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Department of Civil Engineering

Departmental Guidelines for Postgraduate Studies

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Document owner: Postgraduate Coordinator (Prof R Combrinck)

Note:
Students should also consult the following documents for information relating to the University and the Faculty of Engineering:

- *University Yearbook Part 1 (General Information and Rules)*
- *University Yearbook Part 11 (Engineering: Academic programmes and faculty information)*

In addition, staff are referred to the following documents for Department- and Faculty-specific processes

- *Processes for Postgraduate Programme: Faculty of Engineering*
- *Processes for Postgraduate Programmes: Department of Civil Engineering*

Contents

1. Preface

The main aim of the document is to serve as a source of information for students who wish to apply and register for postgraduate studies for the coming academic year, which commence at the start of each new year. It should be read together with the *University Yearbook Part 1 (General Information and Rules) and Part 11 (Engineering: Academic programmes and faculty information),* in which the definitive requirements are stated. Links to all parts of the University Yearbook can be found on the University web site at: https://www.sun.ac.za. Information regarding the Department of Civil Engineering can also be found on our web site at https://civeng.sun.ac.za/.

The Department of Civil Engineering presents several postgraduate qualifications which include both research-based and module-based qualifications. The research-based qualifications include Master of Engineering (Research) (Civil Engineering) (MEng[R]), Doctor of Philosophy in Engineering (PhD) and Doctor of Engineering (DEng). The module-based qualifications include Master of Engineering (Structured) (Civil Engineering) (MEng[S]) and Postgraduate Diploma in Engineering (PGDip[Eng]). There are several broad fields of specialisation within the Department. In general, research-based qualifications can be obtained in any of these fields of specialisation, whereas the module-based qualifications are only available in a subset of fields of specialisation. Research-based qualifications should preferably be pursued on a full-time basis, whereas module-based qualifications are suitable for both full- and part-time students.

This document provides all the details related to the different qualifications presented within the Department and includes:

- The fields of specialisation available
- Details on the research- and module-based qualifications
- The modules available
- The research facilities available to students during their studies
- The enrolment process and requirements
- Aspects related to or of interest during the study period
- Requirements for completion of qualification
- Relevant contact information

2. Definitions

Academic coordinator – The academic staff member responsible for all the structured or module-based postgraduate matters in the Department of Civil Engineering. See Section 15 for contact information.

Academic year – The academic year for Stellenbosch University is linked to a normal calendar year starting in January and ending in December.

Central Application Office (CAO) – The institutional team or office that handles all applications of students whom which to study at Stellenbosch University.

Civil course administration – The administrative team responsible for all postgraduate civil engineering modules and short courses presented within the Department of Civil Engineering. See Section 15 for contact information.

Departmental Management Committee (DMC) – A committee of senior academic members that oversees and manages all matters in the Department of Civil Engineering.

Dissertation – The research document written by Doctoral (PhD & DEng) candidates.

Head of Department of Civil Engineering (HOD) – The academic staff member who coordinates and has overall responsibility for all matters in the Department of Civil Engineering. See Section 15 for contact information.

International Office – The office or department of Stellenbosch University in charge of all study related matters of all foreign students. See Section 15 for contact information.

Module coordinator – The academic staff member responsible for administration of a given postgraduate module. This staff member must be a member of the Faculty Board of the Faculty of Engineering.

Package – A specific discipline or field of specialisation within the Department of Civil Engineering is referred to as a package.

Package coordinator – The academic staff member responsible for all the postgraduate matters for a specific Civil Engineering-related package or discipline.

Postgraduate administration – The administrative staff member(s) responsible for administration of postgraduate applications, registrations and thesis / dissertation examinations within the Department of Civil Engineering. See Section 15 for contact information.

Postgraduate coordinator – The academic staff member responsible for all postgraduate matters in the Department of Civil Engineering. See Section 15 for contact information.

Postgraduate departmental module – Any module presented and administrated within the Department of Civil Engineering.

Postgraduate faculty module – One of a preselected set of modules offered on a Faculty-wide basis within the Faculty of Engineering. Most of these modules are presented and administrated by other departments in the Faculty (including Applied Mathematics).

Postgraduate qualification – Any postgraduate degree or diploma offered within the Faculty of Engineering.

Postgraduate Office (PGO) – The PGO is a central support and liaison office for SU postgraduate students and staff.

Registrar's division – The registrar's division assigned to the Faculty of Engineering. This division has the function and responsibility of registering all postgraduate students for all postgraduate programmes given in the Faculty of Engineering. See Section 15 for contact information for masters and diploma related matters as well as doctoral related matters.

Research assignment – The research document written by structured master's (MEng[S]) candidates.

Research student – A student pursuing a qualification where the research is the dominant component of the degree. This includes research Master's degrees (MEng[R]) and doctoral (PhD) degrees.

South African Qualification Authority (SAQA) – SAQA is the oversight body of the National Qualification Framework (NQF) which is the system that records the credits assigned to each level of learning. 1 SAQA credit implies 10 hours of intensive focus required.

Structured student – A student pursuing a qualification where the course-work component dominates the degree. This includes module-based or structured Master's degrees (MEng[S]) and postgraduate diplomas (PGDip[Eng]).

Study leader / Supervisor – The academic staff member responsible for guiding and advising an individual student in the research component of their postgraduate studies. This includes the selection of the appropriate modules and the formal request for module registration to the postgraduate coordinator (research students) or academic coordinator (structured students). This staff member must be a member of the Faculty Board of the Faculty of Engineering.

SUNLearn – The online learning platform where all registered academic modules and short courses are hosted for all registered Stellenbosch University students.

SUNScholar – The online digital archive where all final, approved theses and dissertations are published and preserved

SUNStudent – The online portal for Stellenbosch University student administration, including applications for admission of prospective students

Thesis – The research document written by Master Research (MEng[R]) candidates.

3. Introduction (Why do a Postgraduate Degree?)

Research-based postgraduate qualifications are aimed at the exploration of advanced material into a specific theme and developing the capacity for independent problem identification and solving. The **MEng (Research)** and **PhD** qualifications offered in the Department of Civil Engineering involve guided research studies into a spectrum of possible disciplines, referred to as packages in this document, as given in Section 4.

Module-based qualifications are aimed at the study of advanced curriculum material related to a specific engineering-related discipline. The **MEng (Structured)** and **Postgraduate Diploma in Engineering (PGDip[Eng])** qualifications offered in the Department of Civil Engineering involve guided and examined coursework, with the MEng[S] also involving a research assignment as discussed in Section 6.

The professional and personal benefits of obtaining a postgraduate qualification are diverse and unique to each individual. Postgraduate study provides an opportunity to develop and refine one's depth of technical knowledge and maturity as an engineering professional. The qualification is intended to enable the study of specialised and advanced concepts, methods and materials that are not covered in the broadly-based BEng degree. In this process, students are also exposed to interesting and enriching experiences, including connection with fellow students, student life in Stellenbosch, and conference attendance in other interesting places.

While it is not always the case, research staff in the Department of Civil Engineering often have funding available to contribute to the support of full-time research students.

4. Packages/Fields of specialisation

There are several disciplines or fields of specialisation within the Department of Civil Engineering. Each of these disciplines are referred to as a package within this guideline document. Each qualification and research topic is associated with one of these packages and the Department will ensure that the necessary modules and study leadership are available to support the qualifications provided for within each package. The details of the qualifications provided for in each package for research-based qualifications are given in Section 5 and for module-based qualifications in Section 6. Each package has a package coordinator responsible for academic and logistical matters related to that package. The packages within the Department of Civil Engineering are discussed next.

4.1 Construction Engineering and Management

Construction Engineering and Management addresses aspects in all areas of construction and/or infrastructure development. Construction is a truly multi-disciplinary field. This focus area investigates the inter-relationships and challenges faced by engineers working with government, private clients, contractors, architects and end users as they need to collaborate towards delivering projects on time, within cost, and to quality. Students from diverse engineering backgrounds are welcome to get in touch with the package coordinator, and are encouraged to develop their own research topic in collaboration with their study leader. After all, construction engineering and management is a very broad (and interesting!) field. That said, the following research/focus areas are given preference:

- Procurement / Constructability.
- Sustainability / Environmental engineering.
- Technology in construction.
- The diffusion of innovations in construction.

