



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

Faculty of Engineering, Built Environment and  
Information Technology

**POSTGRADUATE BROCHURE 2015**  
**Department of Mechanical and Aeronautical Engineering**

Departmental website address:  
<http://www.me.up.ac.za>

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## 1. INTRODUCTION

As part of the postgraduate programme in the Department of Mechanical and Aeronautical Engineering, engineering students may register for the BEngHons, MEng, PhD degrees in Mechanical Engineering, or for the DEng degree. Candidates with BSc, BTech or equivalent qualifications may register for the BScHons(Applied Science)(Mechanics) degree. This qualification allows the student to subsequently register for the MSc(Applied Science)(Mechanics) degree, which may be followed by the PhD (Mechanics) degree. Students who wish to register for modules for non-degree purposes may register for Engineering Special Postgraduate.

With this prospectus particulars pertaining to requirements, available modules and study arrangements are described in detail. The prospectus is however intended to provide information and must be read in conjunction with and subordinate to the Yearbook of the University of Pretoria, specifically two volumes: *General Regulations and Rules* and *School of Engineering*. Both these volumes are available for download as pdf documents at this [link](#), or at <http://www.up.ac.za>, then select either “Undergraduate students” from the “Study at UP” menu, then expand the “Study information” menu (click on the adjacent plus sign) and then select “Yearbook information”.

This prospectus is a dynamic document that may change as we approach the year 2015, or while the year 2015 progresses. Changes are recorded in a [register](#) on the last page. Students are encouraged to continually check the [postgraduate web page](#) of the department for the latest version of this brochure. In addition to the link above, the postgraduate web page can be reached via the departmental web page at <http://www.me.up.ac.za>, expand the “Academic Programmes” menu (click on the adjacent plus sign) and then select “Postgraduate”.

### 1.1. Contact Information

Further enquiries with regard to postgraduate studies may be directed to the following persons:

<b>Academic Arrangements (Department)</b>			
Registration Module changes Administration enquiries	Ms A Kgatshe	012 420 2096 (Tel) 012 362 5087 (Fax) <a href="mailto:abea.kgatshe@up.ac.za">abea.kgatshe@up.ac.za</a>	
Coordinators for postgraduate studies; curriculum structure, all postgraduate degrees	Prof NJ Theron	012 420 3309 <a href="mailto:nico.theron@up.ac.za">nico.theron@up.ac.za</a>	
	Dr. A Lexmond	012 420 6890 <a href="mailto:axel.lexmond@up.ac.za">axel.lexmond@up.ac.za</a>	
<b>General Administration (EBIT Student Administration, Eng I level 6)</b>			
Applications Honours	Ms S Steenberg	012 420 5315	<a href="mailto:stefanie.steenberg@up.ac.za">stefanie.steenberg@up.ac.za</a>
Applications Master's, PhD	Ms S Steenberg	012 420 5315	<a href="mailto:stefanie.steenberg@up.ac.za">stefanie.steenberg@up.ac.za</a>
Theses/Dissertations	Ms S Steenberg	012 420 5315	<a href="mailto:stefanie.steenberg@up.ac.za">stefanie.steenberg@up.ac.za</a>
General admin: Master's, Honours	Ms M Motlhamme	012 420 5299	<a href="mailto:millie.motlhamme@up.ac.za">millie.motlhamme@up.ac.za</a>
<b>Financial Administration</b>			
Students accounts	Ms M Frates	012 420 4061	<a href="mailto:matty.frates@up.ac.za">matty.frates@up.ac.za</a>
	Or contact the Client Service Centre		

Enquiries in connection with specific modules must, as far as possible, be directed to the lecturer concerned. Ms A Kgatshe acts as administrator of postgraduate studies in the department, and any enquiries that cannot be answered by the abovementioned personnel, may be directed to her.

Further information on the department and its research programmes can be obtained at the departmental web page at <http://www.me.up.ac.za>.

## 2. HONOURS DEGREES

The Department awards the following taught honours degrees: the BEngHons degree in Mechanical Engineering (degree code 12240051) follows on a BEng degree, and the BScHons (Applied Science)(Mechanics) degree (code 12243021) follows on a BSc, a BTech or equivalent. For all honours degrees the candidate must successfully complete modules that total 128 SAQA credits (1 credit represents 10 study hours). The minimum duration is one year of full time study. Most of the postgraduate semester modules carry a weight of 16 credits, but some 32 credit modules are also offered. Normally an after-hours student (i.e., a student who is working for an employer on a full time basis but also studies after-hours; previously called a part-time student) shall complete 64 module credits per annum so that the degree may be conferred after two years. This can however be accelerated.

The purpose of the honours degree is, on the one hand, to gain a deeper and more focussed knowledge and understanding of a field of specialization in engineering science, usually as preparation for master's research, but sometimes also in support of specific career goals in industry. On the other hand, the honours degree can also serve the purpose of broadening the student's knowledge of the engineering science in general, and depending on the selection of honours degree modules, both of these purposes may to some extent be served by a specific honours degree. The honours degree, and specifically the BScHons (Applied Sciences)(Mechanics), can **not** be used as an alternative route or as a support mechanism for registration, with the Engineering Council of South Africa (ECSA), as a professional engineer (PrEng). The recommended and correct route to registration is to complete a four year BEng degree (or equivalent) at a university that is accredited for this purpose in terms of the Washington Accord.

Postgraduate modules are presented either in blocks or periods. In the case of 16 credit modules, block presentation entails three full contact days, typically presented at one month intervals. The 32 credit modules entail six full contact days in three two-day blocks, also presented at one month intervals. On the other hand, presentation in periods occurs in either 50 minute periods, weekly two hour periods, bi-weekly four hour periods or even a number of three hour periods. Further details are shown in [tables 1](#) and [2](#), and also in the time table in [section 13](#).

In addition to attending the formal contact days, students are expected to complete assignments. Satisfactory completion of these assignments and formal tests form part of the examination entrance requirements. According to the SAQA guidelines of one credit per 10 notional hours, it is expected that a student will typically do 160 hours of work to complete a 16 credit module, or 320 hours in the case of a 32 credit module.

Note that, with the exception of the compulsory modules of the BScHons (Applied Science) programme (see [section 2.1](#)), a student may repeat any module only once. No supplementary or special examinations are granted at postgraduate level (see Eng. 17(f)(v))

in the School of Engineering year book). The General Regulation G.12.5 (see General Regulations and Rules year book) pertaining to undergraduate students who miss examinations due to unforeseen circumstances or illness, also apply to honours students with respect to all modules offered by the Department. Both these volumes can be downloaded from the University's web site; see [section 1](#) for details.

Postgraduate modules are by default presented in English, unless all registered students and the lecturer agree that the lectures should be in Afrikaans. All students are entitled to participate in English or Afrikaans during contact sessions or answer tests or examinations in either one of these languages. All study material will usually be available in English only.

### **2.1. Compulsory modules for the BScHons (Applied Science)(Mechanics) degree**

Candidates for the BScHons (Applied Science)(Mechanics) degree must select and do any one of the following three 32 credit module options:

1. MTV 732 Thermoflow 732, or
2. MSY 732 Structural Mechanics 732, or
3. The combination of MIR 781 Reliability engineering 781 and MIP 780 Maintenance practice 780.

The modules listed as options above are all presented in the first semester of each year. **These modules must be passed on the first attempt; otherwise the student's registration will be terminated.** In addition to these modules, BScHons (Applied Science) students may choose the remaining 96 credits from the postgraduate modules offered by the department, subject to the normal prerequisites as well as the additional prerequisites listed in [table 1](#) below. Students will be allowed to register for first semester modules without having passed the prerequisite module listed in table 1 provided that the student is concurrently registered for the prerequisite module.

## **3. MASTER'S DEGREES**

The department awards two research based master's degrees, namely the MEng degree in Mechanical Engineering (degree code 12250051), which follows on a BEngHons, and the MSc (Applied Science)(Mechanics) degree (code 12253021), which follows on a BScHons (Applied Science)(Mechanics). It is compulsory to complete the honours degree before admission to the master's degree will be considered.

Both master's degrees are awarded on the basis of 128 credits based on a dissertation and an examination covering the field of the dissertation.

Candidates must demonstrate a sound and fundamental knowledge in a specialised field of mechanical engineering science, which will normally have been formed by the focus of their honours degree course work. They will further be trained in the scientific method of work and thought processes, and have proven through supervised independent research, their ability to use scientific methods in scientific investigation.

