POSTGRADUATE **2016**

Faculty of Engineering and the Built Environment

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UNIVERSITY
OF
JOHANNESBURG

UNIVERSITY OF JOHANNESBURG

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

POSTGRADUATE PROGRAMMES

RULES AND REGULATIONS
2016

www.uj.ac.za/engineering

IMPORTANT NOTICE

Always copare the information contained in this copy of the
Rules and Regulations book with the copy on the Inernet.
The electronic copy is updated regulary.
The University reserves the right to supplement, delete or change any part of a regulation without prior notice.

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GENERAL INFORMATION AND CONTACT DETAILS

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ACADEMIC DEPARTMENTS

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Town and Regional Planning – Doornfontein Campus
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SCHOOL OF MECHANICAL AND INDUSTRIAL ENGINEERING

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Head of Department: Prof Esther Akinlabi
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Head of Department: Mr Mohammed Belaid
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FACULTY-SPECIFIC REGULATIONS

EB1 ACADEMIC REGULATIONS

The Faculty Regulations should be read in conjunction with the *Academic Regulations* of the University of Johannesburg, which contains:

Admission requirements
Registration regulations
Credit and promotion requirements
Exemption and recognition of prior learning (RPL) requirements
Duration of programmes
Teaching, learning and assessment
Regulations for examinations and tests
Academic regulations applicable to Masters and Doctoral Degrees
Regulations for a particular programme as provided in this publication
Faculty postgraduate policy

EB2 POSTGRADUATE DEGREE PROGRAMMES OFFERED

All engineering science research based programmes (MEng, MPhil, DIng and DPhil) are offered on the Auckland Park Campus (APC), the coursework masters programmes (MEng (Engineering Management) and MPhil (Engineering Management)) are offered on the Auckland Park Bunting Road Campus and the technology programmes (MTech and DTech) on the Doornfontein Campus (DFC).

Postgraduate degree programme		Minimum study period		Campus
Master of Technology	MTech	1 year full-time	2 years part-time	DFC
Master of Engineering (Research based)	MEng	1 year full-time	2 years part-time	APK
Master of Philosophy (Research based)	MPhil	1 year full-time	2 years part-time	APK
Master of Engineering (Lectured)	MEng	18 months full-time	2 years part-time	APB
Master of Philosophy (Lectured)	MPhil	18 months full-time	2 years part-time	APB
Doctor of Technology	DTech	2 years full-time	3 years part-time	DFC
Doctor of Ingeneriae	DIng	2 years full-time	3 years part-time	APK
Doctor of Philosophy	DPhil	2 years full-time	3 years part-time	APK

EB3 ADMISSION AND STUDY REQUIREMENTS

Students applying for admission to a postgraduate Master's degree will normally be required to hold a qualification at the level of an Honours degree, a four-year Bachelor's degree, BTech degree or an equivalent qualification of an equivalent standard. Enrolment for a doctoral degree will normally require a Master's degree in the relevant discipline. In addition, candidates for admission to Master's and Doctoral degrees need to have obtained their previous degree with an average mark of at least 65%.

The applications of students who do not satisfy the formal entrance requirements for a specific higher degree programme may be considered in terms of UJ's Recognition of Prior Learning Policy, which is binding on this matter. In case of foreign students, consideration of their application for admission is subject to the rules stipulated in the University's Academic Regulations.

All postgraduate students are expected to familiarise themselves with and adhere to the University's Code of Academic Ethics. For this purpose all masters and doctoral research proposals must receive ethics clearance before a project can commence.

EB4 HIGHER DEGREES

4.1 Master's Degrees

4.1.1 Upon successful completion of the BTech (or equivalent degree), students may, where applicable, register for a Master's degree in Technology (Master of Technology – MTech).

4.1.2 Successful completion of the MTech (or equivalent) degree may allow a student to register for a Doctoral degree in Technology (Doctor of Technology – DTech). Regulations regarding application and registration for a higher degree are contained in the University of Johannesburg Postgraduate Research Manual. This document can be obtained from the UJ Intranet or the Faculty Administration Office.

4.1.3 Students for the MEng degree programme in Engineering are admitted for study on the grounds of a four-year Bachelor's degree in Engineering, on recommendation of the Head of the relevant Department.

4.1.4 It is a requirement for all international resident students to also submit the following documents with their application, only if the preceding degree was not obtained at the University of Johannesburg:

(i) For admission to an MEng/MPhil degree, a copy of the applicant's final year undergraduate engineering project

4.1.5 Study towards the MEng degree programme in the Faculty can be undertaken by means of any of the following:

(i) A research and/or development project and completion of a dissertation. The study is concluded with an oral presentation.

(ii) Lectured MEng degrees, consisting of lectured modules and a minor dissertation, as determined by the Head of the relevant Department.

4.1.6 A key requirement for the MEng and MPhil degrees is a demonstrated ability to conduct fundamental research independently. This ability can be developed by completing a research-based programme. Alternatively, the theoretical knowledge required at Master's level can be supplemented by coursework, while the ability to conduct research can be demonstrated by a significant research component. To ensure that both the lectured and research components are of significant value, each should comprise 50% of the programme credits.

4.2 Lectured Master's Degrees

4.2.1 The final marks for the coursework modules will be published within 30 days after the final assessment opportunity.

4.2.2 Students who have failed a module twice will not be allowed to continue their studies in the same module at the University, except with permission of the Executive Dean on recommendation of the relevant Head of School after consultation with the Lecturer, or on recommendation of the Faculty's Examination and/or assessment Committee (Academic Regulation 6.6).

4.2.3 Appeals against academic exclusion for Master's programme by coursework

(i) Students may lodge an appeal against their academic exclusion (i.e. receiving a TF global result code for failing a module twice) at the faculty on the campus where the student is registered.

(ii) Applicants who want to appeal must follow the prescribed administrative procedure by submitting their motivation and supporting documents as well as other substantiating documents to the Executive Dean's office according to faculty guidelines and procedures and in accordance with UJ policies within 7 days after the results of the module has been published.

(iii) The Executive Dean's office will consider the appeals and may refuse or allow readmission.

(iii) The students will be notified of the outcome of the appeal.

(iv) The decision of the Executive Dean's office is final.

4.3 Doctoral Degrees

4.3.1 Students for the DIng degree programme in Engineering are admitted on the grounds of a Master's degree in Engineering, on recommendation of the Head of the relevant Department.

4.3.2 Doctoral studies consist of independent research and development work, and an applicable thesis. The study is concluded with a presentation.

4.3.3 For admission to a DIng/DPhil/DTech degree, a copy of the applicant's Master's dissertation.

EB5 OBTAINING A QUALIFICATION

A qualification is awarded or conferred with distinction if the requirements below are met:
Duration:

(i) Students must complete an undergraduate programme in the minimum period of study specified for the programme, unless the Executive Dean has approved a longer period of study for legitimate reasons.

(ii) Students must complete an honours qualification, advanced diploma or postgraduate diploma within one year if registered full time and within two years if registered part time.

(iii) Students must complete a master's qualification within one year full time and two years part time.

(b) Average final mark for the qualification:

(i) Students must achieve a weighted and/or proportional calculated average final mark for an undergraduate qualification of at least 75% as determined by the Faculty Board, approved by Senate and contained in the Faculty Rules and Regulations.

(ii) Students must achieve an average final mark for an honours qualification, advanced diploma or postgraduate diploma of at least 75% calculated by weighting the final marks for all the modules comprising the qualification in accordance with the NQF credit values allocated to the modules.

(iii) Students for a master's qualification by dissertation must achieve a final mark of at least 75% for the dissertation.

(iv) Students for a master's qualification by coursework must achieve an average final mark for the qualification of at least 75% calculated by weighting the average final marks for all the coursework modules and the final mark for the minor dissertation in accordance with the credit values allocated to all the coursework modules and the minor dissertation respectively (for example, if the credit value of the minor dissertation represents 40% of the total credit value of the qualification, the average final mark for the qualification will be weighted in the proportion of 40 for the minor dissertation and 60 for all the coursework modules).

(v) Decimal marks may be rounded upwards or downwards in accordance with the decision taken by the Faculty Assessment Committee concerned.

(c) A student must never have failed a module as a first attempt in the relevant programme.

(d) A student must have obtained a minimum mark of 65% in every prescribed module at NQF 7 in the qualification, in the case of a master's qualification by coursework, in the minor dissertation as well.

(e) Students for an honours qualification, advanced diploma or postgraduate diploma must have been registered for the full curriculum as prescribed for each academic year on a full-time or part-time basis, as the case may be.