4.2 Engineering Informatics

The focus area of Civil Engineering Informatics considers applications of information technology, and data analysis, and computational methods in the various specialist fields of Civil Engineering. The scope of problems of interest is aimed at expanding and improving the computational techniques that underlie applications in computer simulations of materials, traffic simulation, water flow simulation, structural analysis, and information management. This provides the basis for the systematic mapping of problems to the computer in such a way that the potential of information technology can be fully exploited. All research work includes a notable component of computer programming. Current research interests for this package are:

- Uncertainty quantification in numerical simulations used in engineering.
- Forward and inverse numerical modelling of mechanical systems.
- Risk and reliability in engineering design.
- Simulation of engineering systems in water reticulation, transportation.
- Health monitoring and digital twinning in digital and conventional construction.

4.3 Fire Engineering

Fire Engineering is the application of scientific and engineering principles, rules, codes, and expert judgement, based on an understanding of the phenomena and effects of fire and the reaction and behaviour of people to fire – to protect people, property, production and the environment from the destructive effects of fire. Fire engineering is inherently multi-disciplinary with engineers from civil, mechanical, chemical, mechatronic and electrical engineering being active in the field.

A broad range of topics are investigated within the team at Stellenbosch University, often with a combination of experimental testing and numerical modelling. Students are encouraged to get in touch with the fire engineering

team for more information (fire@sun.ac.za). This exciting field is growing fast and we welcome students from many engineering backgrounds. Typical research themes for this package are:

- Structural fire engineering (steel, timber, biomass, recycled materials).
- Fire modelling and fire dynamics.
- Fire safety for green energy systems (solar, green hydrogen).
- Wildland fire safety.
- Informal settlement and refugee camp fire safety.

4.4 Geotechnical Engineering

Geotechnical Engineering research considers the design and behaviour of structures built on, in and with geomaterials such as soil and rock. Research work extends from understanding the societal context of geotechnical engineering, through the cognitive process behind design decisions, to evaluating and developing the complex tools required to inform engineering decisions. Primary application of this research is found in global stability and seepage assessment of mining and industrial structures such as tailings dams and pit slopes. Methodologies used extend from laboratory work and numerical simulation, through to natural language processing and participant observation. Most research work includes a component of multidisciplinary work. Typical research themes for this package are:

- Back analysis of tailings dam incidents and failures.
- Cataloguing different human errors and examples from geotechnical engineering practice.
- Reliability analysis of geotechnical designs.
- Improving methods of site characterisation used in geotechnical engineering.
- Preparation of high-fidelity case studies of various geotechnical engineering structures (e.g., pit slopes, sea walls, waste rock facilities, natural slopes, transport cuttings, and foundations).

4.5 Pavement Engineering

Pavement Engineering considers the design of surfaced roads from the perspective of materials, traffic loading, and environmental factors. Pavement material types of interest include granular and cemented materials, bituminous materials (bitumen, asphalt and seals), emulsion and foamed bitumen stabilised materials and concrete. Research is conducted into material characteristics and behaviour, development of material models, mix design of materials, structural design of material layers and implementation i.e. construction of materials. Durability of materials in the context of environmental factors such as rainfall, temperatures, climate, and loading due to traffic and heavy vehicles, is a primary consideration. Typical research themes for this package are:

- Alternative materials to bitumen (lignin, rubber, plant-based and bio oils).
- Performance evaluation through APT (accelerated pavement testing),
- Performance testing of granular, cemented and bituminous stabilised materials (mostly triaxial testing).
- Economic evaluation of road construction costs.

4.6 Port and Coastal Engineering

In Port and Coastal Engineering, the emphasis is on coastal processes, considered by numerical and physical modelling, and on the implications of these processes for the design of coastal and port structures. Environmental aspects of coasts and ports, planning and design of port infrastructure are also considered. Typical research themes for this package are:

- Coastal processes, waves, seawater-levels, sediment transport.
- Marine and coastal climate change effects, impacts and adaptation.
- Estuaries (abiotic aspects).
- Marine structures, ports and harbours, shipping, ship motions.
- Marine hydrodynamics.
- Marine water quality, dilution and outfalls.

4.7 Structural Engineering

Structural engineering is the branch of Civil Engineering that deals with large, modern buildings, bridges and other similar structures and infrastructure. All aspects of structural engineering are provided for within this package, including structural analysis and computational mechanics, concrete and steel structures, building materials with special reference to concrete technology and masonry. Facilities are available for the experimental and numerical examination of materials and structures. The typical research themes for this package are:

- Digital construction and 3D printing of concrete structures.
- Life cycle optimisation and risk informed decision making.
- Health monitoring of existing structures.
- Reliability modelling and calibration of structural design codes of practice.
- Development of advanced cement-based materials and new products.
- Structural dynamics and seismic behaviour of structures.
- Advanced construction materials technology, including fibre and textile reinforced concrete and nanotechnology.
- Alternative and more sustainable building materials.
- Early age properties of concrete.
- Durability of cement based materials.

4.8 Transportation Engineering

Transportation Engineering is the application of science and technology to the safe, efficient and sustainable movement of people and goods. Within the Department of Civil Engineering the main focus is on ground-based transportation, including road and rail-based transport. The Transportation programme is designed to immerse students in a wide range of transportation related subjects, including policy development, transportation planning, geometric design, traffic monitoring and management, and transportation safety. Specialist areas of note are Traffic and Transportation Engineering – including Intelligent Transport Systems (ITS) – Public Transport, and Traffic Safety Engineering. Research projects in Transportation Engineering are fairly wide-ranging, given the scope of the field. Research topics are typically developed by the individual students, though occasionally topics may be developed by staff members as part of externally funded research projects. The typical research themes for this package are:

- Road safety, notably to understand or mitigate road safety challenges within South Africa.
- Intelligent Transport Systems, including the development of technologies to manage traffic behaviour.
- Traffic Engineering, including issues related to traffic flow, travel demand, urban growth and geometric design.
- Transportation planning and public transport, considering the sustainable movement of people by various transport modes, including informal public transport.
- Non-motorised transport (NMT), especially the challenges faced by NMT users in SA and to develop responses to promote safe NMT travel.

4.9 Water and Environmental Engineering

Water and environmental engineering considers the development and management of water resources in the context of sustainable use of a limited resource. Researchers cover the fields of river and storm water hydraulics, design of hydraulic structures such as dams, tunnels and pump stations, water reticulation systems, low and flood flow hydrology, and the impact of climate change on water resources. Both physical as well as numerical modelling is carried out as part of research using state-of-the-art methods and laboratory infrastructure. Typical research themes for this package are:

- Hydraulic structures.
- Storm water and river hydraulics.
- Sediment transport and reservoir sedimentation.
- Water quality management and modelling.
- Eco-hydraulics.
- Surface hydrology.
- Flood hydrology.
- Water services.
- Water treatment.
- Sewer systems analysis.

5. Research-based qualifications

Research-based qualifications refer to all degrees where the research component dominates the degree. Practical relevance of the research is often guided and frequently also funded by the needs of industry and technology development. Research degrees are therefore often linked to student bursaries and other research funds, and candidates are encouraged to contact preferably the study leader, or alternatively the package coordinator for more information on funding. The distinctive characteristics of the research-based qualification are as follows:

- An analytical, modelling and knowledge basis is obtained by guided studies under the supervision of specialists.
- Independent investigative capability is developed through the execution of research of a suitable topic and the writing of a thesis (MEng[R]) or dissertation (PhD).
- The ability to perform an in-depth investigation in respect of an identified problem, together with the additional expertise gained in the specialised field of study.
- The benefit to the profession is in the problem identification and solving capability that is developed.