The master's degree can **not** be used as an alternative route or as a support mechanism for registration, with the Engineering Council of South Africa (ECSA), as a professional engineer (PrEng). The recommended and correct route to registration is to complete a four year BEng degree (or equivalent) at a university that is accredited for this purpose in terms of the Washington Accord.

All candidates for the master's degree must prepare and submit at least one article for publication in an ISI accredited journal (listed at <http://science.thomsonreuters.com/mjl/index.html>), before submitting the dissertation. This article must be based on research done for the dissertation, and must be approved by the supervisor (see [Appendix 2](#)).

#### **4. DOCTORAL DEGREES**

The PhD (Mechanical Engineering) and the PhD (Mechanics) degrees are each awarded based on grounds of a research thesis and an examination covering the field of the thesis.

Candidates for the doctoral degree must prove that they have an in-depth and fundamental but also wide ranging knowledge of a specialised field in science, are trained in the scientific method of work and thinking and have in particular demonstrated their ability to apply scientific methods in a scientific investigation through independent research, making an original contribution to science.

The doctoral degree can **not** be used as an alternative route or as a support mechanism for registration, with the Engineering Council of South Africa (ECSA), as a professional engineer (PrEng). The recommended and correct route to registration is to complete a four year BEng degree (or equivalent) at a university that is accredited for this purpose in terms of the Washington Accord.

All candidates must prepare and submit at least two articles for publication in an ISI accredited journal (listed at <http://science.thomsonreuters.com/mjl/index.html>). The research for this article must be done in collaboration with the department. Before submitting the article to the journal approval must be obtained from the supervisor (see [Appendix 2](#)).

The DEng is a doctoral degree awarded on grounds of publications and may be awarded to a candidate on grounds of exceptional and wide-ranging research work, which enjoys international recognition. In the Faculty this is interpreted as that, based on his/her research outputs, the candidate is generally and internationally recognised as a leader in his/her field.

#### **5. ADMISSION TO POSTGRADUATE STUDIES AT THE UNIVERSITY OF PRETORIA**

The procedure for admission of a student to the University of Pretoria is slightly different for South African citizen and for international applicants. International applicants are referred to [section 5.2](#) below.

##### **5.1. Applicants who are South African citizens**

Before registration, prospective postgraduate students from other universities and students who have discontinued their studies at the University of Pretoria for a year or longer, must apply for admission to the University. This can be done either online or through mailing the completed application forms and the corresponding fees, called the "paper-based application". Details of both are available on the University's web site at this [link](#) or at <http://www.up.ac.za>, then select "Apply at UP" from the "Study at UP" menu. This brings one to the "New Students- Undergraduate" page. On this page select "Apply at UP" from the list on the left. For a paper-based application the necessary forms and documentation may be downloaded from the University's web site at the link above or requested by e-mail

from [csc@up.ac.za](mailto:csc@up.ac.za), including the applicant's name, postal address and type of application form (postgraduate). The following postal address may also be used:

Client Service Centre  
University of Pretoria  
Private bag X20  
Hatfield  
0028

Applications close on 31 October of each year, for South African citizen students planning to commence with studies towards the BScHons (Applied Science)(Mechanics) degree in the first semester of the following year. For the BEngHons (Mechanical Engineering) degree an application closing date is not applied, provided that the modules the student plans to do have not started at the time of application. There is no closing date for master's and PhD degree applications.

A student planning to commence with postgraduate studies without interruption directly after completion of another degree at the University of Pretoria does not need to apply for admission, although he/she is required to indicate his/her intention by requesting an internal application form from the Client Service Centre. This form needs to be filled in, signed and submitted for approval to one of the coordinators for postgraduate studies (see [Contact Information](#)). The form should then be submitted to Student Administration, 6th floor, Engineering Building I. An internal application can also be submitted on-line.

## 5.2. International applicants

Before registration, prospective international postgraduate students must apply for admission to the University. This can be done either online or through mailing the completed application forms and the corresponding fees, called the "paper-based application". Details of both are available on the University's web site at this [link](#) or at <http://www.up.ac.za>, then select "Apply at UP" from the "Study at UP" menu. This brings one to the "New Students- Undergraduate" page. On this page select "Apply at UP" from the list on the left. For a paper-based application the necessary forms and documentation may be downloaded from the University's web site at the link above or requested by e-mail from [csc@up.ac.za](mailto:csc@up.ac.za), including the applicant's name, postal address and type of application form (international). The following postal address may also be used:

Client Service Centre  
University of Pretoria  
Private bag X20  
Hatfield  
0028 SOUTH AFRICA

Applications close on 31 August of each year, for international students applying for honours degree studies and planning to commence with this in January of the following year. There is no closing date for master's and PhD degree applications.

Prospective international students are encouraged to also visit the University of Pretoria International Students website at this [link](#) or at <http://www.up.ac.za>, then select "International students" from the "Study at UP" menu.

Current international students who plan to begin with a new programme, for instance to start with a master's degree after completing the honours, do not need to submit a formal application, but need to submit an internal application (see the last paragraph of [section 5.1](#) above), provided that the international office is consulted on this.



## **6. ADMISSION REQUIREMENTS**

### **6.1. BEngHons**

To be admitted to the BEngHons degree programme, the candidate must hold a BEng degree (or equivalent) that is accredited by the Engineering Council of South Africa (ECSA) for purposes of registration as professional engineer. A candidate who holds a bachelor's degree in engineering that was awarded by a university outside South Africa, where the comparable registration authority of that country accredits this degree in a similar way, while that country is a signatory to the Washington Accord, shall also be admitted to this programme. If the foreign country is not a signatory to the Washington Accord, the candidate will be admitted to this programme only if he/she, at his/her own cost, obtains clearance from ECSA that his/her degree would be deemed acceptable for the purposes of registration as professional engineer (or a candidate engineer) in the Republic of South Africa. More information may be obtained from ECSA's web site at this [link](#), or [www.ecsa.co.za](http://www.ecsa.co.za), then select "Evaluation of Qualifications" under the "Education & Accreditation" heading.

### **6.2. BScHons (Applied Science)**

To be admitted to the BScHons (Applied Science) degree programme, the candidate must hold an appropriate bachelor's degree. Only applicants with exceptionally good academic records will be admitted. Typical examples of appropriate bachelor's degrees are a BTech degree in Mechanical Engineering and a BSc degree in Mathematics, Applied Mathematics or Physics. A candidate, whose bachelor's degree in engineering does not meet the admission requirements for the BEngHons programme, may also be admitted to the BScHons (Applied Science) programme.

### **6.3. MEng**

To be admitted to the MEng degree programme, the candidate must hold a BEngHons degree (or equivalent), as well as meet the admission requirements for the BEngHons degree (see [section 6.1](#)). Meeting these requirements, however, does not automatically secure admission to the MEng degree. Admission is possible only for candidates with excellent academic records. Furthermore, admission will be granted only if the intended research fits in with the research foci of the Department and the supervision capacity exists, as decided by the Head of the Department.

### **6.4. MSc (Applied Science)**

To be admitted to the MSc (Applied Science) degree programme, the candidate must hold a BScHons (Applied Science) degree (or equivalent). Meeting this requirement, however, does not automatically secure admission to the MSc (Applied Science) degree. Admission is possible only for candidates with excellent academic records. Furthermore, admission will be granted only if the intended research fits in with the research foci of the Department and the supervision capacity exists, as decided by the Head of the Department.

### **6.5. PhD (Mechanical Engineering)**

To be admitted to the PhD (Mechanical Engineering) degree programme, the candidate must hold an MEng degree (or equivalent), as well as meet the admission requirements for the BEngHons degree (see [section 6.1](#)). The MEng degree requirement implies that the master's degree must have been a research-based degree. Candidates holding a taught

master's degree may apply, but additional requirements may be imposed on an ad hoc basis.

Having obtained the MEng degree (or equivalent) does not automatically secure admission to the PhD (Mechanical Engineering) degree. Admission is possible only for candidates with excellent academic records. Furthermore, admission will be granted only if the intended research fits in with the research foci of the Department and the supervision capacity exists, as decided by the Head of the Department.

