ASIIN Seal & EUR-ACE® Label

Accreditation Report

Master's Degree Programmes
Biomedical Engineering
Chemical Engineering

Provided by
University of Melbourne

Version: 22 September 2023

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Master of Biomedical Engineering	n/a	ASIIN, EUR-ACE® Label	ASIIN, 24.10.2016 – 30.09.23	01, 10
Master of Chemical Engineering	n/a	ASIIN, EUR-ACE® Label	ASIIN, 24.10.2016 – 30.09.2023	01, 09
Date of the contract: 25.08.2022 **Submission of the final version of the Self-Assessment Report:** 30.05.2023 **Date of the audit:** 12.07. – 13.07.2023 **At:** The University of Melbourne, Melbourne Connect Building, Faculty of Engineering and Information Technology				
Peer panel: Prof. Dr.-Ing Jens Hartung, University Kaiserslautern Prof. Dr. Karl-Herbert Schäfer, University of Applied Sciences Kaiserslautern Russell Scott, Consultant and former President of IChemE Chelsea Clements, Queensland University of Technology, Student Representative				
Representative of the ASIIN headquarter: Dr. Iring Wasser				
Responsible decision-making committee: Accreditation Commission for Degree Programs				
Criteria used: European Standards and Guidelines as of 15.05.2015				

[1] ASIIN Seal for degree programs; EUR-ACE® Label: European Label for Engineering Programs;

[2] TC: Technical Committee for the following subject areas: TC 01 – Mechanical Engineering/Process Engineering; TC 09 – Chemistry; TC 10 – Life Sciences

ASIIN General Criteria as of 28.03.2023 Subject-Specific-Criteria of the Technical Committee 01 Mechanical/Process Engineering as of 16.03.2021, the Technical Committee 09 Chemistry, Pharmacy as of 29.03.2019 as well as the Technical Committee 10 Life Sciences as of 28.06.2019 EUR-ACE® Framework Standards and Guidelines, 2021	

B Characteristics of the Degree Program

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Master of Biomedical Engineering	Master	Business	EQF Level 7	Full time or part time; on campus	No	3 years or 6 Semesters (full time)	300 Credit Points	First intake late February 2022. Previously known as Master of Engineering (Biomedical) and Master of Engineering (biomedical with Business)
Master of Chemical Engineering	Master	(i) Business (ii) Materials and Minerals (iii) Sustainability and Environment	EQF Level 7	Full time or part time; on campus	No	3 years or 6 Semesters (full time)	300 Credit Points	First intake February 2022. Previously known as Master of Engineering (Chemical) and Master of Engineering (Chemical with Business)

[3] EQF = The European Qualifications Framework for lifelong learning

The ASIIN experts acknowledge and consider the contextual framework within which the two Master's degree programs under review are offered:

The University of Melbourne was founded in 1853. It has 11 faculties and offers over 600 undergraduate and graduate degree programs. The University has a student population of 54,400, out of which 40% are international students. It is ranked as the 34th university globally and holds the top position in Australia according to THE (Times Higher Education) 2023 Ranking.

The Faculty of Engineering and Information Technology (FEIT) is one of the largest faculties at the University of Melbourne, with over 10,000 students enrolled in undergraduate and postgraduate programs, about one-third being international students. The faculty is organised into three schools: the School of Chemical and Biomedical Engineering (CBE), which houses the Master of Biomedical and the Master of Chemical Engineering, the School of Computing and Information Systems (CIS) and the School of Electrical, Mechanical, and Infrastructure Engineering (EMI).

Each school offers a range of undergraduate and postgraduate programs in engineering and information technology. The student distribution at FEIT is 48% Bachelor's, 47% Master's, and 5% PhD. 33% of the students are female, reflecting efforts to promote gender diversity and inclusion in engineering and information technology.

According to FEIT's 2025 strategy, the Faculty of Engineering and Information Technology has seen significant growth over the last five years, particularly in its student population, primarily from international students. In continuation of this, FEIT aims to attract a diverse student body. The focus areas for 2025 include artificial intelligence (AI), data science and robotics, smart and sustainable development, health technologies, and defence technologies.

In 2008, the University of Melbourne introduced a new degree structure called the "Melbourne Model". This model aims to innovate the traditional undergraduate degree structures in Australia by emphasising breadth over depth, allowing students to customise their degrees, transfer between majors, and take subjects from other disciplines. The flexibility of this model is intended to enable students to adapt their studies according to their abilities and goals.

As regards the **Master's degree program in Biomedical Engineering**, the University presents the following profile on its website:

"The Master of Biomedical Engineering is an entry-to-practice degree that provides students with the necessary knowledge and skills to enter the international workplace as biomedical engineers. Graduates are skilled in biomedical engineering principles and have the ability to apply these skills to complex, open-ended engineering tasks and problems.

Within the degree, students acquire core skills in the areas of biomechanics, biomaterials, biomedical imaging, bioinstrumentation, biosignal processing, biofluid mechanics, bioengineering data analytics, and bioengineering management and regulations. Students will also be able to focus on key discipline areas that include biomechanical engineering, bioinformatics, neuroengineering and tissue engineering.

The degree culminates in a major design and/or research project subject. Students have the opportunity to participate in overseas study, industry-based projects and supervised research.

Students in the Master program can opt for a specialisation in "Business", where students can study tailored business subjects developed in partnership with Melbourne Business School, covering how economics, marketing and finance relate to engineering.

The degree program **Master of Chemical Engineering** is characterized as follows:

The **Master of Chemical Engineering** program is designed to provide students with a formal qualification in engineering at the Master´s level. Chemical engineers invent, design and implement processes through which raw materials are converted into valuable products, such as petrol, power, ceramics, plastics, food additives and pharmaceuticals.

The program promotes development of practical, laboratory-based skills, combined with expertise in computing and simulation. Students develop their expertise under the guidance of staff known internationally for their research in areas such nanotechnology, bioremediation and solvent extraction. Students have the opportunity to complete an industry project in conjunction with a relevant industry partner. Students can choose among various specialisations, including

"**Business",** see above.

"Materials and Minerals", in the framework of which students explore the technologies that underpin all aspects of society (including particle technology) in preparation for a career in materials production or mineral processing or "

“Sustainability and environment”, in which students develop the chemical and biochemical engineering expertise to address environmental challenges and to produce the sustainable fuels, foods and chemicals of the future.

C Accreditation Report for the ASIIN Seal[4]

1. The Degree Program: Concept, content & implementation

Criterion 1.1 Objectives and learning outcomes of a degree program (intended qualifications profile)

Evidence:

- University of Melbourne, Melbourne School of Engineering, Self-assessment for the ASIIN-Seal Chapter 1.
- Master of Biochemical Engineering: https://biochemcal.eng.unimelb.edu.au/study
- Master of Chemical Engineering: https://chemical.eng.unimelb.edu.au/study
- Objectives-Module-Matrices as part of self-assessment report
- Discussions with faculty management, teaching staff, students, graduates and employers during on-site visit.

Preliminary assessment and analysis of the peers

The University of Melbourne seeks accreditation for the **Master of Biomedical Engineering as well as the Master of Chemical Engineering without specialisation and with specialisations**, namely the specialization "**Business"** in both programs and in addition "**Materials and Minerals" as well as "Sustainability and Environment"** for the second Master.

The objectives and learning outcomes of the program were analysed by the experts based on the descriptions in the Self-Assessment Report and several supporting documents, such as the Student Handbooks, the subject descriptions and by an extensive course-level mapping provided by the Faculty. The program profile is also presented on the respective website.

The two Master's programs under review can be studied full-time or part-time study on campus. They are 2–3 year degree programs (full-time), depending on the student's prior study, and requires the successful completion of 300 credit points. The intended learning outcomes (CLOs) are developed based on the program objectives, adaptions arising from a systematic feedback loop involving stakeholders, teaching and professional staff, current students, alumni, and industry representatives. CLOs align with the Australian Qualification

[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

Framework Level 9 and aim to meet and exceed Engineers Australia's Stage 1 Competencies.

For the **Master in Biomedical Engineering**, the following ten graduate learning outcomes on completion of this programme are formulated:

- Acquired knowledge and practice in medical technologies, health informatics and healthcare that has societal and economic impact through innovation, translation and commercialization;
- Gained knowledge and practice in the design and operation of devices and processes, and the application of engineering skills to new medical treatments, instruments and machines;
- Acquired knowledge and practice in anatomy and physiology, biomechanics, biofluid mechanics, biomaterials, electronic circuits, bioinstrumentation, and biomedical engineering regulation;
- Acquired knowledge and practice in advanced biomedical engineering topics which might include computational biomechanics, medical imaging, neural information processing, computational genomics, tissue and soft matter engineering, and systems and synthetic biology;
- Developed problem solving and trouble shooting skills that may be applied in professional practice;
- Gained knowledge and practice in biomedical engineering management including economics, intellectual property, ethics, regulation, and the law as it applies to the biomedical engineering profession;
- Acquired the ability to complete a piece of original research either within an industrial setting or in a laboratory, involving the collection of data, its quantitative analysis and interpretation.
- Developed effective verbal and written communication skills that enable a meaningful contribution to the biomedical engineering community and broader society;
- Developed effective team membership and leadership skills
- Epitomized professional ethical behavior and responsibilities towards the profession and community, including having positive and responsible approaches to personal safety, management of information and professional integrity.