Admission to all research-based qualifications is considered based on the academic history and experience of the applicant as discussed in Section 8. All research-based qualifications, especially MEng[R], usually require full-time study on the campus of Stellenbosch University. However, part-time study options will be considered under special conditions as discussed in Section 8 and with prior arrangement with the intended study leader. More information on the modules, facilities, admission requirements, study logistics as well as the requirements for completing degrees are given in Sections 8 to 14.

5.1 Doctoral – PhD & DEng

The research-based doctoral degree qualification normally extends over a period of 30-36 months of full-time studies. Part-time study is also possible if supported by the study leader. A research dissertation is the end product, but guided study is required to achieve the necessary background for the research process and the assimilation of fundamental knowledge and insight. The outcome of this qualification is a national and

international technical specialist who has contributed original and fundamental knowledge into a field of specialisation. This qualification will confirm the candidate as a specialist in a research field and can also prepare candidates for a potential research or academic career.

Two qualifications are available: the Doctor of Philosophy (PhD) and the Doctor of Engineering (DEng) degrees. The PhD degree involves a specific research project of suitable scope, and is awarded on the basis of the examination of a dissertation on that project. On the other hand the DEng degree is not related to a specific project but is rather awarded to candidates whose research has, over a large number of years, made a substantial contribution towards the field of engineering. As such, admission to pursue a DEng degree is typically only granted to individuals with suitable, demonstrated experience and leadership in engineering. The PhD qualification can be pursued in all the packages or specialisation fields mentioned in Section 4.

The aim of the PhD qualification is to develop the candidate's ability to perform original and independent scientific and technological research into open-ended, complex and even poorly defined research questions. The extent and nature of the PhD qualification consists of the following:

- Research work resulting in a 360 credit dissertation, calculated according to SAQA standards.
- The final dissertation must be uploaded to SUNScholar, and will be publicly available.
- At least one journal article submitted for publication to a suitable peer-reviewed journal.
- An oral defence of the work with satisfactory responses to questions from three examiners.
- At least one public presentation of the research work documented in the dissertation.

5.2 Masters Research – MEng[R]

The research-based master's degree MEng[R] normally extends over a period of 18 to 24 months of full-time, focussed study. While the qualification is awarded on the basis of examination of the resulting research thesis, guided study is required to achieve the necessary background for the research process and the assimilation of fundamental knowledge and insight. This qualification positions the student as a technical specialist with fundamental in-depth training based on advanced problem solving within a sub-direction of Civil Engineering. This qualification will also prepare the candidate for PhD research, and should therefore be followed by candidates who consider an advanced level of postgraduate qualification. The MEng[R] qualification can be pursued in all the packages or specialisation fields mentioned in Section 4.

The aim of the MEng[R] qualification is to develop the candidate's ability to handle independent scientific and technological investigations and to interpret and present the results at the Master's Degree level. The extent and nature of the MEng[R] qualification consists of the following:

- Research work resulting in a 180 credit thesis, calculated according to SAQA standards.
- The final thesis must be uploaded to SUNScholar and will be publicly available.
- Three fundamental modules as relevant preparation and support of the research.
- Delivery of one journal article published or deemed suitable for publication by the study leader.
- At least one public presentation of the research work.

6. Module-based qualifications

Module-based qualifications encompass the qualifications consisting primarily or entirely of course work, completed in the form of subject-specific modules. This includes the Postgraduate Diploma in Engineering (PGDip[Eng]) and structured master's (MEng[S]) qualifications. The distinctive characteristics of the module-based qualification are as follows:

- A coherent curriculum of modules of advanced studies mainly based on modules in a specific field of specialisation, but also some general engineering modules, to make up a total number of required credit hours dictated by the SAQA requirements for the qualification.
- The modules provide advanced knowledge and techniques/methods as well as the implementation thereof.
- The MEng[S] qualification requires a research assignment to develop the ability of using advance knowledge to solve problems in the chosen field of specialization. Note that the final thesis is not uploaded to SUNScholar.

Admission to all module-based qualifications is considered based on the academic history and experience of the applicant as discussed in Section 8. Module-based qualifications are presented in such a way to allow practicing civil engineers the opportunity for advanced study without having to take prolonged study leave. Therefor module-based qualifications can be taken full-time or part-time. More information on the modules, facilities, admission requirements, study logistics as well as the requirements for completing degrees are given in Sections 8 to 14.

6.1 Masters Structured – MEng[S]

A module-based or structured master's qualification, MEng[S], requires a combination of modules and a research assignment and provides for both full-time and part-time studies with 120 credits earned by completing suitable modules at SAQA level 9 or above, 60 credits earned based on the completion of a research assignment. Modules are usually presented in block format to facilitate completion on a part-time basis. The MEng[S] qualification is only supported in some of the packages or specialisation fields mentioned in Section 4, notably:

- Fire Engineering
- Geotechnical Engineering
- Pavement Engineering
- Structural Engineering
- Transport Engineering

This structured presentation nature allows the MEng[S] degree to be obtained through the gaining of integrated knowledge and the development of an advanced ability in application. The extent and nature of the MEng[S] qualification comprise of the following:

- Combined research and course work, resulting in the successful accumulation of 180 credit hours, calculated according to SAQA standards.
- Of the 180 credit hours needed, 120 credits are obtained through course work. This is done by passing eight modules, each with a 15 credit load at NQF level 9. At least three of these modules must be faculty modules (see Section 9).
- The remaining 60 credits are obtained by completion of a field-specific research assignment.

6.2 Postgraduate Diploma in Engineering – PGDip[Eng]

The Postgraduate Diploma in Engineering (PGDip[Eng]) qualification consists of 120 credit hours that are accumulated by completion of suitable modules at NQF level 8. The PGDip[Eng] qualification offers the opportunity for candidates from pure, basic science study backgrounds to bridge the gap to engineering science, in preparation for more advanced postgraduate studies. It also presents candidates, who have completed Bachelor's degrees in Engineering Technology with an avenue for admission into the research-based postgraduate qualifications offered in the Department of Civil Engineering at Stellenbosch University. The PGDip[Eng] is only supported in some of the packages or specialisation fields mentioned in Section 4:

- Geotechnical Engineering
- Pavement Engineering
- Transport Engineering

However, in exceptional and well-motivated instances candidates may be allowed to pursue the qualification in other fields of Civil Engineering.

The extent and nature of the PGDip[Eng] qualification comprise of the following:

- Course work resulting in the successful accumulation of 120 credit hours, calculated according to SAQA standards.
- Passing eight 15 credit modules at NQF level 8 or higher.

7. Special students

Postgraduate students can only register for a full calendar year, and typically do so in the first semester. In exceptional cases, a student may register as a special student later in the year. This can be necessary for example for students registered at another university wishing to attend a postgraduate module at Stellenbosch University, or research students accepted for the following year who need to start research work early.

8. Admission requirements

The Departmental Management Committee (DMC) considers applications for all postgraduate programmes/qualifications. For acceptance to any of the programmes, certain minimum admission requirements must be met. Additional requirements could also be set at the discretion of the DMC. If an applicant does not fully qualify for admission, conditional admittance can be considered. The DMC considers all aspects of the application including:

- Overall academic record.
- Performance in most recent years of study.
- Performance in research aspects.
- Years of relevant industry experience.
- Proficiency in verbal and written English.
- Support of employers in the case of part-time studies.
- Support/motivation from study leader.
- Departmental and study leader capacity and availability in the applied for package .

The flow diagram in Figure 1 summaries the qualification requirements for admission to the respective postgraduate programmes. The following sections give more detail on the qualification and minimum admission requirements for all the postgraduate programmes.