### **6.6. PhD (Mechanics)**

To be admitted to the PhD (Mechanics) degree programme, the candidate must hold an MSc (Applied Science) degree (or equivalent). This means that the master's degree must have been a research-based degree. Candidates holding a taught master's degree may apply, but additional requirements may be imposed on an ad hoc basis.

Having obtained the MSc (Applied Science) degree (or equivalent) does not automatically secure admission to the PhD (Mechanics) degree. Admission is possible only for candidates with excellent academic records. Furthermore, admission will be granted only if the intended research fits in with the research foci of the Department and the supervision capacity exists, as decided by the Head of the Department.

## **7. REGISTRATION**

Online registration is available to all students, provided that, in the case of students who start with these programmes, the applications were submitted in good time. Alternatively a paper based registration process may be used. Off campus after-hours students may either fax or scan and e-mail the completed registration forms, together with proof of payment of the necessary registration fees, to Ms A Kgatshe (see [Contact Information](#)) to complete registration. Please note details of the registration process in the sections below.

### **7.1. Online registration**

Details of the online registration process will be made available to students on the student portal. If a student chooses to register for a module(s) offered by another Department (see [section 11.3](#)), this must be approved by one of the coordinators for postgraduate studies (see [Contact Information](#)). In this case the student should first register on-line for all the other selected modules and then request this approval by e-mail from Prof Theron or Dr Lexmond, who will then, if he approves, forward the message to the Student Administration with a request to add the module(s) to the student's registration.

Registration for the modules [Independent Study MSS 781](#) or [782](#) must also be approved by one of the coordinators for postgraduate studies (see [Contact Information](#)). In this case the lecturer who is going to supervise the independent study should first send an e-mail to both Prof Theron and Dr Lexmond, in which he/she indicates his/her willingness to act in this capacity and in which the names of the students who will be doing this independent study module are listed. The student should then send an e-mail to either Prof Theron or Dr Lexmond with a request that Independent Study MSS 781 or MSS 782 (whichever is the case) should be added to his/her registration. Upon approval the relevant coordinator will forward the e-mail to the Student Administration with a request to add the module to the student's registration.

Student who successfully register on-line do not need to attend the registration session on 24 January.

## **7.2. Paper based registration**

It is suggested that students choosing use paper-based registration attend the registration session on campus on Saturday 24 January 2015. At the registration session the registration form must first be approved by one of the postgraduate coordinators. They will be available in Engineering I room 9-7 from 08:00 to 10:00 on 24 January, and only during this time. After the coordinator has signed the registration form, the student must hand in the form with proof of payment of the registration fee and complete the registration in the Mining Industry Study Centre, Engineering I Building.

If the registration fee is to be paid directly into the University's bank account, this needs to be completed well in advance of the 24 January registration date, to ensure that the payment will already be reflected on the student's university account at registration.

Please note that the postgraduate coordinators shall no longer sign registration forms at random times. Students who fail to get a signature during the indicated time slot on 24 January may hand in their forms to be signed to Ms A Kgatshe (see [Contact Information](#)) during normal office hours. She will then give further instructions to complete registration.

Students interested in doing either one of the modules [Independent Study MSS 781](#) or [782](#) must take note of the paragraph dealing with this in [section 7.1](#).

## **7.3. General**

International students need to ensure that their study permits are valid before registration.

Students wishing to discontinue any module must not only inform the lecturer involved, but must also fill out the necessary forms at Student Administration. Students who have not formally discontinued modules by the dates specified by Student Administration will be held financially accountable.

Except for the BScHons (Applied Science)(Mechanics) programme, students may commence their studies in the second semester.

## **8. DURATION OF STUDY**

A student registered for the honours degree must complete his/her study within 2 years in the case of a full-time student and in the case of an after-hours student (previously called a part-time student, i.e., a student working on a full time basis and studying after-hours) within 3 years after first registration for the degree. For a master's and doctoral degree, 3 and 4 years are allowed, respectively.

If a master's or doctoral student does not obtain the degree for which he/she is registered within the allowed time period, his/her registration will be terminated unless the Dean, on recommendation of the Head of Department, can be convinced that the progress was satisfactory.

## **9. PLAGIARISM**

Students who commit plagiarism will lose all credits obtained in the plagiarised work. The matter shall also be referred to the Disciplinary Committee (Students) for a ruling. Plagiarism is regarded as a serious contravention of the University's rules and can lead to expulsion from the University. More detail is available on the departmental notice board

(see [section 10.1](#)) and at the link below. It is expected that all students should familiarise themselves with the content of these documents.

<http://www.up.ac.za/mechanical-and-aeronautical-engineering/article/48704/plagiarism>

## **10. GENERAL**

### **10.1. Communication between the Department and the student**

The official notice board of the Department of Mechanical and Aeronautical Engineering is on the departmental web site, <http://www.me.up.ac.za>, expand the “Noticeboard” menu (click on the adjacent plus sign) and then select “notices”, or at the this [link](#).

Students are encouraged to browse through this notice board on a regular basis. The Department uses this notice board as a means of communication with students and it is the student’s responsibility to ensure that he/she takes note of all important notices that may appear on the notice board from time to time.

In addition to the notice board, the Department also uses the official postgraduate e-mail list to send out e-mail messages to all postgraduate students. This list is compiled in the beginning of each year from all the e-mail addresses of departmental postgraduate students on the University’s student administration system. The list is updated every three months. Since this is an important communication channel, it is extremely important that each student ensures that the e-mail address listed on the student administration system is current. This is especially important in the case where a master’s or PhD student has completed his/her research work, has moved off campus and has gotten a new e-mail address, before fulfilling all requirements for his/her degree. The Department does not accept any responsibility for a student having missed an announcement due to not receiving such an announcement when this was sent by e-mail to all students on the postgraduate list.

### **10.2. Examination time table**

The examination time table for June and November will be finalized at the beginning of the 1<sup>st</sup> and 2<sup>nd</sup> semesters, respectively, except, in the 2<sup>nd</sup> semester, in the case of the modules that are presented simultaneously with the BEng final year elective modules. For these modules the examination time table is fixed only about one month before the examination.

The official examination time table for postgraduate modules will be published on the departmental notice board (separately from the undergraduate examination time table) whenever this becomes available.

### **10.3. Prescribed text books**

The departmental notice board also contains a link to the SA Textbook.Net database on which all prescribed text books for all modules (as far as this information is available) are listed. Users do not need to log in when visiting this database. Simply click on “Student” and then search for the module with the module code (including a space between the three letters and the three numbers).

## 10.4. Cost of postgraduate studies

The cost of studies is published by the University on its web page at this [link](#), or go to <http://www.up.ac.za>, then select “Undergraduate students” from the “Study at UP” menu. This brings one to the “New Students- Undergraduate” page. On this page select “Fees and funding” from the list on the left. On the “Fees and funding” page, expand “Postgraduate Fees” and then select “Tuition fees per faculty”. The cost of a single 16 credit module is one eighth of the cost listed for the whole BEngHons degree, and that of a 32 credit module is one quarter. The registration fee is generally considered as a first payment of the tuition fees.

## 10.5. Funding of postgraduate studies

Funding for postgraduate studies may be obtained through research assistantships that are awarded by individual lecturers. Prospective students can apply for this type of funding to lecturers working in their fields of interest. New students coming to the University of Pretoria after having completed a qualification at another university need to submit the following with their funding application:

- A full Curriculum Vitae
- A full academic record from all tertiary institutions where the student has studied before
- Two reference letters.

Some lecturers may also expect applicants to submit the completed forms, the templates of which are available on the [postgraduate web page](#) of the department. In addition to the link above, the postgraduate web page can be reached via the departmental web page at <http://www.me.up.ac.za>, expand the “Academic Programmes” menu and then select “Postgraduate”.

## 11. CURRICULA

### 11.1. General arrangements

The following general arrangements apply to students registered for course modules:

- For either one of the two honours degrees 128 credits are required.
- For an honours degree a maximum of 32 credits from approved modules offered by other departments, may be followed.
- A full time honours student may select any combination of credits between the two extremes of 96 credits in one semester and 32 in the second, or 64 credits in both semesters. Spacing the modules in a 3:1 ratio over the first and second semesters typically allows the student to get more preliminary research done towards his/her master’s degree, during his/her honours year. Even though this research is done on an unofficial basis, it plays an important role in finishing up the master’s degree at the end of the second year and in time to graduate at the April ceremony of the third year (for a student starting his/her honours programme in beginning of the first semester of the first year).
- The department retains the right to cancel any module in a certain year if too few students register for the module or if a suitable lecturer is not available because of unforeseen circumstances.