For the **Master of Chemical Engineering**, the following ten graduate learning outcomes on completion of this programme are formulated:

- Gained knowledge and practice in chemical engineering fields of material and energy balances, fluid mechanics, momentum, heat and mass transport, reaction engineering, separation processes, process dynamics and control, bioprocess engineering and process equipment design;
- Gained knowledge and practice in advanced chemical engineering topics which might include particles processing and handling, advanced thermodynamics, computational fluid dynamics, minerals processing, materials, and carbon capture and storage;
- The capacity to apply their knowledge to analyse and design chemical engineering products, processes, and processing facilities and procedures;
- Have developed problem solving and trouble shooting skills that may be applied in professional practice
- Demonstrated proficiency over established and emerging engineering methods and tools to solve practical engineering problems;
- Understood the basic principles underlying the management of physical, human, and financial resource;
- Undertaken a piece of original research either within an industrial setting or in a laboratory, involving the collection of data, its objective analysis and interpretation;
- Effective verbal and written communication skills that enable them to make a meaningful contribution to the changes facing society;
- The capacity to be conversant with important issues relevant to sectors influenced by chemical engineering, such as the sustainability of resources, the efficient operation of all processes, the rise of automation and intelligent processes, and privacy and security in the age of the internet, and
- Epitomized professional ethical behaviour and responsibilities towards their profession and the community, including having positive and responsible approaches to sustainable development, process and personal safety, management of information and professional integrity.

The expert team appreciates that the Faculty has engaged in extensive internal exercises, mapping these learning outcomes to the various subjects (in the ASIIN terminology modules) offered in the two Master programs.

The Faculty in addition provides as part of the Self-Assessment report an extensive "objectives-module matrix", in which the ASIIN Subject Specific Supplementary Notes/the "EUR-ACE" criteria of the European Network for the Accreditation of Engineering Education (ENAEE) are meticulously mapped.

The expert panel acknowledges that the Faculty has taken the suggestions that were made in last accreditation 5 years ago seriously and commend the members of the Faculty on the analytical effort in presenting convincing learning outcomes for the programs under review. The EUR-ACE criteria/ASIIN Subject-Specific Criteria in its various categories (knowledge and understanding, engineering analysis, engineering design, investigation and assessment, engineering practice as well as transferable skills) are well worked out and reflected in the curricula.

The category ***Knowledge and Understanding*** requires that Master graduates at the engineering school in Melbourne have acquired extensive advanced knowledge of mathematical-scientific and engineering principles as well as a critical awareness of the latest findings in their disciplines. Graduates are qualified to analyze and solve problems scientifically, which are unusual or incompletely defined and show competing specifications; they abstract and formulate complex problems from new, emerging fields of their discipline and apply innovative methods to problem-solving.

In the area of E***ngineering Design***, Master graduates are qualified to develop concepts and solutions for fundamentally orientated and partially unusual problems under broad consideration of other disciplines and use their creativity to develop new and inventive products, processes and methods.

As regards ***Investigations and Assessment*** Melbourne graduates are to investigate and assess the application of new and emerging technologies in their disciplines, plan and carry out analytic, model and experimental investigations, critically assess data and draw appropriate conclusions. As far as ***Engineering Practice*** is concerned, graduates are able to classify and systematically combine knowledge of different fields and handle complexity, familiarize themselves with the new and unexplored, make an assessment of applicable methods, their limits, and reflect the non-technical effects of the engineering activity. In the area of ***Transferable/Soft Skills*** graduates have the capacity to function effectively as leaders of a team that may be composed of different disciplines and levels, and work and communicate effectively in (inter)national contexts.

In their analysis, the experts find that the subject specific criteria of ASIIN/EUR-ACE criteria are covered in the learning objectives of the two Master of Engineering programs. The presented learning outcomes correspond to the qualification descriptors relevant to level 7 (Master) of the European Qualifications Framework for Lifelong Learning. A**s regards the attainment of "achieved" learning outcomes, the experts reserve their final verdict until they are provided with a representative sample of student work, which for technical reasons was not possible during the audit on-site.**

The peers inquire how the learning objectives have been developed and revised, and in which way stakeholder groups have been involved. The input by industry has been provided by “Industry Advisory Groups” which have been formed for all the Departments. These groups provide advice on the strategic planning of the Faculty as well as on the design and modernisation of teaching and research programs. The “Industry Advisory Groups” typically meet at least three times a year and work to support the Head of Department providing advice on course content on a regular basis. The experts welcome the existence of this systematic exchange platform.

Another important platform for curricular review is the staff-student exchange committee, which meets regularly during the course of a semester. During the discussions, manifold examples of adjustments to curricular structures are cited. The experts also take note of the general process/procedure for the adaptation of curricula: the initiative usually starts with the subject course coordinator, followed by the school education committee, the academic programs committee and finally the academic board. The deadline for this process is regularly the first of May for the next academic year.

As regards the career perspectives of graduates, the acceptance of graduates emanating from the “Melbourne model” has improved according to the feedback provided from Master Graduates. In the first years following the introduction of the “Melbourne” model, the additional benefit of a Master graduate had not always been evident to the companies. In on-site discussions, industry representatives mentioned to appreciate “critical thinking” capacities and other “soft skills” noted for graduates from the Melbourne-model applying for a job. Students interviewed during the on-site visit proved to be outspoken, communicative and exposed a high level of self confidence in their own abilities.

The experts also learn about an ongoing internal investigation on the qualification of graduates from the Melbourne-model. This investigation started in 2017 (especially targeting the Master of Biomedical Engineering) and has been executed in pursuit of the question, whether graduates from study programs according to the Melbourne-model achieve a competence level similar to those having graduated from specialized consecutive Bachelor and Master programs in engineering.

Work in progress are dependable tracer studies keeping track of the success of national and international graduates on the labor market. The experts on request did not receive dependable data to come to a final verdict. As this was already an issue in the last accreditation, the experts urge the Faculty to collect evidence systematically.

Criterion 1.2 Name of the degree program

Evidence:

A Self-assessment report

B University website: http://www.eng.unimelb.edu.au/study/degrees

Preliminary assessment and analysis of the experts:

The experts take note of the development of the denominations of the degree programs as they evolved in the course of the two previous two ASIIN accreditations:

Back in 2011, the program was then known under the name Master in Engineering (biomolecular). As result of interventions on the part of students and other stakeholders at the time, the name was subsequently changed into Master of Engineering (biomedical) in 2016. The current denomination is **Master in Biomedical Engineering**.

For the **Master in Chemical Engineering** a similar transition took place, as at the time of the last accreditation visit the program operated under the name Master of Engineering (chemical).

Both Master programs dispose of a number of specializations, which are further described in subsequent parts of the report. They are however not a formal component of the degree title.

The Master of Engineering degrees are awarded "with distinction" to high achieving students.

The expert panel considers the names of the two Master degree programs under review and find them adequately reflecting the intended aims and learning outcomes.

Criterion 1.3 Curriculum

Evidence:

- University of Melbourne, Melbourne School of Engineering, Self-assessment for the ASIIN-Seal Chapter 1.
- Master of Biochemical Engineering: https://handbook.Unimelb.edu/au/Master of Biomedical Engineering
- Master of Chemical Engineering: https://handbook.Unimelb.edu/au/Master of Chemical Engineering
- Discussions with faculty management, teaching staff, students, graduates and employers during on-site visit.

Preliminary assessment and analysis of the experts:

The expert team examines the structure of the two Master degree programs and discusses the reception of the "Melbourne Model" among Australian stakeholders.

Regarding the structure of the **Master of Biomedical Engineering**, the program covers either a 2 or a 3 year degree (full-time) curriculum, depending on the prior study of the enrolled student. In the first year (or equivalent), lateral students coming from a different disciplinary background will be required to complete two out of three number of foundation subjects including "Introductory Biology: Life´s Machinery", "Chemistry" or "Engineering Mathematics". The remaining subjects give students the core foundations required for Biomedical Engineering.

YEAR 1			
Semester 1		Semester 2	
Foundation Selective	12.5	Foundation Selective	12.5
Applied Computation in Bioengineering	12.5	Anatomy and Physiology for Bioengineering	12.5
Mechanics for Bioengineering	12.5	Introduction to Biomaterials	12.5
Circuits and Systems	12.5	Biosystems Design	12.5

Students, however, who have already completed the Bioengineering Systems major in their undergraduate studies and who have already taken the required mathematics and science subjects will receive credit for these foundation engineering subjects and accordingly start in second year (more details on this can be found in Section 1.4 Admissions of this report).

In the second year, depicted in the following, students undertake 6 core subjects that build on the foundational knowledge of Biomedical Engineering. The "Biomechanics"-subject embeds bioengineering design requiring students to use their knowledge of materials and mechanics to (re)design an implant or prosthesis.

YEAR 2			
Semester 3		Semester 4	
Biomechanics	12.5	Biofluid Mechanics	12.5
Bioengineering Data Analytics	12.5	Biosignal Processing	12.5
Bioinstrumentation	12.5	Engineering Selective	12.5

Biomedical Eng Management & Regulations	12.5	Bioengineering Elective	12.5

In the fourth semester, students are also required to undertake an engineering elective, either “Critical Communications for Engineers”, “Creating Innovative Engineering” or “Creating Innovative Professionals”. These subjects introduce students to the engineering profession and engineering problem-solving. They also address professional ethics and academic honesty. Finally, these subjects cover soft skills such as written and oral communication, teamwork, and the practical use of information. The last subject in their second year is the first of altogether 5 bioengineering electives.