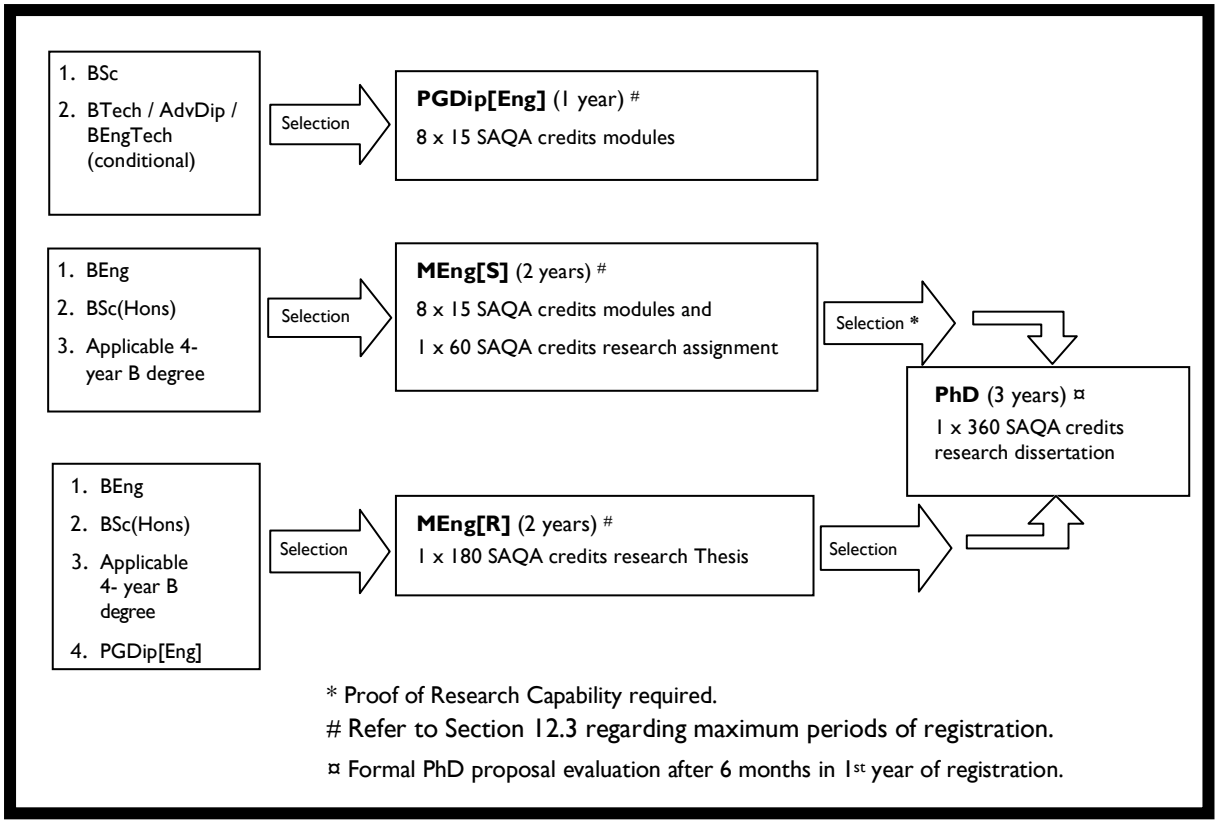

Figure 1. Qualification and admission model for postgraduate programmes

8.1 Postgraduate Diploma in Engineering – PGDip[Eng]

A Postgraduate Diploma in Engineering applicant with the following qualifications (at NQF level 7) will be considered for admission to the PGDip[Eng] programme:

- A three year Advanced Diploma, AdvDip, in Civil Engineering.
- A Bachelors of Technology, BTech, in Civil Engineering.
- A Bachelors of Engineering Technology, BEngTech, in Civil Engineering.
- Bachelor's degree in Natural Science (BSc) degree.

The minimum requirements for admission for applicants with the above-mentioned qualifications are:

- An average of at least 70% for the NQF level 7 qualification, OR
- A relevant degree, showing improved achievement in the latter years of the degree, and at least 5 years relevant experience in industry following completion of the relevant degree, AND
- Proof of preparatory studies in mathematics and statistics (details below).

The Postgraduate Diploma in Engineering, PGDip[Eng], is suited for full-time and part-time studies.

Preparatory studies for the PGDip[Eng] in Civil Engineering is required for students who did not complete a suitable BSc degree programme to ensure adequate mathematical and statistical knowledge to participate in postgraduate engineering modules. Students must demonstrate to the DMC that they have mastered certain the foundational mathematical concepts as listed below, prior to the first registration at SU for the PGDip[Eng] qualification. This would typically be done by completing a set of suitable undergraduate modules at SU or

elsewhere, and is demonstrated by means of a study record in combination with an official university document describing the contents of the relevant modules completed.

Foundational mathematical concepts for preparatory studies consist of the following three sets of mathematical and statistical components:

- Statistics (data analysis principles, probability distributions, regression, statistical testing).
- Calculus (differential, ordinary differential equations, and integration),
- Matrix and vector algebra (matrix inversion and manipulation, dot and cross product, eigenvalues).

8.2 Masters Structured – MEng[S]

A module-based Masters applicant with the following qualifications will be considered for admission to the MEng[S] programme:

- A four year Bachelor's degree (NQF level 8) in Engineering, BEng or a BSc(Eng), or an equivalent and applicable Bachelor's-degree, such as a BSc(Hons) or a BEngTech(Hons) degree.

The minimum requirements for admission for applicants with the above mentioned qualifications are:

- An average of at least 60% for the four year degree, OR
- A relevant degree, showing improved achievement in the latter years of the degree, and at least 5 years relevant experience in industry following completion of the relevant degree.

Module-based masters studies, MEng[S], are suited for full-time and part-time studies.

8.3 Masters Research – MEng[R]

A Masters research applicant with the following qualifications will be considered for admission to the MEng[R] programme:

- A four year Bachelor's degree (NQF level 8) in Engineering, BEng or a BSc(Eng), or an equivalent and applicable Bachelor's-degree, such as a BSc(Hons) or a BEngTech(Hons) degree.
- A Postgraduate Diploma in Engineering (PGDip[Eng]) from the Department of Civil Engineering at Stellenbosch University.

The minimum requirements for admission for applicants with the above mentioned qualifications are:

- An average of at least 60% for the four year degree, OR
- An average of at least 55% for the four year degree and a mark of at least 70% for the final year research project, OR
- A relevant degree, showing improved achievement in the latter years of the degree, at least 5 years relevant experience in industry following completion of the relevant degree and support from the intended study leader.

Masters research studies, MEng[R] are intended to be conducted on a full-time basis. If part-time study is the only option available to the applicant, then they must provide the following:

- Letter of motivation from applicant.
- Letter of support from the employer of the applicant.

- Letter of support from intended study leader.

8.4 Doctoral – PhD

The research-based doctoral degree applicant with the following qualifications will be considered for admission to the PhD programme:

- A research or module-based Masters, MEng[R] and MEng[S] degree in Engineering, MEng or a MSc(Eng), or an equivalent and applicable M-degree.
- Masters degree in Natural Science (MSc).

For admission to the PhD programme, the candidate's academic record and/or relevant experience should illustrate the necessary scope and depth of relevant specialist technical insight. In the case of a module-based master's degree, research aptitude must be demonstrated by the study record.

PhD research studies are intended to be conducted on a full-time basis although part-time is also an option if the applicant can provide the following:

- Letter of motivation from applicant.
- Letter of support from intended study leader.

8.5 DEng

The DEng degree is typically pursued by individuals with suitable, demonstrated experience and leadership in engineering, such as via a career that has made a significant contribution to the global body of knowledge in an engineering discipline.

Admission to the degree is considered by the Faculty Board, upon recommendation of the DMC. There are no specific forms for a DEng application and candidates with a suitable profile should contact the HOD of the Department of Civil Engineering for more information on application and registration.

9. Module requirements per qualification

All students should select modules in consultation with their study leader following the module registration process explained in Section 13. Students can adapt their module selection to their field of specialisation, albeit within the overall module selection constraints given in the following sections. Also note that not all the modules are available every year. The modules that are available for the current year can be found on the Civil Engineering Website at: https://civeng.sun.ac.za/current-postgraduates/.

