnel Management & Motivation** *(3 credits: 2L, 1T, 0B)*
Course Content: Management styles; theories of management; strategic planning; Maslow, McGregor, Herzberg, Drucker, Kaplan and Norton; management, motivation, innovation and leadership theories.

**PRJM-402 Project Management** *(2 h/week: 2L, 0T, 0B)*
Course Content: Use of computer software; critical path methods; Gantt charts; scheduling; contracts; manpower management; labour issues; materials management.

**RESR-414 Reservoir Engineering II** *(4h/week: 3L, 1T, 0B)*
Course Content: Waterflooding; mobility control and EOR processes; pressure maintenance techniques; gas condensate reservoirs; retrograde condensation; design of fracturing and acidizing workovers.

**RSIM-405 Reservoir Simulation** *(5h/week: 1L, 0T, 4B)*
Course Content: Various reservoir computer simulators will be used to examine the effects of grid size, orientation, model validation; black oil, compositional and thermal simulators will be treated. Pitfalls and difficulties will be highlighted and history matching and data validation will be handled.

**DSGN-445 Design Project II** *(15h/week: 0L, 0T, 15B)*
Course Content: The capstone project which will involve the application of engineering principles to the design of a petroleum engineering project which could involve facilities design, developing a complete drilling plan for development wells, a reservoir development and management plan, or a combination of several areas in a project design.

**HOIL-403 Heavy Oil Recovery** *(3h/week: 2L, 1T, 0B)*
Course Content: Recovery processes for heavy oil; primary recovery; waterflooding; steam injection; fireflooding. Modelling of the steamflooding process; heat efficiency; well completion requirements; displacement efficiency; steam generation; corrosion; operating problems in heavy oil recovery processes.

**OFFS-404 Offshore Operations** *(4h/week: 4L, 0T, 0B)*
Course Content: A course that considers offshore operations, platforms, jack-up rigs; floating systems and dynamic positioning; ship-based systems; offshore environmental aspects; sub-sea completions; sub-sea wellhead, manifold and riser systems; servicing of sub-sea equipment; product transportation; platform operations and supply.

**PPRC-403 Professional Practice, Safety and the Environment** *(3 h/week: 3L, 0T, 0B)*
Course Content: Responsibilities of a professional engineer; ethics; engineering legal issues and liabilities; public and worker safety and health issues; sustainable development; environmental issues and responsibilities; role of professional organizations.
**SPEC-403 Specialization Elective**  *(3h/week: 2L, 1T, 0B)*

*Course Content:* A technical specialization subject chosen from a list of courses offered in the semester and intended to provide more in-depth analysis in exploration, drilling, reservoir management, production operations, surface separation, offshore operations, or additional chemistry or mathematics courses designed to provide more depth in solving exploration, drilling, production or reservoir simulation or analysis problems.
Bachelor of Science
in
Process and Utilities Engineering

Chemical / Mechanical / Utilities Options

DURATION
This is a 4-year full-time programme consisting of two 16-week academic semesters per year with a third work term semester each year in the summer.

CREDITS
Graduation from the programme requires successful completion of 232 semester hours in a combination of prescribed and optional courses with a minimum cumulative GPA of 2.0.

INTAKE
September of each year.

PROGRAMME OVERVIEW
This programme prepares graduates for a career in the Process and Utilities industry at a professional level. In addition, graduates meeting the requirements for graduate studies may continue to a M.Sc. degree and, later, to a Ph.D. degree. There are three main streams: the Chemical, Mechanical or Utilities Options. These concentrate on the following areas

- Chemical: Deals with the aspects of process engineering that involve chemical reactions and transformations, phase change, distillation, absorption, and conversion
- Mechanical: Deals with the mechanical process operations that involve unit operations such as filtration, compression, sizing, flow patterns and heat transfer that do not involve chemical transformation
- Utilities: Deals with the electrical generation and distribution systems, water treatment and waste treatment

The programme has been designed to meet the academic requirements for international accreditation as a professional engineering qualification.

ADMISSION REQUIREMENTS
The normal admission requirement is a pass in the Cambridge General Paper and the ALevel subjects: Mathematics and either Physics or Chemistry, plus O-Level/CSEC Physics and Chemistry. Graduates from a 2-year engineering Diploma programme with a minimum cumulative GPA of 3.0 will be considered with some credit being given for Diploma courses which are substantially equivalent to the BSc courses. This is done on a case by case basis, but should generally result in a requirement of about three additional years of study to earn the BSc degree after the engineering Diploma. Other previous tertiary level qualifications will be considered, and any additional academic upgrading courses required to enter the programme will be identified.
## BSc in Process & Utilities Engineering
### Chemical / Mechanical / Utilities Options

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Bachelor of Science
in
Process and Utilities Engineering

Chemical Option

1st Year Courses  (Note: 3h/week lectures, 1h/week tutorial, 2h/week lab = 3L, 1T, 2B)

**CHEM-106  Chemistry for Engineers I (6 credits : 3L, 1T, 2B)**
Course Content: Basic atomic and molecular structure; chemical bonding and kinetics; acid-base and solubility equilibria; electrochemistry and REDOX phenomena; chemical examples from industrial applications.

**COMM-103  Communications (3 credits : 2L, 1T, 0B)**
Course Content: Report and presentation preparation; format, audience and location identification; preparation; use of presentation materials and software/hardware; practice with peer groups; good and bad presentation techniques; how to ensure the message is received; practice in preparing written technical reports, memos, e-mails and letters; appropriate formats for written materials.

**COMP-105  Introduction to Computing (5 credits : 1L, 0T, 4B)**
Course Content: Visual Basic for Applications (VBA) programming for spreadsheet manipulation of data; programme elements such as variable types, data storage, looping, branching, conditional tests, subroutines and functions; practice in writing programmes to carry out typical mathematical operations on spreadsheet data.

**MATH-110  Mathematics I (10 credits : 7L, 3T, 0B)**
Course Content: Functions, limits; derivatives; partial derivatives; integrals; matrices; vectors; determinants; systems of equations, eigenvalues and eigenvectors.

**PHYS-105  Physics for Engineers (5 credits : 3L, 1T, 1B)**
Course Content: Fundamentals of electricity and magnetism; resistance, capacitance and inductance; circuit theory; magnetic fields and conductors; electric motors; transformers; semiconductors.

**CHEM-116  Chemistry for Engineers II (6 credits : 3L, 1T, 2B)**
Course Content: Physical chemistry; surface phenomena; capillary action; surface and interfacial tension; wetting and contact angles; adsorption, desorption; organic chemistry; alkanes, alkenes, alkynes, alcohols, ethers and typical reactions; substitution, halogenation, oxidation and nitration of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry.

**ELEC-106  Electrical and Electronic Systems and Circuits (6 credits : 4L, 1T, 1B)**
Course Content: Application of electrical and electronic components in typical circuits; diodes, amplifiers, rectifiers, gating devices; electrical equipment design; motors and starters; fundamentals of wireless communication; frequency and amplitude modulation; digital systems.
**ENGD-108  Engineering Design I** (8 credits : 4L, 4T, 0B)
Course Content: A problem based learning (PBL) course. Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr’s stress circle; pressure vessels. Development of freehand sketching abilities; isometric projections; plan and elevation views; the golden mean; reading technical drawings; guided practice in skill development.

**MATH-119  Mathematics II** (9 credits : 6L, 3T, 0B)
Pre-requisite : MATH-110
Course Content: Coordinate systems; multiple integrals; vector calculus; grad; div; curl; line and surface integrals; series; power, Taylor and Maclaurin series.

2nd Year Courses

**COMP-206  Computer Programming** (6 credits : 2L, 0T, 4B)
Course Content: Introduction to C++ programming techniques; file structures; data manipulation; subroutines and functions; efficiency of code.

**HCAR-205  Hydrocarbon Processes for Engineers** (5 credits : 3L, 2T, 0B)
Course Content: Application of chemical and engineering principles in the production of gasoline, diesel oil, hydrogen, olefins, aromatics, alcohols, polymers; gas phase and gas-solid reactions; homogeneous and heterogeneous catalytic reactions.

**MBAL-206  Mass, Momentum and Energy Balances** (6 credits : 4L, 2T, 0B)
Course Content: Laws of Conservation; mechanical energy equation; Bernoulli’s theorem; simple mixing and flow examples; combined mass and energy balances; application to industrial processes.

**MATH-208  Mathematics III** (8 credits : 5L, 3T, 0B)
Pre-requisites : MATH-110, MATH-119
Course Content: Ordinary and partial differential equations; solution methods; series solutions; Laplace transforms; convolution; systems of equations; Bessel functions.

**STAT-204  Statistics and Probability** (4 credits : 3L, 1T, 0B)
Course Content: Data analysis, average and spread; permutations and combinations; random variables; probability distributions; mean and variance; normal and other distributions; random sampling; confidence levels; quality control; goodness of fit; regression and correlation analysis.

**COMP-204  Computer Programming Applications** (4 credits : 1L, 0T, 3L)
Course Content: Application of VBA and C++ programming techniques to sample industrial problems and techniques; practice with solving mathematical problems with programming techniques.

**PENG-207  Introduction to Process Engineering** (7 credits : 4L, 3T, 0B)
Course Content: Types of reactor; plug flow, mixing; residence time distributions; adiabatic, exothermic and endothermic reactors; recirculating flow; cascaded reactors; selectivity; condensers; compressors; turbines.
**UENG-207  Introduction to Utilities Engineering (7 credits : 4L, 3T, 0B)**
Course Content: Water treatment processes; waste treatment and handling; environmental considerations; boiling and condensation; overview of steam generation and boilers; condensers; compressors; turbines; electrical machines; electrical circuits; electrical power generation and distribution; transformers.

**MATH-217  Mathematics IV (7 credits : 4L, 3T, 0B)**
**Prerequisites**: MATH-110, MATH-119, MATH-208
Course Content: Complex numbers; conformal mapping; Laplace equation application to heat and fluid flow; Fourier analysis and partial differential equations; Fourier transform; application to heat conduction and diffusion equations.

**NUMT-204  Numerical Techniques in Mathematics (4 credits : 3L, 1T, 0B)**
Course Content: Iterative solution of equations; splines; Newton-Raphson, Gauss methods; round-off and error propagation; finite difference techniques; Euler and Runge-Kutta techniques for differential equations.

**3rd Year Courses**

**FDYN-304  Fluid Dynamics (4 credits : 2L, 1T, 1B)**
Course Content: Hydrostatics and hydrodynamics; rheological models; Newtonian and non-Newtonian fluids; laminar and turbulent flows; boundary layers; flow through pipes, conduits, channels, valves, fittings; flow control in hydraulic systems; pump curves; pneumatic systems; gas Z-factors; compressed air systems; introduction to multiphase flow effects.

**MTRN-309  Mass, Momentum and Heat Transfer (9 credits : 4L, 2T, 3B)**
Course Content: Diffusion processes; convective transfer processes; partial differential equations in different coordinate systems; approximate and exact methods of solution; steady state and transient formulation; conduction, convection and radiation; boiling and condensation; examples of industrial application.

**MATH-304  Mathematics V (4 credits : 3L, 1T, 0B)**
**Prerequisites**: MATH-110, MATH-119, MATH-208, MATH-217
Course Content: Optimization; linear programming; simplex method; hill climbing techniques; regression and curve fitting; interpolation.

**NSOL-304  Numerical Solution of Differential Equations (4 credits : 1L, 1T, 2B)**
Course Content: First and higher order equations; ordinary and partial differential equations; elliptic, parabolic and hyperbolic equations; use of MATLAB.

**EPMM-403  Personnel Management & Motivation (3 credits : 2L, 1T, 0B)**
Course Content: Management styles; theories of management; strategic planning; Maslow, McGregor, Herzberg, Drucker, Kaplan and Norton; management, motivation, innovation and leadership theories.
**THRM-305 Thermodynamics** *(5 credits : 3L, 2T, 0B)*
Course Content: Thermodynamic equilibrium; multicomponent systems and activity coefficients; first, second and third laws; enthalpy and entropy; equations of state; acentric factors; vapour-liquid equilibria; Gibbs free energy; fugacity and the phase rule; compression and expansion; heat engine cycles; chemical equilibria and chemical reactions.

**CATS-305 Catalysts and Catalytic Processes** *(5 credits : 3L, 2T, 0B)*
Course Content: Homogeneous and heterogeneous catalysts; reaction mechanisms; catalyst types; deactivation and regeneration; applications including ammonia and methanol production processes; catalyst choice; reactor types; modeling catalytic processes; mechanisms including adsorption and chemisorption; diffusion controlling; catalyst characterization; catalytic offgas and waste water cleanup for environmental protection.

**CUOP-310 Chemical Unit Operations** *(10 credits : 4L, 3T, 3B)*
Distillation; binary and multicomponent systems; McCabe-Thiele diagrams; HTU/NTU concepts; absorption; adsorption; crystallization; drying; dryer design.

**ECON-304 Engineering Economics and Business Principles** *(4 credits : 3L, 1T, 0B)*
Course Content: Time value of money; discounted cash flows; net present value; payout time; return on investment; cost estimation; licence fees; labour costs; material costs; manufacturing costs; tax implications; risk analysis, contracts, marketing, financing.

**INPC-305 Instrumentation and Process Control** *(5 credits : 3L, 1T, 1B)*
Course Content: Instrumentation for measurement of flow and property parameters; temperature, pressure, volumetric flow rate, density, mass flow rate, humidity, pH, ion specific electrodes, optical methods (LDA); feed forward and feedback control; mathematical models; transfer functions; stability of control; Bode diagrams and Nyquist plots; capacity and dead time; block flow diagrams; cascade control; control valves; tuning control systems (PID); distributed control systems (DCS); programmable logic controllers (PLCs); SCADA systems.

**RKN-302 Reaction Kinetics** *(2 credits : 1L, 1T, 0B)*
Course Content: Chemical reactor design; kinetics of homogeneous reactions; reaction and reactor design dependence on temperature, pressure and flow rate; heterogeneous reaction systems.

**TPHN-303 Transport Phenomena** *(3 credits : 2L, 1T, 0B)*
Course Content: Application of mass, momentum and heat transfer processes to industrial processes; formulation of equations for typical catalytic reactions; further process modeling; analytical solution by the lumped, integral and differential techniques.

**4th Year Courses**

**GPRO-407 Gas Processing and Conversion** *(7 credits : 4L, 3T, 0B)*
Course Content: Gas dehydration; glycol process and regeneration; gas sweetening; DEA/TEA process; feedstock separation; conversion processes; synthesis gas process; production of hydrogen; ammonia and methanol production processes; cryogenic separation and LNG; conversion of natural gas to other products; polyethylene and PVC production.
**MMET-404 Materials & Metallurgy (4 credits : 3L, 1T, 0B)**
Course Content: Properties of materials, plastics, metals, alloys, composites; compositional effects; testing methods; analysis of test results; production methods; forming, extrusion, casting; crystal structures; joining, welding, annealing, tempering; failure analysis; introduction to corrosion; costs and choice of materials for the process industry.

**PSIM-407 Process Design and Computer Simulation (7 credits : 1L, 0T, 6B)**
Course Content: Use of computer simulator (Hysys); equation of state packages; reactant properties; steady state and dynamic modeling of processes; controller tuning on the dynamic model; application to several typical unit operations including distillation; specification of pump, compressor, column, and process piping.

**PMOD-405 Process Modelling and Control (5 credits : 3L, 2T, 0B)**
Course Content: Development of a mathematical model for the overall process; investigation of feedstock composition variation, flow rate variation; sensitivity to other process variables, advanced process control topics.

**PRJM-402 Project Management (2 credits : 2L, 0T, 0B)**
Course Content: Use of computer software; critical path methods; Gantt charts; scheduling; contracts; manpower management; labour issues; materials management.

**REFP-404 Refinery Processes (4 credits : 3L, 1T, 0B)**
Course Content: Oil refining processes; cracking; reforming; alkylation; hydrogen production; fuel blending and octane ratings; product mixes; component purification; catalytic processes; waste treatment and environmental issues.