YEAR 3				
Semester 5		Semester 6		
Biomedical Engineering Capstone Project*				25
Bioengineering Elective	12.5		Bioengineering Elective	12.5
Bioengineering Elective	12.5		Bioengineering Elective	12.5
Approved Elective†	12.5		Approved Elective†	12.5

In their final year, students will choose four bioengineering electives and two approved electives (any Masters-level Engineering and IT subject) and are encouraged to use these electives to broaden their study. The core task however is to undertake a biomedical engineering capstone project, in the framework of which they are exposed to real-life engineering problems. As stated in the University Handbook, it encompasses 400 hours of workload (25 credits, approx. 13-16 ECTS). Three alternatives are at hand for the final capstone project: either the students take the “Biomedical Engineering Capstone Project”, which involves undertaking a major research or advanced innovative design project requiring an independent investigation and the preparation of reports on an approved topic. Students will present their findings in a conference presentation format, held at the end of the project cycle in the latter half of semester two. Students may also split the capstone project by doing two smaller projects (Biomedical Engineering Capstone Project Part 1 and BMEN90032 Biomedical Engineering Capstone Project Part 2). These subjects must be taken in 2 consecutive semesters. Finally, and alternatively, students can replace this combination by applying to enrol in a BioDesign Innovation course, which is yearlong subject with a 50 point credit load. BioDesign Innovation has featured as subject in the program since 2016 and has been introduced to promote the design, innovation, and commercialisation of biomedical concepts. It brings together teams of students from the Master of Biomedical Engineering and Master of Business Administration degrees who collaborate with hospital clinicians to design medical devices to meet important clinical needs. Many of the BioDesign Innovation teams reportedly have won awards for their medical device innovations and around half have subsequently formed start-up companies to commercialise their devices, with most of these participating in the Medtech Actuator Accelerator and other accelerators. The Faculty representatives stress, that the students appreciate the real-world experience provided by the subject, and the impact this subject has upon their subsequent careers.

Students can either study the Master of Biomedical Engineering program without further specialisations, or pursue their career goals and interests through **the 'Business' specialisation.** The Business specialisation offers the opportunity to study tailored business subjects developed in partnership with the Melbourne Business School, covering how economics, marketing and finance relate to engineering. Specializing in business has been an option in previous engineering study programs in Melbourne; the major change in present curricula arises from the increased number of electives in the area of economics.

For the Master in Chemical Engineering it is equally useful to note that students enter the program having completed at least a three-year degree with 25 points (i.e., a quarter of a year) of university mathematics, and 25 points of university chemistry.

YEAR 1				
Semester 1			**Semester 2**	
Engineering Mathematics	12.5	ENGR30002	Fluid Mechanics	12.5
Fundamentals of Chemical Engineering	12.5	CHEN30016	Momentum, Mass, and Heat Transfer	12.5
Material and Energy Balances	12.5	CHEN20011	Digitalization in the Process Industries	12.5
Engineering Selective	12.5	CHEN30015	Safety and Sustainability Case Studies	12.5

In the first year, lateral students extend their mathematics expertise by taking "Engineering Mathematics" plus six core chemical engineering subjects, "Fundamentals of Chemical Engineering", "Materials and Energy Balance" "Fluid Mechanics", "Momentum, Mass and Heat Transfer", "Digitalization in the Process Industry" as well as one elective (either "Critical Communications for Engineers", "Creating Innovative Engineering", or "Creating Innovative Professionals"). These subjects introduce students to the engineering profession, and engineering problem solving. They also address professional ethics and academic honesty. Finally, these subjects cover soft skills such as written and oral communications, teamwork, and the practical use of information. Students with an undergraduate degree in chemical engineering are exempt from these courses and immediately start with the subjects in the second year, which look as follows:

YEAR 2			
Semester 3		**Semester 4**	
Chemical Engineering Thermodynamics	12.5 Credits	Design and Construction of Equipment	12.5
Thermal and Separation Design	12.5	Chemical Engineering Management	12.5
Reactors and Catalysis	12.5	Chemical Engineering Research Project, or Chemical Engineering Internship	25
Elective	12.5		

In Semester 3, Students are required to complete four technical subjects – "Reactors and Catalysis", "Thermal and Separation Design", "Design and Construction of Equipment" as well as "Chemical Engineering Thermodynamics". In Semester 4, students are introduced to the subject "Chemical Engineering Management" learning about project management, financial issues, and sustainable development as well as the role of chemical engineers, emphasizing safety and ethics issues.

In Semester 4, students are required to do either a "Chemical Engineering Research Project" or a "Chemical Engineering Internship". Both subjects build on the learnings from the earlier three semesters. Students who are considering a career in research generally opt for the first option while those more interested in getting an industrial experience will be directed towards the Internship option. The research project in year 2 is team-based, whereas the one in the final year is done individually.

The curricular structure in the last year of the Master in Chemical Engineering looks as follows:

YEAR 3			
Semester 5		**Semester 6**	
Process Engineering	12.5	Chemical Engineering Design Project	25
Process Simulation and Control	12.5		
Elective	12.5	Elective	12.5
Elective	12.5	Elective	12.5

In semester 5, students can select to complete two electives. The electives might be technical such as "Computational Fluid Dynamics" or non-technical such as "Engineering Entrepreneurship". Students might also elect to complete another project-based subject. The program coordinators explain that exposure to real-life engineering problems continues in the subject "Process Engineering", in which students are presented with design challenges, which is considered preparation "Chemical Engineering Design Project".

Students can either study the Chemical Engineering Master program as described above or choose one of **three specializations**, either the **"Business Specialization" mentioned above or "Materials and Minerals", "Sustainability and Environment**".

Concerning specialization in "Material and Minerals", students will have to take additional courses in "High Performance Materials", "Particle Technology" and "Sustainable Minerals and Recycling". Those opting for the specialization "Sustainability and Environment" will have to enroll in "Sustainable Processing", "Wastewater and Environmental Remediation" as well as "Energy, Emission and Pollution Control".

The curricular structure of both Master programs and their various specializations can be found in the annex to this report.

In their appreciation of the two programs under review and the value of the Melbourne Model, the expert team comes to the following conclusions:

Students are found to be motivated and convinced that the Faculty of Engineering and Information Technology at University of Melbourne is the place for qualifying and graduating. Students are overall satisfied with the structure and content of the two Master programs under review and would recommend them to their friends. As regards the profile of the Master entries, up to 50% of graduates from the underlying Bachelor of Science study program enroll in the Master programs under review, 20% of the student intake are belonging to the group of lateral students, which have an undergraduate degree not in the same discipline.

The experts furthermore note with interest that most of the interviewed stakeholders are in favour of the Melbourne curricula. They praise the “1+2” model as a flexible concept for students in pursuit of obtaining a Master qualification in engineering. The concept to “learn as you go along” is considered attractive. High school graduates cherish the option starting either a general Bachelor program in Science or in any other topic, with the option of transferring into a Master of Engineering study program for specializing in the second cycle of academic education. It is also possible transferring back from the Master program in engineering to other science programs. The Melbourne Model is also attractive for international students, who use the foundation year to catch up lacking study related competencies and knowledge, and to also improve their English language capabilities.

The expert team appreciates that the two Master programs contain a number of research and design projects, which frequently originate by the demand of an external industrial client. Students are tutored in the synthesis of practical solutions to complex technical problems within a structured working environment. Partnering enterprises regularly send experts in the requested area of expertise to academia serving as guest lecturer for focusing/specifying projects of interest, and supervising externships, being pursued and presented by students as groups.

The experts also learn from their discussions with representatives from industry, that the graduates emanating from the Melbourne Model are more and more recognized in industry. They generally appreciate the quality of Master graduates, their capacity for cooperation within teams and for organizing joint projects between industry and academia.

The experts can confirm that the study programs are regularly updated and modernized using the input of internal and external stakeholders in the process. Core competencies are reportedly reviewed annually; meeting with program officials take place on a quarterly basis. The design of the new curricula predominantly arose from input from these meetings. A major aspect for broadening contents and knowledge for students in the new curriculum is the internship – also for increasing attractiveness of University of Melbourne study programs versus those from the competing RMIT.

Representatives of the **Faculty express their point of view/wish that the responsibility for promoting the engineering programs should be delegated in similar proportion to the school of engineering as to the science department, for allowing pupils and other interested persons to receive profound information on perspectives for graduates upon qualifying.**

The experts conclude that the two engineering programs under review (plus their various specializations) are designed in a way to develop the competences as exemplified in the Subject-Specific Criteria of ASIIN and the requirements of the EUR-ACE seal.

Internship

The internship in the Master in Biomedical Engineering usually takes place in a hospital or biomedical research institute and has a duration of approximately 10–15 weeks. In addition, students can apply their skills on a real-world innovation challenge through the **Innovation Practice Program"**, supported by an industry mentor. Furthermore, the BioDesign Innovation subject, mentioned above, is an important feature of the program. Students will experience entrepreneurship by collaborating with business students and medical sector experts to design a medical device that meets a real-world clinical need and bring innovations to market. Last, but not least, at the end of the studies, there is the "Biomedical Engineering Capstone Subject", in the framework of which students develop an industry partnered project or pursue their own exploratory research. Students are requested to present their findings to the public at the annual "Endeavour Engineering and IT Exhibition" event of the University of Melbourne.

In both programs under review, internships are frequently initiated by industry and supervised by academia, half the number of students pursue internships with the aim of getting practical experience. The University/faculty has established a portal for applying for internships and an office advising students how and where to apply.