(f) Students for a master's qualification must have been registered for the full curriculum as prescribed for each academic year on a full-time or part-time basis, as the case may be

(g) If students are transferred from another Higher Education Institution in the same programme at the UJ, the same requirements as stated shall apply, subject to the necessary changes having been made.

(h) If students change programmes within UJ, only the modules related to the new programme will be taken into consideration in calculating whether the qualification is obtained with distinction.

EB6 REGISTRATION REQUIREMENTS

For specific Faculty Admission requirements, refer to Regulation EB3.

6.1 All students who enrol at the University of Johannesburg for the first time, must submit certified copies of their academic records and certificates of good conduct, applicable to all previously obtained degrees.

6.2 Students from other universities who wish to continue their studies at the University of Johannesburg, must submit their academic records and certificates of good conduct, issued by the other university, at registration.

6.3 Failure to submit admission documents timeously will result in the cancellation of registration. Registration of students is conditional until all admission requirements have been met.

6.4 Renewal of registration for a dissertation or a minor dissertation takes place during the first semester of the academic year as contained in the University's Year Programme.

6.5 Failure to submit the research or minor research proposal within the specified time frame may result in cancellation of registration.

6.6 Interruption of study may be granted by the Executive Dean for legitimate reasons, as reflected in the Higher Degrees and Postgraduate Policy.

EB7 FEES PAYABLE

In respect of fees payable, refer to the Brochure: **Student Fees.**
If you are not in possession of this brochure and you need information urgently, contact STUDENT FINANCES: 011 559 3777.

EB8 PLAGIARISM

16.1 **"Plagiarism"** means passing off ideas however expressed, including in the form of phrases, words, images, artefacts, sounds, or other intellectual or artistic outputs, as one's own when they are not one's own; *or* such passing off, as an original contribution, of ideas that are one's own but have been expressed on a previous occasion for assessment by any academic institution or in any published form, without acknowledgement of the previous expression. Plagiarism is understood as one of several related forms of academic dishonesty, all of which are addressed in the Student Disciplinary Code.

"Reportable plagiarism" means *Plagiarism* that:

(a) Vitiates the attempt fairly and meaningfully to assess and, where relevant, assign a mark, grade, or other outcome to the work in question; *and*

(b) Is such that an educational response (which may include capping or prescribing a mark) is inappropriate and that a formal academic response or a disciplinary response is appropriate, given the plagiarism history of the student, and all the other relevant circumstances of the case; *or*

(c) In the case of work that is not submitted for assessment (for example work submitted by a student to a supervisor or lecturer for comment), is deemed by the individual academic staff member in question to be reportable, having regard to the nature of the offence, the plagiarism history of the student, the possibility or probability of repeat offence, and all the other circumstances of the case.

EB8 MAGISTER TECHNOLOGIA ENGINEERING TECHNOLOGY PROGRAMMES

EB8.1 MTech: ENGINEERING: CIVIL 724-1 Research-based

EB8.1.1 Purpose of the qualification

A student having obtained this qualification will be competent to conduct research with minimal guidance, and contribute to knowledge production in the engineering environment with success.

EB8.1.2 Qualification outcomes

Demonstrate the capability to identify a problem or need in industry, and apply research methodologies to address the need or problem.

EB8.1.3 Admission requirements and selection criteria

A Baccalaureus Technologiae: Engineering: Civil, **or** an equivalent qualification of an equivalent standard.

EB8.1.4 Conferment of the degree

The MTech: Engineering: Civil will be conferred on students who have completed the dissertation successfully.

EB8.1.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
VEH1208	Dissertation: Civil	VEH1228	Dissertation: Civil

RESEARCH TIME: 100%

EB8.2 MTech: ENGINEERING: CHEMICAL 723-1 Research-based

EB8.2.1 Purpose of the qualification

This qualification is intended for chemical engineers or technologists working in process-related industries. Students who have obtained this qualification will be competent to conduct independent research in chemical engineering, and contribute significantly to knowledge production through the understanding, application and evaluation of existing knowledge. The research problem, its justification, process and outcome is reported in a dissertation, which complies with the generally accepted norms at that level.

EB8.2.2 Qualification outcomes

The qualifying student will have the ability to:

1. Collect and organise information in the selected field/area of research.
2. Apply research methods and techniques appropriately and correctly.
3. Make a significant contribution by recommending improvements to existing Chemical Engineering Science and Technology fields.

EB8.2.3 Admission requirements and selection criteria

A Baccalaureus Technologiae: Engineering: Chemical, **or** an equivalent qualification of an equivalent standard.

EB8.2.4 Conferment of the degree

The MTech: Engineering: Chemical will be conferred on students who have completed the dissertation successfully.

EB8.2.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
VEH1108	Dissertation: Chemical	VEH1128	Dissertation: Chemical

RESEARCH TIME: 100%

EB8.3 MTech: CONSTRUCTION MANAGEMENT 743-1
Research-based

EB8.3.1 Purpose of the qualification
This qualification is intended to enable graduates to apply integrated technical knowledge/skills and advanced analysis and problem-solving to particular specialisation in construction management, property and related fields, through involvement in an applied research project.

EB8.3.2 Qualification outcomes
Conduct research and development in a specialised area and engage in the transfer of technology in the field of construction management and property development.

EB8.3.3 Admission requirements and selection criteria
A BTech: Construction Management, **or** an equivalent qualification of an equivalent standard
OR
A National Higher Diploma: Building Surveying or Construction Supervision, **plus** approved work experience and other post-diploma studies.
Students are selected on academic merit and approved field of study.

EB8.3.4 Conferment of the degree
The M Tech: Engineering: Construction Management will be conferred on students who have completed the dissertation successfully.

EB8.3.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
VEH1508	Dissertation: Construction Management	VEH1528	Dissertation: Construction Management

RESEARCH TIME: 100%

EB8.4 MTech: ENGINEERING: ELECTRICAL 744-1
Research-based

EB8.4.1 Purpose of the qualification
A qualifying student will be able to conduct independent research, with minimum guidance, in a chosen field of Electrical Engineering, and contribute to knowledge production in that field.

EB8.4.2 Qualification outcomes
1. Demonstrate knowledge and understanding of the field/area of investigation.
2. Apply research methods and techniques appropriately and correctly.

EB8.4.3 Admission requirements and selection criteria
A Baccalaureus Technologiae: Engineering: Electrical, **or** an equivalent qualification of an equivalent standard.

EB8.4.4 Conferment of the degree
The MTech: Engineering: Electrical will be conferred on students who have completed the dissertation successfully.

EB8.4.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
VEH1608	Dissertation: Electrical	VEH1628	Dissertation: Electrical

RESEARCH TIME: 100%

EB8.5 MTech: EXTRACTION METALLURGY 616-1
Research-based

EB8.5.1 Purpose of the qualification
At this level, a qualifying student will be is competent in applying specialised knowledge and research methodology in a metallurgical environment, thus contributing to the research and development needs of the metallurgic industry and mining community. The qualified student will be able to register with ECSA as a Professional Technologist.

EB8.5.2 Qualification outcomes
The qualifying student should have the ability to:

1. Initiate and execute applied research in a range of metallurgical activities to full completion.
2. Function at middle to upper management level in a metallurgical environment.

EB8.5.3 Admission requirements and selection criteria
A Baccalaureus Technologiae: Extraction Metallurgy, **or** an equivalent qualification of an equivalent standard.

EB8.5.4 Conferment of the degree
The MTech: Extraction Metallurgy will be conferred on students who have completed the dissertation successfully.

EB8.5.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
VEH1808	Dissertation: Extraction Metallurgy	VEH1828	Dissertation: Extraction Metallurgy

RESEARCH TIME: 100%

EB8.6 MTech: ENGINEERING: INDUSTRIAL 725-1
Research-based

EB8.6.1 Purpose of the qualification
This qualification is intended to allow graduates to apply integrated operations techniques, together with advanced analysis and problem-solving, to a particular specialisation in the field of Industrial Engineering/Operations Management, through involvement in an applied research project.

EB8.6.2 Qualification outcomes and assessment criteria
Conduct research and development in a specialised area and engage in the transfer of technology in the field of Industrial Engineering or Operations Management.

EB8.6.3 Admission requirements and selection criteria
A Baccalaureus Technologiae: Industrial Engineering, **or** an equivalent qualification of an equivalent standard.

EB8.6.4 Conferment of the degree
The MTech: Engineering: Industrial will be conferred on students who have completed the dissertation successfully.