**CORR-403 Corrosion (3 credits : 2L, 0T, 1B)**
Course Content: Mechanism of corrosion; choice of materials of construction; coatings; cathodic and sacrificial anode protection; safety and environmental concerns; economic analysis; maintenance management.

**HUMN-404 Humanities Option (4 credits : 3L, 1T, 0B)**
Course Content: The Humanities option could be a language or a Management course, Trinidad & Tobago History, or similar course.

**DESP-412 Design Project (12 credits : 0L, 12T, 0B)**
Course Content: An extensive design project will draw together during the last semester most of the subjects studied in this programme. A complete design will be performed for a chosen industrial process, including a technical analysis of the process, component specifications; a P&I diagram, a cost estimate and economic analysis, an environmental impact analysis, an analysis of operating flexibility at different production rates, and startup and shutdown recommendations.

**MSEP-402 Membrane Separation Processes Option (2 credits : 2L, 0T, 0B)**
Course Content: Types of membrane separation processes; types of polymers used; mechanisms of separation; adsorption/absorption-diffusion model; separation of impurities from water; gas separation processes; hydrocarbon separation processes; possible future developments.

**PUDS-405 Process and Utilities Design (5 credits : 4L, 1T, 0B)**
Course Content: Methods of design for typical industrial processes; P&I diagrams; material choices; pump, compressor, condenser specification; vessel design and support systems; costing methods, effluent treatment processes; environmental considerations.

**PPSE-403  Professional Practice, Safety & The Environment** *(3 credits : 3L, 0T, 0B)*
Course Content: Responsibilities of a professional engineer; ethics; engineering legal issues and liabilities; public and worker safety and health issues; sustainable development; environmental issues and responsibilities; role of professional organizations.
Bachelor of Science in Process and Utilities Engineering

Mechanical Option

1st Year Courses (Note: 3h/week lectures, 1h/week tutorial, 2h/week lab = 3L, 1T, 2B)

**CHEM-106 Chemistry for Engineers I (6 credits : 3L, 1T, 2B)**
Course Content: Basic atomic and molecular structure; chemical bonding and kinetics; acid-base and solubility equilibria; electrochemistry and REDOX phenomena; chemical examples from industrial applications.

**COMM-103 Communications (3 credits : 2L, 1T, 0B)**
Course Content: Report and presentation preparation; format, audience and location identification; preparation; use of presentation materials and software/hardware; practice with peer groups; good and bad presentation techniques; how to ensure the message is received; practice in preparing written technical reports, memos, e-mails and letters; appropriate formats for written materials.

**COMP-105 Introduction to Computing (5 credits : 1L, 0T, 4B)**
Course Content: Visual Basic for Applications (VBA) programming for spreadsheet manipulation of data; programme elements such as variable types, data storage, looping, branching, conditional tests, subroutines and functions; practice in writing programmes to carry out typical mathematical operations on spreadsheet data.

**MATH-110 Mathematics I (10 credits : 7L, 3T, 0B)**
Course Content: Functions, limits; derivatives; partial derivatives; integrals; matrices; vectors; determinants; systems of equations, eigenvalues and eigenvectors.

**PHYS-105 Physics for Engineers (5 credits : 3L, 1T, 1B)**
Fundamentals of electricity and magnetism; resistance, capacitance and induction; circuit theory; magnetic fields and conductors; electric motors; transformers; semiconductors.

**CHEM-116 Chemistry for Engineers II (6 credits : 3L, 1T, 2B)**
Course Content: Physical chemistry; surface phenomena; capillary action; surface and interfacial tension; wetting and contact angles; adsorption, desorption; organic chemistry; alkanes, alkenes, alkynes, alcohols, ethers and typical reactions; substitution, halogenation, oxidation and nitrination of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry.

**ELEC-106 Electrical and Electronic Systems and Circuits (6 credits : 4L, 1T, 1B)**
Course Content: Application of electrical and electronic components in typical circuits; diodes, amplifiers, rectifiers, gating devices; electrical equipment design; motors and starters; fundamentals of wireless communication; frequency and amplitude modulation; digital systems.

**ENGD-108 Engineering Design I (8 credits : 4L, 4T, 0B)**
Course Content: A problem based learning (PBL) course. Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia;
work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr’s stress circle; pressure vessels. Development of freehand sketching abilities; isometric projections; plan and elevation views; the golden mean; reading technical drawings; guided practice in skill development.

**MATH-119 Mathematics II** *(9 credits : 6L, 3T, 0B)*
*Pre-requisite:* MATH-110
Course Content: Coordinate systems; multiple integrals; vector calculus; grad; div; curl; line and surface integrals; series; power, Taylor and Maclaurin series.

**2nd Year Courses**

**COMP-206 Computer Programming** *(6 credits : 2L, 0T, 4B)*
Course Content: Introduction to C++ programming techniques; file structures; data manipulation; subroutines and functions; efficiency of code.

**HCA-205 Hydrocarbon Processes for Engineers** *(5 credits : 3L, 2T, 0B)*
Course Content: Application of chemical and engineering principles in the production of gasoline, diesel oil, hydrogen, olefins, aromatics, alcohols, polymers; gas phase and gas-solid reactions; homogeneous and heterogeneous catalytic reactions.

**MBAL-206 Mass, Momentum and Energy Balances** *(6 credits : 4L, 2T, 0B)*
Course Content: Laws of Conservation; mechanical energy equation; Bernoulli’s theorem; simple mixing and flow examples; combined mass and energy balances; application to industrial processes.

**MATH-208 Mathematics III** *(8 credits : 5L, 3T, 0B)*
*Prerequisite:* MATH-110, MATH-119
Course Content: Ordinary and partial differential equations; solution methods; series solutions; Laplace transforms; convolution; systems of equations; Bessel functions.

**STAT-204 Statistics and Probability** *(4 credits : 3L, 1T, 0B)*
Course Content: Data analysis, average and spread; permutations and combinations; random variables; probability distributions; mean and variance; normal and other distributions; random sampling; confidence levels; quality control; goodness of fit; regression and correlation analysis.

**COMP-204 Computer Programming Applications** *(4 credits : 1L, 0T, 3L)*
Course Content: Application of VBA and C++ programming techniques to sample industrial problems and techniques; practice with solving mathematical problems with programming techniques.

**PENG-207 Introduction to Process Engineering** *(7 credits : 4L, 3T, 0B)*
Course Content: Types of reactor; plug flow, mixing; residence time distributions; adiabatic, exothermic and endothermic reactors; recirculating flow; cascaded reactors; selectivity; condensers; compressors; turbines.

**UENG-207 Introduction to Utilities Engineering** *(7 credits : 4L, 3T, 0B)*
Course Content: Water treatment processes; waste treatment and handling; environmental considerations; boiling and condensation; overview of steam generation and boilers; condensers;
compressors; turbines; electrical machines; electrical circuits; electrical power generation and distribution; transformers.

**MATH-217 Mathematics IV** *(7 credits : 4L, 3T, 0B)*

**Prerequisite**: MATH-110, MATH-119, MATH-208

Course Content: Complex numbers; conformal mapping; Laplace equation application to heat and fluid flow; Fourier analysis and partial differential equations; Fourier transform; application to heat conduction and diffusion equations.

**NUMT-204 Numerical Techniques in Mathematics** *(4 credits : 3L, 1T, 0B)*

Course Content: Iterative solution of equations; splines; Newton-Raphson, Gauss methods; round-off and error propagation; finite difference techniques; Euler and Runge-Kutta techniques for differential equations.

### 3rd Year Courses

**FDYN-304 Fluid Dynamics** *(4 credits : 2L, 1T, 1B)*

Course Content: Hydrostatics and hydrodynamics; rheological models; Newtonian and non-Newtonian fluids; laminar and turbulent flows; boundary layers; flow through pipes, conduits, channels, valves, fittings; flow control in hydraulic systems; pump curves; pneumatic systems; gas Z-factors; compressed air systems; introduction to multiphase flow effects.

**MTRN-309 Mass, Momentum and Heat Transfer** *(9 credits : 4L, 2T, 3B)*

Course Content: Diffusion processes; convective transfer processes; partial differential equations in different coordinate systems; approximate and exact methods of solution; steady state and transient formulation; conduction, convection and radiation; boiling and condensation; examples of industrial application.

**MATH-304 Mathematics V** *(4 credits : 3L, 1T, 0B)*

**Prerequisite**: MATH-110, MATH-119, MATH-208, MATH-217

Course Content: Optimization; linear programming; simplex method; hill climbing techniques; regression and curve fitting; interpolation.

**NSOL-304 Numerical Solution of Differential Equations** *(4 credits : 1L, 1T, 2B)*

Course Content: First and higher order equations; ordinary and partial differential equations; elliptic, parabolic and hyperbolic equations; use of MATLAB.

**EPMM-403 Personnel Management & Motivation** *(3 credits : 2L, 1T, 0B)*

Course Content: Management styles; theories of management; strategic planning; Maslow, McGregor, Herzberg, Drucker, Kaplan and Norton; management, motivation, innovation and leadership theories.

**THRM-305 Thermodynamics** *(5 credits : 3L, 2T, 0B)*

Course Content: Thermodynamic equilibrium; multicomponent systems and activity coefficients; first, second and third laws; enthalpy and entropy; equations of state; acentric factors; vapour-liquid equilibria; Gibbs free energy, fugacity and the phase rule; compression and expansion; heat engine cycles; chemical equilibria and chemical reactions.

**ECON-304 Engineering Economics and Business Principles** *(4 credits : 3L, 1T, 0B)*
Course Content: Time value of money; discounted cash flows; net present value; payout time; return on investment; cost estimation; licence fees; labour costs; material costs; manufacturing costs; tax implications; risk analysis, contracts, marketing, financing.

HETX-305  Heat Exchangers and Steam Generators (5 credits : 3L, 2T, 0B)
Course Content: Double-wall pipe units; shell and tube; plate designs; high efficiency designs; multi-pass; countercurrent and cocurrent flow; unit sizing; introduction to pinch technology methods; boilers; heat transfer through boiler surfaces.

HETC-305  Heating and Cooling Processes (5 credits : 3L, 2T, 0B)
Course Content: Refrigeration; refrigerants; compression and expansion; thermodynamic considerations; Joule-Thompson effect; air liquefaction; cryogenic and other processes; space cooling; air conditioning; humidity adjustment; sizing of units.

INPC-305  Instrumentation and Process Control (5 credits : 3L, 1T, 1B)
Course Content: Instrumentation for measurement of flow and property parameters; temperature, pressure, volumetric flow rate, density, mass flow rate, humidity, pH, ion specific electrodes, optical methods (LDA); feed forward and feedback control; mathematical models; transfer functions; stability of control; Bode diagrams and Nyquist plots; capacity and dead time; block flow diagrams; cascade control; control valves; tuning control systems (PID); distributed control systems (DCS); programmable logic controllers (PLCs); SCADA systems.

MUOP-310  Mechanical Unit Operations (10 credits : 4L, 3T, 3B)
Course Content: Particle and separation technology; particle size reduction; size distribution; sieving; movement of solids in fluids; centrifuges; hydrocyclones; flow through packed beds; filtration; dimensionless groups applied to mixing and stirring; general form of balance equations.

4th Year Courses

HPTE-404  High Pressure/Temperature Engineering (4 credits : 4L, 0T, 0B)
Course Content: Pressure vessels and high pressure piping; codes and inspections; centrifugal and reciprocating compressors, valve fittings, safety; instrumentation and process control; choice of materials; heating methods; plant startup and shutdown; maintenance.

ICFD-403  Introduction to Computational Fluid Dynamics (3 credits : 3L, 0T, 0B)
Course Content: Basis for the solution of partial differential equations; formulation, initial and boundary conditions and classification of the partial differential equations; derivation of the difference expressions; consistency, stability and convergence of the finite difference process; iterative solution for elliptic differential equations.

MMET-404  Materials & Metallurgy (4 credits : 3L, 1T, 0B)
Course Content: Properties of materials, plastics, metals, alloys, composites; compositional effects; testing methods; analysis of test results; production methods; forming, extrusion, casting; crystal structures; joining, welding, annealing, tempering; failure analysis; introduction to corrosion; costs and choice of materials for the process industry.

PSIM-407  Process Design and Computer Simulation (7 credits : 1L, 0T, 6B)
Course Content: Use of computer simulator (Hysys); equation of state packages; reactant properties; steady state and dynamic modeling of processes; controller tuning on the dynamic
model; application to several typical unit operations including distillation; specification of pump, compressor, column, and process piping.

**PMOD-405 Process Modelling and Control (5 credits : 3L, 2T, 0B)**
Course Content: Development of a mathematical model for the overall process; investigation of feedstock composition variation, flow rate variation; sensitivity to other process variables, advanced process control topics.

**PRJM-402 Project Management (2 credits : 2L, 0T, 0B)**
Course Content: Use of computer software; critical path methods; Gantt charts; scheduling; contracts; manpower management; labour issues; materials management.

**REFP-404 Refinery Processes (4 credits : 3L, 1T, 0B)**
Course Content: Oil refining processes; cracking; reforming; alkylation; hydrogen production; fuel blending and octane ratings; product mixes; component purification; catalytic processes; waste treatment and environmental issues.

**CORR-403 Corrosion (3 credits : 2L, 0T, 1B)**
Course Content: Mechanism of corrosion; choice of materials of construction; coatings; cathodic and sacrificial anode protection; safety and environmental concerns; economic analysis; maintenance management.

**HUMN-404 Humanities Option (4 credits : 3L, 1T, 0B)**
The Humanities option could be a language or a social science course, Trinidad & Tobago History, or similar course.

**DESP-412 Design Project (12 credits : 0L, 12T, 0B)**
Course Content: An extensive design project will draw together at the end of the last semester most of the subjects studied in this programme. A complete design will be performed for a chosen industrial process, including a technical analysis of the process, component specifications; a P&I diagram, a cost estimate and economic analysis, an environmental impact analysis, an analysis of operating flexibility at different production rates, and startup and shutdown recommendations.

**MSEP-402 Membrane Separation Processes Option (2 credits : 2L, 0T, 0B)**
Course Content: Types of membrane separation processes; types of polymers used; mechanisms of separation; adsorption/absorption-diffusion model; separation of impurities from water; gas separation processes; hydrocarbon separation processes; possible future developments

**PUDS-405 Process and Utilities Design (5 credits : 4L, 1T, 0B)**
Course Content: Methods of design for typical industrial processes; P&I diagrams; material choices; pump, compressor, condenser specification; vessel design and support systems; costing methods, effluent treatment processes; environmental considerations.

**PPSE-403 Professional Practice, Safety & The Environment (3 credits : 3L, 0T, 0B)**
Course Content: Responsibilities of a professional engineer; ethics; engineering legal issues and liabilities; public and worker safety and health issues; sustainable development; environmental issues and responsibilities; role of professional organizations.
Bachelor of Science in Process and Utilities Engineering

Utilities Option

1st Year Courses (Note: 3h/week lectures, 1h/week tutorial, 2h/week lab = 3L, 1T, 2B)

CHEM-106 Chemistry for Engineers I (6 credits : 3L, 1T, 2B)
Course Content: Basic atomic and molecular structure; chemical bonding and kinetics; acid-base and solubility equilibria; electrochemistry and REDOX phenomena; chemical examples from industrial applications.

COMM-103 Communications (3 credits : 2L, 1T, 0B)
Course Content: Report and presentation preparation; format, audience and location identification; preparation; use of presentation materials and software/hardware; practice with peer groups; good and bad presentation techniques; how to ensure the message is received; practice in preparing written technical reports, memos, e-mails and letters; appropriate formats for written materials.

COMP-105 Introduction to Computing (5 credits : 1L, 0T, 4B)
Course Content: Visual Basic for Applications (VBA) programming for spreadsheet manipulation of data; programme elements such as variable types, data storage, looping, branching, conditional tests, subroutines and functions; practice in writing programmes to carry out typical mathematical operations on spreadsheet data.

MATH-110 Mathematics I (10 credits : 7L, 3T, 0B)
Course Content: Functions, limits; derivatives; partial derivatives; integrals; matrices; vectors; determinants; systems of equations, eigenvalues and eigenvectors.

