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Biomedical Engineering Programmes Guide for 2024

20 February 2024

Change History

See Section 1.4

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Note: M&M is the abbreviation for Mechanical & Mechatronic Engineering and E&E for Electrical & Electronic Engineering

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Table of Contents

1 Background and overview

This document gives the rules and procedures that apply to the postgraduate programmes hosted by the Institute for Biomedical Engineering (IBE). Further to these rules, the general rules of the Engineering Faculty also apply to the IBE's programmes.

1.1 Overview of IBE degree programmes

The IBE hosts interdisciplinary postgraduate programmes aimed at biomedical engineering research and practice. The IBE programmes are intended to augment the mono-disciplinary programmes (such as MSc and MEng programmes). Therefore, the focus in the IBE degree programmes is on modules and research spanning more than one faculty and are aimed at students from diverse disciplinary backgrounds.

Supervisors for student research and projects are mostly drawn from the Faculties of Engineering, Science, and Medicine & Health Sciences, but any faculty could contribute. See details for each degree programme in the relevant sections.

Figure 1 illustrates the relationships between the IBE degree programmes and the routes from other qualifications into these programmes. Note that admission to any of the IBE degree programmes is subject to selection, in addition to relevant prior qualifications. Details are given in later sections of this guide.

Candidates with a 3-year bachelor's degree are advised to complete a BScHons[1] or a PGDip in Engineering in a field relevant to biomedical engineering, thereby establishing a strong disciplinary base before entering into the IBE's interdisciplinary programmes.

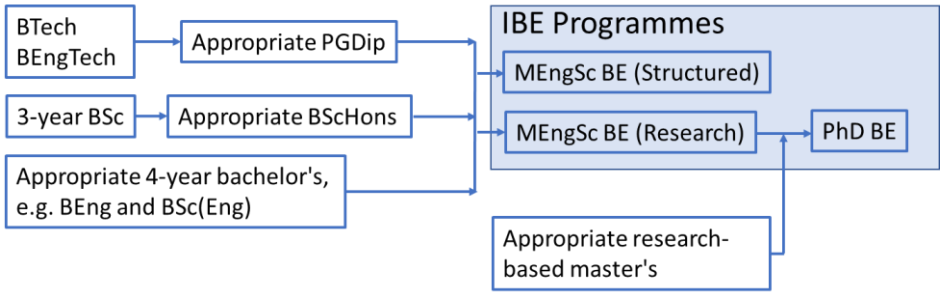

Figure 1: IBE degree programmes and qualifications required for entry

1.2 Overview of admission and selection process

Applicants should note that there is a limited capacity in the IBE's degree programmes and therefore not all students that meet the minimum requirements will necessarily be admitted. Even students who are provisionally selected may not succeed in finding a suitable research topic and supervisors.

The admission process is as follows (please refer to later sections covering each degree programme for more details):

- Start with submitting an application on the University's system for applications for who are not registered SU students when applying, or follow the instructions given on the M&M website for applicants who are registered SU students when applying. The application must include academic transcript(s) from undergraduate to the most recent qualification, listing the courses/modules completed and the corresponding grades awarded, as well as

[1] Prospective students are encouraged to consider the BSc Biomedical Mathematical Sciences stream.

qualifications completed. However, transcripts need not be provided for studies at Stellenbosch University (SU).

- The closing date for applications for students with foreign qualifications is 30 September. For students with South African qualifications, the closing date is 1 December, but since foreign students will have to select topics and supervisors before that date, it is advisable that South African students also apply by 30 September.
- Provisional selection:
    - Applications are first evaluated by the IBE's Postgraduate Admissions Committee against the minimum admission requirements for the particular degree programme. The minimum admission requirements relate to the applicant's prior qualifications and academic record. The Postgraduate Admissions Committee may consider applications that do not meet the normal admission and selection requirements, but demonstrate in another way a similar level of competence. The Engineering Faculty's procedures for Recognition of Prior Learning or Credit Accumulation and Transfer (RPL/CAT) are applied in these situations. If applicants want to submit information in addition to their transcripts to motivate their admission on exceptional grounds, they should send that information to the Postgraduate Officer.
    - If applicants are, at time of application, still studying in a programme required for admission, provisional selection may be based on the assumption that the student will complete those studies. Note that such students' final selection will be subject to confirmation when all the relevant academic results are available.
    - Students that meet the minimum admission requirements are provisionally selected and will be informed of this by email.
- Final selection:
    - A candidate that is provisionally selected must find a suitable research topic and supervisors before the candidate can be finally selected and admitted. To this end, these candidates are sent an IBE Postgraduate Application Form and a list of research potential topics. The list includes the contact details of the potential supervisors and an indication of whether the supervisor can offer financial support to the student.
    - Candidate should then contact potential supervisors. Note that all students who were provisionally admitted necessarily will be able to find a supervisor willing to accept that student. Also note that supervisors typically consider, inter alia, candidates' prior academic record in terms of performance and appropriateness for their available topics.
    - When agreement has been reached between a candidate and supervisor(s), the student must complete the IBE Postgraduate Application Form.
        - The Study Plan section of the form must be completed in consultation with the supervisors and with consideration of the requirements given below for each degree programme. The Study Plan must list all the compulsory and supplementary modules that the student intends completing. Note that the IBE Postgraduate Admissions Committee may require that modules be added to the Study Plan.
        - The provisional project/research topic and supervision sections must be completed and signed by the supervisors (preferably all supervisors, but at least the main supervisor).
        - The candidate's own signature must be added to the form.

        - We prefer that all the above is completed electronically on the form, rather than scanning in the form after completing it.
    - The completed IBE Postgraduate Application Form must be submitted to the Postgraduate Officer.

- If the Postgraduate Admissions Committee decides that an applicant meets the admission and selection requirements, and the applicant has been accepted by supervisors as student for a suitable research topic (for master's and PhD programmes), the student is granted admission. That decision is communicated to the Faculty Administrator at the office of the Registrar, where the student's application for admission is then processed.
- If the application included the final results of prior studies required for admission, the above admission is final.
- If applicants are still awaiting final results that are required for final admission, the status of their admission remains provisional until all the relevant academic results are available.
- Note that provisional and final admission/selection lapses if students do not start in the particular IBE programme in the academic year for which they were admitted or selected.

The completed IBE Postgraduate Application Form, with the Study Plan and the Study Agreement (where relevant) constitute the agreement amongst the IBE, the student and the supervisors for the duration of the student's study in the degree programme. The research proposal, after being accepted by the supervisors and the IBE Postgraduate Coordinator, will be considered to be part of the Study Plan. This agreement may only be changed with the approval of the student, the supervisors and the Programme Coordinator. Note that changes involving modules offered in block format must be done at least 6 weeks prior to the start of the module, and not later than the first week of the semester in which the module is offered.

1.3 Student funding

The IBE itself does not offer funding, such as bursaries, to support students. Students could approach the following for funding, but should note that these sources are likely to have less funding available than students requiring support:

- The research supervisors of MEngSc (Research) and PhD students
- NRF: https://nrfsubmission.nrf.ac.za/
- Postgraduate Office: http://www.sun.ac.za/english/research-innovation/Research-Development/postgraduate-office

1.4 Change history

2023/11/02

First public release.

2024/02/20

Updated Study Agreement template (Appendix B). There is now a unique template for each programme (PhD; MEngSc (research); MEngSc (structured)).

Updated the contact information.

Updated the dates in Appendix A.

2 PhD in Biomedical Engineering

2.1 Outcomes and scope

The Doctor of Philosophy in Biomedical Engineering programme prepares the candidate for a research, academic, or high-level consulting career. It requires that a candidate to undertake independent research, with minimal supervision, at the most advanced academic levels culminating in the submission, assessment and acceptance of a dissertation, as well as papers that merit submission to peer-reviewed journals. Through the research that leads to the dissertation and papers, a graduate develops the ability to evaluate the research at the forefront of biomedical engineering based on knowledge of the relevant literature and applicable research methodologies. The defining characteristic of this qualification is that the candidate is required to demonstrate high level independent research capability and to make a significant and original contribution at the frontiers of biomedical engineering knowledge.

The PhD in Biomedical Engineering programme typically requires three years of full-time research (the minimum period is two years), culminating in a dissertation that describes original research and at least two papers suitable for publication in research journals. The PhD normally follows after a research-based master's degree.

Due to the interdisciplinary character of the programme, students will normally have a supervisor in one faculty and at least one co-supervisor in another faculty. One supervisor must be from the engineering faculty, unless the IBE management committee approves otherwise.

Supplementary coursework (non-credit bearing) may be required of students who do not have the necessary background for their research. Supplementary modules may be prescribed by the supervisors and/or the IBE Postgraduate Admissions Committee.

2.2 Admission and selection

Admission to the PhD programme is treated in two phases: Phase 1 only grants admission to the first year of study (the candidacy phase), while Phase 2 grants permission to continue after the first year of study. It should be noted that admission to the first year of study grants access to the candidacy phase only and does not automatically imply permission to continue beyond the first year.

2.2.1 Phase 1: candidacy phase

Please refer to Section 1.2 for an overview of the admission process. That process only applies to Phase 1 and not Phase 2. In addition to the particulars in Section 1.2, for selection for the PhD programme, the candidate must submit to the Postgraduate Officer:

- Proof of research ability relevant to a PhD in Biomedical Engineering, such as a pdf copy of a research master's thesis and/or research papers reporting research work done by the candidate.

The IBE Postgraduate Admissions Committee may grant provisional Phase 1 admission if the candidate has demonstrated that he/she has the required background knowledge and research ability. Normally candidates are required to meet one of the following minimum admission requirements:

- A research-based MSc, MMed, MEngSc, MSc(Eng), MEng or other relevant master's degree completed in at most three years. If a final mark is awarded for the master study, a mark of at least 65 is required for South African master's programmes, or the equivalent for international students.