EB8.6.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
VEH1308	Dissertation: Industrial	VEH1328	Dissertation: Industrial

RESEARCH TIME: 100%

EB8.7 MTech: ENGINEERING: MECHANICAL 726-1
Research-based

EB8.7.1 Purpose of the qualification
This qualification is intended for students who will make a contribution, through research, to understanding the application and evaluation of existing knowledge in a specialised area of technology. They will also be able to demonstrate a high level of overall knowledge in that area, ranging from fundamental to advanced theoretical or applied knowledge.

EB8.7.2 Qualification outcomes and assessment criteria
Complete research successfully in engineering processes, products or systems.

EB8.7.3 Admission requirements and selection criteria
A Baccalaureus Technologiae: Engineering: Mechanical, **or** an equivalent qualification of an equivalent standard.

EB8.7.4 Conferment of the degree
The MTech: Engineering: Mechanical will be conferred on students who have completed the dissertation successfully.

EB8.7.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
VEH1408	Dissertation: Mechanical	VEH1428	Dissertation: Mechanical

RESEARCH TIME: 100%

EB8.8 MTech: ENGINEERING: METALLURGY 615-1
Research-based

EB8.8.1 Purpose of the qualification
At this level a qualifying student will be competent in applying specialised knowledge and research methodology in a metallurgical environment, thus contributing to the research and development needs of the metallurgical industry and mining community. The qualified student will be able to register with ECSA as a Professional Technologist.

EB8.8.2 Qualification outcomes and assessment criteria

The qualifying student should have the ability to:

1. Initiate and execute applied research in a range of metallurgical activities to full completion.
2. Function at middle to upper management level in a metallurgical environment.

EB8.8.3 Admission requirements and selection criteria

A Baccalaureus Technologiae: Engineering: Metallurgy, **or** an equivalent qualification of an equivalent standard.

EB8.8.4 Conferment of the degree

The MTech: Engineering: Metallurgy will be conferred on students who have completed the dissertation successfully.

EB8.8.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
VEH1708	Dissertation: Metallurgy	VEH1728	Dissertation: Metallurgy

RESEARCH TIME: 100%

EB8.9 MTech: QUANTITY SURVEYING 745-1
Research-based

EB8.9.1 Purpose of the qualification

This qualification is intended to enable graduates to apply integrated technical knowledge/skills and advanced analysis and problem-solving to a particular specialisation in quantity surveying, property development and other related fields, through involvement in an applied research project.

EB8.9.2 Qualification outcomes and assessment criteria

Conduct research and development in a specialised area and engage in the transfer of technology in the field of quantity surveying and property development.

EB8.9.3 Admission requirements and selection criteria

A BTech: Quantity Surveying, **or** an equivalent qualification of an equivalent standard
OR
A National Higher Diploma: Building Surveying **plus** approved work experience and other post-diploma qualifications.
Students are selected on academic merit and approved field of study.

EB8.9.4 Conferment of degree

The MTech: Quantity Surveying will be conferred on students who have completed the research project and dissertation successfully.

EB8.9.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
VEH1908	Dissertation: Quantity Surveying	VEH1928	Dissertation: Quantity Surveying

RESEARCH TIME: 100%

EB8.10 MTech: OPERATIONS MANAGEMENT 426-2
Research-based

EB8.10.1 Purpose of the qualification
The qualification aims to develop intellectual and professional skills, and provides the student with the opportunity to show evidence of independent and original scientific work. This qualification will further provide the student with the opportunity to display competence in the application of relevant research methodology, and the proper written and/or oral communication of the research process and findings and to reflect on the research process and findings.

EB8.10.2 Qualification outcomes and assessment criteria
Conduct research and development in a specialised area and engage in the transfer of technology in the field of quantity surveying and property development.

EB8.10.3 Admission requirements and selection criteria
An applicant must hold a BTech: Operations Management or an equivalent qualification at NQF Level 7 as determined by a Status Committee.

For admission to an MTech programme, all applications will be reviewed in terms of academic performance and prior qualifications, and if necessary, the applicants will be interviewed to ascertain, amongst others, interest in the postgraduate study and the department's ability to accommodate the research interest.

EB8.10.4 Conferment of degree
The MTech: Operations Management will be conferred on students who have completed the research project and dissertation successfully.

EB8.10.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
NV426-1	Research Project and Dissertation	NV4261B	Research Project and Dissertation

RESEARCH TIME: 100%

In a dissertation, students must prove that they understand a particular problem in the industry or field in which they have done research, are able to analyse and set it out logically, are able to arrive at logical conclusions or diagnoses, and are then able to make proposals for the improvement or the elimination of the problem.

EB9 MASTER OF ENGINEERING ENGINEERING SCIENCE PROGRAMMES

EB9.1 MEng: ELECTRICAL AND ELECTRONIC Research-based (SAQA 73987) M6ER1Q

EB9.1.1 Purpose of the qualification

The purpose of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering sciences and/design and synthesis, and related principles to specific problems of society at large. One of the main objectives of this process is to develop an advanced capability to conduct fundamental engineering research independently. It also promotes a lifelong learning approach.

EB9.1.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering research/development problems creatively and innovatively by applying relevant fundamental knowledge of i.e. Mathematics, Basic Science and Engineering Sciences in the chosen field of research.
2. Plan and manage engineering research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise judgement based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct applicable levels of investigation, research and/or experiments by applying appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering and specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate research methods, skills, tools and information technology effectively and critically in engineering research/development practice, and show an understanding and a willingness to accept responsibility for the impact of inter-disciplinary research/development activities on society and the environment.
8. Perform synthesis of components, systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the inter-disciplinary field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of research/development activities.
12. Explore, where applicable, education and career opportunities in engineering research/development.
13. Organise and develop entrepreneurial opportunities through engineering, technical research, development and/or managerial skills.

EB9.1.3 Admission requirements and selection criteria

An approved four-year Bachelor's degree in Engineering or similar approved degree at honours level.

Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty.

EB9.1.4 Conferment of the degree

The MEng: Electrical and Electronic degree will be conferred on students who have completed the research seminar and dissertation successfully.

EB9.1.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
M6E0109	Dissertation	M6E0209	Dissertation

RESEARCH TIME: 100%

EB9.2 MEng: MECHANICAL M6MR3Q
Research-based (SAQA 73989)

EB9.2.1 Purpose of the qualification

The purpose of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering sciences and/design and synthesis and related principles to specific problems of society at large. One of the main objectives of this process is to develop an advanced capability to do fundamental engineering research independently. It also promotes a lifelong learning approach.

EB9.2.2 Qualification outcomes

Exit level outcomes:

The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering research and development problems creatively and innovatively by applying relevant fundamental knowledge of i.e. Mathematics, Basic Science and Engineering Sciences in the chosen field of research.
2. Plan and manage engineering research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise judgment based on knowledge and expertise pertaining to the field of research.
5. Plan and conduct applicable levels of investigation, research and/or experiments by applying appropriate theories and methodologies, and perform data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering and specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate research methods, skills, tools and information technology effectively and critically in engineering research/development practice, and show an understanding and a willingness to accept responsibility for the impact of engineering research/development activities on society and the environment.
8. Perform procedural and non-procedural design and synthesis of components, systems, works, products or processes as a set of related systems, and assess their social, legal,

health, safety and environmental impact and benefits, where applicable, in the chosen field of research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the engineering field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering research and development activities.
12. Explore, where applicable, education and career opportunities through engineering problem-solving, design, technical research and managerial skills.
13. Organise and develop entrepreneurial opportunities through engineering, technical research, development and/or managerial skills.

EB9.2.3 Admission requirements and selection criteria

An approved four-year Bachelor's degree in Engineering or similar approved degree at honours level.
Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty.

EB9.2.4 Conferment of the degree

The MEng: Mechanical degree will be conferred on students who have completed the research seminar and dissertation successfully.

EB9.2.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
M6M0109	Dissertation	M6M0209	Dissertation

RESEARCH TIME: 100%

EB9.3 MEng: CIVIL M6CR4Q
Research-based (SAQA 73986)

EB9.3.1 Purpose of the qualification

The purpose of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering sciences and/design and synthesis and related principles to specific problems of society at large. One of the main objectives of this process is to develop an advanced capability to conduct fundamental engineering research independently. It also promotes a lifelong learning approach.

EB9.3.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:
1. Identify, assess, formulate, interpret, analyse and solve engineering research and development problems creatively and innovatively by applying relevant fundamental knowledge of i.e. Mathematics, Basic Science and Engineering Sciences in the chosen field of research.
2. Plan and manage engineering research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence,

and exercise judgement based on knowledge and expertise, pertaining to the field of research.