PHYS-105 Physics for Engineers (5 credits : 3L, 1T, 1B)
Course Content: Fundamentals of electricity and magnetism; resistance, capacitance and induction; circuit theory; magnetic fields and conductors; electric motors; transformers; semiconductors.

CHEM-116 Chemistry for Engineers II (6 credits : 3L, 1T, 2B)
Course Content: Physical chemistry; surface phenomena; capillary action; surface and interfacial tension; wetting and contact angles; adsorption, desorption; organic chemistry; alkanes, alkenes, alkynes, alcohols, ethers and typical reactions; substitution, halogenation, oxidation and nitration of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry.

ELEC-106 Electrical and Electronic Systems and Circuits (6 credits : 4L, 1T, 1B)
Course Content: Application of electrical and electronic components in typical circuits; diodes, amplifiers, rectifiers, gating devices; electrical equipment design; motors and starters; fundamentals of wireless communication; frequency and amplitude modulation; digital systems.

ENGD-108: Engineering Design I (8 credits : 4L, 4T, 0B)
Course Content: A problem based learning (PBL) course. Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr’s stress circle; pressure vessels. Development of freehand sketching abilities; isometric projections; plan and elevation views; the golden mean; reading technical drawings; guided practice in skill development.

**MATH-119 Mathematics II (9 credits : 6L, 3T, 0B)**
**Pre-requisite :** MATH-110
Course Content: Coordinate systems; multiple integrals; vector calculus; grad; div; curl; line and surface integrals; series; power, Taylor and Maclaurin series.

**2nd Year Courses**

**COMP-206 Computer Programming (6 credits : 2L, 0T, 4B)**
Course Content: Introduction to C++ programming techniques; file structures; data manipulation; subroutines and functions; efficiency of code.

**HCAR-205 Hydrocarbon Processes for Engineers (5 credits : 3L, 2T, 0B)**
Course Content: Application of chemical and engineering principles in the production of gasoline, diesel oil, hydrogen, olefins, aromatics, alcohols, polymers; gas phase and gas-solid reactions; homogeneous and heterogeneous catalytic reactions.

**MBAL-206 Mass, Momentum and Energy Balances (6 credits : 4L, 2T, 0B)**
Course Content: Laws of Conservation; mechanical energy equation; Bernoulli’s theorem; simple mixing and flow examples; combined mass and energy balances; application to industrial processes.

**MATH-208 Mathematics III (8 credits : 5L, 3T, 0B)**
**Pre-requisites :** MATH-110, MATH-119
Course Content: Ordinary and partial differential equations; solution methods; series solutions; Laplace transforms; convolution; systems of equations; Bessel functions.

**STAT-204 Statistics and Probability (4 credits : 3L, 1T, 0B)**
Course Content: Data analysis, average and spread; permutations and combinations; random variables; probability distributions; mean and variance; normal and other distributions; random sampling; confidence levels; quality control; goodness of fit; regression and correlation analysis.

**COMP-204 Computer Programming Applications (4 credits : 1L, 0T, 3L)**
Course Content: Application of VBA and C++ programming techniques to sample industrial problems and techniques; practice with solving mathematical problems with programming techniques.

**PENG-207 Introduction to Process Engineering (7 credits : 4L, 3T, 0B)**
Course Content: Types of reactor; plug flow, mixing; residence time distributions; adiabatic, exothermic and endothermic reactors; recirculating flow; cascaded reactors; selectivity; condensers; compressors; turbines.

**UENG-207 Introduction to Utilities Engineering (7 credits : 4L, 3T, 0B)**
Course Content: Water treatment processes; waste treatment and handling; environmental considerations; boiling and condensation; overview of steam generation and boilers; condensers; compressors; turbines; electrical machines; electrical circuits; electrical power generation and distribution; transformers.

**MATH-217  Mathematics IV (7 credits : 4L, 3T, 0B)**

Pre-requisites: MATH-110, MATH-119, MATH-208

Course Content: Complex numbers; conformal mapping; Laplace equation application to heat and fluid flow; Fourier analysis and partial differential equations; Fourier transform; application to heat conduction and diffusion equations.

**NUMT-204  Numerical Techniques in Mathematics (4 credits : 3L, 1T, 0B)**

Course Content: Iterative solution of equations; splines; Newton-Raphson, Gauss methods; round-off and error propagation; finite difference techniques; Euler and Runge-Kutta techniques for differential equations.

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**3rd Year Courses**

**FDYN-304  Fluid Dynamics (4 credits : 2L, 1T, 1B)**

Course Content: Hydrostatics and hydrodynamics; rheological models; Newtonian and non-Newtonian fluids; laminar and turbulent flows; boundary layers; flow through pipes, conduits, channels, valves, fittings; flow control in hydraulic systems; pump curves; pneumatic systems; gas Z-factors; compressed air systems; introduction to multiphase flow effects.

**MTRN-309  Mass, Momentum and Heat Transfer (9 credits : 4L, 2T, 3B)**

Course Content: Diffusion processes; convective transfer processes; partial differential equations in different coordinate systems; approximate and exact methods of solution; steady state and transient formulation; conduction, convection and radiation; boiling and condensation; examples of industrial application.

**MATH-304  Mathematics V (4 credits : 3L, 1T, 0B)**

Prerequisites: MATH110, MATH119, MATH208, MATH217

Course Content: Optimization; linear programming; simplex method; hill climbing techniques; regression and curve fitting; interpolation.

**NSOL-304  Numerical Solution of Differential Equations (4 credits : 1L, 1T, 2B)**

Course Content: First and higher order equations; ordinary and partial differential equations; elliptic, parabolic and hyperbolic equations; use of MATLAB.

**EPMM-403  Personnel Management & Motivation (3 credits : 2L, 1T, 0B)**

Course Content: Management styles; theories of management; strategic planning; Maslow, McGregor, Herzberg, Drucker, Kaplan and Norton; management, motivation, innovation and leadership theories.

**THRM-305  Thermodynamics (5 credits : 3L, 2T, 0B)**

Course Content: Thermodynamic equilibrium; multicomponent systems and activity coefficients; first, second and third laws; enthalpy and entropy; equations of state; acentric factors; vapour-liquid
equilibria; Gibbs free energy, fugacity and the phase rule; compression and expansion; heat engine cycles; chemical equilibria and chemical reactions.

**ECON-304 Engineering Economics and Business Principles** *(4 credits: 3L, 1T, 0B)*
Course Content: Time value of money; discounted cash flows; net present value; payout time; return on investment; cost estimation; licence fees; labour costs; material costs; manufacturing costs; tax implications; risk analysis, contracts, marketing, financing.

**HETX-305 Heat Exchangers and Steam Generators** *(5 credits: 3L, 2T, 0B)*
Course Content: Double-wall pipe units; shell and tube; plate designs; high efficiency designs; multi-pass; countercurrent and cocurrent flow; unit sizing; introduction to pinch technology methods; boilers; heat transfer through boiler surfaces.

**HETC-305 Heating and Cooling Processes** *(5 credits: 3L, 2T, 0B)*
Course Content: Refrigeration; refrigerants; compression and expansion; thermodynamic considerations; Joule-Thompson effect; air liquefaction; cryogenic and other processes; space cooling; air conditioning; humidity adjustment; sizing of units.

**INPC-305 Instrumentation and Process Control** *(5 credits: 3L, 1T, 1B)*
Course Content: Instrumentation for measurement of flow and property parameters; temperature, pressure, volumetric flow rate, density, mass flow rate, humidity, pH, ion specific electrodes, optical methods (LDA); feed forward and feedback control; mathematical models; transfer functions; stability of control; Bode diagrams and Nyquist plots; capacity and dead time; block flow diagrams; cascade control; control valves; tuning control systems (PID); distributed control systems (DCS); programmable logic controllers (PLCs); SCADA systems.

**MUOP-310 Mechanical Unit Operations** *(10 credits: 4L, 3T, 3B)*
Course Content: Particle and separation technology; particle size reduction; size distribution; sieving; movement of solids in fluids; centrifuges; hydrocyclones; flow through packed beds; filtration; dimensionless groups applied to mixing and stirring; general form of balance equations.

### 4th Year Courses

**ENET-405 Electrical Machines and Networks** *(5 credits: 4L, 1T, 0B)*
Course Content: Generators, rectifiers, semiconductor applications, power systems, power factors; high voltage transmission; sub-stations and their location; transformers; process industry electrical power requirements; local and remote generation; co-generation.

**EDES-404 Electrical Distribution Design** *(4 credits: 4L, 0T, 0B)*
Course Content: Design methods for electrical systems in the process industries; grid requirements; overload detection and response; power, voltage and amperage limitations; economic considerations; instrumentation and process control requirements.

**MMET-404 Materials & Metallurgy** *(4 credits: 3L, 1T, 0B)*
Course Content: Properties of materials, plastics, metals, alloys, composites; compositional effects; testing methods; analysis of test results; production methods; forming, extrusion, casting; crystal structures; joining, welding, annealing, tempering; failure analysis; introduction to corrosion; costs and choice of materials for the process industry.
**PMOD-405 Process Modelling and Control** *(5 credits : 3L, 2T, 0B)*
Course Content: Development of a mathematical model for the overall process; investigation of feedstock composition variation, flow rate variation; sensitivity to other process variables, advanced process control topics.

**PRJM-402 Project Management** *(2 credits : 2L, 0T, 0B)*
Course Content: Use of computer software; critical path methods; Gantt charts; scheduling; contracts and legal issues; manpower management; labour issues; materials management.

**SELS-404 Steam and Electricity Supply** *(4 credits : 3L, 1T, 0B)*
Course Content: Boiler designs; feed water preparation and treatment; superheaters; oil or gas firing fuel; coal-fired boilers; boiler control systems; steam turbines; electric generators; control systems; transformers; transmission lines; substations; rectification; maintenance management.

**WTRT-405 Water and Waste Treatment** *(5 credits : 4L, 1T, 0B)*
Course Content: Water purification processes; filtration; reverse osmosis; distillation; desalination; ion exchange processes; other membrane separation processes; oxygen and biodemand; environmental considerations. Sewage treatment processes; waste disposal; health issues; environmental issues.

**CORR-403 Corrosion** *(3 credits : 2L, 0T, 1B)*
Course Content: Mechanism of corrosion; choice of materials of construction; coatings; cathodic and sacrificial anode protection; safety and environmental concerns; economic analysis; maintenance management.

**HUMN-404 Humanities Option** *(4 credits : 3L, 1T, 0B)*
Course Content: The Humanities option could be a language or a social science course, Trinidad & Tobago History, or similar course.

**DESP-412 Design Project** *(12 credits : 0L, 12T, 0B)*
Course Content: An extensive design project will draw together during the last semester most of the subjects studied in this programme. A complete design will be performed for a chosen industrial process, including a technical analysis of the process, component specifications; a P&I diagram, a cost estimate and economic analysis, an environmental impact analysis, an analysis of operating flexibility at different production rates, and startup and shutdown recommendations.

**MSEP-402 Membrane Separation Processes** *(2 credits : 2L, 0T, 0B)*
Course Content: Types of membrane separation processes; types of polymers used; mechanisms of separation; adsorption/absorption-diffusion model; separation of impurities from water; gas separation processes; hydrocarbon separation processes; possible future developments.

**PUDS-405 Process and Utilities Design** *(5 credits : 4L, 1T, 0B)*
Course Content: Methods of design for typical industrial processes; P&I diagrams; material choices; pump, compressor, condenser specification; vessel design and support systems; costing methods, effluent treatment processes; environmental considerations.

**PPSE-403 Professional Practice, Safety & The Environment** *(3 credits : 3L, 0T, 0B)*
Course Content: Responsibilities of a professional engineer; ethics; engineering legal issues and liabilities; public and worker safety and health issues; sustainable development; environmental issues and responsibilities; role of professional organizations.
Bachelor of Science
in
Information and Communications Technology

DURATION / SCHEDULING:
This is a 4-year degree consisting of 8 academic semesters of full-time study and 3 work semesters (2 academic semesters and 1 work semester per year). For 2006 – 2007, the academic semesters will be held at the O’Meara campus. This will obtain until the Wallerfield campus is available.

INTAKE:
September of each year

CREDITS:
Graduation from the programme requires successful completion of 223 credits in a combination of prescribed and optional courses with a minimum cumulative GPA of 2.0.

PROGRAM OVERVIEW
Expertise and skills in ICT are essential today in all enterprises, corporations, government, and the society in general. With this context in mind the BSc program in ICT has been designed to allow students to specialize in Information Systems, Software Engineering, and Digital Communications including Telecommunications. The first 2 ½ years of the programme are common for all BSc students, while the last 1 1/2 years are devoted to building specialization in one of the above mentioned areas. The programme has been designed to build a strong engineering foundation and also impart competency in computer hardware and software systems, modern digital wireline and wireless communications, telecommunication systems, networking technologies, software engineering and information systems. Graduates form this programme are expected to be true ICT professionals with expertise in computers, software, communications, and information systems. The programme seeks to provide an appropriate balance between theory, practice, and other key skills such as team work, project management, communications skills, ethics, and entrepreneurship. It is also designed to prepare students to seek post graduate educations in the future if the students so desire.

GRADUATES WILL WORK AS
Computer Specialists, Communications Network Designers and Architects, Database Administrators, Applications Developers, Logic and Circuit Designers, Software Engineers, Telecommunications and Digital Communications Systems Specialists, Information Systems Managers and Wireless Networks and Mobile Computing Experts

ADMISSION REQUIREMENTS:
The normal admission requirement is a pass in CAPE II or in the Cambridge General Paper (or CAPE Communication Studies and Caribbean Studies), and the A-Level subjects: Mathematics and either Chemistry or Physics, plus O-Level/CSEC Physics and Chemistry. Graduates from a 2-year engineering Diploma programme with a minimum GPA of 3.0 will be considered with some credit being given for Diploma courses which are substantially equivalent to the BSc courses. This is done on a case by case basis, but should generally result in a requirement of about three additional years of study to earn the BSc degree after the engineering Diploma. Other previous tertiary level qualifications will be considered, and any additional academic upgrading courses required to enter the programme will be identified.
# Bachelor of Science in ICT

## Computer Engineering / Telecommunications Eng. / Information Systems Options

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- 185 -
Bachelor of Science
in
Information and Communications Technology

Computer Engineering Option

Note: 3h/week lectures, 1h/week tutorial, 2h/week lab = 3L, 1T, 2B

1st Year, 1st Semester

MATH-110 Mathematics I (10 credits: 7L, 3T, 0B)
Prerequisite: 
Course Content: Functions, limits; derivatives; partial derivatives; integrals; matrices; vectors; 
determinants; systems of equations, eigenvalues and eigenvectors.

CHEM-106 Chemistry for Engineers I (6 credits: 3L, 1T, 2B))
Prerequisite: 
Course Content: Basic atomic and molecular structure; chemical bonding and kinetics; acid-base 
and solubility equilibria; electrochemistry and REDOX phenomena; chemical examples from 
industrial applications.

COMP-105 Introduction to Computing (5 credits: 1L, 0T, 4B)
Prerequisite: 
Course Content: Visual Basic for Applications (VBA) programming for spreadsheet manipulation 
of data; programme elements such as variable types, data storage, looping, branching, conditional 
tests, subroutines and functions; practice in writing programmes to carry out typical mathematical 
operations on spreadsheet data.

COMM-103 Communications (3 credits: 2L, 1T, 0B)
Prerequisite: 
Course Content: Report and presentation preparation; format, audience and location identification; 
preparation; use of presentation materials and software/hardware; practice with peer groups; good 
and bad presentation techniques; how to ensure the message is received; practice in preparing 
written technical reports, memos, e-mails and letters; appropriate formats for written materials.

PHYS-105 Physics for Engineers (5 credits: 3L, 1T, 1B)
Prerequisite: 
Course Content: Fundamentals of electricity and magnetism; resistance, capacitance and induction; 
circuit theory; magnetic fields and conductors; electric motors; transformers; semiconductors.