### 11.2. Postgraduate modules presented by the department

A list of modules with the 2015 semesters in which these modules will be presented, is given in [tables 1](#) and [2](#), table 1 listing the 16 credit and table 2 the 32 credit modules. The syllabi for these modules are given in [section 12](#). The lecturers responsible for these modules, with their contact information, are listed in the timetable in [section 13](#).

In [tables 1](#) and [2](#) the two numbered columns under the year heading indicate the two semesters. The first semester runs from end January to June and the second from July to November. The letter “b” in the semester column refers to a module being presented in block format and “p” to a module presented in either 50 minute periods, weekly two-hour periods, bi-weekly four hour periods or even a number of three hour periods. Table 1 also indicates for each module the concurrent registration prerequisite that applies in the case of BSchHons (Applied Science)(Mechanics) students. These prerequisites do not apply to BEngHons students.

### 11.3. Postgraduate modules presented by other Departments

Students may also consider modules from other departments. The final selection of modules must be approved by one of the coordinators for postgraduate studies in the Department of Mechanical and Aeronautical Engineering ([Contact Information](#)). If a student registers for a module offered by another department, it is his/her own responsibility to in advance check with that department for any special conditions and work that needs to be done before the commencement of the module in question. Such students are urged to obtain the post-graduate brochures of the departments concerned. The following departments could be considered:

Industrial and Systems Engineering	Ms H Helm	012 420 5230
Electrical and Electronic Engineering	Ms H Gouws	012 420 2190
Department of Materials Science and Metallurgical Engineering	Prof. WE Stumpf <a href="mailto:waldo.stumpf@up.ac.za">waldo.stumpf@up.ac.za</a>	012 420 3184
Engineering and Technology Management	Ms T van Zyl	012 420 4764
Mathematics and Applied Mathematics	Ms Y McDermot	012 420 3550

**Table 1: 16 credit modules offered by Mechanical and Aeronautical Engineering**

Module	Code	2015		BScHons (Applied Science) Prerequisite <sup>1</sup>
		1	2	
<a href="#">Advanced finite element methods 781</a>	MEE 781		b	MSY 732
<a href="#">Advanced fluid mechanics 781</a>	MSX 781		b	MTV 732
<a href="#">Advanced heat and mass transfer 780</a>	MHM 780		p	MTV 732
<a href="#">Advanced thermodynamics and energy systems 781</a>	MTX 781		b	MTV 732
<a href="#">Aerodynamics 780</a>	MLD 780	p		MTV 732
<a href="#">Air conditioning and refrigeration 780</a>	MLR 780	p		MTV 732
<a href="#">Condition-based maintenance 780</a>	MIC 780		b	MTV 732 or MSY 732 or MIR 781 & MIP 780
<a href="#">Control systems 780</a>	MBB 780	b		MSY 732
<a href="#">Experimental structural dynamics 783</a>	MSY 783	b		MSY 732
<a href="#">Fatigue 780</a>	MSV 780		b	MSY 732
<a href="#">Finite element methods 780</a>	MEE 780	p		MSY 732
<a href="#">Fluid mechanics 780</a>	MSX 780	p		MTV 732
<a href="#">Fossil Fuel Power Stations 781</a>	MUU 781		b	MTV 732
<a href="#">Fracture mechanics 780</a>	MSF 780		b	MSY 732
<a href="#">Independent study 781</a>	MSS 781			MTV 732 or MSY 732 or MIR 781 & MIP 780
<a href="#">Independent study 782</a>	MSS 782			MTV 732 or MSY 732 or MIR 781 & MIP 780
<a href="#">Maintenance logistics 782</a>	MIP 782	b		MIR 781 & MIP 780
<a href="#">Maintenance operations 783</a>	MIP 783		b	MIR 781 & MIP 780
<a href="#">Maintenance practice 780</a>	MIP 780	b		None
<a href="#">Maintenance practice 781</a>	MIP 781		b	MIR 781 & MIP 780

<sup>1</sup> The prerequisites listed here do not apply to BEngHons students. These are so-called concurrent registration prerequisites. This means that the student either needs to be registered for the prerequisite concurrently, or should have passed it earlier.

Module	Code	2015		BScHons (Applied Science) Prerequisite <sup>2</sup>
		1	2	
<a href="#">Mechatronics 780</a>	MEG 780		p	MTV 732 or MSY 732 or MIR 781 & MIP 780
<a href="#">Numerical methods 780</a>	MWN 780	b		MTV 732 or MSY 732 or MIR 781 & MIP 780
<a href="#">Non-destructive testing 780</a>	MCT 780		b	MSY 732 or MIR 781 & MIP 780
<a href="#">Numerical thermoflow 780</a>	MSM 780	p		MTV 732
<a href="#">Numerical thermoflow 781</a>	MSM 781		p	MTV 732
<a href="#">Optimum design 780</a>	MOO 780		p	MTV 732 or MSY 732 or MIR 781 & MIP 780
<a href="#">Porous flow 780</a>	MAN 780		b	MTV 732
<a href="#">Reliability-based maintenance 781</a>	MII 781		b	MIR 781 & MIP 780
<a href="#">Reliability engineering 781</a>	MIR 781	b		None
<a href="#">Vehicle dynamics 780</a>	MVI 780	b		MSY 732
<a href="#">Vibration-based condition monitoring 781</a>	MEV 781	b		MSY 732 or MIR 781 & MIP 780

**Table 2: 32 credit modules offered by Mechanical and Aeronautical Engineering**

Module	Code	2015	
		1	2
<a href="#">Structural mechanics 732</a>	MSY 732	b	
<a href="#">Thermoflow 732</a>	MTV 732	b	

<sup>2</sup> The prerequisites listed here do not apply to BEngHons students. These are so-called concurrent registration prerequisites. This means that the student either needs to be registered for the prerequisite concurrently, or should have passed it earlier.



## 12. SYLLABI

The syllabi given in this prospectus were compiled as accurately as possible. The department however retains the right to change these according to circumstances.

### **MEE 781 Advanced finite element methods 781 (16 Credits)**

Non-linear statics: Overview of non-linear effects: geometric, material and boundary conditions. Continuum mechanics: tensors, indicial notation, deformation gradients, stress and strain measures, transformations and rotations, stress-strain relationships, constitutive models. Principles of virtual work. Solution methods: direct iteration, Newton methods, incremental/iterative procedures. Lagrange engineering strains. Large displacement finite element analysis of continua: total Lagrangian formulation. Small strain plasticity: Additive decomposition, flow rule, hardening laws, continuum and consistent tangents.

**Prerequisite:** [MEE 780 Finite Element Methods 780](#) (or equivalent)

### **MSX 781 Advanced fluid mechanics 781 (16 Credits)**

Review (Mathematics, Governing Equations and Boundary Conditions), Exact solutions: Potential flow, Couette flow, Poiseuille flow and combined Couette-Poiseuille flow, laminar boundary layers, Stability of laminar flows: introduction, linearize stability, transition to turbulence, approximate prediction of transition. Turbulent flow: Reynolds averaged equations, two-dimensional turbulent-boundary-layer equations, velocity profiles, turbulent flow in ducts, flat plate flow, flow through Porous media. The module includes a group semester project.

### **MHM 780 Advanced heat and mass transfer 780 (16 Credits)**

Convection correlations: high speed flows, boundary layers, similarity, conservation equations, scale analysis. Thermal radiation: physics, exchange between surfaces, solar, directional characteristics, spectral characteristics, radiation through gasses. Convection, evaporation and boiling: film condensation, film evaporation, pool boiling, forced-convection boiling and condensation, flow regime maps, phase change at low pressures, heatpipes. Heat exchangers: types, regenerators, heat exchanger design. Mass transfer: Fick's Law, mass diffusion, mass convection, simultaneous heat and mass transfer, porous catalysts. High mass transfer rate theory. Mass exchangers.

### **MTX 781 Advanced thermodynamics and energy systems 781 (16 Credits)**

Fundamental concepts of thermodynamics, total flow exergy, restricted dead state and unconstrained equilibrium state, heat transfer, fluid flow and chemical irreversibilities, thermodynamic optimisation, irreversibility distribution ratio, lost exergy, application of entropy generation minimisation (EGM) technique to the fundamentals of power generation, solar power, wind power, and low temperature refrigeration.