5. Plan and conduct applicable levels of investigation, research and/or experiments by applying appropriate theories and methodologies, and perform data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering and specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate engineering research methods, skills, tools and information technology effectively and critically in engineering research/development practice, and show an understanding and a willingness to accept responsibility for the impact of engineering research/development practices on society and the environment.
8. Perform procedural and non-procedural design and synthesis of components, systems, works, products or processes as a set of related systems, and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the engineering field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering research and development activities.
12. Explore, where applicable, education and career opportunities in engineering research/development.
13. Organise and develop entrepreneurial opportunities through engineering, technical research, development and/or managerial skills.

EB9.3.3 Admission requirements and selection criteria

An approved four-year Bachelor's degree in Engineering or similar approved degree at honours level.

EB9.3.4 Conferment of the degree

The MEng: Civil degree will be conferred on students who have completed the research projects and dissertation successfully.

EB9.3.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
M6C0109	Dissertation	M6C0209	Dissertation

RESEARCH TIME: 100%

EB9.4 MEng: ENGINEERING MANAGEMENT M6MC5Q Lectured (SAQA 73988)

EB9.4.1 Purpose of the qualification

The purpose of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering management sciences and/design and synthesis and related principles to specific management systems problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental systems engineering and management research independently. It also promotes a lifelong learning approach.

EB9.4.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering research and development problems creatively and innovatively by applying relevant fundamental knowledge of i.e. Mathematics, Basic Science and/or Engineering and Management Sciences in the chosen field of research.
2. Plan and manage engineering management research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise judgement based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct applicable levels of investigation, research and/or experiments by applying appropriate theories and methodologies, and perform data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering and specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate engineering management research methods, skills, tools and information technology effectively and critically in engineering research/development practice, and show an understanding and a willingness to accept responsibility for the impact of research/development activities on society and the environment.
8. Evaluate systems, works, products or processes as a set of related systems, and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the engineering management field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering management research and development activities.
12. Explore, where applicable, education and career opportunities in engineering management research/development.
13. Organise and develop entrepreneurial opportunities through engineering, technical research, development and/or managerial skills.

EB9.4.3 Admission requirements and selection criteria

An approved four-year Bachelor’s degree in Engineering.

EB9.4.4 Conferment of the degree

The MEng: Engineering Management degree will be conferred on students who have completed the six prescribed modules and minor dissertation successfully. Weight of the minor dissertation is 50%.

EB9.4.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
M6MEM19	Engineering Management	M6MRM29	Reliability Management
M6MAE19	Advanced Engineering Economics	M6MPM29	Project Management
M6MES19	Engineering Systems Management	M6MPD29	Product Development and Marketing

Second year (Prerequisites: Completion of coursework modules)

First semester		Second semester	
M6MMD19	Minor Dissertation	M6MMD19	Minor Dissertation

EB9.5 MEng: ENGINEERING MANAGEMENT M6MR6Q Research-based (SAQA 73987)

EB9.5.1 Purpose of the qualification

The purpose of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering management sciences and/design and synthesis, and related principles to specific management systems problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental independent systems engineering and management research independently. It also promotes a lifelong learning approach.

EB9.5.2 Qualification outcomes

Exit level outcomes:

The qualified student will able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering research and development problems creatively and innovatively by applying relevant fundamental knowledge of i.e. Mathematics, Basic Science and/or Engineering and Management Sciences in the chosen field of research.
2. Plan and manage engineering management research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise judgement based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct applicable levels of investigation, research and/or experiments by applying appropriate theories and methodologies, and perform data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering and specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate engineering management research methods, skills, tools and information technology effectively and critically in engineering research/development practice, and show an understanding and a willingness to accept

responsibility for the impact of research/development activities on society and the environment.

8. Evaluate systems, works, products or processes as a set of related systems, and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the engineering management field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering management research and development activities.
12. Explore, where applicable, education and career opportunities in engineering management research/development.
13. Organise and develop entrepreneurial opportunities through engineering, technical research, development and/or managerial skills.

EB9.5.3 Admission requirements and selection criteria

An approved four-year Bachelor's degree in Engineering.

Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty.

EB9.5.4 Conferment of the degree

The MEng: Engineering Management degree will be conferred on students who have completed the research seminar and dissertation successfully.

EB9.5.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
M6M0109	Dissertation	M6M0209	Dissertation

RESEARCH TIME: 100%

EB9.6 MEng: STRUCTURAL ENGINEERING M6CSEQ
Lectured (SAQA -)

EB9.6.1 Purpose of the qualification

The purpose of the programme is to develop an engineer with advanced abilities in applying fundamental structural engineering sciences, design and synthesis to specific structural engineering problems in society at large. One of the main objectives is to develop an advanced capability to do fundamental structural engineering research independently and, in so doing, promote lifelong learning.

EB9.6.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve structural engineering research and development problems creatively and innovatively by applying relevant fundamental knowledge of i.e. mathematics, basic science and engineering sciences in the chosen field of research.
2. Plan and manage structural engineering research projects demonstrating underlying fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering research/development in the chosen field of research practice.
3. Work effectively individually or with others as a member of a team, group, organization, and community or in multidisciplinary environments in the chosen field of research
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically and take responsibility within his/her own limits of competence and to exercise judgment commensurate with knowledge and expertise, pertaining to the field of research
5. Plan and conduct applicable level of investigations, research and /or experiments by applying appropriate theories and methodologies and perform data analysis and interpretation
6. Communicate effectively, both orally and in writing, with engineering and specifically research audiences and the community at large in so far as they are affected by the research using appropriate structure, style and graphical support
7. Use and assess appropriate structural engineering research methods, skills, tools, technology and information technology effectively and critically in engineering research/development practice and show an understanding and a willingness to accept responsibility for the impact that engineering research/development practice have on society and the environment
8. Perform procedural and non-procedural design and synthesis of components, systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impacts and benefits where applicable in the chosen field of research
9. Employ various learning strategies and skills to master outcomes required in preparing him/herself to engage in continuous learning to keep abreast of knowledge and skills required in the structural engineering field
10. Participate as a responsible citizen in the life of local, national, and global communities by acting professionally and ethically in the chosen field of research
11. Demonstrate where applicable cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering research and development activities
12. Explore, where applicable, education and career opportunities through engineering problem solving, design, technical research and structural engineering skills
13. Organise and develop entrepreneurial opportunities through engineering research, development and/or structural engineering skills

EB9.6.3 Admission requirements and selection criteria

A four year professional Bachelor's degree in Civil Engineering
OR
A Bachelor Honours degree or Postgraduate Diploma in Civil Engineering or an affiliated Engineering field

EB9.6.4 Conferment of the degree

The MEng: Structural Engineering degree will be conferred on students who have completed the six coursework modules (4 core modules and to electives) and minor dissertation successfully. Weight of dissertation is 50%.

EB9.6.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
M6CCT29	Advanced concrete technology	M6PAD19	Plastic analysis and design of structures
		M6ARC19	Advanced reinforced concrete analysis and design

Second year

First semester		Second semester	
M6FEA19	Finite element analysis	M6SOS19	Stability of steel structures
M6CSE19	Minor Dissertation	M6CSE29	Minor Dissertation

Choose two electives	
M6DAR26	Durability, assessment and repair of concrete structures (Second Semester)
M6DYS29	Dynamic analysis of structures (Second Semester)
M6DCS29	Design of cold-formed steel structures (First semester)
M6SPE19	Special topics in civil engineering materials and structures (

EB10 MAGISTER PHILOSOPHIAE ENGINEERING SCIENCE PROGRAMMES

EB10.1 MPhil: ELECTRICAL AND ELECTRONIC ENGINEERING M6ER7Q
Research-based (SAQA 74008)

EB10.1.1 Purpose of the qualification

The purpose of the qualification is to develop an intellectual with advanced abilities in applying fundamental engineering sciences or related inter-disciplinary principles to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental engineering research of an inter/intra-disciplinary nature independently. It also promotes a lifelong learning approach.

EB10.1.2 Qualification outcomes

Exit level outcomes:

The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve research and development problems creatively and innovatively by applying relevant inter-disciplinary knowledge in the chosen field of research.
2. Plan and manage research projects demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of interdisciplinary research.
4. Organise and manage him/herself and his/her activities responsibly, effectively and ethically, accept responsibility within his/her limits of competence, and exercise judgement based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct applicable levels of investigation, research and/or experiments by applying appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate research methods, skills, tools and information technology effectively and critically in research/development practice, and show an understanding and a willingness to accept responsibility for the impact of inter-disciplinary research/development activities on society and the environment.
8. Perform synthesis of systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of inter-disciplinary research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the interdisciplinary field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of research/development activities.
12. Explore, where applicable, education and career opportunities in research/development.
13. Organise and develop entrepreneurial opportunities through technical research, development and/or managerial skills.