1st Year, 2nd Semester

MATH-119 Mathematics II (9 credits: 6L, 3T, 0B)
Prerequisite: MATH-110
Course Content: Coordinate systems; multiple integrals; vector calculus; grad; div; curl; line and surface integrals; series; power, Taylor and Maclaurin series.

**ENGD-108  Engineering Design I** *(8 credits: 4L, 4T, 0B)*
Prerequisite:
Course Content: This is a problem-based learning (PBL) course. Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr’s stress circle; pressure vessels. Development of freehand sketching abilities; isometric projections; plan and elevation views; the golden mean; reading technical drawings; guided practice in skill development.

**ELEC-106  Electrical and Electronic Systems and Circuits** *(6 credits: 4L, 1T, 1B)*
Prerequisite:
Course Content: Application of electrical and electronic components in typical circuits; diodes, amplifiers, rectifiers, gating devices; electrical equipment design; motors and starters; fundamentals of wireless communication; frequency and amplitude modulation; digital systems.

**CHEM-116  Chemistry for Engineers II** *(6 credits: 3L, 1T, 2B)*
Prerequisite:
Course Content: Physical chemistry; surface phenomena; capillary action; surface and interfacial tension; wetting and contact angles; adsorption, desorption; organic chemistry; alkanes, alkenes, alkynes, alcohols, ethers and typical reactions; substitution, halogenation, oxidation and nitration of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry.

**2nd Year, 1st Semester**

**COMP-226  Data Structures** *(6 credits: 4L, 0T, 2B)*
Prerequisite: *Engineering Computation with C++.*
Course Content: Covers advanced programming techniques and data structures. Topics include recursion, dynamic storage allocation, pointers, linked lists, strings, stacks, queues, trees, graphs, tables, searching, and sorting.

**PHYS-206  Advanced Physics** *(6 credits: 4L, 0T, 2B)*
Prerequisite:
Course Content: Oscillations and waves; simple harmonic motion; longitudinal and transverse waves; travelling and stationary waves; the nature of electromagnetic radiation; polarization. Optics; geometrical and physical optics. Quantum physics; quantization of radiation; the hydrogen atom; wave-particle duality; photoelectric effect. Antennas and wave guides. Optical, magnetic and thermal properties of electrical engineering materials.

**LOGC-206  Introduction to Logic Design** *(6 credits: 4L, 0T, 2B)*
Co-requisite: *Electric Circuit Theory.*
Course Content: Introduction to hardware building blocks used in digital computers. Boolean algebra, combinatorial and sequential circuits: analysis and design. Adders, multipliers, decoders,
encoders, multiplexors. Programmable logic devices: read-only memory, programmable arrays.

Counters and registers.

**ELEC-206 Electric Circuit Theory (6 credits: 4L, 0T, 2B)**
**Prerequisites:** Engineering Computation with C++; coreq: Differential Equations.
Course Content: Introduction to electric circuit analysis and design; voltage, current, and power, element I-V curves, circuit laws and theorems; energy storage; frequency domain, frequency response, transient response; sinusoidal steady state and transfer functions; operational amplifiers, design.

**MATH-204 Linear Algebra for Engineers (4 credits: 2L, 2T, 0B)**
Prerequisite: 
Course Content: Systems of linear equations and matrices. Vector spaces and linear transformation using matrix notation, determinants, and eigenvalues and eigenvectors. Examples drawn from engineering applications.

**COMM-203 Technical Communications (3 credits: 3L, 0T, 0B)**
Prerequisite: 
Course Content: The focus of this course is a team project report. The process involves all aspects of the management of communication tasks, both oral and written. The final products are a formal report and an oral presentation of the content.

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**2nd Year 2nd Semester**

**PROB-206 Elementary Probability (6 credits: 4L, 2T, 0B)**
**Prerequisite:** MATH-119
Course Content: A calculus-based introductory course in probability. Language of probability, combinatorics, conditional probability, discrete and continuous random variables, the Poisson process, joint probability distribution, moment generating function, law of large numbers and central limit theorem, sample estimators for mean and variance.

**CMON-207 Computer Organization (7 credits: 4L, 3T, 0B)**
**Prereq:** LOGC-206
Course Content: Introduction to structures and techniques used in digital system design. Design with available SSI, MSI, LSI and programmable logic circuits and memories. Application to microprocessors, I/O structures, and interface design.

**MATH-206 Differential Equations (6 credits: 4L, 2T, 0B)**
**Prerequisite:** MATH-119

**ELON-207 Introduction to Electronics (7 credits: 4L, 0T, 3B)**
**Prerequisite:** ELEC-206
Course Content: Principles of diode, BJT, and MOSFET circuits. Graphical and analytical means of analysis. Piecewise linear modeling; amplifiers; digital inverters and logic gates. Biasing and small-signal analysis, microelectronic design techniques. Time-domain and frequency domain analysis and design.
**CMPN-207  Computer Networks** *(7 credits: 4L, 0T, 3B)*  
**Prerequisite:** COMP-206  
Course Content: Computer networks, focusing on the Internet. Application protocols (Web, E-mail), basics of socket programming, major Internet protocols (TCP and IP), fundamental aspects of routing and reliable data transfer over networks, medium access protocols, wired and wireless. Local Area Networks (LANs) technologies. Hands-on laboratory modules on client-server programming, Internet experiments, and protocol implementation.

**3rd Year 1st Semester**

**RESH-304  Fundamentals of Research** *(4 credits: 4L, 0T, 0B)*  
**Prerequisite:** SCEN-106  
Course Content: Focuses on research methods in the field of science, technology and society. Focuses on the following methods: problem statement and hypothesis formulation; research design in science, technology and society; data sources; and data acquisition and analysis.

**CMOS-307  Introduction to Operating Systems** *(7 credits: 4L, 0T, 3B)*  
**Prerequisite:** COMP-206, CMON-207  
Course Content: Operating system concepts and design objectives. Concurrent processes, process synchronization, and deadlocks. Resource management including virtual memory, CPU scheduling, and secondary storage. File structures, input/output, and distributed systems. Case studies of popular operating systems.

**CMPH-307  Microprocessors** *(7 credits: 4L, 0T, 3B)*  
**Prereq:** COMP-206, CMON-207  
Course Content: Hardware and software design methodology for embedding microcontrollers and microprocessors. Architecture, hardware, I/O, interrupts, memory organization, and decoding. Software techniques including dispatch tables and real time monitors. Intel 8048 and Motorola 68HC05, 68HC11, and 68HC16 microcontrollers, Intel 8085 and 8086 series microprocessors, and Motorola 68000 series microprocessors. Peripheral devices including counter timers, serial USARTs, parallel ports, interrupt controllers, disk controllers, and DMA controllers. Emphasis on both hardware and software design.

**MATH-304  Discrete Mathematics for Engineering** *(4 credits: 4L, 2T, 0B)*  
**Prerequisite:**  
Course Content: Propositional logic, set theory, relations, combinatorics, graphs. Topics are treated with particular emphasis on applications to the engineering discipline.

**SGSS-30  Signals and Systems** *(7 credits: 4L, 0T, 3B)*  
**Prerequisite:** MATH-206, ELEC-206  
Course Content: Continuous-time and discrete-time signals and systems. Convolution sum, convolution integral. Linearity, time-invariance, causality, and stability of systems. Frequency domain analysis of signals and systems. Filtering, sampling, and modulation. Laplace transform, z-transform, pole-zero plots. Linear feedback systems.
3rd Year 2nd Semester

**ELON-30  Analog Electronics (7 credits: 4L, 0T, 3B)**
**Prerequisite:** ELON-207
Course Content: Topics include differential amplifiers, frequency response, operational amplifier structure and design, multistage circuit design, BJT, MOSFET, CMOS, and BiCMOS design principles, active filters and oscillators, and power devices.

**CMSS-307  Communication Systems (7 credits: 4L, 0T, 3B)**
**Prerequisite:** SGSS-307
Course Content: Signal analysis and transmission: amplitude modulation, angle modulation, pulse-amplitude and pulse-code modulation; amplitude shift-keying, frequency shift-keying, phase-shift keying. Case studies of practical communication systems.

**DGSP307  Digital Signal Processing (7 credits: 4L, 0T, 3B)**
**Prerequisite:** SGSS-307.
Course Content: Introduces techniques of digital signal processing and application to deterministic as well as random signals. Topics include representation of discrete-time random signals, A/D conversion, D/A conversion, frequency domain and z-domain analysis of discrete-time signals and systems, discrete-time feedback systems, difference equation and FFT based realizations of digital filters, design of IIR Butterworth filters, window-based FIR filter design, digital filtering of random signals, FFT-based power spectrum analysis.

**DIGI-307  Digital Circuits (7 credits: 4L, 0T, 3B)**
**Prerequisite:** LOGC-206, ELON-207
Course Content: Detailed study of bipolar and MOS integrated-circuit-logic family characteristics. Analysis of transfer characteristics and switching speeds of gates.

4th Year 1st Semester

**CEPR-407  Senior Design Project I (7 credits: 4L, 0T, 3B)**
**Prerequisite:** Senior Standing.
Course Content: Development of the technical, communication, personal, and team skills needed for successful design in telecommunications and computer engineering. Specifications and standards, information collection, design strategies, modeling, computer-aided design, optimization, system design, failure and reliability, human factors. Oral and written communication of technical information. Team dynamics and ethical issues in design. Design project for a small-scale telecommunication or computer system. Preparation of detailed proposals for senior design projects in the following semester.

**CMAR-407  Computer Architecture (7 credits: 4L, 0T, 3B)**
**Prerequisite:** CMPS-307
Course Content: The concepts of computer architecture from a quantitative approach. Instruction set design with examples from both RISC and CISC architectures. Processor implementation techniques and microprogramming, pipelining and methods to cope with pipeline hazards, and the memory hierarchy (cache and virtual memory). Parallel and vector architectures, future directions, and examples of highly parallel computers.
4th Year 2nd Semester

CEPR-417  Senior Design Project II (7 credits: 4L, 0T, 3B)  
Prerequisite: CEPR-407  
Course Content: Continuation of a team project in an area of telecommunications and computer engineering, as proposed in Senior Design Project I. Application of technical, communication, personal, and team skills. Oral and written communication of technical information, including progress reports, technical memos, final report, and oral presentations.

MGMT-414: Management (4 credits: 4L, 0T, 0B)  
Prerequisite:  
Course Content: This managerial course involves an analysis of the managerial functions of planning, organizing, leading and controlling. Students will enhance their communication and problem solving skills through extensive case studies.

PLUS

2 Humanities electives & 2 Technical electives

4th Year - Technical Electives

CETE-4x7  Test Engineering (7 credits: 4L, 0T, 3B)  
Prerequisite: DIGI-307, ELON-307  
Course Content: An introduction to test engineering principles with emphasis on computer-controlled instrumentation and data acquisition using industry standard bus structures such as the IEEE-488 bus and related protocol, D/A, A/D, and parallel I/O interfaces. Application software will be written in Visual Basic for testing a particular unit and interfacing various GPIB instruments. Visual Basic will be used as the overall project management software for the Unit Under Test. Design for testability and related topics will also be covered. Laboratory projects will emphasize automated testing using the principles covered in class.

CECS-4x:  Control Systems (7 credits: 4L, 0T, 3B)  
Prerequisite: ELON-307  
Course Content: This course is a study of feedback control systems theory including practical applications of compensation and PID concepts. Control system modeling, transient and steady state characteristics, stability and frequency response are analyzed. Compensation and controller design using Root locus methods are covered. The use of control system software, such as MATLAB, in the analysis and design of control systems is emphasized.

CEEP-4x7  Embedded PC s (7 credits: 4L, 0T, 3B)  
Prerequisite: DIGI-307, COMP-206.  
Course Content: Introduction to the programming and interfacing of embedded PC’s, with emphasis on systems using single-board, x86-based, computers. Programming will introduce both assembly and C languages. Interfacing will emphasize the use of the serial, parallel and USB ports. Operating systems will emphasize Linux and DOS. The PC BIOS and peripherals such as disk drives and video interfaces will also be studied.
4TH YEAR COURSES - HUMANITIES ELECTIVES

**TEHV-4x4  Technology & Human Values (4credits: 4L, 0T, 0B)**  
**Prerequisite:** SCEN-106  
Course Content: Examines the interactions between science, technology and human values. Specifically, explores psychological, moral, and philosophical consequences of, and humanistic responses to, technological change. Readings—essays, fiction, and research articles—treat such topics as the philosophical foundations of modern science, scientism, technicism; the impact of technology on images of man found in modern literature; and the moral implications of various kinds of recent technology.

**COSC-4x4  Computers & Society (4credits: 4L, 0T, 0B)**  
Prerequisite:  
Course Content: Examines the historical evolution of computer and information systems and explores their implications in the home, business, government, medicine, and education. Topics include automation and job impact, privacy, and legal and ethical issues.

**ESEN-4x4  Ethics and the Environment (4credits: 4L, 0T, 0B)**  
**Prerequisite:** SCEN-106  
Course Content: An examination of contemporary environmental problems from the perspective of ethics or moral philosophy. An analysis of the ethical presuppositions and value principles underlying environmental policy. The study of ethical theories and their application to the environmental crisis.

**ENEC-4x4  Environmental Economics (4credits: 4L, 0T, 0B)**  
**Prerequisite:** SCEN-106  
Course Content: Presents a detailed overview of the relationship between political economy and the environment. Draws on diverse case studies including global warming, harvesting of minerals on the ocean’s floor, destruction of old growth forests, and contamination of the nation’s water, air, and soils. Explores the economic remedies to the fast-changing relationship between society and nature.
Bachelor of Science
in
Information and Communications Technology

Information Systems Option

Note: 3h/week lectures, 1h/week tutorial, 2h/week lab = 3L, 1T, 2B

1st Year: 1st Semester

**MATH-110 Mathematics I (10 credits: 7L, 3T, 0B)**
Prerequisite:
Course Content: Functions, limits; derivatives; partial derivatives; integrals; matrices; vectors; determinants; systems of equations, eigenvalues and eigenvectors.

**CHEM-106 Chemistry for Engineers I (6 credits: 3L, 1T, 2B)**
Prerequisite:Course Content: Basic atomic and molecular structure; chemical bonding and kinetics; acid-base and solubility equilibria; electrochemistry and REDOX phenomena; chemical examples from industrial applications.

**COMP-105 Introduction to Computing (5 credits: 1L, 0T, 4B)**
Prerequisite:
Course Content: Visual Basic for Applications (VBA) programming for spreadsheet manipulation of data; programme elements such as variable types, data storage, looping, branching, conditional tests, subroutines and functions; practice in writing programmes to carry out typical mathematical operations on spreadsheet data.

**COMM-103 Communications (3 credits: 2L, 1T, 0B)**
Prerequisite:Course Content: Report and presentation preparation; format, audience and location identification; preparation; use of presentation materials and software/hardware; practice with peer groups; good and bad presentation techniques; how to ensure the message is received; practice in preparing written technical reports, memos, e-mails and letters; appropriate formats for written materials.

**PHYS-105 Physics for Engineers (5 credits: 3L, 1T, 1B)**
Prerequisite:
Course Content: Fundamentals of electricity and magnetism; resistance, capacitance and induction; circuit theory; magnetic fields and conductors; electric motors; transformers; semiconductors.

1st Year: 2nd Semester

**MATH-119 Mathematics II (9 credits: 6L, 3T, 0B)**
Prerequisite:
Course Content: Coordinate systems; multiple integrals; vector calculus; grad; div; curl; line and surface integrals; series; power, Taylor and Maclaurin series.
**ENGD-108  Engineering Design I** (8 credits: 4L, 4T, 0B)
Prerequisite:
Course Content: This is a problem-based learning (PBL) course. Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr’s stress circle; pressure vessels. Development of freehand sketching abilities; isometric projections; plan and elevation views; the golden mean; reading technical drawings; guided practice in skill development.

**ELEC-106  Electrical and Electronic Systems and Circuits** (6 credits: 4L, 1T, 1B)
Prerequisite:
Course Content: Application of electrical and electronic components in typical circuits; diodes, amplifiers, rectifiers, gating devices; electrical equipment design; motors and starters; fundamentals of wireless communication; frequency and amplitude modulation; digital systems.