9.1 Module-based qualifications

For MEng[s] students three of the eight 15 credit modules that comprise the MEng[S] qualification are required to be faculty modules, where the remaining credits would usually be accumulated by completing departmental modules. All these modules must be taken at an NQF level 9. The 60 credit research assignment is also a compulsory requirement for completing the MEng[S] degree.

PGDip[Eng] students must pass eight 15 credit modules (at NQF level 8), of which at least five must be departmental modules. Admission to the programme requires additional prior learning in mathematics, which is necessary for many of the postgraduate modules offered in the Department of Civil Engineering (see Section 8.5).

For full-time MEng[S] and PGDip[Eng] students at least five modules (preferably more) must be completed in the first year of study, with the remaining modules completed in the second year of study. For part-time MEng structured and PGDip[Eng] students at least three modules (preferably more) must be completed for each year of study. Cases where students fail more than half of their modules in a given year, are brought to the attention of the academic coordinator.

9.2 Research-based qualifications

MEng[R] students are required to complete/pass three departmental modules (at NQF level 9) as chosen in consultation with their study leader. These three modules form part of the preparatory studies for their research at no additional registration cost. Only these three modules will appear on the student's study record. In exceptional, motivated cases where a further module forms a crucial part of the preparation of the student for their research work, permission from the HOD can be requested to register for an additional module. Should an MEng[R] student wish to register for a module not hosted by Civil Engineering (for example faculty modules), they will have to pay for the module registration cost themselves. For full-time MEng[R] students it is recommended that at least two modules be completed in the first year of study. Part-time MEng[R] students are expected to complete at least one module in the first year of study. However, note that the Department of Civil Engineering only allows part-time enrolment for the MEng[R] degree in exceptional cases (See Section 8).

PhD (and DEng) students do not need to take any modules. However, doctoral students may request permission from the HOD to register for a departmental module. As with MEng[R] students, registration for modules external to the Department of Civil Engineering are not for the account of the student.

10. Research facilities

10.1 Laboratories and equipment

The department also has several state of the art laboratories which often form an essential part of the research conducted by postgraduate students. These laboratories include areas focussed on heavy structures, fire safety, construction materials, 3D concrete printing, geotechnique, pavement technology, transport safety, smart mobility, hydraulics, and water treatment. All these laboratories are well equipped for both research and specialist services to industry.

The large and well-equipped construction materials and heavy structures laboratories provide, amongst other items, the following components and equipment: concrete mixing and testing equipment, concrete durability testing equipment, rheometer and two 3D concrete printers, climate rooms, curing baths, compression and tensile creep frames, cutting rooms, drying ovens, three and two dimensional optical strain measurement systems, 2 MN compression testing machine, advanced universal testing machines (5 kN, 250 kN and 2 MN) and 2 x 50 kN and 2 x 500 kN servo controlled hydraulic actuators, full scale mechano-type test frames, various load cells and LVDTs and other advanced measurement systems.

Stellenbosch University is developing a new fire engineering laboratory with various equipment setups currently being installed. Facilities include large-scale smoke extraction for fire experiments, materials characterisation, structural testing systems, material flammability and specialised experimental setups via associated university labs. Students will have access to cone calorimetry, radiant panels for fire testing, ignition systems and free burning setups. The fire engineering team also works closely with Ignis Testing in Cape Town, which has allowed many students to undertake furnace tests, material tests and to develop specialised setups as part of their research theses.

The Geotechnical laboratory includes triaxial equipment (up to 300 mm diameter), direct shear box equipment, consolidation equipment, permeability equipment and index testing. Custom equipment is also manufactured in house for bespoke research tests. Field equipment includes plate load equipment and dynamic penetration hammer efficiency equipment. State-of-practice design software is available to all students along with necessary computing facilities.

The Pavement Engineering laboratory has a selection of the latest testing and analysis performance equipment. This includes bitumen stabilised materials' equipment such as a Rachig Emulsion Mill, WLB10S laboratory foam plant and twin-shaft Pugmill mixer. For bitumen and granular/cemented/asphalt material testing the equipment includes a shear-plate rheometer, dynamic shear rheometer, rotational viscometer, gyratory compactors, vibratory compactors, falling-weight compactors, high pressure permeameter, Marvil permeameter, MTS servo-hydraulic system 100 kN for ITS, SCB, UCS, ITT and triaxial testing UTM-25 pneumatic testing system for materials testing of specimens 150mm diameter, large triaxial servo-hydraulic 200 kN for 300mm diameter x 600mm high specimens, IPC four point beam fatigue and flexural modulus testing apparatus and monotonic beam tester. There is also accelerated pavement testing equipment that includes a model mobile load simulator (MMLS3), Three PGRL laboratory test beds (2 x temperature conditioning, 1 x water+temperature conditioning as well as a laser and texture depth measurement (MTD and MPD).

The Division of Water Engineering has an enclosed hydraulics laboratory facility which serves both the Water Engineering and Port and Coastal Engineering disciplines. These facilities include a large area of 3 000 m^2 which is used for hydraulic scale model experiments including three-dimensional model studies. The space is serviced by overhead moving measuring bridges and a gantrycrane. There are also four narrow glass wall flumes (two flumes of 1.5 m deep x 0.6 m wide x 22 m long and two flumes of 1.2 m deep x 1.0 m wide x 40 m long) in which flow experiments can be performed. One of the 1.0 m wide flumes is also equipped with a wave generator. There are six supply pumps (total capacity of approximately 700 litres/s) with pipe and channel reticulation system and three constant head tanks as well as the needed measurement instrumentation including flow and water level recorders.

Transportation research is supported by the Smart Mobility Laboratory of the Department of Civil Engineering which is a laboratory space with access to various real-time and historical traffic data sources measured on the road network in Stellenbosch, Cape Town, and certain roads in South Africa through various industry partnerships.

Computer modelling and programming also finds wide application in research and specialist consulting work. The department has extensive computer facilities to support analysis and information technology for civil engineers. This includes in-house dedicated computational servers as well as access to central high performance computational facilities where needed. Facilities are also available for numerical examination of structures, pavement and most other infrastructure. Software at our disposal includes Abaqus, Strand7, Diana, Prokon, Matlab, and Pyrosim. Water engineering-related mathematical modelling is carried out using software that include Mike 11, HECRAS 1D/2D, Mike 21C, ANSYS Fluent, Mike 3, Delft3D. Transportation modelling software, PTV VISSIM, VISUM and VISWALK, and a traffic control centre augment our transportation research. In addition research groups in the Department of Civil Engineering make use of several drones and modern surveying and imaging instruments.

10.2 Analytical facilities at SU

In addition to the laboratories and equipment mentioned in Section 10.1, the Department of Civil Engineering also has access to the services of the Central Analytical Facilities of Stellenbosch University (CAF). CAF offers scientific tests and analytical expertise to science and engineering students and researchers, as well as related businesses. CAF has several laboratories with state-of-the-art equipment which include amongst others a CT-

scanner, Spectrometry, Microcopy, XRF etc. More information can be found at: https://www.sun.ac.za/english/research-innovation/caf

11. Important dates

For postgraduate studies the most important dates to be adhered to during an academic year are those related to application, registration, examination and finally graduation. All the important deadlines and dates related to postgraduate studies and the schedule for postgraduate modules are kept up to date on the webpage for the Department of Civil Engineering, accessible via the following links.

- For important postgraduate dates visit: www.civeng.sun.ac.za/current-postgraduates/ under the Thesis Requirements tab.
- For Modules dates visit: www.civeng.sun.ac.za/current-postgraduates/ under the Schedule and Course Modules tab.

For the purpose of this guideline document the most important application, registration, examination and graduation deadlines and dates are broadly set out in the following sections (please consult the website links above for the precise dates applicable for a given academic year).

11.1 Application dates for new students

- End of January: Closing of applications for all new South African postgraduate students for starting studies in the current academic year.
- End of March: The opening of electronic applications (via SUNStudent) for all new postgraduate qualifications for starting studies in the following academic year.
- End of October: Closing of electronic applications for all new non-South African (foreign) postgraduate students for starting studies in the following academic year.