- Other qualifications and an academic transcript that the IBE Postgraduate Admissions Committee considers to be equivalent to the above.

As described in Section 1.2, after provisional admission, the candidate should liaise with prospective supervisors to find supervisors and a research topic. Note that the topic remains provisional in Phase 1 and is only confirmed in Phase 2 of the admission process, but already in Phase 1 it must be clear that the research area will provide sufficient scope for original work by the student.

The supervisors and IBE Postgraduate Admissions Committee may prescribe supplementary coursework if they deem the candidate's background to be insufficient for the research topic. All candidates are required to complete Professional Communication 871, unless they had completed it as part of their master's studies.

2.2.2 Phase 2: post-candidacy phase

Note that Phase 1 of the admission process only allows for one year of registration as PhD student and that admission does not automatically allow continuation after the first year. To be allowed to continue after the first year of registration, the following procedures apply:

The PhD student must submit a full research proposal and an executive summary that both meet the Engineering Faculty's requirements by the date set in Appendix A in their first year of registration. Appendix D gives an indication of the requirements, but the exact requirements and templates should be obtained from the Postgraduate Officer as they are refined from time to time.

Typically two to four weeks after a candidate has submitted the research proposal, his/her suitability to continue with PhD studies will be assessed by a Candidature Panel. Students should, by email to the Postgraduate Officer, request a copy of these procedures, which are updated from time to time by the Engineering Faculty. Some typical aspects are: The Candidature Panel comprises the supervisor(s) and at least two expert and experienced people. An oral presentation by the candidate may be required in some cases. If improvements to the Research Proposal and/or Executive Summary are required by the Candidacy Panel, only a single round of improvements is allowed.

Note that if the Faculty Board does not approve continuation of a PhD candidate before the end of the first year of registration, that candidate will normally not be permitted to continue with PhD studies. Note that students that register later in an academic year, must still complete the candidacy process before the end of that year. This requirement applies to parttime students too.

All supplementary modules prescribed by the supervisors and the IBE Postgraduate Admissions Committee must be completed (i.e. a final mark of at least 50 % must be achieved, if marks are awarded, or "satisfactory/duly completed" must be assigned if final marks are not awarded in the module) in the first year of study. Students who do not meet this requirement will not be allowed to continue into the second year of study. This requirement applies to parttime students too, unless express permission for later completion was given by the Postgraduate Coordinator. Note that all students are required to complete Professional Communication 871 as supplementary module, unless the student had completed it as part of master's studies.

2.3 Dissertation requirements

The dissertation[2] must address one central and coherent research question, reflecting Biomedical Engineering research of the student of at least 3600 hr duration (360 credits). The body of the dissertation may comprise either:

- An introduction, a number of chapters and a conclusion, or

[2] At Stellenbosch University, the term "dissertation" is reserved for the main submissions of doctoral students.

- An introduction, a combination of chapters and published or unpublished papers, and a conclusion.

If papers are included as part of the body of the dissertation, students must refer to the relevant sections in Part 1 of the University Calendar for further instructions and obtain the latest Engineering Faculty guidelines from the Postgraduate Officer.

The dissertation must comply with the IBE's formatting requirements, adhere to the "Guide for Writing Technical Reports" and satisfy all the requirements given in Part 1 of the University Calendar. The dissertation may not exceed 200 pages from the introduction to the appendices. An online repository with additional information may be included with the dissertation, but the examiners must be able to assess the student's work without referring to the repository.

Further requirements are stipulated in the chapter on Postgraduate Qualifications in Part 1 of the University Calendar.

2.4 Assessment criteria

All PhD students must have submitted at least one research paper to an international research journal by the time the student's PhD dissertation is submitted for examination. All PhD students must also table another research paper, of acceptable standard for submission to an international research journal, at their oral examination. Note that two papers are considered to be the absolute minimum and normally PhD students should produce three or more papers. The subject of the papers, whether the papers are suitable for submission to a journal and where they are submitted, will be decided by the supervisor(s). However, should the dissertation be classified as confidential or secret, the papers must be submitted to the supervisor(s), who will decide whether and when the papers will be submitted to journals.

The dissertation submitted for examination must meet the following criteria:

- The scope of the dissertation must be commensurate with 3600 hours of research in biomedical engineering at PhD level.
- It must be the student's own work, but if the dissertation includes papers to which other authors have contributed, the papers must largely report the student's own research and the contribution of the other authors must be disclosed, as required by Part 1 of the University Calendar and the Engineering Faculty's procedures.
- The dissertation must make an original contribution to knowledge in its field and the dissertation or part of it must be publishable in a peer-reviewed research journal.
- The dissertation must exhibit an adequate command of the relevant research methods.
- The dissertation must exhibit an adequate familiarity with the relevant literature.
- The dissertation must exhibit the ability to interpret research results.
- The dissertation must exhibit a clear and systematic presentation of the material and logical exposition of the argument.
- The dissertation must exhibit proper documentation and support of the results of independent research.
- The dissertation must exhibit acceptable linguistic and stylistic presentation.

A public oral presentation by the student on his/her research is required in all cases. Every PhD student shall undergo an oral examination on his/her dissertation. The public presentation normally will directly precede the oral examination.

2.5 Final mark

No mark is awarded for a PhD at Stellenbosch University, but only a pass or fail is awarded on the basis of the dissertation and the oral examination. A pass will not be awarded unless all the other assessment criteria have been satisfied.

3 MEngSc in Biomedical Engineering (Research)

The Master of Engineering Science in Biomedical Engineering programme has two branches, i.e. Research and Structured. This section gives details about the Research branch.

3.1 Outcomes and scope

This research master's programme is aimed at developing interdisciplinary engineering science research specialists in biomedical engineering. They will be able to develop complex biomedical engineering systems by integrating the medical and the engineering domains. The graduates will be able to develop new systems and improve existing systems. The graduates will be able to apply these systems to human patients, addressing healthcare needs of South Africa and of global communities.

The MEngSc in Biomedical Engineering (Research) typically requires two years of full-time study (the minimum period is one year), culminating in a thesis that describes advanced research and at least one paper suitable for publication in a research journal.

Due to the interdisciplinary character of the degree programme, students will normally have a supervisor in one faculty and at least one co-supervisor in another faculty. One supervisor must be from the engineering faculty, unless the IBE management committee approves otherwise.

All students are required to complete modules that provide a base for research in biomedical engineering and the necessary background for their research. These modules are classified as supplementary coursework, which implies that the modules do not contribute directly to the student's final mark and do not contribute to the credits required for be awarded the degree. Please note the progression requirements related to supplementary modules given in the next section.

3.2 Admission and selection

Please refer to Section 1.2 for an overview of the admission process.

The Postgraduate Coordinator may grant provisional admission if the candidate has demonstrated that he/she has the required ability and background knowledge. Normally candidates are required to meet one of the following minimum admission requirements:

- An appropriate 3-year BSc degree and an appropriate BScHons or PGDip completed in the minimum study time with an overall average of at least 60%, an average of at least 60% in the BScHons or PGDip, and a mark of at least 65% in a major individual project in the BScHons or PGDip.
- An appropriate 4-year BSc degree in the area of medical and health sciences, completed in the minimum study time with an overall average of at least 60%, a final year average of at least 60% and a mark of at least 65% in a major individual project in the final year.
- A 4-year BEng or BSc(Eng) degree completed in the minimum study time with an overall average of at least 60%, a final year average of at least 60% and a mark of at least 65% in the final year project.
- An appropriate BTech or BEngTech degree completed in the minimum study time with an overall average of at least 75% and an average of at least 75% in the final year, and an

appropriate PGDip completed in the minimum study time with an overall average of at least 60% and a mark of at least 65% in a major individual project in the PGDip. The PGDip must have contained a mathematics module that included a substantive coverage of ordinary differential equations and a module that required programming in MATLAB, C or a similar programming language.

- Other qualifications and an academic transcript that the IBE Postgraduate Admissions Committee considers to be equivalent to one of the above.

As described in Section 1.2, after provisional selection the candidate should liaise with prospective supervisors to find supervisors and a research topic.

The supplementary modules in the Study Plan must be determined in consultation with the supervisors, with consideration of Section 3.3.

3.3 Supplementary coursework

All students are required to complete 75 credits[3] as supplementary coursework[4]:

- Professional Communication 871 [0 credits] (plagiarism-related aspects of research ethics).
- Research Methodology (Biomedical Engineering) 874 [15 credits] (The scientific method. Critical literature review. Understand and apply research ethics. Understand and avoid plagiarism. Scientific writing techniques and requirements. Research methodologies typically encountered in Biomedical Engineering). Note that, as part of this module, students must prepare a research proposal for their thesis research.
- Biomedical Engineering 874 [15 credits] (a basic introduction and overview of biomedical engineering, including biomechanics, energy conservation in biomechanical systems, respiration, the cardiovascular system, light and sound, biosignal processing, electrophysiological signals, etc.).
- Biomedical Engineering Design 874 [15 credits] (the bio-design process: healthcare problem definition, needs analysis and market research with intellectual property considerations, concept generation and evaluation informed by an understanding of medical ethics and regulations, building and evaluating physical models or prototypes of a medical device).
- Physiology 874 [15 credits] (levels of organization in the body and homeostasis, cell physiology, plasma membrane and membrane potential, principles of neural and hormonal communication, central nervous system, peripheral nervous system, afferent division, efferent division, muscle physiology, cardiac physiology, blood vessels and blood pressure, blood, immune system, respiratory system, urinary system, fluid and acid-base balance, digestive system, energy balance, temperature regulation, principles of endocrinology, peripheral endocrine glands, reproductive system).
- Introduction to Anatomy for Biomedical Engineers 874 [15 credits] (Introduction to anatomy as a discipline, terminology and basic concepts, how to use library resources, broad overview of specific systems: cardiovascular system, respiratory system, central and peripheral nervous system, musculoskeletal system).