**CHEM-116  Chemistry for Engineers II** (6 credits: 3L, 1T, 2B)
Prerequisite:
Course Content: Physical chemistry; surface phenomena; capillary action; surface and interfacial tension; wetting and contact angles; adsorption, desorption; organic chemistry; alkanes, alkenes, alkynes, alcohols, ethers and typical reactions; substitution, halogenation, oxidation and nitration of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry.

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**2nd Year : 1st Semester**

**COMP-206  Data Structures** (6 credits: 4L, 0T, 2B)
Prerequisite: *Engineering Computation with C++.*
Course Content: Covers advanced programming techniques and data structures. Topics include recursion, dynamic storage allocation, pointers, linked lists, strings, stacks, queues, trees, graphs, tables, searching, and sorting.

**PHYS-206  Advanced Physics** (6 credits: 4L, 0T, 2B)
Course Content: Oscillations and waves; simple harmonic motion; longitudinal and transverse waves; traveling and stationary waves; the nature of electromagnetic radiation; polarization. Optics; geometrical and physical optics. Quantum physics; quantization of radiation; the hydrogen atom; wave-particle duality; photoelectric effect. Antennas and wave guides. Optical, magnetic and thermal properties of electrical engineering materials.

**LOGC-206  Introduction to Logic Design** (6 credits: 4L, 0T, 2B)
Coreq: *Electric Circuit Theory.*
Prerequisite:
ELEC-206  Electric Circuit Theory (6 credits: 4L, 0T, 2B)
Prerequisite:  Engineering Computation with C++; coreq: Differential Equations.
Course Content: Introduction to electric circuit analysis and design; voltage, current, and power, element I-V curves, circuit laws and theorems; energy storage; frequency domain, frequency response, transient response; sinusoidal steady state and transfer functions; operational amplifiers, design.

MATH-204  Linear Algebra for Engineers (4 credits: 2L, 2T, 0B)
Course Content: Systems of linear equations and matrices. Vector spaces and linear transformation using matrix notation, determinants, and eigenvalues and eigenvectors. Examples drawn from engineering applications.

COMM-203  Technical Communications (3 credits: 3L, 0T, 0B)
Course Content: The focus of this course is a team project report. The process involves all aspects of the management of communication tasks, both oral and written. The final products are a formal report and an oral presentation of the content.

2nd Year : 2nd Semester

PROB-206  Elementary Probability (6 credits: 4L, 2T, 0B)
Prerequisite:  MATH-119
Course Content: A calculus-based introductory course in probability. Language of probability, combinatorics, conditional probability, discrete and continuous random variables, the Poisson process, joint probability distribution, moment generating function, law of large numbers and central limit theorem, sample estimators for mean and variance.

CMON-207  Computer Organization (7 credits: 4L, 3T, 0B)
Prerequisite:  LOGC206
Course Content: Introduction to structures and techniques used in digital system design. Design with available SSI, MSI, LSI and programmable logic circuits and memories. Application to microprocessors, I/O structures, and interface design.

MATH-206  Differential Equations (6 credits: 4L, 2T, 0B)
Prerequisite:  MATH-119.

ELON-207  Introduction to Electronics (7 credits: 4L, 0T, 3B)
Prerequisite:  ELEC-206
Course Content: Principles of diode, BJT, and MOSFET circuits. Graphical and analytical means of analysis. Piecewise linear modeling; amplifiers; digital inverters and logic gates. Biasing and small-signal analysis, microelectronic design techniques. Time-domain and frequency domain analysis and design.

CMPN-207  Computer Networks (7 credits: 4L, 0T, 3B)
Prerequisite:  COMP-206
Course Content: Computer networks, focusing on the Internet. Application protocols (Web, Email), basics of socket programming, major Internet protocols (TCP and IP), fundamental aspects of routing and reliable data transfer over networks, medium access protocols, wired and wireless.
Local Area Networks (LANs) technologies. Hands-on laboratory modules on client-server programming, Internet experiments, and protocol implementation.

**3rd Year : 1st Semester**

**RESH-304 Fundamentals of Research (4 credits: 4L, 0T, 0B)**  
**Prerequisite:** SCEN-106  
Course Content: Focuses on research methods in the field of science, technology and society. Focuses on the following methods: problem statement and hypothesis formulation; research design in science, technology and society; data sources; and data acquisition and analysis.

**CMOS-307 Introduction to Operating Systems (7 credits: 4L, 0T, 3B)**  
**Prerequisite:** COMP-206, CMON-207  
Course Content: Operating system concepts and design objectives. Concurrent processes, process synchronization, and deadlocks. Resource management including virtual memory, CPU scheduling, and secondary storage. File structures, input/output, and distributed systems. Case studies of popular operating systems.

**CMPH-307 Microprocessors (7 credits: 4L, 0T, 3B)**  
**Prerequisite:** COMP-206, CMON-207  
Course Content: Hardware and software design methodology for embedding microcontrollers and microprocessors. Architecture, hardware, I/O, interrupts, memory organization, and decoding. Software techniques including dispatch tables and real time monitors. Intel 8048 and Motorola 68HCO5, 68HC11, and 68HCHC16 microcontrollers, Intel 8085 and 8086 series microprocessors, and Motorola 68000 series microprocessors. Peripheral devices including counter timers, serial USARTs, parallel ports, interrupt controllers, disk controllers, and DMA controllers. Emphasis on both hardware and software design.

**MATH-304 Discrete Mathematics for Engineering (4 credits: 4L, 2T, 0B)**  
Course Content: Propositional logic, set theory, relations, combinatorics, graphs. Topics are treated with particular emphasis on applications to the engineering discipline.

**CMPP-307 Database Systems (7 credits: 4L, 0T, 3B)**  
**Prerequisite:** Data Structures  
Course Content: This course emphasizes the concepts and structures necessary for the design and implementation of database management systems. Topics include data models, data normalization, data description languages, query facilities, file organization, index organization, file security, data integrity, and reliability.

**3rd Year : 2nd Semester**

**CMPS-307 Human Computer Interaction (7 credits: 4L, 0T, 3B)**  
**Prerequisite:** COMP-206  
Course Content: This course deals with the design of software user interfaces. Topics include the steps in designing interfaces, human factors in interfaces, software design considerations and use of interface development tools. The design of effective screens and menus and the development of effective interaction routines is emphasized.
**CMSD-307  Distributed Systems Development** (7credits: 4L, 0T, 3B)
**Prerequisite:** COMP-206, CMPN-207
Course Content: This course examines the concepts and issues of Distributed Computing. Students build a set of real-life applications based on a mix of different tools on different tiers of distributed systems. Basic Web technologies, HTTP Client / Server middleware, SQL and Call-Level Interfaces (including ODBC and JDBC) are covered. Students use shell scripts, Java and XHTML in applications, as well as J2EE (Enterprise Edition) and application servers for deployment.

**CMOO-307  Object Oriented Information Engineering** (7credits: 4L, 0T, 3B)
**Prerequisite:** COMP-206
Course Content: Students learn how to apply object-oriented methodologies in order to determine an optimal Information Technology System’s structure (its “architecture”). They will gain a basic understanding of the technologies that make alternative architectures possible (eg. Middleware).

**CMRE307  Requirements Engineering** (7credits: 4L, 0T, 3B)
**Prerequisite:** COMP-206, CMPP-307
Course Content: Students learn how to define, document, and exploit a process by which the functionality and behaviour of a complex IT system may be determined and documented. They will apply this process to produce a specification that would be part of the analysis and design of a system.

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**4th Year : 1st Semester**

**ISPR-407  Information Systems Project I** (7credits: 4L, 0T, 3B)
**Prerequisite:** COMP-206, CMPP-307
Course Content: This course introduces the methods of object-oriented software engineering as applied to Information Systems. Topics include: planning and feasibility, requirements analysis, specification, system life-cycle, prototyping, object-oriented design, documentation and CASE tools. A substantial real-life project will be undertaken in teams. The project will be completed in ISPR417.

**CMNB-407  Network Databases** (7credits: 4L, 0T, 3B)
**Prerequisite:** CMPN-207, CMPP-307
Course Content: Distributed information systems present a wide variety of challenges to system architects and network managers. This course examines the variety of topologies available to distributed databases, the technology used to connect these distributed entities, and the network bandwidth characteristics associated with each topology. On completion, given a specific network bandwidth pattern, the learner will be able to predict likely underlying database topologies.

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**4th Year 2nd Semester**

**MGMT-414  Management** (4credits: 4L, 0T, 0B)
Course Content: This managerial course involves an analysis of the managerial functions of planning, organizing, leading and controlling. Students will enhance their communication and problem solving skills through extensive case studies.

**ISPR-417: Information Systems Project II** (7credits: 4L, 0T, 3B)
**Prerequisite:** ISPR-407.
Course Content: This course is a continuation of *Information Systems I*. The designed system is developed, tested and documented. A system acceptance test is conducted. Topics covered include project management and teamwork, system presentations, backup and audit controls, special purpose system structures, reliability and maintenance, and system documentation.

**PLUS**

*2 Humanities electives & 2 Technical electives*

**4thYear – Technical Electives**

**ISSE-4x7  Software Engineering Life Cycles & Standards (7 credits: 4L, 0T, 3B)**
**Prerequisite:** CMOO-307, CMRE-307.
Course Content: This course presents students with an overview of methodologies used in the engineering of software (lifecycles), as well as the standards that have emerged to ensure that quality is preserved throughout those lifecycles.

**ISSM-4x7  Software Testing & Maintenance (7 credits: 4L, 0T, 3B)**
**Prerequisite:** CMOO-307, CMRE-307
Course Content: Students examine the design, management and implementation of software testing environments. Students practice the continuous improvement process using a variety of techniques: test-first design, unit testing, continuous integration and refactoring. Tools such as knowledge management software, automated testing, build tools and revision control systems are used in both the UNIX and Windows environments.

**ISDB-4x7  Database Administration Concepts (7 credits: 4L, 0T, 3B)**
**Prerequisite:** CMPP-307
Course Content: This course explains the features and expectations of relational database management. It provides an in-depth examination of the Oracle database system followed by comparisons with SQL Server and DB2.

**ISST-4x7  Business IT Strategies (7 credits: 4L, 0T, 3B)**
**Prerequisite:** CMPN-207, CMSD-307
Course Content: Students learn how to describe and evaluate the computer network as part of an organization’s strategic plan, identify and describe the wide range of network applications in business, explain how the Internet can be used for business applications in a competitive environment, apply tools and techniques for analyzing and assessing computer network opportunities and formulate strategies for sustaining organizational success, analyze network opportunities and formulate strategies for achieving personal goals in a business setting, evaluate the computer network requirements for a business, evaluate alternate network solutions and select the most appropriate, and discuss emerging and future network applications, and their implications for business opportunities.

**ISPM-4x7  Project Management for IT Professionals (7 credits: 4L, 0T, 3B)**
**Prerequisite:** Senior Standing.
Course Content: This course focuses on the investigation and application of appropriate project management skills for those in supervisory, leadership and project leadership management positions in the information systems technology profession.
ISIN-4x7  Internet Software Techniques (7 credits: 4L, 0T, 3B)
Prerequisite: CMPP-307, CMSD-307
Course Content: The concepts and issues of Web development and the current technologies in the area are discussed. Students will build a set of real-life applications based on a mix of different tools on different tiers of distributed Web systems. An overview of .NET platforms will be given. Students will also practice document type definitions and schemas for XML applications, manipulating and linking XML data, and interchanging document fragments.

4th Year - Humanities Electives

TEHV-4x4  Technology & Human Values (4 credits: 4L, 0T, 0B)
Prerequisite: SCEN-106
Course Content: Examines the interactions between science, technology and human values. Specifically, explores psychological, moral, and philosophical consequences of, and humanistic responses to, technological change. Readings—essays, fiction, and research articles—treat such topics as the philosophical foundations of modern science, scientism, technicism; the impact of technology on images of man found in modern literature; and the moral implications of various kinds of recent technology.

COSC-4x4  Computers & Society (4 credits: 4L, 0T, 0B)
Prerequisite:
Course Content: Examines the evolution of computer and information systems and explores their implications in the home, business, government, medicine, and education. Topics include automation and job impact, privacy, and legal and ethical issues.

ESEN-4x4  Ethics and the Environment (4 credits: 4L, 0T, 0B)
Prerequisite: SCEN-106
Course Content: An examination of contemporary environmental problems from the perspective of ethics or moral philosophy. An analysis of the ethical presuppositions and value principles underlying environmental policy. The study of ethical theories and their application to the environmental crisis.

ENEC-4x4  Environmental Economics (4 credits: 4L, 0T, 0B)
Prerequisite: SCEN-106
Course Content: Presents a detailed overview of the relationship between political economy and the environment. Draws on diverse case studies including global warming, harvesting of minerals on the ocean’s floor, destruction of old growth forests, and contamination of the nation’s water, air, and soils. Explores the economic remedies to the fast-changing relationship between society and nature.
Bachelor of Science
In
Information and Communications Engineering

Telecommunications Engineering Option

Note: 3h/week lectures, 1h/week tutorial, 2h/week lab = 3L, 1T, 2B

1st Year 1st Semester

MATH-110 Mathematics I (10 credits: 7L, 3T, 0B)
Course Content: Functions, limits; derivatives; partial derivatives; integrals; matrices; vectors; determinants; systems of equations, eigenvalues and eigenvectors.

CHEM-106 Chemistry for Engineers I (6 credits: 3L, 1T, 2B))
Course Content: Basic atomic and molecular structure; chemical bonding and kinetics; acid-base and solubility equilibria; electrochemistry and REDOX phenomena; chemical examples from industrial applications.

COMP-105 Introduction to Computing (5 credits: 1L, 0T, 4B)
Course Content: Visual Basic for Applications (VBA) programming for spreadsheet manipulation of data; programme elements such as variable types, data storage, looping, branching, conditional tests, subroutines and functions; practice in writing programmes to carry out typical mathematical operations on spreadsheet data.
COMM-103 Communications (3 credits: 2L, 1T, 0B)
Course Content: Report and presentation preparation; format, audience and location identification; preparation; use of presentation materials and software/hardware; practice with peer groups; good and bad presentation techniques; how to ensure the message is received; practice in preparing written technical reports, memos, e-mails and letters; appropriate formats for written materials.

PHYS-105 Physics for Engineers (5 credits: 3L, 1T, 1B)
Course Content: Fundamentals of electricity and magnetism; resistance, capacitance and induction; circuit theory; magnetic fields and conductors; electric motors; transformers; semiconductors.

1st Year, 2nd Semester

MATH-119 Mathematics II (9 credits: 6L, 3T, 0B)
Prerequisite: MATH-110
Course Content: Coordinate systems; multiple integrals; vector calculus; grad; div; curl; line and surface integrals; series; power, Taylor and Maclaurin series.

ENGD-108 Engineering Design I (8 credits: 4L, 4T, 0B)
Course Content: This is a problem-based learning (PBL) course. Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr’s stress circle; pressure vessels. Development of freehand sketching abilities; isometric projections; plan and elevation views; the golden mean; reading technical drawings; guided practice in skill development.

ELEC-106 Electrical and Electronic Systems and Circuits (6 credits: 4L, 1T, 1B)
Course Content: Application of electrical and electronic components in typical circuits; diodes, amplifiers, rectifiers, gating devices; electrical equipment design; motors and starters; fundamentals of wireless communication; frequency and amplitude modulation; digital systems.

CHEM-116 Chemistry for Engineers II (6 credits: 3L, 1T, 2B)
Course Content: Physical chemistry; surface phenomena; capillary action; surface and interfacial tension; wetting and contact angles; adsorption, desorption; organic chemistry; alkanes, alkenes, alkynes, alcohols, ethers and typical reactions; substitution, halogenation, oxidation and nitration of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry.

2nd Year 1st Semester

COMP-206 Data Structures (6 credits: 4L, 0T, 2B)
Prerequisite: Engineering Computation with C++.
Course Content: Covers advanced programming techniques and data structures. Topics include recursion, dynamic storage allocation, pointers, linked lists, strings, stacks, queues, trees, graphs, tables, searching, and sorting.