EB10.1.3 Admission requirements and selection criteria

An approved four-year Bachelor's degree in Engineering or similar approved degree at honours level.

Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty.

EB10.1.4 Conferment of the degree

The MPhil: Electrical and Electronic degree will be conferred on students who have completed the research seminar and dissertation successfully.

EB10.1.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
M6E0109	Dissertation	M6E0209	Dissertation

RESEARCH TIME: 100%

EB10.2 MPhil: MECHANICAL ENGINEERING M6MR8Q Research-based (SAQA 74015)

EB10.2.1 Purpose of the qualification

The purpose of the qualification is to develop an intellectual with advanced abilities in applying fundamental engineering sciences or related inter-disciplinary principles to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to do fundamental engineering research of inter/intra-disciplinary nature independently. It also promotes a lifelong learning approach.

EB10.2.2 Qualification outcomes

Exit level outcomes:

The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve research/development problems creatively and innovatively by applying relevant inter-disciplinary knowledge in the chosen field of research.
2. Plan and manage research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of interdisciplinary research.
4. Organise and manage him/herself and his/her activities responsibly, effectively and ethically, accept responsibility within his/her limits of competence, and exercise judgement based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct applicable levels of investigation, research and/or experiments by applying appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate research methods, skills, tools and information technology effectively and critically in research/development practice, and show an understanding and a willingness to accept responsibility for the impact of inter-disciplinary research/development activities on society and the environment.

8. Perform synthesis of systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of inter-disciplinary research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the inter-disciplinary field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of research/development activities.
12. Explore, where applicable, education and career opportunities in research/development.
13. Organise and develop entrepreneurial opportunities through technical research, development and/or managerial skills.

EB10.2.3 Admission requirements and selection criteria

An approved four-year Bachelor's degree in Engineering or similar approved degree at honours level.

Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty.

EB10.2.4 Conferment of the degree

The MPhil: Mechanical degree will be conferred on students who have completed the research seminar and dissertation successfully.

EB10.2.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
M6M0109	Dissertation	M6M0209	Dissertation

RESEARCH TIME: 100%

EB10.3 MPhil: CIVIL ENGINEERING M6CR9Q
Research-based (SAQA 74006)

EB10.3.1 Purpose of the qualification

The purpose of the qualification is to develop an intellectual with advanced abilities in applying fundamental engineering sciences or related inter-disciplinary principles to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to do fundamental engineering research of inter/intra-disciplinary nature independently. It also promotes a lifelong learning approach.

EB10.3.2 Qualification outcomes

Exit level outcomes:

The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve research/development problems creatively and innovatively by applying relevant inter-disciplinary knowledge in the chosen field of research.
2. Plan and manage research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of inter-disciplinary research.

4. Organise and manage him/herself and his/her activities responsibly, effectively and ethically, accept responsibility within his/her limits of competence, and exercise judgement based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct applicable levels of investigation, research and/or experiments by applying appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate research methods, skills, tools and information technology effectively and critically in research/development practice, and show an understanding and a willingness to accept responsibility for the impact of inter-disciplinary research/development activities on society and the environment.
8. Perform synthesis of systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of inter-disciplinary research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the inter-disciplinary field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of research/development activities.
12. Explore, where applicable, education and career opportunities in research/development.
13. Organise and develop entrepreneurial opportunities through technical research, development and/or managerial skills.

EB10.3.3 Admission requirements and selection criteria

An approved four-year Bachelor's degree in Engineering or similar approved degree at honours level.

Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty.

EB10.3.4 Conferment of the degree

The MPhil: Civil degree will be conferred on students who have completed the research seminar and dissertation successfully.

EB10.3.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
M6C0109	Dissertation	M6C0209	Dissertation

RESEARCH TIME: 100%

EB10.4 MPhil: ENGINEERING MANAGEMENT M6MC0Q
Lectured (SAQA 74010)

EB10.4.1 Purpose of the qualification

The purpose of the qualification is to develop an intellectual with advanced abilities in applying fundamental engineering management sciences and/design and synthesis and related inter-disciplinary principles to specific management systems problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental systems engineering and management research of an inter/intra-disciplinary nature independently. It also promotes a lifelong learning approach.

EB10.4.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering management research/development problems creatively and innovatively by applying relevant inter-disciplinary knowledge in the chosen field of research.
2. Plan and manage engineering management research projects, demonstrating inter-disciplinary knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of inter-disciplinary research.
4. Organise and manage him/herself and his/her activities responsibly, effectively and ethically, accept take responsibility within his/her limits of competence, and exercise judgement based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct applicable levels of investigation, research and/or experiments by applying appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate data analysis and interpretation.
7. Use and assess appropriate engineering management research methods, skills, tools and information technology effectively and critically in research/development practice, and show an understanding and a willingness to accept responsibility for the impact of inter-disciplinary research/development activities on society and the environment.
8. Perform systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of interdisciplinary research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the inter-disciplinary field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering management research/development activities.
12. Explore, where applicable, education and career opportunities in engineering management research/development.
13. Organise and develop entrepreneurial opportunities through inter-disciplinary research, development and/or managerial skills.

EB10.4.3 Admission requirements and selection criteria

A Baccalaureus Technologiae, Engineering **or** an equivalent qualification of an equivalent standard. With 1.5 years appropriate experience.

EB10.4.4 Conferment of the degree

The MPhil: Engineering Management degree will be conferred on students who have completed the six prescribed modules and minor dissertation successfully. Weight of the minor dissertation is 50%.

EB10.4.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
M6MEM19	Engineering Management	M6MRM29	Reliability Management
M6MAE19	Advanced Engineering Economics	M6MPM29	Project Management
M6MES19	Engineering Systems Management	M6MPD29	Product Development and Marketing
Second year (Prerequisites: Completion of coursework modules)			
First semester		Second semester	
M6MMD19	Minor Dissertation	M6MMD29	Minor Dissertation

EB10.5 MPhil: ENGINEERING MANAGEMENT M6MR2Q Research-based (SAQA 74010)

EB10.5.1 Purpose of the qualification

The purpose of the qualification is to develop an intellectual with advanced abilities in applying fundamental engineering management sciences and/design and synthesis, and related interdisciplinary principles to specific management systems and problems of society at large. One of the main objectives in this process is to develop an advanced capability to do independent systems engineering and management research of an inter/intra-disciplinary nature. It also promotes a lifelong learning approach.

EB10.5.2 Qualification outcomes

Exit level outcomes:

The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering management research/development problems creatively and innovatively by applying relevant inter-disciplinary knowledge in the chosen field of research.
2. Plan and manage engineering management research projects, demonstrating inter-disciplinary knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of inter-disciplinary research.
4. Organise and manage him/herself and his/her activities responsibly, effectively and ethically, accept responsibility within his/her limits of competence, and exercise judgement based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct applicable levels of investigation, research and/or experiments by applying appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate data analysis and interpretation.
7. Use and assess appropriate engineering management research methods, skills, tools and information technology effectively and critically in research/development practice,

and show an understanding and a willingness to accept responsibility for the impact of inter-disciplinary research/development activities on society and the environment.

8. Perform systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of inter-disciplinary research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the inter-disciplinary field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering management research/development activities.
12. Explore, where applicable, education and career opportunities in engineering management research/development.
13. Organise and develop entrepreneurial opportunities through inter-disciplinary research, development and/or managerial skills.

EB10.5.3 Admission requirements and selection criteria

A Baccalaureus Technologiae, Engineering **or** an equivalent qualification of an equivalent standard. With 1.5 years appropriate experience. Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty.

EB10.5.4 Conferment of the degree

The MPhil: Engineering Management degree will be conferred on students who have completed the research seminar and dissertation successfully.

EB10.5.5 Curriculum

CODE	**MODULE**	**CODE**	**MODULE**
First year			
First semester		Second semester	
M6M0109	Dissertation	M6M0209	Dissertation

RESEARCH TIME: 100%

EB11 DOCTORAL DEGREE ENGINEERING TECHNOLOGY PROGRAMMES

EB11.1 DTech: ENGINEERING: MECHANICAL (SAQA 73924) DTM002

EB11.1.1 Purpose of the qualification

This qualification is intended for students who will make a significant and original contribution to knowledge in a specialised area of technology. They will be able to demonstrate a high level of overall knowledge in that specialised area, ranging from fundamental to advanced theoretical or applied knowledge.