11.2 Application dates for current students

- Middle of January: Final date for application for extension of study period (re-admission) for students who have exceeded their allowable study periods.
- Beginning of April: Final date for application for interruption of studies for students who wish to motivate for a year of study leave.

11.3 Registration dates for new and current students

- End of March: Final date for postgraduate students to register for a postgraduate qualification for the current academic year. It is advised to register long before this deadline, starting as early as January/February.
- End of March: Final date for postgraduate students to register for postgraduate modules for the current academic year. Modules can only be registered for after completing registration for the qualification, and must be done in consultation with the study leader. It is also advised to register for modules long before this deadline, starting as early as January/February.
- Final date to de-register for a 1st semester module (Middle of February) and final date to de-register for a 2nd semester module (End of July).

11.4 Examination dates for current students

- Middle of September: Final version of PhD-proposal and executive summary to be submitted to reviewers for PhD students in their first year of studies.
- For graduation in December of the current year.

    - Beginning of August: Final version of PhD dissertation to be submitted to examiners.
    - Beginning of September: Final version of research based, MEng[R], thesis to be submitted to examiners.
    - Beginning of October: Final version of module-based, MEng[S], research assignment to be submitted to examiners.
- For graduation in April of the following year.
    - Middle October: Final version of PhD dissertation to be submitted to examiners for April graduation of the following year.
    - Beginning of November: Final version of research based, MEng[R], thesis to be submitted to examiners.
    - Beginning of December: Final version of module-based, MEng[S], research assignment to be submitted to examiners.

11.5 Graduation-related deadlines for current students

- Beginning of March: Final version of PhD dissertations and MEng[R] theses to be uploaded to SUNScholar for April graduation of the current year.
- Early April: Graduation ceremony.
- End of November: Final version of PhD dissertations and MEng[R] theses to be uploaded to SUNScholar for December graduation of the current year.
- Early December: Graduation ceremony.

12. Enrolling for the degree

12.1 Application and registration

All students who intend to study at Stellenbosch University must apply using SUNStudent, the online application portal. The application process for all postgraduate programmes (except DEng, see 8.5) are generally the same and can be summarised as follows:

- Students apply via the institutional online application portal (SUNStudent at www.sun.ac.za/pgstudies) before the closing date for applications (see Section 11.1).

- The Department of Civil Engineering application form (CIVPG01) together with a CV detailing post-degree work experience should be submitted will all applications. The form is available at https://civeng.sun.ac.za/prospective-postgraduates/.

- Applications are reviewed by the Central Application Office for completeness. In cases where a candidate holds qualifications awarded by a non-South African institution(s), a credential evaluation is processed by the International Office to assist environments in the comparability of the qualifications and confirmation of the candidate's eligibility to postgraduate studies at SU.

- Once applications are marked as reviewed by the Central Application Office, the application is evaluated by the DMC according to the requirements and procedures of the specific package (see Section 8).

- If the application does not include all the necessary information, the DMC may request more information from the applicant directly. This can be package-specific or additional academic documents, an interview with the candidate or a request that the applicant contact the prospective study leader for provisional acceptance by the study leader.

- The decision by DMC is communicated by the Department of Civil Engineering via email to the applicant. The names of accepted applicants are also sent to the Registrar's division, who issues the provisional offer to the applicant via SUNStudent, and thereafter the final offer following the applicant's acceptance of the provisional offer. Provisional offers are issued if the applicant has not yet completed the required minimum qualification (for example, final year BEng students applying for the MEng programme). Once proof of the qualification is uploaded, the Faculty Administrator changes the offer status from provisional to final.

- Only once the applicant has accepted both the provisional and final offers via the online SUNStudent portal can they register as a postgraduate student.

- The accepted applicant now registers for the programme and becomes a postgraduate student. The Departmental Postgraduate Administration will send out information to the student regarding registration of the programme. This includes information on the registration process, study fees and money payable with registration, registration dates and deadlines (see Section 11), contact details at the Faculty registrar's office who is responsible for registration of students.

- For foreign students pre-registration at International Office is compulsory before the student can register for the programme.

- New postgraduate students will be required to attend an information session on plagiarism within their first year of study. The plagiarism sessions are available online via SUNLearn. Students receiving financial support are required to sign a Memorandum of Understanding (MoU) clarifying expectations and deliverables associated with the funding.

- Once registered for the main academic programme, the student must register for modules following the module registration process outlined in Section 13.1.

- It is the student's responsibility to manage their annual registration and to keep it up to date, including modules for which they are enrolled. It is not the responsibility of the departmental administrative staff, the postgraduate coordinator, or study leader.

12.2 Interruption and discontinuation of studies

After registering for the programme in the first year, a student must register for the programme on an annual basis until graduation. Students may not choose in which year they will "actively" continue with or register for their studies. Study fees for each year between first registration and graduation will automatically be imposed (even if the student fails to register), unless the student has formally applied for interruption of studies or formally indicates that they will discontinue their studies.

The interruption of studies can only be requested for one year, and must be done via a formal application process. The interruption of studies should be well motivated and is normally only awarded once for the applicable degree by the Faculty Board and by Senate, and only if recommended by the Department of Civil Engineering.

The student must continue with their studies in the year following an approved interruption. The request for interruption of studies must be made in the relevant academic year and preferably no later than beginning of April of the same year. Interruption of studies (and the crediting of associated fees) cannot be requested retroactively in later academic years.

Should a student wish to discontinue their studies, they must notify the Department of Civil Engineering and complete the necessary documentation. Failure to do so will result in continued accumulation of study fees owed each year (see Section 12.4). Should the student wish to continue their studies again in future, they will have to re-apply for the degree and register again.

12.3 Allowable study periods

Figure 2 shows the allowable enrolment years for the different postgraduate programmes. This includes the minimum (M), normal (N) and final (F) number of years allowed to complete a programme. If a student does not complete (pass) the qualification after the final year of enrolment, they must apply for readmission to an additional year (X) which is only approved in exceptional cases where clear motivation showing unforeseen circumstances and realistic progress to completion can be given.

Programme	**Years of Enrolment**								
	1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***
PGDip (Eng) Full-time	*M*	*F*	***X***	-	-	-	-	-	-
PGDip (Eng) Part-time	*M*	*N*	*F*	***X***	-	-	-	-	-
MEng (Structured) Full-time	*M*	*F*	***X***	-	-	-	-	-	-
MEng (Structured) Part-time	*M*	*N*	*N*	*F*	***X***	-	-	-	-
MEng (Research) Full-time	*M*	*N*	*F*	***X***	-	-	-	-	-
MEng (Research) Part-time	*M*	*N*	*N*	*N*	*F*	***X***	-	-	-
MEngSc (Structured) Full-time	*M*	*F*	***X***	-	-	-	-	-	-
MEngSc (Structured) Part-time	*M*	*N*	*N*	*F*	***X***	-	-	-	-
MEngSc (Research) Full-time	*M*	*N*	*F*	***X***	-	-	-	-	-
MEngSc (Research) Part-time	*M*	*N*	*N*	*N*	*F*	***X***	-	-	-
PhD Full-time (after master's)	*M*	*M*	*N*	*F*	***X***	-	-	-	-
PhD Full-time (after BEng, no master's)	*M*	*M*	*M*	*N*	*F*	***X***	-	-	-
PhD Part-time (after master's)	*M*	*M*	*N*	*N*	*N*	*N*	*F*	***X***	-
PhD Part-time (after BEng, no master's)	*M*	*M*	*M*	*N*	*N*	*N*	*N*	*F*	***X***

Key:

M	Minimum enrolment period	Normal maximum period of enrolment
N	Normal enrolment after minimum	
F	Final concessional year (may register without having to apply for readmission)	
X	Enrolment only if readmission has been approved by the Faculty Board or, for a PhD, the Senate.	Allowed in exceptional circumstances
-	Further registrations normally not allowed	

Figure 2. Periods of enrolment for postgraduate programmes, as given in the University Yearbook: Part 11, Faculty of Engineering

12.4 Study fees

The yearly study fees payable for each qualification are not the same between the different qualifications. The fees may also increase from year to year and also depend on whether the student is full-time or part-time as well as whether a student is South African or foreign. Also see Section 12.2 regarding interruption and discontinuation of studies in order to avoid potential study debt.