During its discussions with students, the expert team is informed about the following aspects:

- The interviewed students mention that currently the number of available internships is not sufficient and complain about the fact that almost all offered projects are unpaid, in particular for the Master in Biomedical Engineering.
- Students report on difficulties in receiving confirmation when applying for internships. They see a connection between a perceived lower recognition of their Bachelor degree in Science, compared to competing students applying after having graduated as Bachelor in Engineering. This issue is said to cause delays and extended

study times related to the need of reorganizing the time line of individual study programs.

- Students wish to be informed in more detail on criteria used for assessing internships, either through student societies, the LMS Canvas resource, or direct student emails.

Student in the interviews express their wish, that they in the future are able to apply via the university website from a larger offer of guaranteed options, for conducting internships with payment, covering their expenses.

The experts note, that currently the internship is organized as an elective course. At the same time, research and capstone design projects are frequently organized in the framework of an internship. **The experts recommend that the Faculty should use all options for helping students having graduated as Bachelor of Science from the University of Melbourne or related study programs, to apply via meaningful internet portals from a sufficiently available number of offered internships, preferentially covering their expenses.**

International Mobility

Concerning the aspect of mobility, the experts distinguish between "incoming" and "outgoing" mobility. As is further elaborated under the criterion 1.4 on "Admission", about one-third of the students in the Master in Biomedical Engineering are of foreign origin (mostly from China), in the Master in Chemical Engineering it is almost evenly split between native Australian and international students.

As regards "outgoing mobility", the experts note that none of the invited student had spent time abroad for pursuing subjects of the curriculum. When questioned, students point out that this is partly due to intrinsic lack of motivation, others are concerned to extend time for graduation, others are without orientation how to address this option professionally without adequate support from the university.

The expert team kindly asks the Faculty to provide a list of international exchange partners and to provide an overview how many students in both Master programs under review have actually engaged in international exchange. At this stage, the experts see a need to provide more opportunities for international academic exchange for Australian students (outgoing mobility).

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Report

- Selection and Admission Policy (MPF1295): https://policy.unimelb.edu.au/MPF1295/
- University web page: https://study.unimelb.edu.au/
- Discussions during the audit

Preliminary assessment and analysis of the experts:
Admission and selection of prospective students are clearly regulated at the University of Melbourne. The admission system is based on the University's Selection and Admission Policy. The entry requirements, application closing dates, and directions on how to apply are available on the University webpage and thus accessible to all stakeholders. The decision on admitting applicants are made on the department level.

As represented in the figures below, admission to the **Master in Biochemical as well as the Master in Chemical Engineering programs** are organised through various pathways:

1. High School leavers must complete at least three years of full-time undergraduate study. **If they seek entry into the Master of Biomedical Engineering program**, applicants have to complete, when enrolling, the Biomedical Engineering Systems major in either the Bachelor of Science degree or the Bachelor of Biomedicine degree, or a series of subjects in the Bachelor of Commerce program.
   In analogy: for entry into the **Master in Chemical Engineering program,** students need to complete the Chemical Engineering Systems major in the Bachelor of Science degree and a series of electives in Engineering.
2. Students who attained an average score of 65% in the Bachelor of Science degree with Biomedical or Chemical Engineering Systems as major will receive 100 points credit towards their respective 3-year Master's programs, effectively reducing their standard period of study to 2 years. Students from the Bachelor of Commerce program, who completed the required biomedical or chemical engineering subjects, usually receive around 50 points credit, which translates in a standard period of study of then 2.5 years.
3. Students with a Bachelor's degree of at least three years can also apply for the two Master programs under review. If applying from another institution, they need a grade equivalent to 65% at the University of Melbourne and must have completed half a year of study in first-year mathematics and first-year science in the respective discipline. In other words: applicants for the Master of Biomedical Engineering must have either biology, chemistry or physics as their science component, for the Master in Chemical Engineering, they must have chemistry as their science component.

The experts take note of the fact, that the 65% grade at Melbourne is the cut-off between an Honours grade and a Pass grade; Pass students at the University of Melbourne require only a mark of 50%.

As regards the language requirements, international students must meet the English language requirements through tests like IELTS, TOEFL, Pearson Test of English (Academic), or Cambridge English: Advanced/Certificate of Advanced English (CAE).

According to the Self-Assessment Report, senior and experienced academics are responsible for evaluating all applications for admission. The assessment considers the grading system used at the applicant's university, the institution's standing, and the institution's quality, particularly in the case of applicants having qualified from academic institutions in China, which are classified into different categories based on their performance and international standing (the lower the ranking, the higher the score must be).

Based on the enrolment data for 2022 for the Master in Biomedical Engineering, out of the total intake of 74 students, 52 were of Australian in origin, with 22 coming from abroad (mostly from China). For The Master in Chemical Engineering program, the corresponding numbers are 70 students with the national and international intake almost 50:50%, with applicants coming from China being the largest fraction, totalling to 18 students.

The enrolment figures for the reviewed program decreased by approximately 20% in 2021. This was mainly due to a decrease in international students caused by the COVID-19 pandemic. In the discussions held during the audit, the experts learn that, in general, approximately 2000 students apply to the Master of Engineering programs. Out of these, 800 are admitted, resulting in an admission rate of 40%. Furthermore, about 75-80% of students admitted to the Master of Engineering programs are pathway students (follow the two-year track), while only 20-25% are "lateral entry students" (follow the three-year path).

In their assessment, the experts find the admission rules to be binding, transparent, and based on the University's written regulations. As regards the credit transfer for lateral students, there are adequate University policies in place.

Students during the interview testify that they are informed in detail about the requirements and the necessary steps to apply for admission into the program. Moreover, students are satisfied with the information available regarding the course program and admission requirements! They are also convinced that the University of Melbourne is the place for qualifying and graduating.

The experts are being told that the University is keeping track of the performance record of its Master students so that an instrument is in place to monitor the performance records of students with various enrolment backgrounds. In order to substantiate this claim, the experts request a detailed overview regarding the progression and dropout rates of recent student cohorts.

Criterion 1.5 Workload and Credits

Evidence:

- Self-Assessment Report
- Study Handbook on the University Website: https://handbook.unimelb.edu.au/courses/biomedical /chemical
- Statistical Data on Study Subjects, 2022
- Discussions during the audit

Preliminary assessment and analysis of the experts:

The University of Melbourne uses a credit system to track student progress and achievement. Excluding the foundational year (Year 0 as specified in Criterion 1.3), the Master degree programs under review comprises 200.0 credit points.

The University maintains a standard of subjects (modules) awarding 12.5 credit points. Students usually enrol in four 12.5-point subjects each semester, making a standard load of eight 12.5-point subjects over a year. The larger subjects, like the capstone project, carry 25-point weighting and may be completed within a year.

Each 12.5-point Masters-level subject requires a total commitment of 200 hours (approx. 6-8 ECTS) from every student, which equates to 800 hours of workload (approx. 30 ECTS) for a whole semester. This includes:

- Attending all classes, such as lectures, tutorials, workshops, and laboratory classes.
- Undertaking any additional reading or viewing tasks.
- Private study revising and reviewing all notes, including reviewing lecture recordings.
- Completing all assessment items during the semester, such as reports, assignments, and projects.
- Preparing for mid-semester and/or end-of-semester examinations.
- Undertaking all examinations.

FEIT uses end-of-subject surveys to keep track of students' course workload. The Staff-Student Liaison Committee (SSLC) also plays a crucial role in this monitoring process, meeting once or twice per semester to provide academic staff with feedback on both subject- and program-level issues. This allows for more detailed adjustments throughout the semester than the official end-of-subject survey.

Overall, the experts are satisfied with the way the system of academic credits is administered by the University and the Faculty of Engineering and Information Technology for the two Master programs under review. The Course Handbooks for the two programs are available on the University website. This information clearly details the time commitment and distinguishes between credits given for various forms of supervised studies and self-study time.

During the interviews, all students reportedly experienced a marked increase in workload due to increased speed of teaching and complexity of the material taught, as should be the case in Master level programs. Students equally minute that they have become accustomed to new challenging learning situations at the university while improving their capacity to study independently. The experts in the discussions with students and staff alike learn of no complaints. Students are generally satisfied with the workload and the distribution of credits between the semesters.

The experts learn that the vast majority of students successfully complete their respective degree within the standard study period. They nevertheless would like to receive detailed data on student outcomes for the two Master's program under review, such as average length of study, progression rates and number of dropouts for recent student cohorts in order to substantiate this claim.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Self-Assessment Report
- Master of Biochemical Engineering: https://handbook.Unimelb.edu/au/Master of Biomedical Engineering
- Master of Chemical Engineering: https://handbook.Unimelb.edu/au/Master of Chemical Engineering
- Discussion during the audit

Preliminary assessment and analysis of the experts:

In its Self-Assessment Report, the Faculty of Engineering and Information Technology records that appropriate didactical instruments and methods are implemented for the two Master degree program under review and that the variations in learning methods and tools are adjusted to the level of knowledge, skills, and competencies set in each module.

The university's approach to learning is described as being student-centred involving teaching methods that prioritise the student's active involvement in the learning process. As students encounter various teaching methods that cater to different learning styles, these approaches seek to enhance non-technical abilities, including teamwork, time management, problem-solving skills, and self-direction. The primary teaching methods described in the online Handbook encompass lectures involving in-class discussions and case studies by academic staff and industry professionals, tutorials with problem-solving exercises, interactive workshops, individual/group work in a computer lab, presentations, and project-based work.