EB11.1.2 Qualification Outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify and solve problems by means of responses that demonstrate responsible decisions, using critical and creative thinking.
2. Collect, organise, analyse and critically evaluate information.
3. Work effectively with others.
4. Reflect on and explore a variety of strategies to learn more effectively.
5. Communicate effectively, using visual, mathematical and/or language skills in oral and/or written presentation.

EB11.1.3 Admission requirements and selection criteria

An appropriate Magister Technologiae or an equivalent qualification of an equivalent standard, as determined by a Status Committee.
Students are selected on academic merit and approved field of study.

EB11.1.4 Conferment of the degree

The DTech: Engineering: Mechanical will be conferred on students who have completed the research programme and thesis successfully.

EB11.1.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
PFS6009	Thesis: Mechanical Engineering	PFS6209	Thesis: Mechanical Engineering

EB11.2 DTech: EXTRACTION METALLURGY (SAQA -) 618-1

EB11.2.1 Purpose of the qualification

At this level, a qualifying student will be competent in conducting original research and development at a specialised level in Metallurgical Engineering, thus contributing to the research and development needs and knowledge base of the metallurgical industry and mining community. The qualified student will be able to register with ECSA as a Professional Technologist.

EB11.2.3 Admission requirements and selection criteria

An appropriate Magister Technologiae **or** an equivalent qualification of an equivalent standard.
Students are selected on academic merit and approved field of study.

EB11.2.4 Conferment of the degree

The DTech: Extraction Metallurgy is conferred on students who have completed the research programme and thesis successfully.

EB11.2.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
PFS8009	Thesis: Extraction Metallurgy	PFS8209	Thesis: Extraction Metallurgy

EB11.3 DTech: ENGINEERING: METALLURGY 617-1 (SAQA -)

EB11.3.1 Purpose of the qualification

At this level, a qualifying student will be competent in conducting original research and development at a specialised level in Metallurgical Engineering, thus contributing to the research and development needs and knowledge base of the metallurgical industry and mining community. The qualified student will be able to register with ECSA as a Professional Technologist.

EB11.3.3 Admission requirements and selection criteria

An appropriate Magister Technologiae **or** an equivalent qualification of an equivalent standard. Students are selected on academic merit and approved field of study.

EB11.3.4 Conferment of the degree

The DTech: Engineering Metallurgy will be conferred on students who have completed the research programme and thesis successfully.

EB11.3.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
PFS5009	Thesis: Metallurgy	PFS5209	Thesis: Metallurgy

EB12 DOCTORAL DEGREE ENGINEERING SCIENCE PROGRAMMES

EB12.1 DIng: ELECTRICAL AND ELECTRONIC (SAQA 73861) DIN001

EB12.1.1 Purpose of the qualification

The purpose of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering sciences and/design and synthesis, and related principles independently to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental engineering research of an original nature. It also promotes a lifelong learning approach and an aptitude for training other students in similar fields.

EB12.1.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve original engineering research/development problems creatively and innovatively by applying relevant advanced fundamental knowledge of i.e. Mathematics, Basic Science and Engineering Sciences in the chosen field of research.
2. Plan and manage advanced engineering research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise original judgment based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct advanced investigations, research and/or experiments of an original nature by applying or developing appropriate theories and methodologies, and perform data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate advanced engineering research methods, skills, tools and information technology effectively and critically in research/development practice, and show an understanding and a willingness to accept responsibility for the impact of engineering research/development activities on society and the environment.
8. Perform procedural and non-procedural design and synthesis of components, systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the engineering research/development field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering research/development activities.
12. Explore, where applicable, education and career opportunities in advanced engineering research/development.

13. Organise and develop, where applicable, entrepreneurial opportunities through engineering, technical research, development and/or managerial skills.

EB12.1.3 Admission requirements and selection criteria

An approved Master's degree in Engineering or a similar approved degree at Master's level.
Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty and finally by the Senate or Executive Committee of the Senate of the University.

EB12.1.4 Conferment of the degree

The DIng: Electrical and Electronic will be conferred on students who have completed the research seminar and thesis successfully.

EB12.1.5 Curriculum

CODE	MODULE
PFS1009	Thesis: Electrical and Electronic semester 1
PFS1209	Thesis: Electrical and Electronic semester 2

EB12.2 DIng: MECHANICAL (SAQA 73863) DIN002

EB12.2.1 Purpose of the qualification

The purpose of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering sciences and/design and synthesis, and related principles independently to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental engineering research of an original nature. It also promotes a lifelong learning approach and an aptitude for training other students in similar fields.

EB12.2.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering research/development problems of an original nature creatively and innovatively by applying relevant advanced fundamental knowledge of i.e. Mathematics, Basic Science and Engineering Sciences in the chosen field of research.
2. Plan and manage advanced research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise original judgment based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct advanced investigations, research and/or experiments of an original nature by applying or developing appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering and specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate advanced inter-disciplinary research methods, skills and information technology effectively and critically in engineering

research/development practice, and show a responsibility for the impact of engineering research/development activities on society and the environment.
8. Perform procedural and non-procedural design and synthesis of components systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of interdisciplinary research.
9. Employ various learning and research strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning and research, to keep abreast of knowledge and skills required in the engineering management research/development field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering research/development activities.
12. Explore, where applicable, education and career opportunities in advanced engineering research/development.
13. Organise and develop, where applicable, entrepreneurial opportunities through engineering, technical research, development and/or managerial skills.

EB12.2.3 Admission requirements and selection criteria

An approved Master's degree in Engineering or a similar approved degree at Master's level.
Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty and finally by the Senate or Executive Committee of the Senate of the University.

EB12.2.4 Conferment of the degree

The DIng: Mechanical will be conferred on students who have completed the research seminar and thesis successfully.

EB12.2.5 Curriculum

CODE	MODULE
PFS2009	Thesis: Mechanical semester 1
PFS2209	Thesis: Mechanical semester 2

EB12.3 DIng: CIVIL (SAQA 73860) DIN003

EB12.3.1 Purpose of the qualification

The purpose of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering sciences and/design and synthesis, and related principles independently to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental engineering research of an original nature. It also promotes a lifelong learning approach and an aptitude for training other students in similar fields.

EB12.3.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:
1. Identify, assess, formulate, interpret, analyse and solve engineering research/development problems creatively and innovatively by applying relevant fundamental knowledge of i.e. Mathematics, Basic Science and Engineering Sciences in the chosen field of research.
2. Plan and manage advanced engineering research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering research/development in the chosen field of research practice.

3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise judgment based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct advanced investigations, research and /or experiments of an original nature by applying or developing appropriate theories and methodologies, and perform data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering and specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate advanced engineering research methods, skills, tools, technology and information technology effectively and critically in engineering research/development practice, and show an understanding and a willingness to accept responsibility for the impact of engineering research/development activities on society and the environment.
8. Perform procedural and non-procedural design and synthesis of components, systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of research.
9. Employ various learning strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the engineering research/development field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering research/development activities.
12. Explore, where applicable, education and career opportunities in advanced engineering research/development.
13. Organise and develop, where applicable, entrepreneurial opportunities through engineering, technical research, development and/or managerial skills.

EB12.3.3 Admission requirements and selection criteria

An approved Master's degree in Engineering or a similar approved degree at Master's level.
Final admission to the programme will only be granted after successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty and finally by the Senate or Executive Committee of the Senate of the University.

EB12.3.4 Conferment of the degree

The DIng: Civil will be conferred on students who have completed the research seminar and thesis successfully.

EB12.3.5 Curriculum

CODE	MODULE
PFS3009	Thesis: Civil semester 1
PFS3209	Thesis: Civil semester 2

EB12.4 DIng: ENGINEERING MANAGEMENT (SAQA 73862) DIN004

EB12.4.1 Purpose of the qualification

The purpose of the qualification is to develop an engineer with advanced abilities in applying fundamental engineering management sciences and/design and synthesis, and related principles independently to specific management systems problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental independent systems engineering and management research of an original nature. It also promotes a lifelong learning approach and an aptitude for training other students in similar fields.