Note that all of the above modules are offered in block format (typical two blocks of two days contact each) during the first semester.

[3] A 15-credit module nominally requires 150 notional hours of study (contact time included)

[4] Note that the list of modules and their classification as core or optional may change from year to year. Also note that the particulars given here for 2022 are provisional.

Students may apply to the Programme Coordinator to be exempted from some of the normally required modules listed above if they had completed in their prior studies modules that have closely related content.

Further supplementary modules determined by the supervisors, after consultation with the student, may also be required. Further supplementary modules may also be prescribed by the IBE Postgraduate Admissions Committee if they deem the candidate's background to be insufficient for the research topic or if the candidate's academic profile requires the modules to provide a sufficient base in biomedical engineering. The further supplementary modules may include those offered as part of the MEngSc in Biomedical Engineering (Structured), any structured MEng offered by the Engineering Faculty or any other module approved by the IBE Postgraduate Admissions Committee.

All the supplementary modules should not exceed 75 credits for most students. It should be possible to complete all the supplementary modules ideally in the first semester or, at most, in the first year of full-time study. Exceptions to these requirements can be granted by Postgraduate Coordinator. For all students, the supplementary modules must be completed before a student's thesis is submitted for examination

3.4 Thesis requirements

The thesis[5] must address one central and coherent research question, reflecting Biomedical Engineering research. The thesis must show clearly that the student is able to do independent scientific and technical investigations, and to interpret the results.

The thesis must comply with the IBE's formatting requirements, adhere to the "Guide for Writing Technical Reports" and satisfy all the requirements given in Part 1 of the University Calendar. The thesis may not exceed 100 pages from the introduction to the conclusion of the thesis, and an additional 40 pages for appendices. An online repository with additional information may be provided with the thesis, but the examiners must be able to assess the student's work without referring to the repository.

Theses are not allowed to be a compilation of research papers, although it is allowed for PhD dissertations.

Further requirements are stipulated in the chapter on Postgraduate Qualifications in Part 1 of the University Calendar.

3.5 Assessment criteria

To complete the degree programme, all supplementary modules prescribed by the supervisors and the IBE Postgraduate Admissions Committee must be completed (i.e. a final mark of at least 50 % must be achieved, if marks are awarded, or "satisfactory/duly completed" must be assigned if final marks are not awarded in the module). Note that the marks awarded for the supplementary modules are not taken into account when determining the student's final mark for the MEngSc programme. For each module's assessment criteria, please refer to the relevant module framework.

Further, all the above-mentioned supplementary modules must be completed before the thesis is submitted for examination.

All students must table a research paper, of acceptable standard for submission to an international research journal, at their oral examination. The subject of the paper, whether the paper is suitable for submission to a journal and where it will be submitted, will be decided by the supervisor(s).

[5] At Stellenbosch University, the term "thesis" is reserved for the main submissions of master's students, where the submission contributes at least 50% of the final mark for the master's degree.

However, should the thesis be classified as confidential or secret, the paper must be submitted to the supervisor(s), who will decide whether and when the paper will be submitted to journals.

The thesis submitted for examination must meet the following criteria:

- The scope of the thesis must be commensurate with at least 1800 hours[6] of research in biomedical engineering at the level of a master's of engineering science.
- The complexity of the work presented in the thesis, and the level to which the relevant field of study has been mastered, must be commensurate with master's of engineering science. For interdisciplinary research, which will be typical in this biomedical engineering programme, the complexity of at least one discipline should be on par with the level of a final year BEng or BScHons module, while the other fields should be at least at second-year level in their respective disciplines. The integration of the different fields should be at master's level.
- The thesis must exhibit an acceptable level of familiarity with the relevant research literature.
- The thesis must exhibit an acceptable command of the relevant research method.
- The thesis must exhibit an acceptable ability to interpret research results.
- The thesis must exhibit 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 must be provided.

An oral presentation by the student is required in all cases. A public presentation, covering a substantial part of the student 's research (for example presenting a paper at a conference or workshop), may be recognised as fulfilling this requirement, at the discretion of the Postgraduate Coordinator.

Every MEngSc (Research) student shall undergo an oral examination on his/her thesis, unless it is waived, as allowed for in Section 7.7. The postgraduate coordinator may require that a student attend the oral examination in person. At an oral examination, the student is required to answer questions posed by the examiners about the thesis research. If a student had not done another public presentation accepted by the Postgraduate Coordinator, such a presentation will directly precede the oral examination.

3.6 Final mark

The final mark is determined by the thesis examiners after the oral examination. The final mark is solely based on the thesis and oral examination, but a final mark will not be awarded unless all the other assessment criteria have been satisfied.

A final mark of 50 or more is required to be awarded the degree. The degree will be awarded *cum laude* if a mark of 75 or more is awarded.

4 MEngSc in Biomedical Engineering (Structured)

As mentioned above, the Master of Engineering Science in Biomedical Engineering programme has two branches, i.e. Research and Structured. This section gives details about the Structured branch.

[6] Note that the nominal allocation of 180 credits to the MEngSc Research programme does not reflect the amount of work normally required to complete this programme. The normal time required to complete the programme is two academic years of full-time study.

Please note that this programme will not be offered in 2022. The IBE intends offering it from 2023 onwards

4.1 Outcomes and scope

The MEngSc in Biomedical Engineering (Structured) develops students' specialist knowledge and skills to the level where they will be able to critically evaluate and apply biomedical engineering technology and research. The modules (and their associated assignments) and the research project also develop students' abilities to design, select, and apply technically advanced methods, techniques, and technologies to complex practical and theoretical biomedical engineering problems. The "capstone" project, Project (Biomedical Engineering) 886, develops students' intellectual independence and their ability to integrate advanced knowledge and skills from a range of contexts.

The MEngSc in Biomedical Engineering (Structured) is a taught (module based) master's programme. It normally requires two years of fulltime study, but can in principle be completed in one academic year (from February in the first year to January of the second year) if all the modules that the student selected are offered in that period. The programme comprises 120 credits of module work and a 60-credit research assignment (RA). Further supplementary coursework at NQF level 8 (i.e. at the level of a postgraduate diploma or 4-year bachelor's degree) may be required to provide students with the necessary background for their modules and/or project.

4.2 Admission and selection

Please refer to Section 1.2 for an overview of the admission process.

The admission and selection process mirrors that of the research-based MEngSc in Biomedical Engineering, except that:

- Candidates have to find a topic and a supervisor for a RA, and not a thesis.
- The candidate must submit a Study Plan that lists 120 credits of modules at NQF level 9. These modules will be credit bearing (i.e. they are not supplementary). The modules must comply with the requirements given in Section 4.3.

4.3 Compulsory coursework

Students are required to complete the following set of modules (the list of modules and their classification as core or optional may change from year to year; the credits for each module are indicated in square brackets):

- Compulsory modules [75] (these modules correspond the supplementary modules for the Research branch)
    - Professional Communication 871 [0]
    - Research Methodology (Biomedical Engineering) 874 [15]. Note that as part of this module, students must prepare a proposal for their RA.
    - Biomedical Engineering 874 [15]
    - Biomedical Engineering Design 874 [15]
    - Physiology 874 [15]
    - Introduction to Anatomy for Biomedical Engineers 874 [15]
- At least one mathematics or statistics module:

- Numerical Methods 876 [15] (note that this module requires mathematics typically covered in the 2nd year of BEng programmes)
- Biostatistics I 875 [12] Students who choose this module in stead of Numerical Methods, will have to do both Biostatistics I and II.

- A selection from the optional modules to bring the total module credits to at least 120 (note that not all these modules are offered very year):
  - Biostatistics II 875 [12] (note this requires that students have already completed Biostatistics I 875)
  - Data Science (Eng) 874 [15] (requires a statistics background typically covered in BEng programmes)
  - Digital Image Processing 893 [15] (note that this module requires mathematics typically covered in the 2nd year of BEng programmes)
  - Linear Algebra B 812 [8] (note that this module requires mathematics typically covered in the 2nd year of BEng programmes)
  - Project Economics and Finance 812 [15]
  - Project Management 873 [15]
  - Biomedical Engineering 882 [15] (see further information below)
  - Any other modules at NQF level 9 approved by the Postgraduate Coordinator (approval procedure given below).

Note that all of the above modules are normally offered in block format, either in one block of 5 days of contact or in two blocks, each with two days of contact.

In addition to the above modules, each student must complete the RA as part of the following module:

- Project (Biomedical Engineering) 886 [60]

Further details about the project module are given in Section 4.4.

Biomedical Engineering 882 is intended to allow supervisors to offer a tailor-made module for a specific project topic where the background necessary for that topic is not provided by other available modules. The planned content and assessment plan for a particular instance of the module is subject to the approval by the Postgraduate Coordinator before the module is offered. A student may include at most one special topic module in his/her Study Plan.

Students may apply to the Postgraduate Coordinator for recognition of modules done at other departments or institutions, or as part of other degree programmes. A summary of the module content, with a clear indication of the level and scope, and the assessment scheme must be submitted for consideration at time of application. The Postgraduate Coordinator will assess whether each module is considered to be equivalent to relevant category.

In exceptional cases a student may be required or allowed to do additional supplementary modules, e.g. due to insufficient background for the chosen RA topic.

4.4 Research assignment requirements

A limited number of topics for the structured masters will be made available, but students are encouraged to propose their own topics. See Appendix E for more information on this.