For these reasons, this guideline document cannot provide detailed fee amounts for each qualification. In general, for each qualification, there is a fixed yearly study fee for each year seen as part of the normal allowable enrolment period (see Section 12.3). After the normal allowable enrolment period, the yearly study fees increase progressively. In addition, from the second registration year onwards, the study fees for part-time studies are less than for full-time studies.

Research students, MEng[R] and PhD, generally only pay for the mentioned fixed yearly study fees and do not have to pay additional registration fees for a maximum of three departmental modules that form part of their preparatory studies for their research. However, if research students wish to take more than three departmental modules or faculty modules or other modules not hosted by the Department of Civil Engineering, they would have to pay the additional registration cost for these modules.

Module-based students, MEng[S] and PGDip[Eng], pay the mentioned fixed yearly study fees as well as the tuition fees for each of the eight modules. The cost for each module is calculated based on the number of credits of the module. The fee for each module is only payable within the year it is taken. This includes if a module needs to be re-taken after failing. For some modules, students may also have the option of partaking in lunches etc. at an additional cost. These fees are paid directly to the administrative officer of the relevant department. More details on the study fees and the other costs for students can be found in:

- The University Yearbook: Part 3 (available on SU webpage)
- Student fees division via email: studentaccounts@sun.ac.za / studentegelde@sun.ac.za
- For quotations and estimations of fees/cost please use the below link: https://web-apps.sun.ac.za/student-fees-estimate/#/home

13. During enrolled/study period

13.1 Module registration process

The primary principle of the postgraduate module registration process is that a student can only register for modules via their study leader (research students) or package coordinator (structured students).
This ensures appropriate module selection and guidance of students to ensure students complete their degrees within the necessary time frames. The registration process for research (mostly MEng[R]) and module-based students (MEng[S] and PGDip[Eng]) is as follows:

- Students must first be registered for the degree or main programme (see Section 12) before registration for individual modules can be requested.

- Both degree registration and module registration are annual processes and must be done at the start of each academic year. The module registration must be done as soon as possible after the degree registration.

- Once registration for the degree (main programme) has been completed, the student must discuss and agree on the modules required for the degree in consultation with their study leader (research students) or package coordinator (module-based students). Students are encouraged to do this as early as possible. It is the responsibility of the student to make sure that they are able to attend the lectures and contact sessions for their modules when scheduled.

- All the details on module requirements per qualification and module types are discussed in Section 9. The list of available modules for each year can be found at https://civeng.sun.ac.za/current-postgraduates/

- Once consensus is reached between the student and study leader/package coordinator, the postgraduate module registration form CIVPG02 is completed and signed by both student and study leader/package coordinator. This form is then sent to the postgraduate coordinator by the study leader

for research students and to the academic coordinator by the package coordinator for module-based students. The form cannot be submitted directly by the student. See Section 11 for the deadlines for this process to be completed.

- The postgraduate or academic coordinator will confirm that the module requirements are met and then request the module registration via Civil course administration. Once a module is registered, it will appear on the student's study record.

- Once a module has been completed by a student, their study record will be updated to reflect the outcome. If a student fails a module, they must redo the entire module. If the particular module is not available, another module can be taken. Note that supplementary exams are not available at postgraduate level.

- Students are ultimately responsible to ensure that their registration details are correct and up to date as indicated on their online study record. The registration details that must be checked are: the main programme, year of study and registered modules.

13.2 De-registration of registered modules

Students are required to discuss any potential module de-registration with their study leader or relevant package coordinator. Module de-registration should be requested by completing the postgraduate module de-registration form CIVPG03, signed by both the student and the study leader/package coordinator. This form should be sent to the academic coordinator by the study leader before the closing date for module de-registrations (see Section 11). No requests for de-registration after the closing date will be considered. Any new modules must be registered using the process outlined in Section 13.1.

13.3 Library access and accommodation

Once registered, all students are assigned a student number, email account and given access to the networks and online services of Stellenbosch University. This includes access to the physical and online library, which is essential to especially research students. A guide to using the library is available here: http://library.sun.ac.za/en-za/Usingthelibrary/Pages/Postgraduate-guide.aspx

Once registered, finding suitable accommodation in or near Stellenbosch is often the next important step, especially for full-time students whom are excepted to be physically present on the campus of Stellenbosch University during their studies. There is a wide variety of accommodation options available which includes university and private accommodation. More information on accommodation can be found here: http://www.sun.ac.za/english/maties/accommodation

14. Completing the degree

14.1 Examination of modules

All modules at postgraduate level are classified as exit-level modules, and must satisfy all the quality control measures of SU and the Faculty of Engineering applicable to such modules, including both internal and external moderation of main assessments. The detailed assessment rules for modules are listed in the Faculty of Engineering Assessment Rules. Final marks (after moderation) for each module are uploaded to each student's study record.

14.2 Examination of research assignment for MEng[S]

The examination for all research conducted for a degree follows a stringent process to ensure independent and fair evaluation of the research. The MEng[S] requires a 60-credit research assignment as part of a 180-credit programme, or 600 hours (15 weeks) of project work. The research assignment need not show proof of original work or make a substantial novel contribution to knowledge in the field of study, but should illustrate that the candidate can successfully complete a short project, which contains all the basic research elements. For a research assignment two internal examiners or one internal and one external are appointed to evaluate the assignment. The outcome is further considered by an external moderator.

The research assignment is the product of 6 to 12 months of research completed by the student under the supervision of the study leader. Before examination, the final assignment must be submitted to Turnitin to ensure no violations in terms of plagiarism. Once the final assignment is approved by the study leader(s), it is sent out for examination.

For MEng[S], the examiners are requested to confirm that the dissertation satisfies the following criteria:

- The scope of the work is that which can be expected from an 600h project. Note that for multi-disciplinary research, this criterion should be carefully assessed. As a minimum requirement, the complexity of at least one field should be on par with the level of a final year BEng or BSc(Hons) module, while the other fields should be at least at a second-year level in their respective disciplines. The integration of the different fields should be at Master's level.
- The complexity of the work, and the level to which the relevant field of study has been mastered, are sufficient.
- The research assignment shows an acceptable level of familiarity with the relevant research literature.
- The research assignment shows an acceptable command of the relevant research method.
- The research assignment shows an acceptable ability to interpret research results.
- A clear and systematic presentation of the material and logical exposition of the argument are presented.
- Proper documentation and support of the results of independent research are provided.

The examiners are asked to evaluate the compliance of the work with the mentioned assessment criteria. Each examiner then recommends an outcome, which can be one of the following two options:

Recommended outcome A: The research assignment satisfies the assessment criteria adequately and the examiner has indicated changes and/or corrections, which should be completed to the satisfaction of the study leader(s) before the final mark can be submitted.

Recommended outcome B: The research assignment fails to satisfy the assessment criteria adequately. No re-submission is allowed.

For both outcomes the average mark of the two examiners is calculated as the final mark. All related documents and final mark are sent to a designated external moderator who verifies that the correct processes were followed and that the final mark awarded is a fair representation of the marks awarded by the examiners. Students who receive a fail mark, may be allowed to register again for the research assignment module, with a new project and a different study leader, provided that such registration does not extend their total registration period beyond the maximum allowed period.

14.3 Examination of research thesis for MEng[R] or dissertation for (PhD)

The examination for all research conducted for a degree follows a stringent process to ensure independent and fair evaluation of the research. For research-based qualifications the research component comprises 100% of the credits and the final mark for the degree reflects the evaluation of the thesis (MEng[R]) or dissertation (PhD).