The delivery mode for the Master programs – with the exception of the special framework conditions during the COVID-19 pandemic - is on campus, but for some subjects, online, blended synchronous learning (BSL), or dual-delivery modes are now also available. Blended Synchronous Learning (BSL) is a class format that lets students participate in class together, whether they are on campus or online. Equipped rooms allow seamless interaction between all attendees.

Subject delivery modes are published in the online Handbook for both Master programs under review. The availability of a particular class format is indicated in the University's online course timetable. Tutorials and other classes may be recorded and uploaded to the LMS so students can use the recordings to revise their subject material for assessments and exams.

In discussions with teaching staff, the experts learn that the Faculty has a number of mechanisms in place to upgrade the teaching capabilities of its lecturers. It is mandatory and fixed in the contracts for all new staff to enrol in courses for further developing skills in teaching, for all others, improving qualification in teaching is optional. Appropriate teacher-training courses for teachers are offered by different units including the Teaching Learning Laboratory (TLL), the Learning Environment Center as well as the Melbourne Center of Study for Higher Education. More on the details can be found under Criterion 3 in this report. The experts appreciate that courses for newly hired staff are peered by experienced staff, participating in selected sessions. Colleagues continuously receiving less positive records from evaluations are obliged by the head of department to participate in appropriate courses for improving their didactical skills.

The experts confirm that a variety of learning methods are used and that they are aligned with the intended learning outcomes. In the discussions with students, the experts learn that most students are generally satisfied with the quality of teaching and learning in the programs under review – some reservations on this topic given. Students, however, expressed quite uniformly the desire for receiving additional advice in analyzing data and reviewing essences of conducted experiments. **In Depth mentoring by qualified personnel in practical courses is widely considered as potential area of improvement**.

Students appreciate, that industry representatives are incorporated into mandatory and elective subjects as guest lecturers, thereby bringing real life experiences into the classroom. Additionally, most faculty members maintain connections with the industry and relevant professional associations.

To collect systematically a feedback on the quality of teaching and learning, the student satisfaction surveys at the end of each semester for each of the taught subjects would be a valuable source of information. **As is further elaborated under criterion 5 of this report, this quality assurance instrument currently however is not serving its purpose and needs to be overhauled.**

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 1:

The experts thank the University of Melbourne for explaining that the job market for graduates in chemical engineering has changed within the last few years. The oil and gas industry has become a minor employer, with significant increase of graduates finding jobs in bioprocessing, pharmaceutical, and in the mining and material processing sectors. Additionally, more and more graduates are employed by non-engineering industries such as logistics and finances. The experts confirm that the university is keeping track of their graduates and their success on the labour market.

The experts understand that the University of Melbourne does not approve or promote domestic internships that students are required to pay for. Students looking for an internship can access an internet portal (which is called Careers Online). There is no charge for theses services. However, there is a misunderstanding because the experts recommend increasing the number of internships where the students receive money.

The experts point out that it would have been more useful if the University of Melbourne would have provided a concrete list of international cooperation partners for the two degree programmes under review and not just a link to a very general webpage.

The experts consider criterion 1 to be mostly fulfilled.

2. Exams: System, Concept and Organization

Criterion 2 Exams: System, concept and organization

Evidence:

- Self-Assessment Report
- Study Handbook on the University website: https://handbook.unimelb.edu.au/2023/courses/biomedical
- Study Handbook on the University website: https://handbook.unimelb.edu.au/2023/courses/chemical
- Assessment and Results Policy (MPF1326), University of Melbourne: https://policy.unimelb.edu.au/MPF1326/
- Academic Progress Review Policy (MPF1291), University of Melbourne: https://policy.unimelb.edu.au/MPF1291/
- Samples of student's work (Capstone projects)
- The University's academic calendar: https://www.unimelb.edu.au/dates

Preliminary assessment and analysis of the experts:
The Faculty of Engineering and Information Technology presents the general rules for the examination and assessment systems applicable to the two Master programs under review. Exams in the Master in Biomedical/Chemical Engineering and their various specialisations follow detailed policies by the University.

Exams and the corresponding assessment rubrics measure students' learning outcomes according to a predefined grading scale reference. FEIT policy requires continuous assessment in each subject, preventing single-item evaluations and enabling student progress tracking and risk identification by staff. There are generally two modes of course evaluation:

1. Completion of assignments, projects, or laboratory work. These assessments provide students with feedback on their progress throughout the semester.
1. End-of-semester exams, as well as either a written assignment or a mid-semester test. Feedback is reportedly provided within three weeks of submission, and plagiarism is monitored using Turnitin.
2. Each course's types of examinations and relevant expectations are publicly specified in the online Handbook, along with their weighting towards the final grade, expected timing during the semester, and the learning outcomes to be

evaluated by the respective examination. Types of examination may not be changed after the course has commenced.

The form and length of each exam are also specified in the course descriptions available to the students via the University´s learning management system (LMS). The students also learn about mid-term and final exams via the University's academic calendar.

The final grade of each course is a combination of the scores of the individual types of assessment. The exact formula and the final grade required to pass the module are given in the module Handbooks. Students receive a numerical grade on a scale of 0 to 100 for every subject. The student may receive a Pass or Honours result depending on the numerical grade. After the final assignments and exams for the semester, subject results are published through the University's electronic system (my.unimelb) by the dates specified on the institutional website.

At the end of each semester, the School of Chemical and Biomedical Engineering School conducts Examiners' Meetings before releasing the final results to the students. These meetings are usually attended by all academic staff who teach within the discipline. During the meetings, each subject is reviewed separately, and various aspects such as subject results, assessment components, student performance, and areas for improvement are discussed in detail for the next time the subject is taught.

Should a student fail, the assessment is re-marked by a second examiner. Students who fail a core subject must retake the subject. Re-sits or second examinations are only permitted under exceptional circumstances, such as sudden severe illness or family bereavement. A maximum of three attempts to pass an exam per subject is possible.

Special provisions may be made for students with an ongoing medical condition, such as additional reading/writing time. End-of-semester examinations are scheduled centrally by the University over a 13-day period. The exam schedules are adjusted to limit each student to a maximum of two written exams per day and no more than three exams in a 48-hour span.

As stated in the University Handbook, the final assignment for the last year of the Master of Biochemical Engineering and Chemical Engineering and all specialisations is a Capstone Project. It encompasses 400 hours of workload (25 credits, approximately 13-16 ECTS). As has been described under 1.3 of this report, students with the permission of the subject coordinator can alternatively take the BMEN90030 BioDesign Innovation (50 points) in place of BMEN90018 Biomedical Engineering Capstone Project and 25 points of Bioengineering Electives or Approved Electives. Concerning the assessment of the capstone projects, this is usually done via written project report and oral mid semester presentation, however without a formal defense.

Chemical Engineering students must complete either a Research Project or an Internship plus a Design Project in year 3.

In their assessment of this criterion, the experts find that appropriate rules and regulations, which govern the examination systems university-wide, are in place. The rules for re-sits are equally written down in the academic guidelines. All rules and regulations are adequately communicated and transparently published.

The experts also confirm that there are adequate forms and rubrics of assessment for each course in place and that students are generally well-informed about the type of evaluation and the details of what is required to pass each module in the Student Handbooks for each program. Lecturers in the discussion report that there is variety of exam forms used to check the attainment of the respective learning outcomes, including a mix of oral and written exams.

Students in the interviews confirm that they have/are aware of all necessary information regarding examination schedules, forms, and grading rules. Additionally, they are reportedly given sufficient time to prepare for the exams adequately. In some instances however, two examinations have to be written on one day, which is considered by the students as too demanding for being able to perform adequately. **The experts before this background recommend that the faculty should seek every option available for reducing the number of examinations to one per day, particularly in instances of examination having a strong curricular weight.**

Students who fail would be pleased in receiving more help than offered at the moment, for identifying individual weakness – particularly by getting a more substantiated feedback on their assignments and /by hearing from their lecturers the correct answer for an improperly worked out task

As part of an ASIIN accreditation procedure, the expert team regularly reviews samples of achieved (not intended) learning outcomes with a special focus on final theses, research/capstone projects etc. This is necessary for reaching an informed opinion regarding the level of qualification reached by graduates. **During the audit, the experts were due to technical difficulties, not provided with this opportunity. In the aftermath of the visit, the experts therefore kindly ask the program coordinators to make these samples of students work available to them, thus reserving their final verdict of whether a Master level qualification is consistently reached.**

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 2:

The experts thank the University of Melbourne for explaining that it is not always possible to avoid that there is more than one exam per day. However, the University does state, that no student should have more than 2 exams in 1 day, and more than 3 exams across a 2 day period. In an event where this is not possible for a particular student, then that student will be given alternative exam arrangements (where one of the exams is moved for them and they would sit at an alternate time). The experts are satisfied with this solution.

The experts are confident that the University of Melbourne will communicate the possibilities to view the marking of exams and ask for feedback on all assessment items better to the students.

The experts point out that the University of Melbourne should be able providing a more descriptive and more decisive reply, particularly regarding to one of the more serious concerns of this accreditation process, one that the reviewers have mentioned when desk top-reviewing the material prior to leaving for Melbourne, twice in the course of the audit, and finally as part of the report.

The University of Melbourne should acknowledge that capstone projects/Master theses indeed have until now not made accessible for review, and that the university will provide a representative selection of electronic copies of capstone projects for review via the internet.