Students may not register for this program until a topic and supervisor was approved by the programme coordinator.

The RA[7] completed as part of Project (Biomedical Engineering) 886 must address one central and coherent research question, reflecting Biomedical Engineering research of the student of at least 600 hr duration. The RA report must show that the student is able to design, select and apply technically advanced methods, techniques and technologies to complex practical and theoretical biomedical engineering problems.

Each student must do his/her own RA under the supervision of an academic staff member. If the student works as part of a team, his/her own contribution must be clearly distinguished from the other team members.

The RA report must comply with the IBE's formatting requirements and adhere to the "Guide for Writing Technical Reports". The report may not exceed 60 pages from the introduction to the conclusion of the report, and an additional 30 pages for appendices. An online repository with additional information may be included with the report, but the examiners must be able to assess the student's work without referring to the online repository.

4.5 Assessment criteria

Every assessment submitted by a student that was not done under supervision arranged by the IBE must be accompanied a declaration confirming that is the students own work, such as the following "I declare that the entirety of the work contained herein is my own, original work", with the student's signature and a date.

To complete the degree programme, all the modules in the approved Study Plan and Project (Biomedical Engineering) 886 must be completed (i.e. a final mark of at least 50 must be achieved, if marks are awarded, or "satisfactory completed" must be assigned if final marks are not awarded in the module). All the modules in the Study Plan must be completed before the student's RA report will be examined.

For each module's assessment criteria, please refer to the relevant module framework.

The RA report submitted for Project (Biomedical Engineering) 886 must meet the following criteria:

- The report must demonstrate the ability to judiciously apply advanced technical methods to reach a biomedical engineering research project's objectives.
- The report must demonstrate the ability to suitably combine theoretical and practical elements.
- The report must demonstrate personal initiative and advanced skill with respect to problem solving, acquiring information, drawing sensible conclusions and applying sound judgements in the course of the project.

Please refer to Section 7.6 for the examination procedure for the RA report and for the procedures if a student's report is awarded a mark of less than 50.

4.6 Final mark

The final mark is determined by the credit-weighted average of all the modules that contribute to the required 180 credits (which includes the 60-credit project module), except that the final mark will be limited to 45 or less if any of the modules were not completed.

[7] Note that the RA report is not a "thesis" because at Stellenbosch University, the term "thesis" is reserved for the main submissions of master's students, where the submission contributes at least 50% of the final mark for the master's degree.

A final mark of 50 or more is required to be awarded the degree. The degree will be awarded *cum laude* if a mark of 75 or more is awarded.

5 PGDip in Engineering Science

This programme will not be offered by the IBE for the foreseeable future. Candidates with a 3-year bachelor's degree should complete a BScHons or PGDip in Engineering to provide a strong base in their undergraduate discipline. The MEngSc programmes of the IBE can then add a broader multidisciplinary appreciation of biomedical engineering interface with their undergraduate discipline.

6 Progression and related monitoring arrangements

6.1 Study Plan, Study Agreement and Research Proposal

All students are required to compile a Study Plan, as part of the IBE Postgraduate Application Form, before admission. The Study Plan must show all the modules that are to be used to determine whether the student has met all the requirements for graduation and for the student's final mark. The Study Plan must be completed in consultation with the RA/thesis/dissertation supervisor(s) for the PhD and MEngSc programmes.

A Study Agreement is required for MEngSc (Research) and PhD students. It must be based on the example in Appendix B and must be submitted to the Postgraduate Officer by the date indicated in Appendix A. As mentioned in Section 1.2, the Study Agreement forms part of the agreement amongst the IBE, the student and the supervisors for the duration of the student's study in the degree programme.

By the date indicated in Appendix A, MEngSc (Research) & (Structured) students must submit a written research proposal for their thesis or research assignment to the supervisor(s). The proposal must include an exposition of the objectives and planning of the thesis or research assignment. For the research degree, the thesis proposal must include a literature review and an overview of the thesis work completed to date (detailed guidelines for thesis proposals are given in an appendix of the third edition of the Guide for Writing Technical Reports). The research proposal is an outcome of the compulsory Research Methodology module. Once the Postgraduate Coordinator has accepted the research proposal, the proposal forms an integral part of the student's Study Plan.

For PhD students, the research proposal is considered during Phase 2 of the admissions process, as described in Section 2.2.2.

6.2 PhD candidacy and continuation from first to second year

Please refer to Phase 2 of the admissions process, as described in Section 2.2.2.

6.3 Annual satisfactory progress requirements

The general rules of the university require that the IBE Director (usually aided by the Post Graduate Coordinator) confirms that a postgraduate student has made satisfactory progress before the student will be allowed to register for the second or following years, up to the maximum allowed period. Permission to register after the maximum period can only be granted by the Faculty Committee of the Engineering Faculty and will be given only in exceptional cases.

To allow the IBE Director to assess each student's progress and to identify areas where corrective action may be required, all registered MEngSc (Research) & PhD students not graduating December

of the particular year or March of the following year must submit an annual Progress Assessment, using the template in Appendix C, by the due date given in Appendix A.

Although special circumstances will be considered by the IBE Director, the following are typical considerations that will be applied when assessing whether a student's progress is satisfactory:

- Parttime MEngSc (Structured) students are expected to pass at least 45 credits per year. They must also be able to complete the programme in the remaining time by passing no more than 60 credits per year and doing only their research assignment in the last year allowed.
- Fulltime MEngSc (Structured) students are expected to pass at least 105 credits per year.
- Fulltime MEngSc (Research) students are expected to pass al the required supplementary study modules in the first year.
- Parttime MEngSc (Research) students are expected to pass al the required supplementary study modules in their first two years of study.
- Any student that does not complete a module within two attempts will be considered to be making unsatisfactory progress.

6.4 Maximum time of enrolment allowed

Consult section 3.4.1 in the Engineering Calendar.

6.5 Readmission after final concessional year

Consult section 3.4.3 in the Engineering Calendar.

6.6 Interruption of studies

Consult section 3.4.4 in the Engineering Calendar.

6.7 Discontinuation of studies

Refer to the General US Calendar [Section 19 of Administration & Registration].

Inform your supervisor in writing as well as the Faculty Administrator om the Registrar's office and the Postgraduate Officer.

7 Examination of research assignments, theses and dissertations

7.1 RA Report/Thesis/Dissertation requirements

Please refer to the relevant sections above where the details are given about each degree programme.

7.2 Notification of the intent to submit

Students must inform their supervisors of their intention to submit their RA reports/theses/dissertations at least four months before the planned submission date to allow for the appointment of examiners. When deciding on a submission date, students must keep in mind that supervisors may require at least a few weeks to review their draft RA reports/theses/dissertations and that the changes required by the supervisors typically take the students more than one week to complete. The period required by supervisors to review a student's RA report/thesis/dissertation will be even greater if the supervisor has multiple students submitting at the same time.

7.3 Submission of a thesis/dissertation without the supervisors' consent

Theses/dissertations will, except in exceptional circumstances, only be submitted to the examination process after the supervisors have given their consent. Two situations that could lead to examination of the thesis/dissertation without the supervisors' consent are:

- A student may insist on submitting a thesis/dissertation for examination without the supervisors' consent.
- A supervisor will normally review a student's thesis/dissertation (and give feedback to the student) no more than twice. If a supervisor judges the student's thesis/dissertation to still not meet the required standard for submission after two rounds of feedback by the supervisor and improvement by the student, then the supervisor may (at his/her sole discretion) withhold consent and further supervision of the student. The student can then either withdraw from the relevant degree programme or insist on submitting the thesis/dissertations for examination without the supervisor's consent.

If a thesis/dissertation is submitted without a supervisor's consent, the examiners will be instructed not to assume that the thesis being examination has the supervisor's approval.

The supervisor's approval is not required for submission of RA reports, but the supervisors are also examiners for these reports.

7.4 Contact between students, examiners and moderators

Note that there may be no direct contact or correspondence relating to the RA/thesis/dissertation between the student and the examiners, nor between the supervisor and the examiners, during the examination process.

7.5 Initial examination steps for dissertations, theses and research assignments

The following paragraphs outline the first steps of the normal examination procedure that applies to RA reports, theses and dissertations:

- The student should submit a notification form to the Postgraduate Officer notifying his/her submission date. The Postgraduate Officer will send a template via email towards the end of July. Students have to attend the Examination Procedure Session of the Department of Mechanical and Mechatronic Engineering (please refer to Appendix A: Due Dates).
- The student must ensure that the RA report/thesis/dissertation exactly complies with the IBE's formatting requirements and generally complies with the Guide for Writing Technical Reports. The student is responsible for ensuring that the document is free of editorial and grammatical errors before submitting it for examination. Students should make use of the IBE's grammar & layout checklist while writing the draft and then have the checklist signed off by the supervisor(s) before submission.
- Supervisor(s) will hand their consent for submitting the document for examination, or their decision to withhold consent, directly to the Postgraduate Officer.
- The student must submit the RA report/thesis/dissertation to Turnitin, print the cover page (1 page) of the Turnitin report and submit this first page to their supervisor. If evidence of plagiarism is found, the document will be rejected outright and the matter will be referred to the Central Disciplinary Committee.
- Upon receipt of a pdf copy of the RA report/thesis/dissertation (submissions will only be accepted in pdf format), the Postgraduate Officer prepares the normal covering letters for the Postgraduate Coordinator's signature and sends the document with covering letters to

the examiners by email. However, note that the RA report/thesis/dissertation will only be submitted to the examiners after completion of all the required and supplementary coursework.

- Please refer to Appendix A for the final submission dates @ 12:00 noon.