The MEng[R] is a 180-credit thesis, requiring 1800 notional hours of thesis work. An MEng[R] thesis does not need to make a novel contribution to knowledge in the field of study. However, the thesis must clearly demonstrate that the student has mastered the relevant field of study.

The Doctor of Philosophy in Engineering (PhD) is a 360-credit dissertation, requiring 3600 notional hours of research work. For the PhD degree, the dissertation must provide clear and convincing evidence of original work and must make a significant, novel contribution to knowledge in the field of study concerned. The Faculty accepts both standard thesis type dissertations, and publication-based dissertations. For the latter, any or all of the content chapters can be replaced by a published/accepted journal or conference paper, but the dissertation should still form a logical and coherent unit, with a comprehensive introduction, literature study, and conclusion. Copyright clearance for published articles must be obtained from the relevant journals.

The thesis or dissertation for research qualifications are the product of research completed by the student under the supervision of the study leader. Before examination, the final report must be submitted to Turnitin to ensure no violations in terms of plagiarism. Once the final thesis or dissertation is approved by the study leader(s), it is sent out for examination.

For both a MEng[R] and PhD there is one internal examiner affiliated to Stellenbosch University. For the MEng[R] there is one independent external examiner not affiliated with Stellenbosch University; for the PhD there are at least two independent external examiners not affiliated with Stellenbosch University, with at least one from an international institution. The external examiners are selected on the basis of being specialists in the applicable field of study. The examiners are typically given four to six weeks to evaluate the research based on certain criteria.

For an MEng[R] the examiners are requested to confirm that the dissertation satisfies the following criteria:

- The scope of the work is that which can be expected from an 1800h project.
- The complexity of the work, and the level to which the relevant field of study has been mastered, are sufficient.
- The thesis shows an acceptable level of familiarity with the relevant research literature.
- The thesis shows an acceptable command of the relevant research method.
- The thesis shows an acceptable ability to interpret research results.
- A clear and systematic presentation of the material and logical exposition of the argument are presented.
- Proper documentation and support of the results of independent research are provided.

For a PhD the examiners are requested to confirm that the dissertation satisfies the following criteria:

- The scope of the work is that which can be expected from a PhD.
- The work contains significant novel and original contributions.
- The work is publishable in a professional, peer-reviewed, journal.
- The dissertation shows an acceptable level of familiarity with the relevant research literature.
- The dissertation shows an acceptable command of the relevant research method.
- The candidate shows an acceptable ability to interpret research results.
- A clear and systematic presentation of the material and logical exposition of the argument are presented.
- Proper documentation of the results of independent research is presented.
- The dissertation shows acceptable linguistic and stylistic presentation.

The examiners are asked to provide a detailed written report where the compliance of the work with the assessment criteria is evaluated. Each examiner then recommends an outcome, which generally can be one of the following three options:

Recommended outcome A: The dissertation satisfies all the assessment requirements. The examiner has indicated minor changes and/or corrections, which should be completed to the satisfaction of the study leader(s) before the final copy can be submitted to Stellenbosch University.

→ If this outcome is chosen by all examiners then:

- MEng[R]: The examination process is completed, except in cases near 75%, where an oral examination can be necessary.
- PhD: A compulsory oral defence involving the student and the three examiners is held, facilitated by the postgraduate coordinator and also attended by the HOD. If after the oral defence the recommended outcome is still A, the examination process is complete, with the provision that the changes are made to the dissertation to the satisfaction of the study leader(s).

Recommended outcome B: The dissertation fails to satisfy some or all of the assessment requirements. The examiner has indicated major changes and/or improvements, which must be completed before an outcome can be determined. The dissertation can be improved once only, after which it has to be resubmitted.

→ If this outcome is chosen by at least one of the examiners, an oral defence between the student and examiners is held. The student also provides a written response document which address all the comments of the examiners. This response document is sent to all examiners before the oral examination.

- If after the oral examination the recommended outcome is unanimously changed to outcome A, then the examination process is complete, given that the changes are made to the thesis or dissertation to the satisfaction of the study leader(s).
- If after the oral examination, the recommendation from at least one examiner is still chooses outcome B, the student is allowed one opportunity to improve the thesis or dissertation. This improved thesis or dissertation is then sent for a second evaluation by the examiners. The examiners can now recommend outcome A or C, or if a unanimous decision cannot be reached, the process is referred to the DMC for further processing.

Recommended outcome C: The dissertation fails to satisfy some or all of the assessment requirements. The work is fundamentally flawed. No resubmission is recommended.

→ If all the examiners choose outcome C, then the degree is not awarded. However, if not all the examiners recommended outcome C, then the process explained for outcome B is followed.

14.4 Publication and format of research assignments, theses and dissertations

Only research theses of MEng[R] and dissertations of PhD that passed the examination process are published on SUNScholar, and only after the all corrections and improvements were made and approved by the study leader. See Section 11 for the deadlines for uploading the final version to SUNScholar. The research assignments of MEng[S] are not published on SUNScholar. However, all research work can be published in journals or conferences if there are no conflicts of interest, non-disclosure or intellectual property related issues. All work that find its way to publication must include copyright permission from the original author to use images, graphs, etc., that have come from a third party, and must be appropriately referenced. It is the responsibility of the student to get such permission. If it is impossible to get permission, the student must be able to prove that sufficient effort has been made to get permission and record of the efforts must be kept.

The format of a research assignment for MEng[S] is that of a full project report. The format of a MEng[R] thesis is that of a standard monograph thesis. The standard format of a PhD dissertation is that of a monograph thesis, with a clear, logical, and comprehensive description of the work, including an extensive literature study, and a clear presentation of the original contributions. The Faculty also accepts publication-based dissertations, in which any or all of the content chapters are replaced by journal or conference paper(s) that have either been published, submitted, or are in a final draft form. The following elements are required in the PhD dissertation:

- A comprehensive introduction to the dissertation.
- Expanded literature study(s), and clear presentations of the original contributions.
- For chapters where a paper replaces the standard format, the chapter must be introduced by a short discussion of the context of the paper within the dissertation, the publication status of the paper, and the specific contributions of the student in the case of multiple authors.
- In the case of a short conference paper replacing a content chapter, students are encouraged to use an extended version of the paper.
- A conclusion that includes all the work in context with respect to the whole.
- The dissertation as a whole should form a logical and coherent unit.

The format of a DEng dissertation is that of an overview of the candidate's work over the course of many years, with a self-evaluation of impact. The DEng dissertation differs substantially from the PhD, in that it is a review, and only references work completed by the candidate.

More information regarding the format of the research work are stated in the Yearbook of the University of Stellenbosch, Part 1 (General), 'Rules for Higher Degrees', available on the University website.

14.5 Pass requirements

The requirements for completion of the respective qualifications are different for the different programmes.

For PhD the pass requirements are:

- A passed 360-credit dissertation after examination process has been completed, including an oral defence between the student and the examiners.
- A public presentation of the research work.
- A journal article that has been submitted to an appropriate journal for peer review and which is deemed publishable by the study leader.

For MEng[R] the pass requirements are:

- A passed 180-credit thesis after examination process has been completed.
- The completion of three postgraduate modules at preparation for the research.
- A public presentation of the research work.
- A journal article that is deemed suitable by the study leader to submit for peer review.

For MEng[S] the pass requirements are:

- A passed 60-credit research assignment module after examination process has been completed.
- Passing a collection of modules at NQF level 9 for a cumulative 120 credits.

For PGDip[Eng] the pass requirements are:

- Passing a collection of modules at NQF level 8 for a cumulative 120 credits.

14.6 Graduation

There are two graduation opportunities for students, one in December and one in April. The date and deadlines of examination etc. in order to qualify for these graduation opportunities are given in Section 11. Students can only graduate if they comply with the pass requirements mentioned in the previous section.

Information regarding graduation will be communicated by Stellenbosch University to all students eligible for graduating. Letters certifying that requirements for graduation have been completed can only be issued by the Registrar's division.

15. Contact information

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