EB12.4.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering research/development problems independently, creatively and innovatively by applying relevant advanced fundamental knowledge of i.e. Engineering and/or Engineering Management Sciences in the chosen field of research.
2. Plan and manage advanced engineering research project(s), demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering research/development/management in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise original judgment based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct advanced investigations, research and/or experiments of an original nature by applying or developing appropriate theories and methodologies, and perform data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate advanced research methods, skills, tools, technology and information technology effectively and critically in engineering research/development practice, and show an understanding and a willingness to accept responsibility for the impact of research/development activities on society and the environment.
8. Perform procedural and non-procedural design and synthesis of components, systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of research.
9. Employ various learning and research strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning and research, to keep abreast of knowledge and skills required in the engineering management research/development field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering management research/development activities.
12. Explore, where applicable, education and career opportunities in advanced engineering management research/development.
13. Organise and develop, where applicable, entrepreneurial opportunities through engineering, technical research, development and/or managerial skills.

EB12.4.3 Admission requirements and selection criteria

An approved Master's degree in Engineering or a similar approved degree at Master's level.
Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty and finally by the Senate or Executive Committee of the Senate of the University.

EB12.4.4 Conferment of the degree

The DIng: Engineering Management will be conferred on students who have completed the research seminar and thesis successfully.

EB12.4.5 Curriculum

CODE	MODULE
PFS2009	Thesis: Engineering Management semester 1
PFS2209	Thesis: Engineering Management semester 2

EB13 DOCTOR PHILOSOPHIAE ENGINEERING SCIENCE PROGRAMMES

EB13.1 DPhil: ELECTRICAL AND ELECTRONIC ENGINEERING (SAQA 73897) DPH601

EB13.1.1 Purpose of the qualification

The purpose of the qualification is to develop an intellectual with advanced abilities in applying fundamental engineering sciences or related inter-disciplinary principles independently to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct independent fundamental inter-disciplinary engineering research of an original nature. It also promotes a lifelong learning approach and an aptitude for training other students in similar fields.

EB13.1.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve research/development problems of an original nature creatively and innovatively by applying relevant advanced interdisciplinary fundamental knowledge and/or Computer Engineering Sciences in the chosen field of research.
2. Plan and manage research project(s), demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of interdisciplinary research.
4. Organise and manage him/herself and his/her activities responsibly, effectively and ethically, accept responsibility within his/her limits of competence, and exercise original judgment based on knowledge and expertise, pertaining to the field of inter-disciplinary research.
5. Plan and conduct advanced inter-disciplinary investigations, research and/or experiments of an original nature by applying or developing appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audience, using appropriate structure, style and graphical support.
7. Use and assess appropriate advanced inter-disciplinary research methods, skills, tools and information technology effectively and critically in research/development practice, and show an understanding and a willingness to accept responsibility for the impact of engineering research/development activities on society and the environment.
8. Perform synthesis of systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of inter-disciplinary research.
9. Employ various learning and research strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the engineering research/development field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of inter-disciplinary research/development activities.
12. Explore, where applicable, education and career opportunities in advanced research/development.
13. Organise and develop, where applicable, entrepreneurial opportunities through technical research, development and/or managerial skills.

EB13.1.3 Admission requirements and selection criteria

An approved Master's degree in Engineering or a similar approved degree at Master's level.
Final admission to the programme will only be granted upon successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty and finally by the Senate or Executive Committee of the Senate of the University.

EB13.1.4 Conferment of the degree

The DPhil: Electrical and Electronic Engineering will be conferred on students who have completed the research seminar and thesis successfully.

EB13.1.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
PFS1009	Thesis	PFS1209	Thesis

EB13.2 DPhil: MECHANICAL ENGINEERING (SAQA 73911) DPH600

EB13.2.1 Purpose of the qualification

The purpose of the qualification is to develop an intellectual with advanced abilities in applying fundamental engineering sciences or related inter-disciplinary principles independently to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental inter-disciplinary engineering research of an original nature. It also promotes a lifelong learning approach and an aptitude for training other students in similar fields.

EB13.2.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering research/development problems of an original nature creatively and innovatively by applying relevant advanced inter-disciplinary fundamental knowledge in the chosen field of research.
2. Plan and manage research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering research/development in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively and ethically, accept responsibility within his/her limits of competence, and exercise original judgment based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct advanced inter-disciplinary investigations, research and/or experiments of an original nature by applying or developing appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate advanced inter-disciplinary research methods, skills, tools and information technology effectively and critically in research/development practice, and show an understanding and a willingness to accept responsibility for the impact of research/development activities on society and the environment.

8. Perform synthesis of systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of interdisciplinary research.
9. Employ various learning and research strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning and research, to keep abreast of knowledge and skills required in the inter-disciplinary research/development field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering research/development activities.
12. Explore, where applicable, education and career opportunities in advanced research/development.
13. Organise and develop, where applicable, entrepreneurial opportunities through technical research, development and/or managerial skills.

EB13.2.3 Admission requirements and selection criteria

An approved Master's degree in Engineering or a similar approved degree at Master's level.
Final admission to the programme will only be granted after successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty and finally by the Senate or Executive Committee of the Senate of the University.

EB13.2.4 Conferment of the degree

The DPhil: Mechanical Engineering will be conferred on students who have completed the research project and thesis successfully.

EB13.2.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
PFS2009	Thesis	PFS2209	Thesis

EB13.3 DPhil: CIVIL ENGINEERING (SAQA 73896) DPH602

EB13.3.1 Purpose of the qualification

The purpose of the qualification is to develop an intellectual with advanced abilities in applying fundamental engineering sciences or related inter-disciplinary principles independently to specific problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental inter-disciplinary engineering research of an original nature. It also promotes a lifelong learning approach and an aptitude for training other students in similar fields.

EB13.3.2 Qualification outcomes

Exit level outcomes:
The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve research/development problems of an original nature creatively and innovatively by applying relevant advanced inter-disciplinary fundamental knowledge and/or Computer Engineering Sciences in the chosen field of research.
2. Plan and manage advanced inter-disciplinary research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) advanced inter-disciplinary practice.

3. Work effectively, individually or with others, as a member of a team, group, organization and the community or in multi-disciplinary environments in the chosen field of inter-disciplinary research.
4. Organise and manage him/herself and his/her activities responsibly, effectively and ethically, accept responsibility within his/her limits of competence, and exercise original judgment based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct advanced inter-disciplinary investigations, research and/or experiments of an original nature by applying or developing appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate advanced inter-disciplinary research methods, skills, tools and information technology effectively and critically in research/development practice and show an understanding and a willingness to accept responsibility for the impact of research/development activities on society and the environment.
8. Perform a synthesis of systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of research.
9. Employ various learning and research strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning and research, to keep abreast of knowledge and skills required in the engineering research/development field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of research/development activities.
12. Explore, where applicable, education and career opportunities in advanced research/development.
13. Organise and develop, where applicable, entrepreneurial opportunities through technical research, development and/or managerial skills.

EB13.3.3 Admission requirements and selection criteria

An approved Master's degree in Engineering or a similar approved degree at Master's level.
Final admission to the programme will only be granted after successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty and finally by the Senate or Executive Committee of the Senate of the University.

EB13.3.4 Conferment of the degree

The DPhil: Civil Engineering will be conferred on students who have completed the research project and thesis successfully.

EB13.3.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
PFS3009	Thesis	PFS3209	Thesis

EB13.4 DPhil: ENGINEERING MANAGEMENT (SAQA 73901) DPH603

EB13.4.1 Purpose of the qualification

The purpose of the qualification is to develop an intellectual with advanced abilities in applying fundamental engineering management sciences and/design and synthesis, and related inter-disciplinary principles independently to specific management systems problems of society at large. One of the main objectives in this process is to develop an advanced capability to conduct fundamental inter-disciplinary engineering research of an original nature. It also promotes a lifelong learning approach as well as an aptitude for training other students in similar fields.

EB13.4.2 Qualification outcomes

Exit level outcomes:

The qualified student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering research/development problems of an original nature creatively and innovatively by applying relevant advanced fundamental knowledge of i.e. Engineering Management Sciences in the chosen field of research.
2. Plan and manage research projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering research/development/management in the chosen field of research practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation and the community or in multi-disciplinary environments in the chosen field of research.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise original judgment based on knowledge and expertise, pertaining to the field of research.
5. Plan and conduct advanced inter-disciplinary investigations, research and/or experiments of an original nature by applying or developing appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with specifically research audiences and the community at large, in so far as they are affected by the research, using appropriate structure, style and graphical support.
7. Use and assess appropriate advanced inter-disciplinary research methods, skills, tools and information technology effectively and critically in engineering research/development practice, and show an understanding and a willingness to accept responsibility for the impact of research/development activities on society and the environment.
8. Perform synthesis of components, systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits, where applicable, in the chosen field of inter-disciplinary research.
9. Employ various learning and research strategies and skills to master outcomes required for preparing him/herself to engage in continuous learning and research, to keep abreast of knowledge and skills required in the engineering management research/development field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically in the chosen field of research.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering management research/development activities.
12. Explore, where applicable, education and career opportunities in advanced engineering management research/development.
13. Organise and develop, where applicable, entrepreneurial opportunities through technical research, development and/or managerial skills.