The experts consider criterion 2 to be mostly fulfilled

3. Resources

Criterion 3.1 HR Resources, Staff Development and Student Support

Evidence:

- Self-Assessment Report
- Staff CVs
- Academic Appointment, Performance and Promotion Policy (MPF1299), University of Melbourne: https://policy.unimelb.edu.au/MPF1299/
- Staff Development, Education and Training Procedure (MPF1149), University of Melbourne: https://policy.unimelb.edu.au/MPF1149/
- Special Studies Program (SSP) Guidelines and Process, Faculty of Engineering and Information Technology

- http://www.services.unimelb.edu.au/disability/
- Discussions during the audit

Preliminary assessment and analysis of the experts:

HR Resources

The University of Melbourne's teaching staff are categorised as professor, associate professor, reader, senior lecturer, lecturer, and tutors (or senior tutors). Typically, academics are appointed as lecturers directly from a post-doctoral position at another institution. Advancement to higher levels requires a case to be argued by the applicant and supported by the respective Department or School.

Within FEIT, the number of Teaching and Research (T&R) and Education Specialist continuing staff has increased by 50%, going from 180 in 2018 to 270 in 2023. During the same period, the number of fixed-term staff has grown by 6.4%, rising from 250 to 266. Teaching and Research staff are expected to teach 2 to 2½ subjects per year, while Education Specialist staff are expected to teach up to 4 subjects per year and focus particularly on project subjects. Permanent staff (T&R and Education Specialists) account for the bulk of FEIT's teaching activities, although a considerable amount is also fulfilled by fixed-term and casual staff.

Currently, the School's staff-student ratio, measured in terms of equivalent full-time students and full-time equivalent staff, is currently 23.2. This represents an improvement from the ratio of 27.3 observed during the last accreditation visit, which is explained due to the increase in staff as well as the post-COVID-19 decrease in enrolments.

The professional staff has recently undergone a restructuring, resulting in the centralisation of some services, such as IT. The staff members supporting FEIT's teaching and research activities include Operations Management, Academic Programs support, Student Enrichment (mobility, industry placements), Future Students (student recruitment and admissions handling), Facilities and Occupational Health and Safety, Human Resources, Marketing and Communications, Advancement, Research Services, and IT services. FEIT has more than 80 employees working in these areas.

Additionally, the two Master programs, on frequent occasions, invite guest lecturers from industry providing insights into specific scenarios and contexts that industry practitioners face. This supplements the more general content taught in other lectures.

Job Conditions and Performance Review of Staff

The University of Melbourne has established a number of evaluation methods related to the performance review of its staff. One input is the evaluation of students' satisfaction with teaching and learning via questionnaires. Currently, only 10-15% of the students participate in these student evaluations, which raises a number of questions further discussed in subsequent parts of this report.

Another important component is the University's Academic Performance Framework (APF), which guides the planning, feedback, and reporting of academic performance for all academic positions. The APF focuses on three core dimensions: the type of Activity (range and volume of academic activities in teaching, research and administration), Engagement (nature and role of engagement with communities and industry), and Quality and Impact (academic excellence, originality, and influence). The university has established related confirmation criteria, probation criteria, and performance expectations for academic staff assessments. Its Academic Career Benchmarks and Indicators (ACBI) provide illustrative indicators of academic performance.

It is important to note, that the University/Faculty has introduced the possibility to adapt the relative weight of the above-mentioned components to the individual talents and interests of its staff members with some lecturers putting more emphasis on the teaching, others on their research record. The general scheme in place foresees a 40% weight for research and teaching each. This balance on request can be shifted to a maximum of 60% for either research or teaching, while the fraction for administration remains stable at 20%. The person in charge for promoting teaching staff is the head of department. Meetings for this purpose are conducted annually with all members of the teaching staff. A lack in research funding is considered as serious drawback for being promoted.

HR Development

FEIT encourages its academic staff to develop teaching skills and enrol in professional programs such as the Melbourne Teaching Certificate (MTC) and Graduate Certificate in University Teaching (GCUT) facilitated by the University's Centre for the Study of Higher Education.

The MTC is a semester-long program that provides a tailor-made understanding of teaching at the University of Melbourne and Australian higher education. Participants collaborate with colleagues, develop an understanding of effective teaching, learning, and assessment principles in higher education, reflect on their teaching practices, and propose practical solutions for teachers across the university.

The GCUT is a part-time course designed to provide a critical understanding of effective teaching principles in higher education. Participants learn appropriate teaching approaches for different environments, large and small group teaching, assessment design, curriculum design, innovative procedures, and the use of educational technologies. The course emphasises reflection and continuous improvement of teaching practice.

In addition, FEIT has established a Teaching and Learning Laboratory (TLL) in 2021. This unit assists the professional development of academic staff by providing training on various topics such as curriculum design, education technology, Artificial Intelligence in education, project-based learning, gender inclusion etc. The training program includes seminars and workshops that promote evidence-based best practices. TLL also supports the training and professional development of sessional staff through the Tutor and Demonstrator Development (TADD) program. Participation in these training courses is usually mandatory for newly hired staff, for other staff categories it is offered on a voluntary basis.

During the audit, the expert group was impressed to learn about the Faculty's Special Studies Program (SSP) from their discussions with FEIT staff. The program grants academic staff a paid six-month leave and additional financial support if they meet certain requirements. Its purpose is to advance individual and strategic objectives relating to research, teaching, innovation, or collaboration within the Faculty.

Support and assistance for students

The University of Melbourne and the Faculty for Engineering and Information Technology offers a broad range of support services for its student population. In terms of institutional structures, it is the so-called “Stop 1”, which is the University’s first contact point for student support by phone, email, or live chat. Dedicated Stop 1 advisers help students in a wide range of areas, from administration and enrolments to health and wellbeing support and academic skills and career opportunities.

In addition, FEIT has established a Teaching and Learning Laboratory (TLL) in 2021. This unit assists the professional development of academic staff by providing training on various topics such as curriculum design, education technology, Artificial Intelligence in education, project-based learning, gender-related topics, putting inclusion into practice, to mention the most relevant themes. The training program includes seminars and workshops that promote evidence-based best practices. TLL also supports the training and professional development of sessional staff through the Tutor and Demonstrator Development (TADD) program. Participation in these training courses is usually mandatory for newly hired staff, for other staff categories advanced training programs are offered on a voluntary basis.

FEIT monitors students' academic progress and checks academic achievement to identify students “at risk” and possible remedial actions. Students are considered to be "at risk" of making unsatisfactory progress if they fail 50% or more of the enrolled credit points during a progress review period and/or fail a compulsory or core subject during their first attempt. The same applies if they fail a specific elective subject for the second time or withdraw from all subjects during a progress review period.

In their appreciation of this criterion, the experts come to the following conclusions:

The teaching staff's composition, scientific orientation, and qualifications, as specified in the Staff CVs, are suitable for successfully implementing and sustaining the two Master programs under review. **The ratio of lab assistants versus students should however be consistently monitored to evaluate, whether an increase might contribute in increasing quality of teaching in laboratory courses. It is recommended to increase the number of teaching in laboratory courses that have expert or relevant knowledge in the appropriate laboratory task. Students point out that often there were teaching staff that were not knowledgeable of the laboratory tasks they were asking the students to complete.**

All interviewed teaching staff demonstrate a high degree of motivation and dedication to the institution. The option of successfully applying for a sabbatical every three years in the expert´s eyes is an attractive tool for keeping up motivation. The expert team recognises the University's support for sabbaticals. This is usually done via swap of teaching with colleagues. The experts learn however that the space for conducting more extensive research in the course of the sabbatical is restricted, particular in the Biomedical Engineering department. The planning of new building for the department is in progress and will help to overcome this bottleneck.

The experts equally are able to identify a considerable degree of satisfaction within the group of teaching staff regarding available instruments for assessing and planning career pathways and the use of these instruments. **Due to a participation of merely 10% to 15% on average in student evaluation surveys, the experts share the opinion of the teaching staff, that using the results of these questionnaires for the purpose of career development and promotion of teachers should be reconsidered.** Lecturers during the interviews expressed their wish filtering out answers comprising offensive feedbacks and leaving out negative and very likely not representative impressions, which then would adversely affect their promotion. Alternatively, measures might be taken, to get a feedback of all students by appropriate means (see more under criterion 5), thus making it truly representative.

The experts positively note the possibility to adapt the promotion scheme by increasing relative weight of strength from a minimum of 20% to a maximum of 60% for either teaching or research, thus catering for the different interests and individual areas of talents and strengths. The promotion system under the supervision of the head of department is overall reported to be fair by the interviewed staff. **Having said this, the experts nevertheless note, that a number of staff members wish to benefit from more effective options of midcareer development, as well as more support during the promotion process.**

After discussions with the teaching staff, the expert team can confirm that staff members benefit from **a considerable range of professional development options**. The experts acknowledge that the University of Melbourne and FEIT offer sufficient support mechanisms and opportunities for lecturers, who wish to strengthen their professional and teaching skills. The expert team takes note of the fact that teachers enroll on a regular basis in courses for developing and improving teaching skills – some colleagues do so on a voluntary basis, some on a mandatory basis due to contractual agreements. Successful participation in one of the training courses is affirmed by well-recognized certificates. The interviewed staff voice a high rate of satisfaction regarding the offers provided by the Teaching Learning Laboratory (TLL), particularly for courses in guided teaching. Further support for training and newly developing teaching methods are offered by the Learning Environment Center and the Melbourne Center of Study for Higher Education.