### **MLD 780 Aerodynamics 780 (16 Credits)**

Panel methods, Green's identity, different 2-D panel methods, airfoil design and analysis, 3-D vortex systems, vortex lattice methods for 3-D potential flow, boundary layer methods, theory of boundary layers, some finite difference methods, separation, computer methods, compressible potential flow, Mach waves and shock waves, Prandtl Glauert equations, subsonic, supersonic and transonic flow on thin airfoils, finite difference methods applied to small perturbation equation.

### **MLR 780 Air conditioning and refrigeration 780 (16 Credits)**

Comfort and indoor air quality. Psychometrics. System types and selection. Cooling and heating load calculations: conduction, radiation, convection, internal loads and thermal storage. Design of air handling unit, ducts, plant and reticulation. Control systems. Introduction to integrated system simulation.

### **MIC 780 Condition-based maintenance 780 (16 Credits)**

Theory and practical applications of condition based maintenance techniques. Pitfalls of the various condition based maintenance techniques. Acoustic emission, wear debris monitoring, oil analysis, thermography and non-destructive testing, standards.

### **MBB 780 Control systems 780 (16 Credits)**

Introduction to state space methods, full state feedback design, disturbances and tracking systems, linear observers, compensator design by the separation principle, linear quadratic optimum control, Kalman filter, linear quadratic Gaussian compensator.

**Prerequisite:** A working knowledge of [MATLAB/OCTAVE](#)

**MSY 783 Experimental structural dynamics 783 (16 Credits)**

Spatial, modal and response models of structures, frequency response functions and the relationships between spatial, modal and response models for single degree of freedom systems and multi-degree of freedom systems, modal analysis, operational modal analysis, updating finite element models.

**Prerequisite:** A working knowledge of [MATLAB/OCTAVE](#)

**MSV 780 Fatigue 780 (16 Credits)**

Fatigue principles addressing both elasticity and plasticity; notch effects; variable amplitude loading conditions; multi-axial fatigue and weld fatigue.

**MEE 780 Finite element methods 780 (16 Credits)**

Stress and the differential equilibrium equation. Isoparametric formulation. Numerical integration. Reduced integration. Convergence, stability and accuracy. The Patch test. Membrane elements: assumed stress mixed interpolations. 3-D elements. Error estimates and mesh refinement. Sensitivity analysis.

**Prerequisite:** A working knowledge of [MATLAB/OCTAVE](#) or FORTRAN77

**MSX 780 Fluid mechanics 780 (16 Credits)**

Mathematical preliminaries: historical overview, scalar, vector and tensor algebra (in context of partial differential equations), Green's lemma and the Divergence theorem, Eulerian/Lagrangian representations, derivative of a function, Reynolds transport theorem. Governing equations: viscous compressible and incompressible flow, derivation of conservation of mass, derivation of conservation of momentum, boundary conditions, mathematical characteristics, non-dimensionalisation.

**MUU 781 Fossil fuel power stations 781 (16 Credits)**

This module contains a comprehensive study of all mechanical systems and processes of a fossil fuel power station. The module will include the analysis of steam cycles, combined cycle power generation, fuels and combustion, combustion mechanisms, combustion equipment and firing methods, the draught group, steam generators, steam turbines, condenser, feedwater and circulating water systems, coal handling, ash handling, compressor plant, water treatment, the importance of HVAC, control and instrumentation, control philosophies and environmental considerations.

**MSF 780 Fracture mechanics 780 (16 Credits)**

Historical development; Linear Elastic Fracture Mechanics (LEFM): Stress concentrations and singularities, stress intensity factor, stability of crack propagation; Elasto-plastic fracture mechanics: crack tip plasticity, small scale yielding, measurement of  $K_{Ic}$ , J-integral; Fatigue crack growth: Paris Law; life prediction; combined mode fracture, strain energy density methods.

**MSS 781 Independent study 781 (16 Credits)**

This module allows a student to study a certain body of knowledge in mechanical or aeronautical engineering, as specified by a lecturer in the Department of Mechanical and Aeronautical Engineering, on an individual basis, under the supervision of that lecturer. The total volume of work that is to be invested in this module by an average student must be 160 hours. The body of knowledge studied must be of an advanced nature, at the level of the other postgraduate modules offered by the Department. Normal requirements for assessment that include the use of an external examiner apply to this module also.

**MSS 782 Independent study 782 (16 Credits)**

This module allows a student to study a certain body of knowledge in mechanical or aeronautical engineering, as specified by a lecturer in the Department of Mechanical and Aeronautical Engineering, on an individual basis, under the supervision of that lecturer. The total volume of work that is to be invested in this module by an average student must be 160 hours. The body of knowledge studied must be of an advanced nature, at the level of the other postgraduate modules offered by the Department. Normal requirements for assessment that include the use of an external examiner apply to this module also.

**MIP 782 Maintenance logistics 782 (16 Credits)**

*Introduction:* Introduction to Logistics, RAM (Reliability, Maintainability, and Availability), Measures of Logistics, Inventory Systems,

*Systems Engineering and Supportability Analysis:* Systems Engineering Process, Supportability Analysis,

*Aspects of Logistical Design:* Logistics in the Design and Development Phase, Just-in-Time Systems, Facility Layout, Job Design and Work Measurement,

*Logistics from the Development to the Retirement Phase:* Logistics in the Production/Construction Phase, Logistics in the Utilisation and Support Phase,

*Planning and Scheduling:* Forecasting, Planning, Maintenance Scheduling, Project Management, Theory of Constraints,

*Logistics Management:* Quality Management, Supply Chain Management, Logistics Management.

**MIP 783 Maintenance operations (16 Credits)**

*Understanding the Maintenance Function:* Maintenance Models, Maintenance Profit Impact, Maintenance Reliability Centredness, Strategic Fundamentals,  
*Building a Business Case for Maintenance, Maintenance Management Systems:* Philosophies, System Structure, Database Structure, Maintenance Administration, Work/Cost/Materials Control,  
*Maintenance Cost Management:* Maintenance Cost Strategies, Maintenance Budgeting, Maintenance Cost Analysis,  
*Total Productive Maintenance:* History, Benefits, Structure, Implementation,  
*Strategic Thinking in Maintenance:* Principles, The role of a Maintenance Policy, Measurement,  
*Quality in Maintenance:* Quality Principles, Total Quality Management, Maintenance Application,  
*Maintenance Risk:* Risk Calculation, Macro Risk Management, Micro Risk Management,  
*World Class Maintenance:* Definitions, Methods to achieve WCM.

**MIP 780 Maintenance practice 780 (16 Credits)**

Failure characteristics and analysis. Maintenance economics – Budgeting and cost control. Life cycle partnering and maintenance contracting. Legal aspects and case study. Performance measurement and benchmarking. Maintenance programming – Network analysis. Variability analysis. Maintenance strategy, plan, and protocol design – a new look at RCM. Maintenance tactic selection techniques. Introduction to condition-based maintenance. Tribology and contamination control presented with case studies. Maintenance Maturity Indexing and Variable Relationships development.

**MIP 781 Maintenance practice 781 (16 Credits)**

Maintenance process modelling and configuration management. Maintenance audit systems. Systems thinking and complexity analysis as applied to the maintenance environment. Risk analysis. “Fit” analysis. Management information systems. CMMS and implementation. Maintenance Finance and Cost types. Project selection techniques. Employee competence analysis and motivation of maintenance workers. Work priority modelling.

**Prerequisite:** [MIP 780 Maintenance practice 780](#) (recommended)

**MEG 780 Mechatronics 780 (16 credits)**

Sensors: mechanical and optical limit switches, encoders, thermocouples, strain gauges, CCD cameras, IR sensors, piezo-electric sensors, capacitive sensors, torque sensors, tactile sensors, gyroscope and ultrasonic sensors. Actuators: DC motors, stepper motors, AC motors, pneumatic actuators, hydraulic actuators, memory shape alloys. Signal conditioning: component interconnection, amplifiers, analogue filters, modulators and demodulators, analogue-digital conversion, sample-and-hold circuitry, multiplexers, software and hardware implementation of digital filters and Wheatstone bridge. Control: H-Bridge motor control, PWM motor control, control of stepper motors, non-linear control of hydraulic and pneumatic actuators, PLCs, SCADA systems, industrial Fieldbus, micro-processor control.