7.6 Examination procedure for MEngSc (Structured) research assignments

After the initial examination steps given above, the further steps of the examination procedure are more or less as follows (the exact procedure may be changed by the Engineering Faculty from time to time):

- The supervisor(s) and the internal examiner are asked in the covering letters to complete their examination of the report in four weeks.
- When the Postgraduate Officer has received the examination reports from the supervisor(s) and internal examiner, a pdf of the RA report and the examination reports from the supervisor(s) and the internal examiner are sent via email to the external moderator for consideration.
- The external moderator is asked to complete the moderation in four weeks.
- When the Postgraduate Officer has received the moderator's report, this report is submitted to the Postgraduate Coordinator, together with the examiners' reports. If the reports' recommendations are closely aligned, the external moderator's recommend mark is recorded as the final mark for the student's project. If there are significant differences of opinion between the reports, the reports are tabled at the IBE Management Committee who makes a final decision about the mark to be awarded to the student's project. If a supervisor or examiner is also a member of the Management Committee, they do not take part in the final decision about the student's project mark.
- If a student submits a report for examination and the report is found to be insufficient to pass the module, the student will fail the module. No opportunity to improve the report is given. If the student's total study time in the degree programme allows it, the student may repeat the module once in a following academic year and do a new project under the supervision of a different supervisor.

7.7 Examination procedure for MEngSc (Research) Theses and PhD Dissertations

After the initial examination steps given above, the further steps of the examination procedure are more or less as follows (the exact procedure may be changed by the Engineering Faculty from time to time):

- The internal and external examiners are asked in the covering letters to complete their examination of the thesis/dissertation in six weeks.
- The supervisor(s) are given the opportunity to submit reports commenting on the amount of guidance given to the student, the student's general performance and circumstances imposed on the student that may have constrained his/her performance. This report must be submitted to the Postgraduate Officer before the supervisor(s) are given access to the examiners' reports.
- When the Postgraduate Officer has received the examination reports from the examiners, the reports are submitted to the Postgraduate Coordinator.
- For MEngSc (Research) students, the Postgraduate Coordinator may offer the student and the supervisor(s) the opportunity to waive the oral examination in some cases. Note that if

the grades recommended by the examiners differ notably, an oral examination will be arranged.

- If the examiners give their consent, their reports (without making their recommended marks known) are made available to the supervisor, who may provide copies to the student.
- At the oral examination, an independent non-examining chairperson (appointed by the Postgraduate Coordinator) presides over a meeting of the examiners, supervisor(s) and student. Out-of-town examiners normally participate by way of telephone or video conference. The student may be required by the Postgraduate Coordinator to attend the oral examination in person. The oral examination normally uses the following process:
    - The chairperson confirms that the student has met the requirements regarding preparing and/or submission of journal articles from the research.
    - The student does a 20-minute oral presentation about his/her research. This presentation is open to the public.
    - The chairperson, examiners, supervisor(s), and student then meet *in camera*.
    - The examiners pose questions to the student and consider his/her answers. The supervisor(s) are not allowed to participate in the questions or answers.
    - When the examiners have no further questions, the student leaves the room. The chairman reads the supervisor reports to the examiners to place the research into context with respect to aspects such as the amount of work done, independence, unique contributions, etc., which the supervisors can expand on. The examiners then have the opportunity to pose questions to the supervisors. The supervisors may also add to their written reports and comment on the merit of the work of the student.
    - When the examiners have no further questions for the supervisors, the supervisors leave the room and the chairperson gives the examiners the opportunity to reconsider the recommendations in their earlier reports.
    - The chairperson attempts to help the examiners reach a consensus recommendation and, for MEngSc (Research) theses, a final mark. If consensus is reached, the corresponding decision is noted and made known to the student and supervisor(s), with the warning that the result is subject to approval by the IBE Management Committee and, for all PhD results, the Engineering Faculty Board and the University Senate.
    - If the examiners cannot reach consensus, their reports are referred to the IBE Management Committee who decides on further procedures, in accordance with the Engineering Faculty's rules.
- If the examiners require extensive revisions and re-examination of the thesis/dissertation, the student will be given only one opportunity for the revisions. The revised thesis must be submitted to the Postgraduate Officer for re-examination. The time required for this process may require that a student register for another academic year and pay the corresponding fees.
- In the case of a favourable decision by the examiners (typically including that minor changes are required), the student must complete the required changes to the thesis/dissertation, and submit the final version (e-thesis) in the prescribed pdf format to the Postgraduate Officer at least two weekdays before the due date for the relevant graduation ceremony. If the supervisor(s) so require, the student must also arrange, though the printers appointed by the University, for obtaining a bound paper copy for each supervisor at the student's cost.

8 Converting between degree programmes

8.1 Converting between MEngSc (Structured) and MEngSc (Research)

For conversion from the structured to the research masters, a supervisor and thesis topic must first be identified, and a new IBE Postgraduate Application Form, including the revised Study Plan, must be completed and submitted to the Postgraduate Officer. If the student is accepted into the MEngSc (Research) programme, the Postgraduate Officer will inform the Faculty Administrator.

Applications for conversion from the research to the structured master's will be considered only if the student has not submitted a thesis to the examiners. A project supervisor and topic must first be identified, and a new IBE Postgraduate Application Form, including the revised Study Plan, must be completed and submitted to the Postgraduate Officer. If the application is successful, the Postgraduate Officer will inform the Faculty Administrator. Note that students converting to the MEngSc (Structured) will have to do further modules.

8.2 Converting between MEngSc (Research) and PhD

8.2.1 Requirements for upgrades from master's to PhD

The following prerequisites must be met for an upgrade to be considered:

- Upgrades from master's to PhD programmes are only possible from the MEngSc (Research).
- Candidates must be registered for their second or third year of registration for the master's degree when they apply.
- At the time of application, the research work should already contain substantial original material, which is publishable.
- The work completed at the time of application for the upgrade should be of such a high quality that a substantial part of it can form part of a PhD dissertation.
- The scope of the work should be extendable to the expected levels for a PhD.
- The additional work should be of such a nature that it can be completed within 18 months of full-time work.

8.2.2 Procedures for upgrades from master's to PhD

Please request the latest version of the Engineering Faculty's procedures from the Postgraduate Officer.

9 Parttime studies

Parttime students must have access to the Internet, be able to send and receive e-mail, and be able to use a Web browser for their studies. Parttime students must be able to attend lectures and examinations in Stellenbosch. Parttime study in the thesis/dissertation parts of MEngSc (Research) and PhD programmes are only feasible in exceptional circumstances and are subject to the arrangements agreed with the supervisor(s).

To qualify for parttime studies, a student should submit proof of employment. Note that for PhD students, the deadlines for Phase 2 of the PhD admission and selection process (Section 2.2.2) is the same as for fulltime students. Prospective parttime students should therefore be well advanced with the preparation of their research proposals before their first registration in the PhD programme.

A student who registered initially for the degree on a fulltime basis will normally not be allowed to change this registration to a parttime basis.

Note that there is no differentiation regards to tuition fees between fulltime and parttime studies.

10 General rules

Residential MEngSc and PhD students with supervisors in the Engineering Faculty may be required to serve at least four hours per week as student assistants for modules in the undergraduate programmes of the Faculty of Engineering, except in the last semester of the normal duration of the programme.

Plagiarism will not be tolerated at all. Any assessment in which an instance of plagiarism is identified, will be given zero as a mark and the matter will be handled according to the University's policy on plagiarism. Note that self-plagiarism is also unacceptable; this includes unreferenced re-use of one's own articles and previous assignments.

Lecturers may, at their discretion, require students to submit assignments on Turnitin (through SUNLearn).

Verbatim copying of any significant amount of information from any published sources, even with appropriate acknowledgement of the sources, is unacceptable and if found in assignments, the mark for that assessment will be substantially reduced. Students will only be given marks if they have at least interpreted, integrated or applied published work.

Extensions to deadlines for submitting assessments (e.g. assignments) may not exceed one week and may be granted by the relevant lecturer, at his/her sole discretion, if a student applies for it in writing before the original due date and submits valid reasons which indicate exceptional and unforeseen circumstances. Extensions to centrally scheduled assessments, e.g. examinations, will not be granted.

11 Duties of supervisors and students

The duties of the supervisor are:

- To be readily available for appointments with the student, at least 1 hour per fortnight, except when on leave. When the supervisor is on research or study leave, he/she will make arrangements for continued study guidance.
- Give regular guidance and feedback to the student about formulation of objectives, literature, methodology and progress.
- Make arrangements for equipment and operating costs that are required by the student for his/her research, unless the research topic was suggested by the student.
- Require of the student no more than 9 hours per week (averaged over a semester) of work not directly related to his/her coursework and research. The time that the faculty or department requires that a student serves as assistant in modules is included in this total.
- Attempt to provide a workplace for fulltime MEngSc (Research) and PhD students (such as in an office or in a laboratory).

The responsibilities of the student are to:

- Regularly meet with the supervisor in Stellenbosch or online, irrespective of whether a fulltime or parttime, residential or non-residential student.
- Do his/her best to complete the degree programme within the normal duration.

- Repay all bursaries and assistantships that were arranged by the supervisor if the degree programme is not successfully completed.
- If a fulltime student, undertake no parttime work, assistantships or academic activities unrelated to the degree programme, without the express permission of the supervisor, until the programme has been completed.
- If a fulltime student, work at least 60 hours per week on coursework, research and assistantships. If a parttime student, work at least 25 hours per week on coursework and research.
- Use all equipment, instrumentation, experimental set-ups and laboratories with care and good judgement.
- Scrupulously comply with all the terms and conditions set out in this guide, as well as Parts 1 and 11 of the University Calendar.
- Attend the IBE's meetings of postgraduate students, either in-person or online.