The experts consider the peer-reviewing process at the faculty, in the framework of which more experienced teacher tutor younger colleagues by attending their classes, a strong instrument for sharing and improving teaching expertise. Colleagues continuously receiving less positive records from evaluations are obliged by the head of department to participate in appropriate courses for improving methods and/or didactics. All academic staff should be obliged to attend the TLL on a regular basis, say every 2 or 3 years.

The experts also commend the Faculty for organizing a “Festival of teaching”, thereby sending a strong signal to the community and putting a welcome focus on the value of teaching.

Concerning the quality of student services and counseling, the expert team notes, that students are generally satisfied with the services and options provided to them. The experts positively view the support of the University for the manifold student clubs, which serve manifold purposes. Some of the clubs are regularly visited by alumni, some of the clubs even dispose of mentors from industry.

The information received regarding personalized tutoring is however ambiguous. The interviewed students from the Biomedical Engineering master minute, that at the beginning of their studies a mentoring program has been introduced, which in the following semesters does not seem to be continued; students from the Chemical Engineering program were not aware of such personalized mentoring program. Only few interviewed students in this context expressed the wish to receive mentoring on choosing modules and having options in choices, in order to proceed more directly and thus in shorter time through the curriculum.

Regarding other student services, they are generally perceived to be of high quality with a small number of reservations: Students would be pleased in receiving additional help on mental health issues, when needed**.** At the moment, they consider that the response time from the responsible service unit takes too long for being helpful – possibly due to lack in personal. Since mental health is a concern to students, the **expert team recommends evaluating whether the number of staff and the infrastructure available suffices for providing adequate support to students facing mental health issues.**

In general terms, as regards the issue of support from consulting: or receiving information, **students prefer being contacted via social media instead of the existing e-mailing systems.**

As regards students with disabilities, the experts can confirm that there are rules and regulations in place as well as institutional support on the level of the relevant Subject Coordinator and the Student Equity and Disability Support:

Criterion 3.2 Funds and equipment

Evidence:

- Self-Assessment Report
- Discussion during the audit
- Guided tour through the laboratories

Preliminary assessment and analysis of the experts:

As part of the Self-Assessment Report, the Faculty of Engineering and Information Technology describes its primary sources of income: 64% are generated from its teaching and learning activities, including tuition fees, 32% from research and 4% from other sources. FEIT's income is allocated towards paying staff and university charges such as space, library, IT, property, and buildings. Additional funds are available for FEIT-based activities such as student services, advancement, business analysis, finance support, marketing, recruitment and admissions, and research services. The single tuition fee for the two Masters programs range from 38,700 (Australian full fee) to 50,000 (international full fee) AUD/year (23,200 to 30,000 Euro/year). For the entire Master program, the total amount ranges between 122,000 AUD (for national) and 158,000 AUD for international students. The University’s website outlines the specific tuition fee rates applicable to different groups.

As part of the FEIT 2025 strategy, there has been significant investment in infrastructure to support teaching and research activities. This encompasses laboratories and, notably, the Melbourne Connect Hub, where the audit was conducted and which is an excellent, modern teaching, learning and research centre. Students have various ways to utilise the building, such as open project spaces in active zones, seminar rooms for research and project meetings, and a collaborative area dedicated to academic, innovation, and industry interaction. Additionally, the Faculty has a presence at several other locations and plans to establish a new campus in 2025.

Melbourne Connect. Source: University of Melbourne.

Melbourne Connect includes the Telstra Creator Space and the Science Gallery. The creator space, which opened in 2021 as an accessible fabrication lab, is open to both FEIT staff and students. Following mandatory training, students can access a multitude of tools, laser cutters, and 3D printers to encourage innovative thinking and entrepreneurial thinking, as well as to provide a space for industry collaboration. The Science Gallery offers students opportunities to engage and showcase their innovations through curated themed exhibitions.

FEIT's lecture halls across different buildings and spaces come with modern audio-visual equipment that permits blended synchronous learning, as well as the automated recording and uploading of lectures. Collaborative learning spaces feature tables that are designed for group and collaborative learning. Additionally, FEIT has created multiple informal learning spaces in the engineering precinct to promote a sense of community.

Students have full access to the University's library system, where they can find over 47,000 books and 14,100 volumes of international engineering journals. Moreover, the library subscribes to 377 international engineering journals, and students can access additional engineering journals online through its electronic resource system, Supersearch. This system allows students to access databases like SciFinder Scholar, ScienceDirect, Web of Science, ENGINE, Proquest, Compendex Web, SAI Global, Kluwer Online Journals, and Knovel.

FEIT provides students with access to 725 computers in its teaching spaces. These computers are available seven days a week from 6 am to midnight, except during scheduled classes. The availability of each computer can be checked in real-time through a web-based application. One-quarter of the computers are replaced every year on a rolling basis. FEIT invests significantly in teaching software and hardware, with approximately 200 software packages available for student use.

In their appreciation of this sub-criterion, the experts come to the following conclusions:

Overall, the experts judge the available funds, the technical equipment, and the infrastructure (in particular laboratories, library, formal teaching spaces) to be cum grano salis satisfactory to sustain the two Master degree programs under review. This finding is supported during the interviews with teaching staff members, who generally voice satisfaction with the equipment and the financial framework conditions. The group of interviewed students equally confirms that they are generally satisfied with the available equipment, software packages and general support. The basic technical equipment for teaching students at the Master’s level is available in sufficient numbers.

Under the impression of their own visit through the laboratories, the experts come to a more differentiated evaluation of the situation:

Concerning the laboratory infrastructure, the experts find that all chemicals were labelled according to existing safety regulations; tanks for waste and for biohazards existed.

Safety showers were present in sufficient amount at places where needed. Laboratory coats and safety glasses were provided. Gloves to be worn when handling chemical substances were also available, however with comparatively low degree of protection level. **In the expert´s eyes, the Faculty must therefore ensure that protective gloves are available in suitable quantity and in adequate quality for reliably protecting students in respective experiments from hazards imposed by chemicals handled.**

In the Chemical Engineering Laboratory more than one exits for leaving laboratory in case of emergency existed. In visiting Biomedical Engineering laboratories only a single existed. **The experts therefore insist that the Faculty/University has to make sure, that laboratories used for conducting experiments are equipped with more than one safety exit. Although during the visit, tables allowing students to take notes were available, none of the visited laboratories had desks positioned in separated space, for documenting data without directly being in touch by the experimental set-up.** The experts also point out that the laboratories are too congested (little separation), safe working issues and the equipment is mainly old or with reduced functions. g

Concerning the significance of the modelling laboratory for the study programs under review, the experts find that it is used almost exclusively for fundamental studies in a Ph.D.-program and has no obvious significance for students pursuing a master degree in the study programs under review.

As regards the available equipment for experiments conducted in Chemical Engineering wet-laboratories, all set-ups presented pointed to one-dimensional experimental design, thus cause and effect studies, for determining one variable upon systematically altering a selected parameter. The experts were not in a position to determine whether experiments conducted in the Chemical Engineering wet-laboratories truly reach master level in terms of depth and widths. In order to do so, the expert team has to review manuals delivered otherwise to students for preparing and conducting respective experiments. The same findings apply to the equipment for experiments conducted in the Biomedical Engineering wet-laboratories. The major aims of experiments conducted in laboratory shown reportedly were designed for making students accustomed to working in biochemical laboratories, which clearly is a demand in beginner-type courses, typically required in the Bachelor-part of a consecutive study program.

In order to reach a conclusion, whether experiments conducted in the Chemical and Biomedical Engineering wet-laboratories truly reach master level in terms of depth and widths requires reviewing manuals delivered otherwise to students. The experts consequently ask the program coordinators to forward a list of experiments and additional information regarding the set up for these experiments/a list of experiments as well as a concise description of practical procedures and learning outcomes to clarify, whether learning outcomes of respective courses comply with those required for a master degree.

Otherwise existing bottlenecks due to missing equipment or a lack of infrastructure refer to providing funding for introducing new teaching methods and laboratory techniques with the aid of casual tutors, which according to the information provided during the on-site visit is limited and frequently not granted. **The experts consider the use of casual staff a useful concept for assisting to conduct laboratory courses and recommend increasing funding in this area as well as for local engineering support staff.**

As regards the need for annually updating software licenses, the use of open source codes, allowing students to reprogram software for controlling, for instance distillation processes, using columns for adapting software to control devices used for demonstrating basic concepts of controlling processes would constitute an improvement according to the expert´s opinion. This would have the additional benefit to prepare and train students for similar problem solving application in industry. **The procedure for renewing software licenses should be evaluated and a use of open access software in instances considered, where students have to learn writing and adapting routines for process control by themselves. The experts take also note of requests by interviewed stakeholder to increase support for acquiring and annually licensing software on the department level, which would considerably improve the teaching and working situation of staff members.** A shift in responsibility from department to faculty level in the past reportedly has added bureaucracy and often uncertainty of responsibility to previously established processes. Centralizing IT-support has led to a more indirect way and less effective mode of providing help and advice.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 3:

The experts understand that the university cannot ignore the outcome of the questionnaires when assessing the performance of the staff members. However, there are other tools that can be used to assess the teaching performance of academic staff and the experts encourage the university to use these tools.

The experts are glad that the University of Melbourne has recognised that the number of students with mental health problems has increased dramatically during the COVID pandemic. The university was quite unprepared for this situation and is currently monitoring the development in order to find out if there is sufficient support. The experts expect that the university will react if they find that the number of staff and the infrastructure is not sufficient for providing adequate support to students facing mental health issues.