**MCT 780 Non-destructive testing (16 credits)**

Probability, design and management in non-destructive testing (NDT). Fundamental theory of commonly used NDT methods: Ultrasonic Testing, Electromagnetic Testing (MT and ACFM), Radiographic Testing, penetrant Testing, Eddy Current Testing. Other NDT Technologies including phased array UT, Time-of flight diffraction, Digital RT and Acoustic Emission Monitoring.

**MWN 780 Numerical methods 780 (16 Credits)**

Solving systems of linear algebraic equations using direct and iterative methods from small to large scale systems. Numerical solutions of nonlinear systems of equations. Solving eigenvalue problems. Numerical approximation strategies. Numerical differentiation. Numerical Integration. Numerical solutions to initial-value problems for ordinary differential equations. Numerical solutions to boundary-value problems for ordinary differential equations. Numerical solutions to partial-differential equations.

**MSM 780 Numerical thermoflow 780 (16 Credits)**

Fluid Mechanics refresher (governing equations, boundary conditions, application of inviscid, laminar and turbulent flow). Methods of weighted residuals (finite element, finite volume and difference methods). Mesh generation and boundary conditions: Types of mesh structured and unstructured mesh generation and application (inviscid flow, heat conduction etc.). Heat conductions: Governing equations, discretisation, finite approximation, solution methods (Gauss-Seidel, Tri-diagonal matrix algorithm) etc. This module is suited to postgraduate students doing research in thermofluids and who want to use available CFD codes or who want to write their own codes to solve fluid mechanics, heat and mass transfer problems.

**MSM 781 Numerical thermoflow 781 (16 Credits)**

The Efficient Solvers: Background, multigrid theory and detailed description of the algorithm. Finite Volume method: Understand the governing equations, general form of the transport equations, Gauss's theorem and the finite volume discretisation. Iterative solution algorithm: Pressure-velocity coupling, types of grids, unsteady flows, multiple phases. Finite Volume Discretisation: Diffusion term, convection term and source term for steady flows. Convection-diffusion problems: Boundary conditions, higher order discretisation, accuracy / stability. Solution Algorithm for Pressure-Velocity coupling: SIMPLE, SIMPLER, SIMPLEC & PISO. Laminar, transitional

and turbulent flow: Background and theory. Turbulence modelling and examples: Definition of turbulence, turbulence modelling approaches, turbulence models ( zero-equation models, one equation, two equation, Reynolds Stress Model (RSM), Large Eddy Simulation, wall function approach), turbulence modelling guidelines. Recent CS developments: Current state of the art in turbulence modelling etc. Viscous boundary meshes: Background and objectives, internal and external flow, turbulence modelling considerations.

**Prerequisite:** [MSM 780 Numerical thermoflow 780](#)

### **MOO 780 Optimum design 780 (16 Credits)**

Introduction to design and elements of computer aided design. Optimum design problem formulation. Optimum design concepts. Linear programming methods. Integer programming. Numerical methods for unconstrained and constrained optimum design. Model reduction. Interactive and practical design optimisation.

### **MAN 780 Porous flow 780 (16 Credits)**

Transport through porous media has raised considerable attention in recent decades due to its relevance in a wide range of applications such as vehicle engines, thermal insulation engineering, electronics cooling, filtration, water movement in geothermal reservoirs, heat pipes, underground spreading of chemical waste, nuclear waste repository, geothermal engineering, grain storage, enhanced recovery of petroleum reservoirs and biological science. This module gives an introduction to the physical models used in the study of fluid flow and heat transfer in porous materials, and will give an understanding of the transport mechanism.

### **MII 781 Reliability-based maintenance 781 (16 Credits)**

Component reliability: Weibull analysis, Limitations of Weibull analysis – when not to use it. System reliability and availability: reliability/availability modelling, the availability block diagram (ABD), Cut sets, capacity constraints, m-out-of-n systems and storage capacity, Fault trees, Failure modes, Effects and criticality analysis (FMECA). Failure and repair rate data: Reliability engineering's red herring: "We don't have the data", Some data banks that are in fact useful, Data synthesis: the method of paired comparisons, Paper on The use of NERC-GADS data in determining standards for system design, Case study in and exercise in data synthesis.

**Prerequisite:** [MIR 781 Reliability engineering 781](#)

### **MIR 781 Reliability engineering 781 (16 Credits)**

Introduction to probabilistic distributions, computation of system reliability, building reliability models and optimisation of system reliability; Fault Tree Analysis; Failure Modes, Effects and Criticality Analysis (FMECA), Monte Carlo Simulation; probability-based design.

### **MSY 732 Structural mechanics 732 (32 credits)**

This module may not be done as part of the BEngHons degree.

#### *Static structural analysis:*

Statically determinate systems, stress-strain relations, statically indeterminate systems. Torsion. Bending: Euler beam theory, bending stress, slope and deflection, statically indeterminate beams. Buckling: stability of equilibrium, eccentric loading, initial curvature. Stress and strain transformation: Mohr's circle, principal stresses and strains. Yield criteria and stress concentration. Variation of stress and strain: equilibrium and compatibility.

#### *Dynamics:*

Plane kinematics of rigid bodies. Kinetics of systems of particles. Plane kinetics of rigid bodies, equations of motion, work-energy relations.

#### *Vibration:*

Introduction to vibration: basic concepts, classification, modelling elements. Single degree of freedom systems: undamped and damped free vibration, undamped and damped harmonic motion, non-periodic excitation, numerical integration. Multidegree of freedom systems: discretisation, eigenproblem,

### **MTV 732 Thermoflow 732 (32 credits)**

This module may not be done as part of the BEngHons degree. It consolidates fundamental and applied aspects of thermodynamics, fluid mechanics, and heat transfer:

#### *Thermodynamics:*

Basic Concepts (including work, heat, reversibility, enthalpy, heat capacity, etc.); First Law; Second Law (Entropy, Heat Engines and Heat Pumps; Carnot Cycle for Ideal Gas); Third Law; Mathematical Relations of Thermodynamics (Exact Differentials and State Functions; Transformations; PVT Relationships); Reversible Processes in Ideal Gases (Isochoric, Isobaric, Isothermal, Isentropic, Polytropic); Phase-change process; Cycles in Engineering Applications (Reciprocating Engine Cycles; Vapour Power Cycles; Refrigeration and Heat Pump Cycles).

*Fluid Mechanics:*

Basic Concepts (e.g. liquids and gases and solids, density, viscosity, surface tension, vapour pressure, etc.);

Statics: pressure and head, static forces, buoyancy).

Fluid Flow: Uniform and Steady Flow; Real and Ideal Fluids; Compressible and Incompressible Flow; One-, two- and three-dimensional flow; Laminar and Turbulent Flow; Discharge and Mean Velocity; Continuity Equation and its Applications; Momentum Equation and its Applications; Energy Equation and its Applications; Laminar and Turbulent Flows (incompressible flows; laminar and turbulent flows; boundary layers)

*Heat Transfer:*

Basic Concepts;

Conduction: Fourier's Law; One -and Two Dimensional Steady -and Unsteady State Conduction.

Convection: Velocity Boundary Layer; Thermal Boundary Layer; Laminar and Turbulent Flows; Heat and Momentum Transfer; Newton's Law of Cooling; Similarity and Dimensional Approach; External Forced Convection (single-phase; phase-change); Internal Forced Convection (single-phase; phase-change) Laminar -and Turbulent Flow; Internal Flow and External Flow

Heat Exchangers: Parallel -and Counterflow; LMTD method; Effectiveness-NTU Method; Selection of Heat Exchangers

**MVI 780 Vehicle dynamics 780 (16 Credits)**

Tyres: Characteristics and tyre models used in simulation of ride comfort and handling. Road inputs: Classification of roads. Road profiles. Road roughness. Suspension components: springs, dampers. Controllable suspension systems. Modelling aspects. Human reaction: Human response to vibration. Driver models. Human reaction times. Vertical vehicle dynamics (ride comfort): Vibration levels in a vehicle. Simulation of ride comfort. Effect of seat characteristics on vibration levels. Test and evaluation procedures. Lateral vehicle dynamics (handling): Simulation of steady state and dynamic handling. Rollover propensity. Test procedures. Computer applications: Application of computer codes in the analysis of vehicle dynamics.