Appendix A: Due dates

In addition to the following due dates, the Study Agreement fixes the dates of some events.

Note:

- PGO denotes the Postgraduate Officer
- MEngSc R denotes MEngSc (Research) and MEngSc S denotes MEngSc (Structured)
- All documents intended for the Postgraduate Coordinator must be submitted through the Postgraduate Officer.

• All deadlines are 12:00 noon unless indicated otherwise. • All meetings are in-person unless indicated otherwise. **Pre-graduation Event**	**Action**	**Deadline**
PG Information Meeting: All new PG 1st year registrations (Hybrid)	Attend	12 Feb
Study Agreement	To PGO	29 Feb
Professional Communication 771/871 – all IBE postgrad student in their 1st year of studies	Completed	9 Apr
Research Proposals (all master's students completing the Research Methodology module) – Final pdf document approved by supervisor/s	To PGO	17 May
Examination Procedure Information Session: 2023/2024 (All students submitting in Aug/Sept or Nov 2023)	Attend	1 Aug
PhD Proposal & Executive Summary (Appendix D) Full-time students Part-time students July registrations	 To PGO To PGO To PGO	 31 Jul 30 Aug 29 Feb
Upgrade (MEngSc (Research) to PhD) before examination (on recommendation of supervisor)	To PGO	2 Sep
Progress Assessment for all registered MEngSc R & PhD students not graduating Dec 2023 / March 2024 (Appendix D)	To PGO	31 Oct
Application for re-admission for the following year (only students in final concessional year)	To PGO	2 Dec

December Graduation 2024		
PhD dissertation submission to examiners	To PGO	12-15 Aug
MEngSc R thesis & MEngSc S RA submission to examiners	To PGO	9-12 Sept
PhD oral dates (please make sure you are available on all days)	Attend	1-3 Oct
MEngSc R oral dates (please make sure you are available on all 4 days)	Attend	28-31 Oct
Thesis/dissertation examined and approved for SUNScholar	To PGO	15 Nov
March/April Graduation 2025		
PhD dissertation submission to examiners	To PGO	4-7 Nov
MEngSc R thesis & MEngSc S RA submission to examiners	To PGO	11-14 Nov
PhD oral dates (please make sure you are available on all days)	Attend	TBC*
MEngSc R oral dates (please make sure you are available on all 5 days)	Attend	TBC*
Thesis/dissertation examined and approved for SUNScholar	To PGO	18 Nov
(Alternative days for MEngSc R students in case of delays experienced with feedback from examiners)	Attend	TBC*
Graduation Ceremonies 2024 / 2025:		
March 2024 (week of 25-28 March)		28 March @ 13:00
December 2024 (week of 9-13 December)		TBC*
March 2025		TBC*

Graduation info: SU website

* TBC – please keep an eye on updated versions of the study guide.

Appendix B: Study Agreement template

Institute for Biomedical Engineering
Stellenbosch University
Study Agreement for Postgraduate Study (ALL 1st yr MEngSc Research & PhD students)

1. Particulars of Student:

1.1. Initials and Surname: _____

1.2. Student number: _____

2. Supervisor: _____

3. Programme: _____

4. Thesis/Dissertation topic: _____

5. Start date of study: _____

6. Date that thesis/research proposal is to be submitted:

_____

7. Planned completion date of programme: _____

8. Responsibilities:

Once the thesis/research proposal has been accepted by the Postgraduate Coordinator/Faculty Board, it will be part of the study agreement.

8.1. Responsibilities of the Supervisor

The supervisor agrees to:

8.1.1. To be readily available for appointments with the student, typically _ hour per _____, except when on leave. When the supervisor is on research or study leave, he/she will make arrangements for continued study guidance.

8.1.2. Give regular guidance and feedback about formulation of objectives, literature, methodology and progress.

8.1.3. Arrange financing for equipment and operating costs that is needed by the student for his/her research.

8.1.4. Attempt to arrange bursaries and assistantships to the amount of _____ per year made available in ___ instalments for ___ years for the student, subject to acceptable progress of the student to complete the degree in the allocated time (two years for a Master's degree and three years for a Doctoral degree). This amount excludes any other bursaries or scholarships received during that year (such as bursaries from the University, Faculty, Department, NRF, Harry Crossley fund etc.). These additional bursaries will be monitored by the supervisor(s) in order for the total bursary amount paid to the student to not exceed _____ per annum. This bursary amount arranged by the supervisor may be revised by the supervisor if the student receives other bursaries.

8.1.5. Require no more than 9 hours of work per week not related to this programme (time for one student assistantship of 4 hours per week forms part of these hours).

8.1.6. Attempt to provide a workplace for the student in an office or in a laboratory.

8.2 Responsibilities of the student

The student agrees to:

8.2.1. Do his/her best to finish this study programme in _____ years.

8.2.2. Repay all bursaries and assistantships that were arranged by the supervisor and costs incurred by the Department, with interest accrued at the prime interest rate if the agreed upon study programme was not completed successfully within the maximum registration period allowed by the Faculty of Engineering for the programme. The repayment will be completed within two years of the last day of registration in the programme.

8.2.3. Until the completion of the programme in paragraph 3:

- ✧ Not accept bursaries without the permission of the supervisor except university awarded merit bursaries. All bursaries must be reported to the supervisor as soon as they are awarded, including the amount of said bursaries. This restriction will apply to all bursaries from the National Research Foundation, employers such as Eskom and SASOL, and bursaries from trusts or other donor agencies.
- ✧ Undertake no part/full time work, assistantships, or modules without the prior permission of the supervisor, which must be applied for in writing.
- ✧ Not change the study plan without the permission of the supervisor. If the student wants to change programme or research project he/she must apply in writing to do so and may forfeit the bursary if it is decided that the new programme/ project is no longer part of the focus of the supervisor or grant.
- ✧ Be at his/her office from _____ to _____ and from _____ to _____ every workday, unless arranged otherwise with the supervisor, and to take no more than_____ workdays vacation per year.
- ✧ Work ____ hours per week on coursework, research, and assistantships.
- ✧ Remain a full-time student for the entire academic year in which bursary is received. If the degree is completed midway through the year, only ___ % of the values of the bursary will be received from it. The supervisor must be informed of any change in the status of registration.
- ✧ Use all equipment, instrumentation, experimental set-ups and laboratories with care and good judgement.
- ✧ Scrupulously comply with all the terms and conditions set out in the Study Guide for the postgraduate programme, as well as Parts 1 and 11 of the University Calendar.
- ✧ Assist with demonstrations associated with the lab's funding support, as well as for the Faculty's Winter week and Open Days.
- ✧ Comply with the Department's requirements for service by postgraduate students (e.g. student assistantships).

8.2.4 Submit at least ___ manuscript(s) for publication, which should meet the approval of the supervisor(s), or be acceptable for publication in the proceedings of an international/national conference within 24 months of study,

and/or

submit at least ___ manuscript(s) for publication within 24 months of study, which should meet the approval of the supervisor(s), and are acceptable for submission for publication in an international journal.

8.2.5 Provide the supervisor with the final draft of his/her thesis/dissertation (which has been thoroughly checked using spell checker and grammar checker software) at least **6 weeks** before the intended date for submission to the examiners.

8.2.6 **Code of Conduct** guiding the relationship between the supervisor and student – General Calendar Part 1 – 2024 (p.72)

9. Signatures:

Student _____ **Date** _____

Supervisor _____ **Date** _____

PG Coordinator _____ **Date** _____

Institute for Biomedical Engineering
Stellenbosch University
Study Agreement for Postgraduate Study (ALL 1st Yr MEngSc Structured students)

1. Particulars of Student:

1.1. Initials and Surname: _____

1.2. Student number: _____

2. Supervisor: _____

3. Programme: _____

4. Research Assignment Topic: _____

_____

_____

5. Start date of study: _____

6. Date that research assignment proposal is to be submitted: _____

_____

7. Planned completion date of programme: _____

8. Responsibilities:

Once the research assignment proposal has been accepted by the Postgraduate Coordinator, it will be part of the study agreement.

8.1. Responsibilities of the Supervisor

The supervisor agrees to:

8.1.1. To be readily available for appointments with the student, typically _ hour per _____, except when on leave. When the supervisor is on research or study leave, he/she will make arrangements for continued study guidance.

8.1.2. Give regular guidance and feedback about formulation of objectives, literature, methodology and progress.

8.1.3. Arrange financing for equipment and operating costs that is needed by the student for his/her research.

8.1.4. Attempt to arrange bursaries and assistantships to the amount of _____ per year made available in ___ instalments for ___ years for the student, subject to acceptable progress of the student to complete the degree in the allocated time (one year for a Structured Master's degree). This amount excludes any other bursaries or scholarships received during that year (such as bursaries from the University, Faculty, Department, NRF, Harry Crossley fund etc.). These additional bursaries will be monitored by the supervisor(s) in order for the total bursary amount paid to the student to not exceed _____ per annum. This bursary amount arranged by the supervisor may be revised by the supervisor if the student receives other bursaries.

8.1.5. Require no more than 9 hours of work per week not related to this programme (time for one student assistantship of 4 hours per week forms part of these hours).

8.1.6. Attempt to provide a workplace for the student in an office or in a laboratory.

8.2 Responsibilities of the student

The student agrees to:

8.2.1. Do his/her best to finish this study programme in _____ year/s.

8.2.2. Repay all bursaries and assistantships that were arranged by the supervisor and costs incurred by the Department, with interest accrued at the prime interest rate if the agreed upon study programme was not completed successfully within the maximum registration period allowed by the Faculty of Engineering for the programme. The repayment will be completed within two years of the last day of registration in the programme.