PHYS-206 Advanced Physics (6 credits: 4L, 0T, 2B)
Course Content: Oscillations and waves; simple harmonic motion; longitudinal and transverse waves; travelling and stationary waves; the nature of electromagnetic radiation; polarization. Optics; geometrical and physical optics. Quantum physics; quantization of radiation; the hydrogen atom; wave-particle duality; photoelectric effect. Antennas and wave guides. Optical, magnetic and thermal properties of electrical engineering materials.

**LOGC-206 Introduction to Logic Design** (6 credits: 4L, 0T, 2B)
**Co-requisite:** Electric Circuit Theory.

**ELEC-206 Electric Circuit Theory** (6 credits: 4L, 0T, 2B)
**Prerequisite:** Engineering Computation with C++;
**Co-requisite:** Differential Equations.
Course Content: Introduction to electric circuit analysis and design; voltage, current, and power, element I-V curves, circuit laws and theorems; energy storage; frequency domain, frequency response, transient response; sinusoidal steady state and transfer functions; operational amplifiers, design.

**MATH-204 Linear Algebra for Engineers** (4 credits: 2L, 2T, 0B)
Course Content: Systems of linear equations and matrices. Vector spaces and linear transformation using matrix notation, determinants, and eigenvalues and eigenvectors. Examples drawn from engineering applications.

**COMM-203 Technical Communications** (3 credits: 3L, 0T, 0B)
Course Content: The focus of this course is a team project report. The process involves all aspects of the management of communication tasks, both oral and written. The final products are a formal report and an oral presentation of the content.

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**2nd Year 2nd Semester**

**PROB-206 Elementary Probability** (6 credits: 4L, 2T, 0B)
**Prerequisite:** MATH-119
Course Content: A calculus-based introductory course in probability. Language of probability, combinatorics, conditional probability, discrete and continuous random variables, the Poisson process, joint probability distribution, moment generating function, law of large numbers and central limit theorem, sample estimators for mean and variance.

**CMON-207 Computer Organization** (7 credits: 4L, 3T, 0B)
**Prerequisite:** LOGC-206
Course Content: Introduction to structures and techniques used in digital system design. Design with available SSI, MSI, LSI and programmable logic circuits and memories. Application to microprocessors, I/O structures, and interface design.

**MATH-206 Differential Equations** (6 credits: 4L, 2T, 0B)
**Prerequisite:** MATH119.

**ELON-207 Introduction to Electronics** (7 credits: 4L, 0T, 3B)
**Prerequisite:** ELEC-206
Course Content: Principles of diode, BJT, and MOSFET circuits. Graphical and analytical means of analysis. Piecewise linear modeling; amplifiers; digital inverters and logic gates. Biasing and small-signal analysis, microelectronic design techniques. Time-domain and frequency domain analysis and design.

**CMPN-207 Computer Networks** (7 credits: 4L, 0T, 3B)
**Prerequisite:** COMP-206
Course Content: Computer networks, focusing on the Internet. Application protocols (Web, E-mail), basics of socket programming, major Internet protocols (TCP and IP), fundamental aspects of routing and reliable data transfer over networks, medium access protocols, wired and wireless. Local Area Networks (LANs) technologies. Hands-on laboratory modules on client-server programming, Internet experiments, and protocol implementation.

### 3rd Year 1st Semester

**RESH-304 Fundamentals of Research** (4 credits: 4L, 0T, 0B)
**Prerequisite:** SCEN-106.
Course Content: Focuses on research methods in the field of science, technology and society. Focuses on the following methods: problem statement and hypothesis formulation; research design in science, technology and society; data sources; and data acquisition and analysis.

**CMOS-307 Introduction to Operating Systems** (7 credits: 4L, 0T, 3B)
**Prerequisite:** COMP-206, CMON-207
Course Content: Operating system concepts and design objectives. Concurrent processes, process synchronization, and deadlocks. Resource management including virtual memory, CPU scheduling, and secondary storage. File structures, input/output, and distributed systems. Case studies of popular operating systems.

**CMPH-307 Microprocessors** (7 credits: 4L, 0T, 3B)
**Prerequisite:** COMP-206, CMON-207
Course Content: Hardware and software design methodology for embedding microcontrollers and microprocessors. Architecture, hardware, I/O, interrupts, memory organization, and decoding. Software techniques including dispatch tables and real time monitors. Intel 8048 and Motorola 68HC05, 68HC11, and 68HC16 microcontrollers, Intel 8085 and 8086 series microprocessors, and Motorola 68000 series microprocessors. Peripheral devices including counter timers, serial USARTs, parallel ports, interrupt controllers, disk controllers, and DMA controllers. Emphasis on both hardware and software design.

**MATH-304 Discrete Mathematics for Engineering** (4 credits: 4L, 2T, 0B)
Course Content: Propositional logic, set theory, relations, combinatorics, graphs. Topics are treated with particular emphasis on applications to the engineering discipline.
**SGSS-307  Signals and Systems (7 credits: 4L, 0T, 3B)**
**Prerequisite:** MATH-206, ELEC-206
Course Content: Continuous-time and discrete-time signals and systems. Convolution sum, convolution integral. Linearity, time-invariance, causality, and stability of systems. Frequency domain analysis of signals and systems. Filtering, sampling, and modulation. Laplace transform, z-transform, pole-zero plots. Linear feedback systems.

**3rd Year 2nd Semester**

**ELON-307  Analog Electronics (7 credits: 4L, 0T, 3B)**
**Prerequisite:** ELON-207
Course Content: Topics include differential amplifiers, frequency response, operational amplifier structure and design, multistage circuit design, BJT, MOSFET, CMOS, and BiCMOS design principles, active filters and oscillators, and power devices.

**CMSS-307  Communication Systems (7 credits: 4L, 0T, 3B)**
**Prerequisite:** SGSS-307
Course Content: Signal analysis and transmission: amplitude modulation, angle modulation, pulse-amplitude and pulse-code modulation; amplitude shift-keying, frequency shift-keying, phase-shift keying. Case studies of practical communication systems.

**DGSP-307  Digital Signal Processing (7 credits: 4L, 0T, 3B)**
**Prerequisite:** SGSS-307
Course Content: Introduces techniques of digital signal processing and application to deterministic as well as random signals. Topics include representation of discrete-time random signals, A/D conversion, D/A conversion, frequency domain and z-domain analysis of discrete-time signals and systems, discrete-time feedback systems, difference equation and FFT based realizations of digital filters, design of IIR Butterworth filters, window-based FIR filter design, digital filtering of random signals, FFT-based power spectrum analysis.

**Digi-307  Digital Circuits (7 credits: 4L, 0T, 3B)**
**Prerequisite:** LOGC-206, ELON-207
Course Content: Detailed study of bipolar and MOS integrated-circuit-logic family characteristics. Analysis of transfer characteristics and switching speeds of gates.

**4th Year 1st Semester**

**CEPR-407  Senior Design Project I (7 credits: 4L, 0T, 3B)**
**Prerequisite:** Senior Standing
Course Content: Development of the technical, communication, personal, and team skills needed for successful design in telecommunications and computer engineering. Specifications and standards, information collection, design strategies, modeling, computer-aided design, optimization, system design, failure and reliability, human factors. Oral and written communication of technical information. Team dynamics and ethical issues in design. Design project for a small-scale telecommunication or computer system. Preparation of detailed proposals for senior design projects in the following semester.
**CMAR-407 Computer Architecture (7 credits: 4L, 0T, 3B)**  
**Prerequisite:** CMPS-307  
Course Content: The concepts of computer architecture from a quantitative approach. Instruction set design with examples from both RISC and CISC architectures. Processor implementation techniques and microprogramming, pipelining and methods to cope with pipeline hazards, and the memory hierarchy (cache and virtual memory). Parallel and vector architectures, future directions, and examples of highly parallel computers.

### 4th Year 2nd Semester

**CEPR-417 Senior Design Project II (7 credits: 4L, 0T, 3B)**  
**Prerequisite:** CEPR-407  
Course Content: Continuation of a team project in an area of telecommunications and computer engineering, as proposed in Senior Design Project I. Application of technical, communication, personal, and team skills. Oral and written communication of technical information, including progress reports, technical memos, final report, and oral presentations.

**MGMT-414 Management (4 credits: 4L, 0T, 0B)**  
Course Content: This managerial course involves an analysis of the managerial functions of planning, organizing, leading and controlling. Students will enhance their communication and problem solving skills through extensive case studies.

**PLUS**

2 Humanities electives & 2 Technical electives

### 4th Year - Technical Electives

**CEHF-4x7 High Frequency Systems (7 credits: 4L, 0T, 3B)**  
**Prerequisite:** ELON-307, PHYS-206  
Course Content: A study of electronic transmission systems. The course includes the detailed study of rf transmission lines with a concentration on their fundamental principles, specifications, operation and practical applications. The course also includes the study of the fundamental principles of wireless and fiber-optic communications. Electromagnetic interference and electrostatic discharge, standards and regulations, and an introduction to the concepts of distributed networks are also introduced.

**CEAT-4x7 Audio Technologies (7 credits: 4L, 0T, 3B)**  
**Prerequisite:** DIGI-307, ELON-307  
Course Content: The fundamentals of specifications, standards, devices, circuits and systems used in audio are studied. Acoustics, power amplifiers, preamplifiers, frequency contouring circuits, signal processors, microphones, loudspeakers and sound reinforcement systems are covered. Laboratory investigations include proto-boarding, designing and analyzing selected practical audio circuits. P-Spice simulations and computer-aided testing are utilized in conjunction with several laboratory exercises.

**CEWS-4x7 Wireless Communications Systems (7 credits: 4L, 0T, 3B)**  
**Prerequisite:** CMSS-307
Course Content: This course investigates point-to-point radio frequency (rf) communications systems. The underlying principles, requirements, and characteristics of electromagnetic propagation and antennas are studied. Existing systems and recent advances in the area of wireless communications will be covered, including terrestrial and satellite applications. Topics covered include FDMA, TDMA, and CDMA based design. The application of wireless design principles to radar will also be discussed. Laboratory experiences and computer simulations supplement the classroom discussions.

**CEFO-4x7 Fiber-optic Communications Systems (7 credits: 4L, 0T, 3B)**

**Prerequisite:** CMSS-307

Course Content: A detailed study of optical-wavelength communications systems. The underlying principles, requirements, and characteristics of optic sources, detectors, and dielectric wave-guides (fibers) are studied. Heavy emphasis is placed on systems analysis, including power budgets, bandwidth budgets, and signal-to-noise ratios. Recent advances in the area of fiber-optics will be covered, as well as emerging technologies and applications. Laboratory experiences supplement the classroom discussions.

**4TH YEAR COURSES - Humanities Electives**

**TEHV-4x4 Technology & Human Values (4 credits: 4L, 0T, 0B)**

**Prerequisite:** SCEN-106

Course Content: Examines the interactions between science, technology and human values. Specifically, explores psychological, moral, and philosophical consequences of, and humanistic responses to, technological change. Readings—essays, fiction, and research articles—treat such topics as the philosophical foundations of modern science, scientism, technicism; the impact of technology on images of man found in modern literature; and the moral implications of various kinds of recent technology.

**COSC-4x: Computers & Society (4 credits: 4L, 0T, 0B)**

Course Content: Examines the historical evolution of computer and information systems and explores their implications in the home, business, government, medicine, and education. Topics include automation and job impact, privacy, and legal and ethical issues.

**ESEN-4x4 Ethics and the Environment (4 credits: 4L, 0T, 0B)**

**Prerequisite:** SCEN-106

Course Content: An examination of contemporary environmental problems from the perspective of ethics or moral philosophy. An analysis of the ethical presuppositions and value principles underlying environmental policy. The study of ethical theories and their application to the environmental crisis.

**ENEC-4x4 Environmental Economics (4 credits: 4L, 0T, 0B)**

**Prerequisite:** SCEN-106

Course Content: Presents a detailed overview of the relationship between political economy and the environment. Draws on diverse case studies including global warming, harvesting of minerals on the ocean’s floor, destruction of old growth forests, and contamination of the nation’s water, air, and soils. Explores the economic remedies to the fast-changing relationship between society and nature.
Bachelor of Science
in
Manufacturing Engineering

DURATION / SCHEDULING
This is a 4-year full-time programme consisting of two 16-week academic semesters per year with a third work term semester each year.

CREDITS
Graduation from the programme requires successful completion of 232 credits in prescribed courses with a minimum cumulative GPA of 2.0

INTAKE
September of each year.

PROGRAMME OVERVIEW
This is a full-time programme designed to prepare engineers for a wide range of activities in Manufacturing. Engineers will be grounded in areas such as Design, Automation, Mechatronics, Manufacturing, Production and Management.

EMPLOYMENT OPPORTUNITIES
Graduates of this programme will be able to function at senior levels in the Manufacturing Industry, in areas of design, automation, production, maintenance, marketing and management.

ADMISSION REQUIREMENTS
The normal admission requirement is a pass in CAPE II or in the Cambridge General Paper (or CAPE Communication Studies and Caribbean Studies), and the A-Level subjects: Mathematics and either Chemistry or Physics, plus O-Level/CSEC Physics and Chemistry. Graduates from a 2-year engineering Diploma programme with a minimum GPA of 3.0 will be considered with some credit being given for Diploma courses which are substantially equivalent to the BSc courses. This is done on a case by case basis, but should generally result in a requirement of about three additional years of study to earn the BSc degree after the engineering Diploma. Other previous tertiary level qualifications will be considered, and any additional academic upgrading courses required to enter the programme will be identified.
## Bachelor of Science in Manufacturing Engineering

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**Total 1st Year : 1st Semester/2nd Semester :** 29/29  16/17  6/9  7/3

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**Total 2nd Year : 1st Semester/2nd Semester :** 29/29  15/17  2/3  12/9

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**Total 3rd Year : 1st Semester/2nd Semester :** 29/29  18/17  0/2  11/10

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**Total 4th Year: 1st Semester/ 2nd Semester:**

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<th>Credits 1st Semester</th>
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<td>29/29</td>
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**Total Programme Credits:**

- 232 -
Bachelor of Science
in
Manufacturing Engineering

1st Year (Note: 3h/week lectures, 1h/week tutorial, 2h/week lab = 3L, 1T, 2B)

CHEM-106 Chemistry for Engineers I (6 credits : 3L, 1T, 2B)
Course Content: Basic atomic and molecular structure; chemical bonding and kinetics; acid-base and solubility equilibria; electrochemistry and REDOX phenomena; chemical examples from industrial applications.

COMM-103 Communications (3 credits : 2L, 1T, 0B)
Course Content: Report and presentation preparation; format, audience and location identification; preparation; use of presentation materials and software/hardware; practice with peer groups; good and bad presentation techniques; how to ensure the message is received; practice in preparing written technical reports, memos, e-mails and letters; appropriate formats for written materials.

COMP-105 Introduction to Computing (5 credits : 1L, 0T, 4B)
Course Content: Visual Basic for Applications (VBA) programming for spreadsheet manipulation of data; programme elements such as variable types, data storage, looping, branching, conditional tests, subroutines and functions; practice in writing programmes to carry out typical mathematical operations on spreadsheet data.

MATH-110 Mathematics I (10 credits : 7L, 3T, 0B)
Course Content: Functions, limits; derivatives; partial derivatives; integrals; matrices; vectors; determinants; systems of equations, eigenvalues and eigenvectors.

PHYS-105 Physics for Engineers (5 credits : 3L, 1T, 1B)
Course Content: Fundamentals of electricity and magnetism; resistance, capacitance and induction; circuit theory; magnetic fields and conductors; electric motors; transformers; semiconductors.

CHEM-116 Chemistry for Engineers II (6 credits: 3L, 1T, 2B)
Course Content: Physical chemistry; surface phenomena; capillary action; surface and interfacial tension; wetting and contact angles; adsorption, desorption; organic chemistry; alkanes, alkenes, alkynes, alcohols, ethers and typical reactions; substitution, halogenation, oxidation and nitration of aromatics; functional groups and typical reactions with industry examples; addition and elimination, oxidation and reduction reactions. Ammonia and methanol production chemistry.