**MEV 781 Vibration-based condition monitoring 781 (16 Credits)**

Vibration measurement: conventional and optical technique, digital signal processing in vibrations, vibration monitoring: diagnostics and prognostics, artificial intelligence in vibration monitoring, human vibration.

**Prerequisite:** A working knowledge of [MATLAB/OCTAVE](#)

### 13. MODULE PRESENTATION TIMETABLE

#### Notes

1. It is expected that the student will come prepared to the first contact session. Once a student is registered for a module, he/she should have access to the module web page on clickUP, if such a page exists. The web page typically includes the module study guide. Preparatory work expected of students will be indicated in either the study guide or the module web page. Students, who are planning to do a module but have not yet registered for the module two weeks before the module starts, should contact the relevant lecturer to determine what preparatory work needs to be done.
2. A three second semester honours degree modules, namely MHM 780 Advanced heat and mass transfer 780, MEG 780 Mechatronics 780 and MOO 780 Optimum design 780, are presented simultaneously with corresponding BEng final year undergraduate elective modules under different module codes. These modules are therefore presented according to the undergraduate time table of the School of Engineering, with three 50 minute periods per week. In the cases of MEG 780 and MOO 780 these three periods fall on a single week day. For these three modules there will be two semester test weeks, when there will be no lectures. The dates for these modules will not be indicated in the time table below, only the times and day(s) of the week will be indicated. The undergraduate second semester starts on 20 July and ends on 5 November 2015. The two semester test weeks are from 22 to 29 August and 12 to 17 October 2015, as well as 24 October 2015. Note that tests may be scheduled on the three Saturdays, 22 and 29 August and 24 October. There will also be a holiday break from 3 to 11 October. No classes are presented on public holidays. Furthermore it should be noted that on Tuesday 22 September a Friday time table will be followed, while there will be no classes on Friday 25 September. **All information in this note pertains only to these three modules.**
3. For the examination time table please refer to [section10.2](#).
4. If venues are not yet indicated in the time table below shortly before a contact session, please consult the responsible contact person or look for a possible announcement on the clickUP pages of the module in question.

<b>FIRST SEMESTER: 2015</b>				
<b>MODULE</b>	<b>CODE</b>	<b>CONTACT PERSON</b>	<b>VENUE</b>	<b>TIME/DATE</b>
<a href="#">Aerodynamics 780</a>	MLD 780	Ms B Barbieri-Huyssen 012 420 6316 <a href="mailto:barbara.buysen@up.ac.za">barbara.buysen@up.ac.za</a>	Eng II 3-27	<b>08:30 – 11:30</b> 27 Feb 5, 12, 18, 20 March 12, 22 May
<a href="#">Air conditioning and refrigeration 780</a>	MLR 780	Dr J Dirker 012 420 2465 <a href="mailto:jaco.dirker@up.ac.za">jaco.dirker@up.ac.za</a>	Eng II 3 -28	<b>16:30 – 18:30</b> 4, 11, 18 Feb 11, 25 March 1, 8, 15, 22 April 20, 27 May
<a href="#">Control Systems 780</a>	MBB 780	Prof NJ Theron 012 420 3309 <a href="mailto:nico.theron@up.ac.za">nico.theron@up.ac.za</a>	Eng II 3-27	<b>08:30 – 16:30</b> 19 Feb 26 March 14 May
<a href="#">Experimental structural dynamics 783</a>	MSY 783	Prof PS Heyns 012 420 2432 <a href="mailto:stephan.heyns@up.ac.za">stephan.heyns@up.ac.za</a>	Eng I 1-12	<b>08:30 – 16:30</b> 6 Feb 7 April 20 May
<a href="#">Finite element methods 780</a>	MEE 780	Dr N Wilke 012 420 2861 <a href="mailto:nico.wilke@up.ac.za">nico.wilke@up.ac.za</a>	Eng II 3-27	<b>08:30 – 14:30</b> 11, 25 Feb 9, 23 March

<b>FIRST SEMESTER: 2015</b>				
<b>MODULE</b>	<b>CODE</b>	<b>CONTACT PERSON</b>	<b>VENUE</b>	<b>TIME/DATE</b>
<a href="#">Fluid mechanics 780</a>	MSX 780	Dr G Mahmood 012 420 6822 <a href="mailto:gazi.mahmood@up.ac.za">gazi.mahmood@up.ac.za</a>	Eng II 3 -28	<b>09:30 – 12:30</b> 10, 24 Feb 3, 10, 17, 24 March 14 April 26 May
<a href="#">Maintenance logistics 782</a>	MIP 782	Prof JL Coetzee 016 932 1629 <a href="mailto:jasper.coetzee@m-tech.co.za">jasper.coetzee@m-tech.co.za</a>	Eng I 1-12	<b>08:30 – 16:30</b> 16 Feb 16 March 16 April
<a href="#">Maintenance practise 780</a>	MIP 780	Dr CJH Thiart 012 6526 <a href="mailto:coenie.thiart@up.ac.za">coenie.thiart@up.ac.za</a>	Eng I 1-12	<b>08:30 – 16:30</b> 26 Feb 19 March 7 May
<a href="#">Numerical methods 780</a>	MWN 780	Prof S Kok 012 420 5809 <a href="mailto:schalk.kok@up.ac.za">schalk.kok@up.ac.za</a>	Eng I 1-12	<b>08:30 – 15:30</b> 5 Feb 6 March 13 April 8 May
<a href="#">Numerical thermoflow 780</a>	MSM 780	Prof K Craig 012 420 3515 <a href="mailto:ken.craig@up.ac.za">ken.craig@up.ac.za</a>	Eng II 3-27	<b>16:30 – 18:00</b> 9, 16, 23 Feb 2, 16, 23 March 13, 20 April 11, 18, 25 May



<b>FIRST SEMESTER: 2015</b>				
<b>MODULE</b>	<b>CODE</b>	<b>CONTACT PERSON</b>	<b>VENUE</b>	<b>TIME/DATE</b>
<a href="#">Reliability engineering 781</a>	MIR 781	Dr CJH Thiar 012 6526 <a href="mailto:coenie.thiar@up.ac.za">coenie.thiar@up.ac.za</a>	Eng I 1-12	<b>08:30 – 16:30</b> 13 March 17 April 15 May
<a href="#">Structural Mechanics 732</a>	MSY 732	Mr F Pietra 012 420 3695 <a href="mailto:pietra.francesco@up.ac.za">pietra.francesco@up.ac.za</a>	Eng I 1-12	<b>08:30 – 16:30</b> 12, 13 Feb 23, 24 April 28, 29 May
<a href="#">Thermoflow 732</a>	MTV 732	Dr M Sharifpur 012 420 2448 <a href="mailto:mohsen.sharifpur@up.ac.za">mohsen.sharifpur@up.ac.za</a>	Eng II 3-28	<b>08:30 – 16:30</b> 16, 17 Feb 30, 31 March 4, 5 May
<a href="#">Vehicle dynamics 780</a>	MVI 780	Prof PS Els 012 420 2045 <a href="mailto:schalk.els@up.ac.za">schalk.els@up.ac.za</a>	Eng II 3-28	<b>08:30 – 16:30</b> 9 Feb 2 March 25 May
<a href="#">Vibration-based condition monitoring 781</a>	MEV 781	Prof PS Heyns 012 420 2432 <a href="mailto:stephan.heyns@up.ac.za">stephan.heyns@up.ac.za</a>	Eng I 1-12	<b>08:30 – 16:30</b> 30 Jan 27 March 18 May

<b>SECOND SEMESTER: 2015</b>				
<b>MODULE</b>	<b>CODE</b>	<b>CONTACT PERSON</b>	<b>VENUE</b>	<b>TIME/DATE</b>
<a href="#"><u>Advanced Finite Element Methods 781</u></a>	MEE 781	Prof S Kok 012 420 5809 <a href="mailto:schalk.kok@up.ac.za"><u>schalk.kok@up.ac.za</u></a>		To be arranged
<a href="#"><u>Advanced Fluid Mechanics 781</u></a>	MSX 781	Prof K Craig 012 420 3515 <a href="mailto:ken.craig@up.ac.za"><u>ken.craig@up.ac.za</u></a>		To be arranged
<a href="#"><u>Advanced Heat and Mass Transfer 780</u></a>	MHM 780	Dr L Martins 012 420 4743 <a href="mailto:lauber.martins@up.ac.za"><u>lauber.martins@up.ac.za</u></a>	Eng III - 2	<b>10:30-11:20</b> Mondays Tuesdays Fridays
<a href="#"><u>Advanced Thermodynamics and Energy Systems 781</u></a>	MTX 781	Dr A Lexmond 012 420 6890 <a href="mailto:axel.lexmond@up.ac.za"><u>axel.lexmond@up.ac.za</u></a>		To be arranged
<a href="#"><u>Condition-Based Maintenance 780</u></a>	MIC 780	Dr C Thiart 012 420 6526 <a href="mailto:coenie.thiart@up.ac.za"><u>coenie.thiart@up.ac.za</u></a>		To be arranged