8.2.3. Until the completion of the programme in paragraph 3:

- ✧ Not accept bursaries without the permission of the supervisor except university awarded merit bursaries. All bursaries must be reported to the supervisor as soon as they are awarded, including the amount of said bursaries. This restriction will apply to all bursaries from the National Research Foundation, employers such as Eskom and SASOL, and bursaries from trusts or other donor agencies.
- ✧ Undertake no part/full-time work, assistantships, or modules without the prior permission of the supervisor, which must be applied for in writing.
- ✧ Not change the study plan without the permission of the supervisor. If the student wants to change programme or research project he/she must apply in writing to do so and may forfeit the bursary if it is decided that the new programme/ project is no longer part of the focus of the supervisor or grant.
- ✧ Be at his/her office from _____ to _____ and from _____ to _____ every workday, unless arranged otherwise with the supervisor, and to take no more than_____ workdays vacation per year.
- ✧ Work ____ hours per week on coursework, research, and assistantships.
- ✧ Remain a full-time student for the entire academic year in which bursary is received. If the degree is completed midway through the year, only ___ % of the values of the bursary will be received from it. The supervisor must be informed of any change in the status of registration.
- ✧ Use all equipment, instrumentation, experimental set-ups and laboratories with care and good judgement.
- ✧ Scrupulously comply with all the terms and conditions set out in the Study Guide for the postgraduate programme, as well as Parts 1 and 11 of the University Calendar.
- ✧ Assist with demonstrations associated with the lab's funding support, as well as for the Faculty's Winter week and Open Days.
- ✧ Comply with the Department's requirements for service by postgraduate students (e.g. student assistantships).

8.2.4 Provide the supervisor with the final draft of his/her research assignment (which has been thoroughly checked using spell checker and grammar checker software) at least **6 weeks** before the intended date for submission to the examiners.

8.2.5 **Code of Conduct** guiding the relationship between the supervisor and student – General Calendar Part 1 – 2024 (p.72)

9. Signatures:

Student _____ **Date** _____

Supervisor _____ **Date** _____

PG Coordinator _____ **Date** _____

Appendix C: Progress Assessment Report template

Institute for Biomedical Engineering

POSTGRADUATE STUDENT PROGRESS REPORT

(MEngSc Research & PhD students not graduating December, or March of the following year)

The purpose of this report is for you to reflect on your work, your supervision and the resources available. Please answer it honestly as notification of problems will be viewed as a request for assistance and will help the Department to address the needs of postgraduate students.

a. *Please complete Sections 1 and 2 and submit these to the Postgraduate Officer (PGO) directly.*
b. *Fill in your name and your supervisor's name in Section 3 and ask your supervisor to complete this. The written report (mentioned in Section 2B) as well as Section 3 should be handed to your supervisor **at least a week before** the actual deadline of 31 October – please communicate the deadline to him/her by when these documents should be submitted on a OneDrive link received from the PGO.*
c. *Completion of the annual report is essential for your continued enrolment.*
d. *Always use the **latest** template from the study guide.*

1. PERSONAL DETAILS

Name ..... **Student No**. .....

Address.....

Telephone No. (Office) ..... **Mobile no:** .....

Thesis Title .....

.....

Supervisor(s) .....

Degree programme: MEng Research / ☐ ..... PhD ☐

Current Registration: Full time ☐ **.....** Part time ☐

Commencement Date (1st yr) ..... **Expected Completion Date** .....

2A. STUDENT'S COMMENTS

2.1. Has your study plan been submitted AND accepted? Yes ☐ No ☐

2.2. Has your thesis proposal been submitted AND accepted? Yes ☐ No ☐ n/a ☐

2.3. How many modules have you completed to date? .....

2.4. How many modules do you still have to complete? .....

2.5. How often do you consult with your supervisor(s)? Daily ☐ Weekly ☐ Monthly ☐ Other ☐
To what extent has this met your needs?

.....

2.6. Have you presented your work in any formal departmental, university or outside forum in the last year?
Give broad details (e.g. departmental seminar, paper to national conference, etc.) Yes ☐ No ☐

.....

2.7. Have you submitted any work for publication in the last year? Yes ☐ No ☐

2.8. Would you like additional help in language / writing / communications skills? Yes ☐ No ☐

Please elaborate .....

2.9. Does the department provide all necessary facilities for your research? Yes ☐ No ☐

2.10. **In your view**:

	Strongly Disagree				***Strongly Agree***
You have diligently and effectively applied yourself to your project.	1	2	3	4	5
You have shown initiative consistent with the requirements of the research programme/course and level of study.	1	2	3	4	5
You have made satisfactory progress throughout the year.	1	2	3	4	5
You have shown that you will be able to complete the research programme by the due date.	1	2	3	4	5
You have made satisfactory progress in writing your thesis/dissertation	1	2	3	4	5
The scope of the project has been sufficiently outlined.	1	2	3	4	5
Your supervisor exhibits the required expertise to support you during this project.	1	2	3	4	5
Your supervisor has provided reasonable guidance.	1	2	3	4	5
You expect to complete by the date indicated in section 1.	1	2	3	4	5

If you have circled a 3 or lower, please elaborate in a separate document and add it to Sec 2A

2.11. Have there been any difficulties affecting the progress of your work? Yes ☐ No ☐
If yes, have any of the following problems significantly limited your progress over the past year?

☐ Academic background
☐ Settling in
☐ Experimentation
☐ Communication with people
☐ Mechanical failures/Long deliveries
☐ Employment commitments
☐ Language
☐ Access to books/equipment
☐ Understanding work expected
☐ Health/Personal
☐ Financial
☐ Other commitments

If any boxes have been marked, please indicate in your report (Section 2B) what steps you have taken or will take to help overcome these problems.

2B – REPORT ON RESEARCH PROGRAM

Please attach a report (maximum of 4 pages) on your research progress to date.
This report should be signed by your supervisor.

Please make sure to include:

- A statement of the problem that is to be addressed.
- The overall research work plan (start to finish). This should include a revised Gantt Chart based on real progress, as well as the original (Study plan) Gantt Chart.
- A short summary of results to date.
- The work still to be completed.
- Comments on aspects indicated above.
- How far you have proceeded in writing your thesis.

2C – SIGNATURE

I have witnessed the completed entries above, and I also confirm that I have complied with the University's Code of Conduct for Research.

Name *(Print)*…… ***Signature***…… ***Date***……

Advice to Students:

Please remember that throughout your candidature you can expect support and guidance to be readily at hand in your Department or Faculty. If problems arise it is appropriate that you consult with your supervisor and then, if necessary, the Postgraduate Coordinator, Departmental Chairman or Dean.

3. SUPERVISOR'S COMMENTS

Student Name .....

Supervisor .....

3.1. Are supervision arrangements for the student finalised for the whole of the coming year? Yes ☐ No ☐

3.2. How often do you consult with your student? Daily ☐ Weekly ☐ Monthly ☐ Other ☐

3.3. Are you satisfied with the frequency of consultation with the student? Yes ☐ No ☐

3.4. Is the department able to provide all necessary facilities for the student's research during the coming year? Yes ☐ No ☐

3.5. In your view:	***Strongly Disagree***				***Strongly Agree***
The student has diligently and effectively applied him/her to his/her project.	1	2	3	4	5
The student has shown initiative consistent with the requirements of the research program/course and level of study.	1	2	3	4	5
The student has made satisfactory progress throughout the year.	1	2	3	4	5
The student has shown that he/she will be able to complete the research programme by the due date.	1	2	3	4	5
The student has made satisfactory progress in writing his/her thesis/dissertation	1	2	3	4	5
The scope of the project has been sufficiently outlined.	1	2	3	4	5
You exhibit the required expertise to support the student during this project.	1	2	3	4	5
You have provided reasonable guidance.	1	2	3	4	5
You expect the student to complete by the date indicated in section 1.	1	2	3	4	5

If you have circled a 3 or lower, please elaborate:

.....

3.6. Have any of the following problems significantly limited the student's progress over the past year?

☐ Academic background
☐ Settling in
☐ Experimentation
☐ Communication with people
☐ Mechanical failures/Long deliveries
☐ Employment commitments
☐ Language
☐ Access to books/equipment
☐ Understanding work expected
☐ Health/Personal
☐ Financial
☐ Other commitments

If any boxes have been marked, please indicate what steps have been taken or will be taken to help overcome these problems.

.....

.....

If you have answered no to any of the above questions, please elaborate (use additional sheet if necessary).

3B – SIGNATURE

I have witnessed the completed entries above, and I also confirm that the research is conducted in compliance with the University's Code of Conduct for Research.

Name (Print) ..... **Signature** ..... **Date** .....

NB: Please submit the completed report (Section 3) & the signed (by supervisor) written report of the student on a OneDrive link provided by the PGO in time.

Appendix D: PhD Research Proposal & Executive Summary

A large number of research proposals are considered by the Faculty Board and using a common structure will help those involved to productively review the proposals. PhD candidates must therefore use the following structure for their research proposals that are prepared for consideration by the Candidature Panel. This structure is aimed at giving the candidates a clear framework of what the Candidature Panel expects. The instructions provided for each section must be adhered to. Proposals that do not adhere to the instructions will be returned to students and the associated delay may cause the student's registration to lapse.

D.1 Research Proposal

The Research Proposal must be developed in consultation with the supervisor(s). It is limited to 30 pages in length and must contain at least the following information:

- A descriptive title.
- An exposition of the literature relevant to the proposed PhD study, as well as a synthesis and assessment of the most important themes found in the literature.
- A clear explanation of the objectives of the study, with particular reference to how it corresponds to already published work and what the expected original contribution of the study will be.
- A description of the research methodology that will achieve the stated objectives.
- A broad time framework for the study, typically in terms of 4 to 10 activities, and a brief description of the main focus of each activity. A Gantt chart should be included.
- A clear explanation of the resources, infrastructure and equipment (including software, equipment, laboratories, operating costs, etc.) that will be required to complete the study, as well as arrangements that have been made to ensure that the it will indeed be available.
- A critical self-evaluation of the student's progress to date.