EB13.4.3 Admission requirements and selection criteria

An approved Master's degree in Engineering or a similar approved degree at Master's level.
Final admission to the programme will only be granted after successful presentation of a research seminar six months after enrolment. Research topics must also be accepted and approved by the supervisors in the Faculty and finally by the Senate or Executive Committee of the Senate of the University.

EB13.4.4 Conferment of the degree

The DPhil: Engineering Management will be conferred on students who have completed the research project and thesis successfully.

EB13.4.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
PFS2009	Thesis	PFS2209	Thesis

EB14 MODULE DESCRIPTIONS

The outcomes and assessment criteria of each module are stated in the relevant learning guides.

M6MAE19	ADVANCED ENGINEERING ECONOMICS
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To study specific technology management principles related to engineering economy in the engineering product development process.
Content	Engineering and engineering economy; physical and economic efficiency; engineering economy studies, economic and cost concepts, value, life cycle cost, time value of money; interest and equivalence; interest relationships, cash flows; economic equivalence calculations; bonds, loans, working capital, inflation; economic analysis and alternatives, decision making, comparison, replacement evaluation, break-even and optimization; accounting, depreciation and taxes, estimates of economic elements, risk, probability, economic analysis of operations.

M6MEM19	ENGINEERING MANAGEMENT
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To study this specialized form of management concerned with the application of engineering principles to the planning and operational management of industrial and manufacturing operations.
Content	Consideration is given to Engineers as Managers, Organizational Structure, Financial Management, Product Development, Operations Management, Quality Management, Strategic Management, Personnel Management, Team Working & Creativity, Personal Management, Ethical Management, Communication, Project Management and Change Management.

M6MES19	Engineering Systems Management
Purpose	To study the application of systems engineering principles in the development of engineering systems.
Calculation Criteria	Final mark weighting = Semester mark (100%)
Content	Systems engineering principles, requirements engineering, scenario analysis, functional analysis, the role of SE in other discipline or functional groups, decision making, system analysis, system dynamics, system modelling, work breakdown structure, statistical engineering, graphical representation (FFBD, IDEF, DFD), risk management (FMEA, RCA).

M6MPD29	PRODUCT DEVELOPMENT AND MARKETING
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To study specific technology management principles related to the engineering product development process.
Content	Aspects of structured product design, systems and competitive product design. Functions of marketing against the backdrop of engineering design and development. Introduction to production, manufacturing, objective in relation to marketing management and engineering design. Introduction to technical project evaluation.

M6MPM29	PROJECT MANAGEMENT
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To study specific technology management principles related to project management in the engineering product development process.
Content	This course provides the student with a wide range of theoretical knowledge in the field of Project Management. This includes both the proven and traditional approaches to Project Management as well as the more innovative and novel practices that are becoming available. The content is designed to allow the student to understand and to utilize project management concepts when managing any project with regards to time, cost and quality according to accepted standards. The course content includes the following: • the components of modern project management with reference and consideration to the uniqueness and characteristics of the project life cycle; • the principles for excellence in modern project management and the appropriate organisational structures for project management; • all components of the project initiation phase • all components of the project implementation phase • all aspects related to project termination

M6MRM29	RELIABILITY MANAGEMENT
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To study specific technology management principles related to the reliability management in the engineering product life-cycle from development through operation to phase-out and disposal.
Content	Reliability, definitions, evaluation, statistical methods, catastrophical failure models, reliability functions, distribution functions and applications, reliability and maintenance, preventative maintenance, reliability and systems (serie, parallel, standby), introduction to Markov models, economics and reliability, economics of maintenance, availability and cost, reliability and management.

M6CCT19	ADVANCED IN CONCRETE TECHNOLOGY
Purpose	To study and relate the advanced understanding of the chemistry and structure of cementitious systems to engineering performance and applications.
Content	Cement hydration, its role in concrete performance. Microstructural development, pore structure. Chemical admixtures and extenders. Cracking in concrete. Concrete deterioration processes covering basics, diagnosis and rehabilitation strategies. Special concretes.

M6ARC19	ADVANCED REINFORCED CONCRETE ANALYSIS AND DESIGN
Purpose	To study and apply the theory of design to the analysis of reinforced and pre-stressed concrete
Content	Introduction to yield analysis of slabs, the yield line, collapse mechanisms, orthotropic slabs, lower bound theorem and other phenomena. Truss and strut-tie models for torsion and shear analyses. Biaxial bending of short columns, slender columns. Analysis of RC frames subject to lateral loading. Deep beams and structural walls. Flat slab design. Pre-tensioned and post-tensioned slabs.

M6SOS_9	STABILITY OF STEEL STRUCTURES
Purpose	To study stability theory and non-linear structural behaviour
Content	Stability theory. Column strength and stability. Buckling of plates. Elastic lateral–torsional buckling of beams. Composite beams and columns. Plate and box girders. Uniaxial and biaxial bending of beam-columns. Frame stability and National design methods. Thin-walled design.

M6FEA29	FINITE ELEMENT ANALYSIS
Purpose	To develop a theoretical basis of finite element methods and apply non-linear FEA to engineering problems
Content	This course provides the fundamentals of the finite element method, including elasticity, matrix algebra, calculus of vibrations, and energy principles. The formulation for axial, beam, isoparametric, membrane, plate, axisymmetric, three-dimensional, torsion, and fluid finite elements is presented. Solution methodologies and computer programming are discussed including the Ritz method, Galerkin's method and finite elements for stability and dynamics. Specific applications to field problems will be demonstrated such as 3D structural elements, heat transfer and flow in porous media. Practical exercises will be conducted using commercial packages such as ABAQUS or PROKON.

M6PAD19	PLASTIC ANALYSIS AND DESIGN OF STRUCTURES
Purpose	To conduct 3D fundamental elastic and plastic analysis of material behaviour, collapse analysis, design of elements and frames
Content	Introduction to material behaviour and theories of plastic analysis. Kinetic and statical methods. Plastic collapse of continuous beams. Analysis of single, multi-bay and multi-storey portal frames. Plastic design of portal framed industrial buildings.

M6DYS_9	DYNAMIC ANALYSIS OF STRUCTURES
Purpose	To develop understanding of the problems of forced vibrations and compute the dynamic response of a structure
Content	Definitions and fundamental aspects of a periodic motion. Free vibration and harmonically excited vibration. Impulse excitation and Duhamel integral. Application of mathematical formulations to dynamics including Fourier analysis and Laplace transform, Eigen values and vectors. Flexibility and stiffness matrix approaches. Coordinate coupling and vibration of continuous systems.

M6DCS29	DESIGN OF COLD FORMED STEEL STRUCTURES
Purpose	To study the nature of local buckling in cold formed structures, the strength design approach and numerical analysis techniques
Content	Introduction to cold formed steel structures. Local buckling. Effective width and properties. Effective width equations. Stiffened and unstiffened sections. Effective width and direct strength design approaches. Application of the design methods to members in tension, bending, compression, combined axial load and bending, wall studs, connections and bracing. Numerical analysis for thin walled structures.

M6DAR29	DURABILITY ASSESSMENT AND REPAIR OF CONCRETE STRUCTURES
Purpose	To study durability and its relation to design principles, conduct assessment of degradation, service life and repair strategies
Content	Design for durability. Concrete degradation processes. Condition assessment. Structural assessment. Repair options and techniques. Repair materials. Structural repairs including strengthening and upgrade. Life cycle costing for reinforced concrete.

M6SPE_9	**SPECIAL TOPIC IN CIVIL ENGINEERING MATERIALS AND STRUCTURES**
Purpose	To conduct a focused in-depth study on a topic of specific research interest
Content	The topic of study should fall within the fields of civil engineering materials and/or structural engineering, while the nature of study may be determined by the supervisor. Registration for this module may only be allowed upon consultation for availability of an academic supervisor for the student's work. An announcement for availability of the module for the academic year will be made as and when appropriate.