<b>SECOND SEMESTER: 2015</b>				
<b>MODULE</b>	<b>CODE</b>	<b>CONTACT PERSON</b>	<b>VENUE</b>	<b>TIME/DATE</b>
<a href="#"><u>Fatigue 780</u></a>	MSV 780	Mr F Pietra 012 420 3695 <a href="mailto:pietra.francesco@up.ac.za">pietra.francesco@up.ac.za</a>		To be arranged
<a href="#"><u>Fossil Fuel Power Stations 781</u></a>	MUU 781	Ms N Kotze 012 420 2446 <a href="mailto:nicola.kotze@up.ac.za">nicola.kotze@up.ac.za</a>		To be arranged
<a href="#"><u>Fracture mechanics 780</u></a>	MSF 780	Dr H Inglis 012 420 3125 <a href="mailto:helen.inglis@up.ac.za">helen.inglis@up.ac.za</a>		To be arranged
<a href="#"><u>Maintenance Operation 783</u></a>	MIP 783	Prof JL Coetzee 016 932 1629 <a href="mailto:jasper.coetzee@m-tech.co.za">jasper.coetzee@m-tech.co.za</a>		To be arranged
<a href="#"><u>Maintenance Practise 781</u></a>	MIP 781	Prof JL Coetzee 016 932 1629 <a href="mailto:jasper.coetzee@m-tech.co.za">jasper.coetzee@m-tech.co.za</a>		To be arranged

<b>SECOND SEMESTER: 2015</b>				
<b>MODULE</b>	<b>CODE</b>	<b>CONTACT PERSON</b>	<b>VENUE</b>	<b>TIME/DATE</b>
<a href="#">Mechatronics 780</a>	MEG 780		Eng III - 2	<b>Fridays</b> 08:30 – 10:20 11:30 – 12:20
<a href="#">Non-destructive testing 780</a>	MCT 780	Dr M Johannes 012 841 2522 <a href="mailto:mjohannes@csir.co.za">mjohannes@csir.co.za</a>		To be arranged
<a href="#">Numerical Thermoflow 781</a>	MSM 781	Prof K Craig 012 420 3515 <a href="mailto:ken.craig@up.ac.za">ken.craig@up.ac.za</a>		To be arranged
<a href="#">Optimum Design 780</a>	MOO 780	Dr N Wilke 012 420 2861 <a href="mailto:nico.wilke@up.ac.za">nico.wilke@up.ac.za</a>	Eng III - 2 Eng III - 5	<b>Mondays</b> 12:30 - 13:20 14:30 - 16:20
<a href="#">Porous flow 780</a>	MAN 780	Dr M Sharifpur 012 420 2448 <a href="mailto:mohsen.sharifpur@up.ac.za">mohsen.sharifpur@up.ac.za</a>		To be arranged

**SECOND SEMESTER: 2015**

<b>MODULE</b>	<b>CODE</b>	<b>CONTACT PERSON</b>	<b>VENUE</b>	<b>TIME/DATE</b>
<a href="#">Reliability-Based Maintenance 781</a>	MII 781	Mr G Harley 012 420 4430 <a href="mailto:george.harley@up.ac.za">george.harley@up.ac.za</a>		To be arranged

## **APPENDIX 1: ARRANGEMENTS FOR DISSERTATIONS AND THESES**

The procedure in this appendix does not replace any official regulations and/or requirements and are simply intended as an aid to students. The responsibility however still rests with students to familiarise themselves with the official regulations and procedures.

### **A1.1. Confidentiality of dissertations and theses**

It is the policy of the faculty that dissertations and theses may not be confidential or classified. Deviation from this rule will only be considered under very exceptional circumstances by the Postgraduate Committee of the Faculty on the recommendation of the Head of Department. Where a student wishes to submit a classified dissertation or thesis, the Postgraduate Committee of the Faculty must grant approval before the student registers for study. In such a case the student must still submit an article for publication.

### **A1.2. Registration of titles**

The proposed title of a student's dissertation/thesis must be approved by the supervisor and co-supervisor, if applicable, and the Departmental Management Committee. In order to do this MEng, MSc and PhD students in collaboration with their supervisors must fill out a title registration form. An electronic version of this form is available and must be used - [www.me.up.ac.za](http://www.me.up.ac.za) - Lecturer's Notice board. The Faculty form with the title "Proposals with regard to titles of theses/dissertations, supervisors and external examiners", also available on the Lecturer's Notice board, must be used by the supervisor to suggest possible external examiners. The student is not permitted to see the copy of this form once the supervisor's recommendation with regards to external examiners has been completed. The final appointment of external examiners is administered by the Postgraduate Committee of the Faculty.

### **A1.3. Submission of dissertations/theses**

The student must inform Ms S Steenberg, Student Administration at least two months before submission of a dissertation/thesis of his/her intention to submit examination copies.

Examination copies must be submitted to Ms S Steenberg, Student Administration.

All other information pertaining to master's and doctoral studies is available in the year book, *Faculty of Engineering, Built Environment and Information Technology: Part 1: School of Engineering*. This is available for download as a pdf document at this [link](#), or at <http://www.up.ac.za>, then select either "Undergraduate students" from the "Study at UP" menu, then expand the "Study information" menu and then select "Yearbook information".

## **APPENDIX 2: PUBLICATION POLICY**

It is important to advance research in the department and to ensure that the department remains active in research. In doing so the necessary infrastructure is created in which students may receive high quality education.

### **A2.1. Arrangements pertaining to master's and doctoral students**

Because exposure to the free literature creates an atmosphere in which work of high quality can prosper, the department considers it important, and therefore the following arrangements are applicable to master's and doctoral research:

- All candidates for the master's degree must submit at least one article for publication in an ISI journal. This article must be based on research done for the dissertation, and must be approved by the supervisor. The degree will not be conferred before proof of receipt by the journal is submitted to the Student Administration.
- All candidates for the doctoral degree must submit at least two articles for publication in an ISI journal, before submission of the thesis. This article need not cover the whole field of the thesis or even the largest part thereof, but research for this specific part must be done in collaboration with the department. The degree will not be conferred before proof of receipt by the journal is submitted to the Student Administration.

### **A2.2. Arrangements with respect to authorship of publications**

The name of the supervisor(s) must appear as co-author(s) on the publication unless the supervisor decides differently. To show that the work has been done in the department, the address of the authors must be indicated as the address of the department.

In determining the authorship of publications forthcoming from studies, the following guidelines will be followed:

- If the supervisor initiated the specific study project, i.e. identified the necessity and potential thereof and created the basic infrastructure and followed the development of the work on a regular basis, he/she must be an author and usually for the first publication forthcoming from the work, the main author.
- If the student initiated the project or certain aspects thereof and helped with the writing of the paper on his original input, he becomes the main author, while the supervisor becomes the co-author.
- If, after the student has completed his/her study, he/she is not interested in publishing certain publishable aspects of the work in collaboration with the supervisor, the university retains the right to publish this work. If the publication and its logic come directly from the report, the student will be approached as co-author, while the supervisor who writes the article will be the main author.

- Sometimes there are cases, which will not clearly fall in any of the above categories. Here the case will be decided at the hand of the following questions (in priority order):

Who initiated the project?

Whose idea was the publication?

Who thought out the logic of the publication?

Who wrote the publication?

Who did the project work?

Students are reminded that dissertations and theses are university documents, and where any publication is extracted from such documents (irrespective of where the research was done and who the author is) the publication must be approved by the department.



## REGISTER OF MODIFICATIONS TO THIS DOCUMENT

<b>Revision Number</b>	<b>Publication date</b>	<b>Changes</b>
0 (Original)	9 December 2014	