D.2 Executive Summary

A document, no longer than 600 words, summarizing the Research Proposal, and prepared by the student in consultation with the supervisor(s). The executive summary must be completed on the Engineering Faculty's template (which can be obtained from the Postgraduate Officer). The following information must be contained in the document:

- The title of the research project.
- Name of the student.
- Name of the supervisor(s).
- A brief description of the research project, as well as the aims.
- The anticipated unique research contribution(s) of the study, the titles of the envisaged papers and to which journals they could be submitted.
- A broad time framework for the study, typically in terms of 4 to 10 activities.
- In the case of an upgrade, a summary of the work that has been completed and what is still required, and a detailed time schedule of work still to be performed.

D.3 Evaluation criteria for PhD research proposals

The Candidature Panel evaluates the proposal based on the following criteria:

- The candidate has satisfactorily demonstrated background knowledge appropriate for the study.
- The candidate has satisfactorily demonstrated research capabilities appropriate for the study.
- Satisfactory expected original contributions are explained in the research proposal.
- A satisfactory exposition of the literature relevant to the PhD studies, as well as a synthesis and evaluation of the most important themes found in the literature, are given in the research proposal.
- The research methodology, aligned with the study's objectives in the research proposal, is satisfactory.
- The research proposal gives a broad time schedule for the study (typically in terms of 4 to 10 activities, with a short description of the focus of each) that is reasonable.
- The research proposal gives a clear explanation of the infrastructure (software, equipment, laboratories, operating costs, etc.) necessary to complete the study, as well as reasonable arrangements to provide it.
- The critical self-evaluation by the student of progress made to date and of his/her research capabilities given in the research proposal is satisfactory.
- The supervisor and co-supervisor(s) (if applicable) have expertise appropriate for the study.

Appendix E: Topic Proposals for Structured Masters

Students must choose a biomedical engineering (BE) problem/product to research using an engineering design methodology. In the project, a BE problem must be researched, and a product proposed to solve this problem. The product can be e.g., a physical artefact, process, programme, a device to test something in a laboratory, or system. A systematic product design approach must be followed. Ultimately, through this research, the student must show that the product has a reasonable chance of success by addressing various aspect of the biomedical engineering design process. The final project deliverable can vary significantly and does not exclude analytical or numerical models, software, virtual models or virtual prototypes. The emphasis here is on following a systematic design process.

Students should choose a topic that is in line with their prior academic experience since the project must demonstrate technical depth.

The scope and complexity of the problem must be sufficient to address all the outcomes, credit load and NQF level of this module. Topics will be vetted by the supervisor and the IBE programme coordinator, based on a one-page project proposal (see next section) by the student.

The project will address the following aspects of the design process (the sequence may vary):

- Research the problem and existing technology to address it. This will include a significant literature review.
- Market research and technology readiness
- Product development
    - Specification development: Must be on system engineering level and must include the entire product life cycle.
    - Concept development
    - Scientific testing: This may include developing a physical model, simulations, mathematical modelling, theoretical modelling, experimental investigations, or similar scientific methods. Depending on the scope and needs of the project, various aspects of the product may be investigated: e.g. how it physically works, life cycle modelling, cost modelling, manufacturing, etc.
    - Concept selection
    - Detail design: This may include further modelling. It may include prototyping. The design must be developed to the point that it can be objectively evaluated against the project goals and product specifications. The entire product life cycle should be considered.
- Ethical approval roadmap. (If relevant.) Identify the required bodies for ethical approval of the product, through its different life cycle stages, bearing in mind the target market (national/international/demographics). Identify and explain how the various requirements for ethical approval may be addressed. This is typically the highlights of an ethics application. This includes, but it not limited to, issues of data security, data analysis, safety, etc.
- Regulatory approval roadmap. (If relevant.) Similar to the ethical approval roadmap, but now related to the regulatory body(ies) that must approve or certify the product.
- Techno-economic analysis: The minimum requirement is a cost analysis of the project, but depending on the scope of the project, it may be expended to include further aspects of the product development.

E.1 One Page Project Proposal

Initials		**Surname**		**SU Number**	
Prior Academic Qualifications					
Project Title					
Problem Description (150 words max.)					
Technical Areas (Provide up to 5 keywords describing the technical areas underpinning the proposed project. Keywords must come from both biomedical and engineering areas to demonstrate multidisciplinary nature of the project. See next pages for example keywords.)					
Prior and New Academic Experience Knowledge (Briefly state how the project will build on your prior academic knowledge, and what new knowledge you expect to need)					
Final Deliverable (What do you plan to deliver in terms of a product demonstrator by the end of the project? This is not limited to a physical product. It can be a simulation, or a model, or a virtual prototype, etc.)					
Facility Requirements (List all major equipment and facilities that will be needed, incl., labs and software)					
Do you expect to use data from, or do tests on, humans, societies or animals?				**Yes**	**No**
Other Requirements or Pertinent Information (List anything that your supervisor should know up front about the project, e.g., if the project will be done with/for a third party, any intellectual property concerns, if you are studying part time, etc.)					

The lists below give some examples of keywords that can be used in the "Technical Areas" field in the One Page Project Proposal. Note, keywords must come from both the biomedical and engineering areas.

Biomedical		**Engineering**	
Orthopaedics	Cancer treatment	Fluid dynamics	Image processing
Psychiatry	Cancer diagnostics	Structural analyses	Machine learning
Dental	Biokinetics	Manufacturing	Electronics
Posture analysis	Ophthalmology	Materials	Signal processing
Physiotherapy	Heart valve	Control systems	Systems engineering

E.2 Marking Rubric for Final Report

The marking rubric for the final report is given on the next page. The first column lists all the project outcomes that must be demonstrated.

Note that there is a subminimum (3/10) on each outcome in the rubric. This means that if a mark of 2/10, or less, is achieved for any of the outcomes, the final mark for this module must be 45 or less.

The intention of the outcomes is that each project must have a similar biomedical engineering design character that will normally include all the outcomes covered in the rubric. However, if during the course of the project it becomes apparent that the topic has evolved in such a way that it will no longer be possible to meet all the outcomes, the supervisor may apply for an exemption to the IBE programme coordinator. The IBE programme coordinator, with the IBE management committee, may grant an exemption if the motivation is acceptable.

Student demonstrated[+] an ability to:	**Fail**					**Pass**			**Distinction**		
Review literature that is current, comprehensive, systematic and relevant. Literature covers biomedical and engineering fields.	There are significant gaps in the review, or the review is incoherent, or reasonable insight is not demonstrated. Not interdisciplinary.					Recent research, relevant to the project, from reputable sources was critically and systematically reviewed. Covers both fields.			The review is either very comprehensive, or novel insights are drawn, or very well critiqued.		
	0	1	2	3	4	5	6	7	8	9	10
Apply interdisciplinary knowledge. Complexity is on par with a honours level module. Integration should be at masters level.	Basic knowledge was used, but incorrectly, or lacking technical depth, or not interdisciplinary. No coherent and/or critical application of knowledge.					Technical knowledge integrated at masters level. Complexity on par with honours level module. Coherent and critical application of the fundamental principles and theory.			Knowledge was applied to the problem in an innovative or advanced way, or interdisciplinary knowledge and/or integration is advanced.		
	0	1	2	3	4	5	6	7	8	9	10
Do biomedical engineering **design** of a product* with product life cycle and cost in mind (with focus on the development phase).	An attempt was made to design something, but the result was not of significant value. Important life cycle issues omitted, or unsatisfactorily addressed.					Alternatives were judiciously considered. Design was approached systematically. Project's result is useful and utilises know-ledge from the applicable areas. Product* life cycle and cost adequately addressed.			The product* can be used as is, has been thoroughly completed and/or is of significant practical or research value. The design is complex/innovative/advanced.		
	0	1	2	3	4	5	6	7	8	9	10
Do a biomedical engineering **product* life cycle analysis** (Focus on the development phases. Should include, if relevant, regulations, ethical concerns, and a business plan)	Important life cycle issues omitted, or unsatisfactorily addressed.					Pertinent product* life cycle issues were identified and addressed in the project			Innovative solutions were implemented to address product* life cycle issues, or a comprehensive plan is available to mitigate the identified issues.		
	0	1	2	3	4	5	6	7	8	9	10
Communicate technical work professionally (Written and oral. Page limit on report is 60 pages from Introduction to Conclusion. Oral is 20 min.)	Objectives, problem statement, scope or content of the project not clearly communicated, or oral presentations or report is not of a professional standard.					Communication was clear and understandable. Oral presentation and report are professional. Structure, style, and language follow scientific writing standards.			A large volume of work is concisely explained. Difficult concepts are understandable at first reading. The material is compiled systematically. Arguments flow logically.		
	0	1	2	3	4	5	6	7	8	9	10
Do individual research (after consultation with the supervisor)	A significant part of the project objectives was not achieved due to, e.g., poor planning, time management, or interaction with co-workers. A lot of supervision was required.					The work was focussed on the objectives, methodical and well planned. Conclusions are well justified. Moderate supervision was required.			The student showed initiative and generated innovative ideas that improved the project's results beyond the original objectives. Student required little supervision.		
	0	1	2	3	4	5	6	7	8	9	10

All outcomes achieved with at least 3/10?	No	Yes	Total out of 60:		× 100/60:	%

*A "**product**" can be e.g., a physical artefact, process, programme, or system.

[+]All outcomes (first column) must achieve at least 3/10 in order to pass the project.