ENGD-108 Engineering Design I (5 credits : 4L, 1T, 0B)
Course Content: Statics and dynamics; forces; vectors; resultants in force systems; equilibrium; kinematics of particles in motion; moments of inertia; work and energy; friction, impulse and momentum; stress and strain; shear, compressive and tensile loading; elasticity; bending; torsion; beams; failure modes; Mohr’s stress circle; pressure vessels. Development of freehand sketching abilities; isometric projections; plan and elevation views; the golden mean; reading technical drawings; guided practice in skill development.
**ELEC-106**  *Electrical and Electronic Systems and Circuits* (6 credits : 4L, 1T, 1B)
Course Content: Application of electrical and electronic components in typical circuits; diodes, amplifiers, rectifiers, gating devices; electrical equipment design; motors and starters; fundamentals of wireless communication; frequency and amplitude modulation; digital systems.

**MATH-119**  *Mathematics II* (9 credits : 6L, 3T, 0B)
**Prerequisite:** MATH-110
Course Content: Coordinate systems; multiple integrals; vector calculus; grad; div; curl; line and surface integrals; series; power, Taylor and Maclaurin series.

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**2nd Year**

**DSGN-205**  *Design Using AutoCAD 2D & 3D* (5 credits : 1L, 0T, 4B)
Course Content: Use of Computer Aided Design (CAD) software in the design and engineering of machinery, machine components, and mechanical systems.

**EMEC-215**  *Engineering Mechanics II* (5 credits : 1L, 0T, 4B)
Course Content: Centroids and CG; friction; vector analysis; relative velocity and projectile motion; dynamics of mechanisms; vibration analysis.

**STAT-204**  *Statistics and Probability* (4 credits : 3L, 1T, 0B)
Course Content: Data analysis, average and spread; permutations and combinations; random variables; probability distributions; mean and variance; normal and other distributions; random sampling; confidence levels; quality control; goodness of fit; regression and correlation analysis.

**MNFG-206**  *Workshop Technology* (6 credits : 2L, 0T, 4B)
Course Content: Machining processes; welding; sheet-metal working; metal cutting theory; tolerances limits and fits; metrology; fasteners. process planning.

**MNFG-214**  *Materials & Processes (Metals)* (4 credits : 3L, 0T, 1B)
Course Content: Classification, structure, properties and applications of metals; manufacturing processes and materials for metalworking; pressworking, casting, rolling, steelmaking, forging, powder metallurgy, metal removal processes; thermal processes for metals.

**ELEC-206**  *Electrical Technology* (6 credits : 3L, 0T, 3B)
Course Content: Characteristics and operation of dc and ac motors, generators, and transformers; basic motor control principles; load calculations; distribution and transmission.

**DSGN-215**  *Design Using Solidworks* (4 credits : 1L, 0T, 3B)
Course Content: Use of parametric Computer Aided Design (CAD) software in the design and engineering of machinery, machine components, and mechanical systems; introduction to finite element analysis and animation.

**MNFG-224**  *Materials & Processes (Non-Metals)* (4 credits : 3L, 0T, 1B)
Course Content: Classification, structure, properties and applications of polymers, ceramics and concrete. Manufacturing processes and materials for polymers and ceramics.
DSGN-225 Tool Die and Mould Design (5 credits : 2L, 0T, 3B)
Course Content: Design and manufacture of jigs, fixtures, press tools, injection moulds and blow moulds; design of tool components.

ELEC-216 Control Systems Engineering (6 credits : 4L, 1T, 1B)
Course Content: Control theory; dynamic linear system control; design of controllers and compensators

THRM-205 Engineering Thermodynamics I (5 credits : 3L, 1T, 1B)
Course Content: Concepts and definitions; first, second and third laws; flow and non-flow processes; properties of fluids; simple cyclic and non-cyclic processes. Heat and mass transfer.

SMTL-205 Strength of Materials I (5 credits : 3L, 1T, 1B)
Course Content: Stresses, strains, torsion, shear and moment in beams; bending and combined stresses; analysis of columns, thin cylinders; stress concentration; plastic behaviour of solids; creep and fatigue.

3rd Year

FDYN-304 Fluid Dynamics (4 credits : 2L, 1T, 1B)
Course Content: Hydrostatics and hydrodynamics; rheological models; Newtonian and non-Newtonian fluids; laminar and turbulent flows; boundary layers; flow through pipes, conduits, channels, valves, fittings; flow control in hydraulic systems; pump curves; pneumatic systems; gas Z-factors; compressed air systems; introduction to multiphase flow effects.

SMTL-305 Strength of Materials II (5 credits : 3L, 1T, 1B)
Course Content: Two and three dimensional stresses; combined stress systems; nonsymmetrical loadings; fatigue and impact applications; stresses due to rotation; analysis of thick cylinders; bending of curved beams, applications of strain gauge circuitry; fatigue; behaviour of prismatic bars, thin plates and shells; thermal stresses; fracture mechanics

ACCT-303 Principles of Accounting (3 credits : 3L, 0T, 0B)
Course Content: Accounting systems; ledgers; postings; balance sheets; income statements; cash flows; budgets. Introduction to economic problem solving and decision-making in industry. Capital sources and costs, discounted cash flow analysis, equivalent annual cost, present worth, rate of return comparisons, investment alternatives, replacement analysis, business finance and decision-making, depreciation, taxes and inflation.

THRM-305 Engineering Thermodynamics II (5 credits : 3L, 1T, 1B)
Course Content: Non-reactive and reactive mixtures, psychrometry, one-dimensional compressible fluid flow; vapour and gas power cycles; reciprocating engines and machine systems; refrigeration and heat pump cycles.

MNFG-304 CAD/CAM (4 credits : 2L, 0T, 2B)
Course Content: Computer applications to design and manufacture; numerical control technology; NC devices; manual and computer assisted programming.

MNFG-314 Materials & Processes (Electronic) (4 credits : 2L, 0T, 2B)
Course Content: Electrical components and interconnections; PCB manufacture; electronic component manufacture; automatic assembly; soldering and cleaning; inspection and testing.
ELEC-306  PLC and Microprocessor Control  (6 credits : 2L, 0T, 4B)
Course Content: PLC design and application; architecture and operation of microprocessor-based systems, including basic hardware and software.

DSGN-315  Design of Pneumatic and Hydraulic Systems  (5 credits : 3L, 0T, 2B)
Elements of pneumatic and hydraulic systems; pneumatic and hydraulic circuit design; electro-pneumatic and electro-hydraulic control.

DSGN-304  Product Design and Innovation  (4 credits : 3L, 0T, 1B)
Course Content: Synthesis of materials; design and processes into final products; lateral thinking and innovative approaches; concurrent engineering; design techniques such as QFD, DFA, FMEA etc.; rapid prototyping; human factors and ergonomics.

DSGN-306  Design of Machine Elements  (6 credits : 4L, 2T, 0B)
Course Content: Design of machine elements; manufacturing methods; kinematics of mechanisms; inspection and testing.

FINC-303  Financial Management and Economics  (4 credits : 3L, 1T, 0B)
Course Content: Principles of economics; costing methods; activity based costing; working capital management; manufacturing systems economics; techno-economic analysis of capital investment projects; financing mechanisms; company law.

WORK-304  Work/Method Study & Production Planning  (4 credits : 2L, 0T, 2B)
Course Content: Productivity; method study; work measurement; process organisation; work-place design; human factors. Production systems and production planning.

MNFG-324  Robotics and Automated Manufacture  (6 credits : 2L, 0T, 4B)
Course Content: Automated manufacturing systems; robotics; AS/RS Systems; automated process control systems.

PROJ-415  Project (Part 1)  (5 credits : 1L, 0T, 4B)
Course Content: Comprehensive project encompassing all stages from conception to implementation plan, utilizing substantial elements of technology tools, such as design, manufacture, management, planning, finance and marketing.

MTIC-405  Mechatronics  (5 credits : 3L, 0T, 2B)
Course Content: Sensors; actuators; DC/AC stepper motors; actuators; programmable controllers; modeling of dynamic systems; system identification; computer simulation and control; computer interfacing; analog to digital conversion; communications interfaces.

PROD-403  Production Management  (3 credits : 3L, 0T, 0B)
Course Content: Production systems; decision making tools; forecasting; aggregate planning; inventory management and JIT tactics; scheduling; production control systems; plant layout and material handling,
DSGN-405  Finite Element Analysis  (5 credits : 1L, 0T, 4B)
Course Content: Finite Element methods; Matrix techniques, eigenvalue problems, equations of
elasticity, plane stress, plane strain, 3D problems, variation methods, element types, element
stiffness, mass matrices and load vectors, assemblage of elements, boundary conditions, application
of method for stress, flow and thermal solutions

PROJ-405  Project Management  (5 credits : 3L, 0T, 2B)
Course Content: Project management and control techniques; cost control; contract management;
Use of computer software; critical path methods; Gantt charts; scheduling; contracts; manpower
management; labour issues; materials management.

QUAL-403  Quality Assurance and Management  (3 credits : 3L, 0T, 0B)
Course Content: Statistical methods, statistical process control, control charts for variables, rational
sampling and attributes, experimental design, two level factorial design, Taguchi approach to
quality of design, ISO 9000, reliability and life testing, management of quality; continuous
improvement techniques.

HSEE-403  HSE Engineering  (3 credits : 3L, 0T, 0B)
Course Content: HSE standards; safety problems and safe practices in industry; safety systems for
industry; impact on environment (air, water and others) of waste and noise. Handling of waste and
perception of risk, environmental responsibility and sustainable development; environmental health
and safety issues; systems for environmental control.

PROJ-415  Project (Part 2)  (10 credits : 1L, 0T, 9B)
Course Content: Comprehensive project encompassing all stages from conception to
implementation plan, utilizing substantial elements of technology tools, such as design,
manufacture, management, planning, finance and marketing. (continued from previous semester)

MNFG-405  Advanced Manufacturing and Nanotechnology  (5 credits : 3L, 0T, 2B)
Course Content: Laser applications; lithography, etching and additive techniques; micromachining;
nanotechnology; nanometrology; emerging techniques in nanomanufacturing.

MGMT-405  Manufacturing Systems Management  (5 credits : 3L, 0T, 2B)
Course Content: Strategic planning; manufacturing systems, including layout, maintenance,
material handling and controls; lean manufacturing, cost analysis, and manufacturing economics.

MKTG-403  Sales and Marketing  (3 credits : 3L, 0T, 0B)
Course Content: Marketing orientation of the political, social, legal, and economic environments;
development of marketing programmes incorporating these perspectives; formulation of strategies
for the design, pricing, channels, and promotion of products/services; basic concepts of selling;
concepts and strategies in international marketing; negotiation skills and buying behavior;
electronic commerce.

SOCY-403  Behavioural Science  (3 credits : 3L, 0T, 0B)
Course Content: Nature and principles of sociology, interrelationships of personality, culture, and
society, social pressures, organizations, and functions. Use of drama to impart individual and
group behavioural modification techniques. Developing emotional intelligence.

ENTR-403  Entrepreneurship  (3 credits : 3L, 0T, 0B)
MASTER OF SCIENCE PROGRAMMES

Master of Science
In
Petroleum Engineering

The Master of Science in Petroleum Engineering can be completed either as a full course-based programme or a coursework plus research project thesis option.

1. Full Course-Based Programme
The full course-based programme will be based on 12 courses, each of 3 hours of lectures per week for a semester. It is planned to present these courses over a 12 month period. All prospective candidates will be required to have a satisfactory background in Engineering courses and Petroleum Engineering Courses. It should also be noted that this programme will only be offered if there is sufficient enrolment for it. Further details may be obtained from the Head of the programme.

The background areas for Petroleum Engineering are:

- Drilling Engineering
- Well Logging
- Production Engineering
- Reservoir Engineering
- Geology

The background Engineering areas are:

- Thermodynamics
- Engineering Mechanics
- Fluid Mechanics or Transport Phenomena
- Mathematics
- Chemistry
- Physics

MSc Coursework Curricula
Course Content: Each of the twelve (12) courses will be three lecture hours a week for a semester. The courses are:
NGAS-504: Natural Gas Engineering
Course Content: Production, transportation, and storage of gas; metering and gauging; performance of wells; estimation of gas reserves; prevention of waste and utilization of natural gas.

STRC-504: Geometry and Mechanics of Geological Structures
Course Content: Description, classification, and mechanical analysis of geologic structures such as faults, folds, and fractures. Deformation mechanisms in rock, in situ stress, seismic interpretation, geologic mapping, and rock fracture. Emphasis on applications to engineering.

ANAL-504: Engineering Analysis
Course Content: This advanced level course is designed for petroleum engineers who wish to sharpen their skills in the practical interpretation of transient pressure well test data for well diagnosis and reservoir management. At the conclusion of the course, the students will develop a better appreciation of the capabilities and limitations of commercial well test analysis software packages that are typically used to analyze well test data.

PETR-504: Advanced Petrophysics
Course Content: Measurement, interpretation, and analysis of petrophysical properties of petroleum reservoir rocks.

WLOG-504: Advanced Well Logging and Correlation
Course Content: This is a hands-on graduate-level course on modern formation evaluation techniques using wireline and logging-while-drilling logs, core data, geological information, 3D seismic data, and physics of fluid-flow in porous media. Emphasis will be placed on the integration of all of the available data into a consistent, testable, and updateable description of the static and dynamic behaviour of hydrocarbon reservoirs. Several single- and multi-well data sets will be used to illustrate, reinforce, and apply the technical concepts discussed in class by way of homework projects implemented with Excel, Matlab, or Schlumberger’s Interactive Petrophysics (IP).

PROD-504: Advanced Production Engineering
Course Content: This course covers topics in formation damage, reservoir simulation, inflow performance and well testing.

STAT-504: Advanced Geostatistics
Prerequisites: A basic statistics course or GSTA304 and PETR 206 or PETR 504.
Course Content: This is an advanced course in statistics applied to the characterization of petroleum reservoirs.

TRAN-504: Pressure Transient Analysis
Course Content: This advanced level course is designed for petroleum engineers who wish to sharpen their skills in the practical interpretation of transient pressure well test data for well diagnosis and reservoir management. At the conclusion of the course, the students will develop a better appreciation of the capabilities and limitations of commercial well test analysis software packages that are typically used to analyze well test data.

ADRL-504 – Drilling Abnormal Pressure And Well Control
Prerequisite: DRLL 306
Course Content: This course covers topics on the methods used to detect abnormal subsurface pressures and the well control operations that result because of drilling abnormally pressured zones.

RESS-504: Advanced Reservoir Engineering
Prerequisites: FFPM 304 and RESR 307 or RESR 404
Course Content: This course covers topics in advanced fluid flow in permeable media, reservoir wettability, and phase behaviour effects.
DRIL-504: Advanced Drilling Engineering
Prerequisite: DRLL 306
Course Content: This is an advanced drilling course which covers directional drilling and fishing techniques.

THOR-504 – Heavy Oil Recovery By Thermal Methods
Course Content: This course reviews the petrophysical and reservoir engineering fundamentals and basic methods in enhanced oil recovery (EOR). It illustrates important mechanisms of heat transfer and teaches the importance of heat management with illustrations of practical calculations for thermal recovery.

2. Coursework Plus Thesis Option
The Master of Science degree in Petroleum Engineering, through the coursework plus thesis option, will be a research-based degree with a limited amount of coursework or assignments. The courses or assignments will be identified to complement the area of study. Students may start this programme at any time of the year.

The areas of study will generally be aligned with areas of interest to local industries. Current areas include heavy oil recovery processes, oil sands mining and separation, gas reservoir engineering studies and others.
Master of Science
In
Oil and Gas Exploration and Production

The MSc in Oil and Gas Exploration and Production is delivered over 3 semesters for a duration of eleven months from, September to July. It should also be noted that this programme will only be offered if there is sufficient enrolment for it. Further details may be obtained from the Head of the programme.

**Semester 1 – Basic Overview Block (UTT O’Meara Campus)**

The purpose of this block is to ensure that the students reach the basic level of knowledge in each of the areas involved in undertaking an exploration and production project. The Block is made up of 450 contact or lecture hours (35 hrs/week). The topics covered are:

- Industry Overview
- Exploration Principles
- Geology Field Trip
- Drilling Engineering
- Well Logging
- Geophysics
- Reservoir Geology
- Reservoir Engineering
- Well Testing
- Reservoir Characterization
- Reservoir Simulation
- Production Technology
- Off Shore Technology
- Economic Evaluation
- Risk Analysis

**Semester 2 – Specialisation Block**

The aim of this block is to provide specialised training in specific discipline areas. This Block consists of 260 contact or lecture hours (26 hours/week). The students pursue post graduate courses at Heriot-Watt University in the UK. The areas of specialisation are:

- Petroleum Engineering
- Reservoir Evaluation and Management
- Petroleum Geology
- Petroleum Geophysics

At Heriot-Watt the students follow a selected specialisation for one semester.
Semester 3 – Team Project Block (UTT O’Meara Campus)

This project constitutes the core of the MSc Programme. Its purpose is to teach the students through the application of the concepts learnt in the first two blocks, while working in a multi-cultural multi-disciplinary team on a real exploration and production project against specific objectives and within a prescribed schedule. The Block is conducted over a 4-month period. The methodology used includes:

- Access to a database related to a real reservoir, which will be used as a starting point.
- Use of technologically advanced working tools.
- Support of external tutors
- Presentation of conclusions and results by phases
- Competition among the different project teams
Master of Science
in
Process and Utilities Engineering

GENERAL DESCRIPTION
The Master of Science degree in Process and Utilities Engineering will be a research-based degree with a limited amount of coursework or assignments. The courses or assignments will be identified to complement the area of study. Students may start this programme at any time of the year.

DURATION
It is expected that a minimum of one year of full-time studies will be required to complete the requirements for the M.Sc. degree. It is also possible that some candidates will complete the degree on a flexible schedule which would take longer.

POSSIBLE PROJECT AREAS
The areas for possible projects for students will vary, depending on the supervising staff and the support from industry in indicated areas of interest. Students will be encouraged to work in areas that are of direct interest to local industries. At this time, several areas have been identified by industry for potential projects and these areas cover petroleum refining, gas processing, some environmental issues, and the biochemical industry.
Master of Science
in
Information and Communications Technology (ICT)

General Description
1. Coursework-based Option
The Master of Science (MSc) Degree in Information and Communications Technology (ICT) will be a research-based degree with a certain number of credited courses. The courses are selected based on the area of specialization a student wants to pursue. There will be a group of core courses that all ICT MSc students must take and the remaining courses can be selected from a list of elective courses in order to specialize in Software Engineering, Communications Engineering, or Information Systems. It is expected that the students will start their course work either in September 2006 or January 2007. Note that not all the courses shown in the list may be offered during a semester.

2. Thesis-based Option
There is also an option to do an MSc by thesis which will involve a more in-depth research project which results in a more extensive thesis. There may also be several courses specified to be taken to complement the area of study.

Duration
It is expected that a minimum of 18 months of studies will be required to complete the courses and research elements in order to complete the requirements for the MSc degree. It is possible that some students will complete the degree on a flexible schedule which would take longer.

Possible Research Areas
The areas of possible research for completing a mandatory thesis will vary depending on the supervising staff and areas where UTT wants to concentrate in order to facilitate technology transfer and economic development in ICT areas in the country. Students will be encouraged to work in areas that are of direct interest and relevant to local industries. At this time UTT has been focusing on a few strategic areas of ICT and focus areas are expected to evolve as UTT receives additional feedback from the industry and adds new academic staff.

Computer Engineering
- Computer Architecture
- Error-Control Codes
- Parallel Computer Architecture
- Design of Asynchronous Circuit and Systems
- Fault-Tolerant Computing
- Multimedia Database Systems and Structures

Communications Engineering
- Digital Communications and digital Signal Processing
- Survivable Optical Networks
- Video and Image Processing and Computer Vision
- Error Control Codes
• Wireless Communications
• Mobile Ad Hoc Networking and Computing
• Interconnection Networks for Multi-computers

Information Systems

• Advanced Data Structures
• Parallel Computation for Engineering
• Software Architecture
• Advanced Software for Computer Engineers
• Software Performance Engineering
• Multimedia Computer Systems Design
• Computers and network Security, Privacy and Encryption
• Entrepreneurship and Business Practices

COURSE DESCRIPTIONS

Computer Architecture (3 credits)
Prerequisite: Computer Organization.
Course Content: The concepts of computer architecture from a quantitative approach. Instruction set design with examples from both RISC and CISC architectures. Processor implementation techniques and microprogramming. Pipelining and methods to cope with pipeline hazards. The memory hierarchy: cache and virtual memory. Parallel and vector architectures, future directions, and examples of highly parallel computers.

Error-Control Codes (3 credits)
Prerequisite: Introduction to Discrete Mathematics.
Course Content: Introduction to codes for error detection and correction, linear algebra over finite fields, bounds, perfect and quasi-perfect codes, probability of error detection, Hamming, BCH, MDS, Reed-Solomon, and non-linear codes.

Fault-Tolerant Computing (3 credits)
Prerequisite: Introduction to Discrete Mathematics.
Course Content: Knowledge of computer architecture and testing. Fault-tolerant PLAs, gate arrays, ALVs, and computer memories. Coding techniques in fault-tolerant computing. Self-error detection/correction for multiprocessors.

Digital Communication (3 credits)
Prerequisites: Communication Systems, Elementary Probability.
Course Content: Channel characterization; signal design; optimal receivers; coherent and noncoherent digital signaling; intersymbol interference; baseband shaping; equalization, synchronization and detection; error detection and correction coding, pulse shaping, synchronization and equalization. DSP implementation are integral theme.
Wireless Communications (3 credits)
Prerequisite: Digital Communication.
Course Content: Design and analysis of robust wireless communication systems. Spread-spectrum and CDMA. Radio-channel modelling: propagation, path loss, multipath, and fading. Cellular system design. Coding, diversity, and equalization. Alternative communication channels. Case studies. Multiple-access, mobility, and networking issues. 2G, 2.5G and 3G cellular techniques, wireless local area networks (Wi-Fi), WiMax/Mobile-Fi, wireless sensor networks, and wireless wireline interworking, Mobile IP will be covered.

Entrepreneurship and Business Practices (3 credits)
Prerequisite:
Course Content: The objective of the course is to give graduate students with technology background the management and business concepts and tools that they will need to effectively function and compete in the business world. It will covers topics such as whether there is a market, what customers want, setting business objectives, setting a company, technology transfer processes, capital requirements, understanding accounting and financial statements, business models and business plan development, building sustainable competitive advantage, organizing the company, organizational models, benchmarking, characteristics of high performance organizations, team building, decision making, conflict management, and incentive systems and accountability.

Interconnection Networks for Multicomputers (3 credits)
Prerequisites: Computer Architecture, Discrete Stochastic Models.
Course Content: Interconnection network topologies; static and dynamic networks; routing in multicomputer networks; network flow control deadlocks in routing; multicast and broadcast; fault-tolerance and reliability of interconnection networks; modules for realization (nodes and routers); performance metrics for different topologies.

Advanced Data Structures (3 credits)
Prerequisite: Data Structures.
Course Content: Review of basic data structures and Java syntax. Data abstraction and object-oriented design in the context of high-level languages and databases. Design implementation from the perspective of data structure efficiency and distributed control. Tailoring priority queues, balanced search trees, and graph algorithms to real-world problems, such as network routing, database management, and transaction processing.

Parallel Computation for Engineering (3 credits)
Prerequisites: Differential Equations, Advanced Physics.
Course Content: Methods of parallel computing for science and engineering applications are presented through lectures and programming exercises drawn from continuum mechanics, diffusive transport, magnetic materials, and molecular modelling. Given the appropriate equations of motion, each student is guided to develop parallel algorithms, design simulation software, and analyze the resulting data using proper statistical and graphical analysis methods. In addition to the weekly laboratories, each student completes a term project.

Software Architecture (3 credits)
Prerequisite: Computer Organization.
Course Content: Software architecture with emphasis on large, distributed, concurrent software systems (i.e., software for telecommunications, real-time control systems, e-commerce applications). Architectural design using patterns and object frameworks. Development of software architecture for a software product line (i.e., a group of products sharing key functionality). Review and analysis of the architecture of existing software systems.
Software Performance Engineering (3 credits)
**Prerequisite:** Computer Organization.
Course Content: Performance analysis of real-time software and systems. Petri net theory, including timed, colored, and stochastic nets. Introduction to queuing theory. Analysis of software performance using software execution models and information processing graphs. Software safety and system performability.

Advanced Software for Computer Engineers (3 credits)
**Prerequisites:** Computer Networks, C, C++, or Java programming experience.
Course Content: Explores the design of software using state-of-the-art technologies; emphasis on distributed systems, Web-based applications, and the use of the latest application frameworks; project-oriented course.

Survivable Optical Networks (3 credits)
**Prerequisite:** Digital Communications.
Course Content: Optical networks design with emphasis on network survivability. Wavelength division multiplexing (WDM), wavelength conversation, optical switching architecture, routing and wavelength assignment algorithms, IP over WDM, optical networks protocols, optical networks control architecture, protection and restoration, spare capacity allocation, survivable routing, design and performance evaluation.

Video and Image Processing and Computer Vision (3 credits)
**Prerequisite:** Signal Processing and Digital Communications.
Course Content: Introduction to image and video processing, media storage and compression, video processing techniques, computer vision, content management and analysis, video production, filtering and editing, applications and entertainment technologies and applications.

Computers and networks security, Privacy and Encryption (3 credits)
**Prerequisite:**
Course Content: The course is aimed at providing students with a good foundation in the principles methods, applications, and legislations around computer security and privacy in networked environments. Wire, wireless and web services environment are targeted. The importance of privacy and security technologies, organizational governance around security and privacy, and government regulations for privacy and security are pervasive throughout the course as key enablers to international electronics and mobile commerce.

Mobile Ad Hoc Networking and Computing (3 credits)
**Prerequisite:** Consent of instructor.
Course Content: Mobile routers, wireless interconnectivity, and an unpredictably changing topology characterize a Mobile Ad hoc Network (MANET). Covers MANET-specific topics related to resource discovery, handoff, MAC-layer, security, routing, mobility and location management, self-organization, caching, and practical implementations.

Parallel Computer Architecture (3 credits)
**Prerequisite:** Computer Architecture.
Course Content: Problems in parallel processing, how they are addressed by current parallel computers, and design of future systems. Topics include characteristics of parallel applications; parallel system support; cache coherency protocols; network interfaces; switch and interconnection network design; scalable systems; and hardware-software tradeoffs. Examples of both small-scale
and large-scale parallel systems, including web servers, clusters of networked PCs, MPPs, and vector supercomputers.

**Multimedia Database Systems and structure (3 credits)**

**Prerequisite:** COMP 307.

Course Content: This course deals with advanced database system concepts including query processing, transaction processing, distributed and heterogeneous databases, object-oriented and object-relational databases, data mining and data warehousing, spatial and multimedia systems, and Internet information systems.

**MSc Thesis for the Coursework-based MSc (12 credits)**

R&D work in specific areas of ICT leading to a comprehensive thesis.
Master of Science
in
Industrial Innovation, Entrepreneurship & Management

A Masters programme that prepares graduates for fast-track careers in industry.

Programme Description

General Description

IIEM is a post-graduate Masters programme that integrates core-learning and skills from lectures, practical exercises, company visits and live industrial projects. The programme is delivered in a variety of ways which provide students with theoretical knowledge and the ability to demonstrate this knowledge both in a controlled environment and in real industrial situations. Students develop new problem solving skills that will enable them to identify improvements for local, regional and international businesses. The programme encourages entrepreneurialism that is suitable for a diverse range of companies covering both large and small companies and across a wide range of products and markets. The programme is carefully structured in a tried and tested method of educating students in, and giving students the opportunity to engage in, every aspect of managing a successful and innovative business.

The background areas for IIEM are:

- Core Skills & Foundation Knowledge
- Project Scoping and Research Planning
- Business Planning, Strategy and Company Creation
- New Product & Processes and Technology Management
- Production Planning, Quality Management and Supply Chain Design
- Opportunity Recognition, Funding and Law
- Human Resources and Finance

Programme Duration

The programme will be delivered as a full-time course over eleven months from September to July.

Programme Details

Semester 1

Orientation & Induction

This is the most important module of the course. It contains introductory lectures on each of the functions that make up an industrial business – Strategy, Sales & Marketing, New Product Development, Operations, Supply Chain Management, Quality, Process Improvement, etc. There is a business planning exercise that develops the skills necessary to take ideas from conception through to the funding stage. The students will be introduced to a range of business improvement tools and shown how to select the appropriate tools for various problem-solving situations, as well as being coached in presentation techniques and report writing. They will visit a number of factories and undertake a range of synthetic industrial problem solving exercises. At the end of this module the students will understand the basic architecture and functions of an industrial business and be prepared to tackle a live, in-company improvement project.
Dissertation
The purpose of the dissertation is to give the students experience of the research processes associated with developing new knowledge. Industrial life tends to emphasize short term problem solving abilities and can often benefit from the rigour of looking at past work, developing a sound experimental method and ensuring that bias in the results is recognised - areas that are all standard parts of the academic research process.

Business Strategy and Creation
This module will emphasize the importance of market and customer focus in both existing business and in setting up new business. It will cover the strategy development processes both at the enterprise and the functional level and the business processes associated with the Sales and Marketing function.

Design and Process Selection
This module focuses on the ability to generate new products and processes; it will cover the technology management business processes, the design process, with practical exercises and manufacturing process characterisation and selection.

Semester 2
Operations and Supply Chain Management
This module will focus on the business processes required to run a manufacturing enterprise, both within the company, such as production planning and control, quality management, performance measurement and those between enterprises such as supply chain design, supplier selection and management, distribution and logistics systems.

Entrepreneurship and Transferable Skills
The entrepreneurial skills will include Opportunity Recognition, Funding, and the people issues involved in starting new businesses. The general transferable skills will include Finance, Law, Commerce, Negotiation and Project Management.

Optional Modules
The optional module includes a module focussed on the operational issues associated with the process industry, a module focussed on business improvement issues for small and medium size enterprises, and a module that looks at global manufacturing networks and enterprise positioning.

Leadership and HR Management
This is a core module that will cover leadership and management skills as well as business functions associated with recruitment, training, motivation and discipline. It will look at the perspective of High Performance Work Organisations as well as the legal requirements.

Semester 3
Business Plan Competition
The skills of idea generation, planning, funding and realisation having been developed, these will be brought together into a capstone project where students generate real business proposals and put them forward to the funding community. Sources of funding will be identified for the most successful and viable proposals.

Dissertation Completion
Time for students to complete their dissertation bringing together learning from both their theoretical studies and the practical experience they have gained in the course to form new contributions to knowledge.

Overseas Tour
A 2-week tour of overseas companies and manufacturing plants to investigate themes that can be of direct practical value in enhancing business profitability in Trinidad and Tobago and the wider region.
Master of Science in Maritime Management

GENERAL DESCRIPTION
The Master of Science degree in Maritime Management is aimed/directed at those with a relevant first degree and professional maritime experience both seagoing and shore-based and who wish to progress in the maritime industry ashore. It will consist of two taught semesters followed by a supervised research project and thesis.

The taught part of the programme will comprise four courses:
- Quality Management in Shipping
- Maritime Commercial Management
- Management of Maritime Pollution
- Duties of Management under International Maritime Law

The thesis will consist of research into a relevant subject approved by the programme leader.

It should be noted that if enrolment numbers are insufficient for this programme, it will not be offered.
DOCTOR OF PHILOSOPHY PROGRAMMES

Doctor of Philosophy programmes are offered in the following areas:

- Information and Communications Technology (ICT)
- Manufacturing Engineering
- Petroleum Engineering
- Process & Utilities Engineering

The PhD programmes consist of some coursework and a major research project and will generally take a minimum of three years to complete.

Students interested in pursuing a PhD programme are advised to approach the Head of the programme area concerned for more details.