The experts that the University of Melbourne for explaining that during the day of the lab tour there were no classes scheduled and hence gloves and other consumables were packed away. The university points out that they have a range of gloves that students have access to during their labs, these are always placed out on the bench in the labs in advance of a lab class. The experts accept this explanation.

With respect to the number of safety exits, the University of Melbourne emphasises that all buildings are built to comply with the Australian building codes. For the small Bacterial and Mamalian labs, the Australian building codes require only one exit. The university admits that the labs are small but only a small amount of students is allowed in the labs at any one time. Additionally, a new building is scheduled for Chemical and Biomedical Engineering, which will include new teaching labs. The experts accept this explanation.

The experts point out that it would have been more useful if the University of Melbourne would have provided a concrete description of the wet-labs and the available devices there that are used in the two degree programmes under review and not just a link to a general webpage.

The experts consider criterion 3 to be mostly fulfilled.

4. Transparency and documentation

Criterion 4.1 Module descriptions

Evidence:

- Self-Assessment Report
- Study Handbook on the University website:
  https://handbook.unimelb.edu.au/2023/courses/biomedical.eng.
  https://handbook.unimelb.edu.au/2023/courses/chemical.eng

Preliminary assessment and analysis of the experts:

The module handbooks for the two Master programs under review are available through the University of Melbourne's website. It is thus accessible to the students as well as to all interested stakeholders.

The experts observe that the handbooks entries contain the necessary information and are presented in a visually clear format. The information available includes the persons responsible for each module (coordinators), the workload, the credit points awarded, the intended learning outcomes, the examination requirements, the forms of assessment and details explaining how the final grade is calculated.

However, a number of module descriptions do not outline the "Learning and Teaching Methods" (under "Further Information" / "Subject Notes" in the individual course entries within the online handbook). **The experts request to review this in order to ensure that the teaching methods for the mentioned modules are publicly accessible.**

The experts, in the course of the interview, learn that students value the handbooks as a valuable information source: all students present considered the handbook as useful source of information.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Report
- Sample Australian Higher Education Graduation Statement (AHEGS) for the degree program under review

Preliminary assessment and analysis of the experts:
The experts confirm that the students of the Master's degree program under review are awarded a Diploma ("testamur"), a Transcript of Records, as well as a Diploma Supplement upon graduation. The Diploma Supplement is embedded within the Australian Higher Education Graduation Statement (AHEGS), issued once a student has graduated.

Each AHEGS conforms to nationally agreed specifications approved by the Australian Department of Education. The graduation statement contains five sections with all the necessary information about the degree program: the grade, the award, the awarding institution, the graduate's academic achievements, and the description of the Australian higher education system, including the Australian Qualifications Framework.

The academic transcript, on the other hand, is an official record of the full academic history. It lists all the courses the graduate has completed, the achieved credit points, marks, grades, and cumulative GPA, and mentions the seminar titles.

The experts note that it would be desirable including more extensive information concerning the graduates' profiles and achieved learning outcomes in the Diploma Supplement (the AHEGS). However, the experts understand that Australian Government regulation determines the document's content, and it cannot be altered arbitrarily, as already established in the previous accreditation report. **Given this background, the experts recommend issuing an additional Diploma Supplement according to the Bologna regulations.**

Criterion 4.3 Relevant rules

Evidence:

- Self-Assessment Report
- All relevant regulations as published in the University of Melbourne's Policy Library: https://policy.unimelb.edu.au/

Preliminary assessment and analysis of the experts:
As the Self-Assessment Report states, the University of Melbourne has a comprehensive repository that serves as a central hub for documenting its various policies and regulations. Some of these documents are listed below:

- Academic Freedom of Expression Policy (MPF1224)
- Academic Progress Review Policy (Coursework) (MPF1291)
- Assessment and Results Policy (MPF1326)
- Courses, Subjects, Awards and Programs Policy (MPF1327)
- Credit, Advanced Standing and Accelerated Entry Policy (MPF1293)

- Enrolment and Timetabling Policy (MPF1294)
- Revocation of Awards Policy (MPF1316)
- Establishment and Award of Student Awards Policy (MPF1062)
- Selection and Admission Policy (MPF1295)
- Student Academic Integrity Policy (MPF1310)
- Student Appeals Policy (MPF1323)
- Student Complaints and Grievances Policy (MPF1066)
- Student Conduct Policy (MPF1324)
- Student Fitness to Practice Policy (MPF1345)
- Student Fitness to Study Policy (MPF1349)
- Student Loans, Fees, and Charges Policy (MPF1325)
- Supervisor Eligibility and Registration Policy (MPF1322)

In view of the information summarized above, the auditors confirm that the rights and duties of both the University and the students are unequivocally defined clearly, and are binding to both sides – the University and the students. All rules and regulations are published on the University's website and, therefore, available to all relevant stakeholders.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 4:

The experts acknowledge that the University of Melbourne does not does not require all subjects/modules to explicitly write down their teaching methods. However, the experts point out that this is not just an option but a requirement and ask the university to up-date the module descriptions to this respect.

The experts consider criterion 4 to be mostly fulfilled.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- The university's Academic Board webpage: https://about.unimelb.edu.au/strategy/governance/peak-bodies-structures/academic-board
- FEIT Industry Advisory Groups: Master of Software Engineering

- Discussion during the audit

Preliminary assessment and analysis of the experts:
The University of Melbourne presents a comprehensive external and internal quality assurance (QA) system, which operates at the University, Faculty, School, and Subject levels.

Concerning the processes related to updating and modernizing the course/program content, delivery, and related QA matters, it is the Teaching and Learning Quality Assurance Committee (TALQAC), a committee of the Academic Board, is in charge for putting regulations into practice. The TALQAC advises on quality assurance policies for courses, assessments, learning support as well as student progression. This committee also evaluates teaching and learning performance using national and international practices, including the Australian national TEQSA's quality framework. The TALQAC also regularly review all study programs.

At the university level, any substantial modifications to a course or subject, such as learning outcomes, assessment statements or exam schedules, must be approved by the Academic Programs Committee (APC), another offspring of the Academic Board. No changes may be made to a subject once the semester has commenced.

As regards other quality instruments in place, students are regularly asked to provide feedback on each of their attended courses through a standardised course evaluation survey ("End of Subject Survey (ESS)"). The survey results are distributed to Deans, Heads of Departments, and academic staff for each subject. If a subject scores lower than expected 3.5 and below (on a 1-5 scale), the Head of Department will meet with the subject coordinator to create a performance improvement plan. The Teaching and Learning Laboratory may also assist with understanding student feedback and suggest improvements. As explained to the experts during the discussion with the program coordinators, lecturers are asked to discuss the received feedback and any action taken as a result with students of the next class.

Apart from surveys, each department has established a Staff-Student Liaison Committee (SSLC) that meets once or twice a semester to provide feedback on subject- and program-level issues. SSLCs allow for specific adjustments during the semester and contribute to improving program quality by monitoring subject delivery, discussing curriculum relevance, identifying duplicated material, highlighting good practices, and monitoring student workloads. Committees include student representatives from all year levels and teaching staff, who collect confidential information on student opinions.

Students can also provide feedback directly to the Head of Department/School and through their student club leaders who attend the Student Wellbeing Committee meetings.

To foster the integration of industry perspectives, FEIT has established Industry Advisory Groups (IAGs) for all Master of Engineering degrees. They provide valuable insights to aid strategic planning, teaching, and research programs. The group meets 2 to 4 times a year to increase industry participation in the school's activities. They have contributed to the curriculum design of the two Master programs through guest lectures, real-world case studies, industry-based projects, site visits, and preparation for employment.

In addition to these internal QA mechanisms, external accreditations/certifications are pursued through national and international subject-relevant agencies and labels. The two Master programs under review have been professionally (re)-accredited and recognised under the EUR-ACE® system as well as the Washington Accord through Engineers Australia.

Overall, the expert panel gains a positive impression of the institutional, procedural and cultural set-up of the Universities/faculties quality assurance system for the program under review. The experts commend the teaching staff for their commitment to continuous improvement of the study programs' curricula. Quality management has a high priority within the University and a variety of functioning structures. Processes and instruments have been created, which feed into continuous improvement cycles for the two programs under review. What the experts are missing, however, is a documented Quality Assurance Handbook, which has not been part of the documentation. The experts therefore kindly ask the Faculty to provide a copy of this QA manual.

The expert group judges the student-staff committees in place to be strong and valid instrument for discussing and solving study related issues.

The experts also consider the University of Melbourne and the Faculty of Engineering and Information Technology to conduct a sufficient number of evaluations to survey the opinion of students, stakeholders, and staff on a regular basis with the following reservations:

As regards the end of semester course surveys for all students, the problem at hand is two-fold: the first shortcoming is related to the fact that only a small percentage of students partake in student evaluations. This is lamentable in itself, but even more so, as this QA device is feeding into the career planning and progression of teaching staff. Further information on this dysfunctional link is provided in prior parts of this report.

Even more critical is the fact, that the interviewed students clearly feel little motivation in taking part in these questionnaires. Students almost unanimously are of the opinion that their criticism regarding teaching methods and contents, delivered in the course of end of semester surveys, is not considered by teachers as source for improving didactics and content. If the Faculty continues to use this QA instrument, the institution has to make sure that an adequate number of students are providing meaningful data and that the results are used in to close quality circles and undertake corrective action, if needed.

The university is requested to provide numbers and statistics on drop-out rates, average time to graduation. Also, the university should monitor periods from graduation to starting a profession, and kind of profession pursued by graduates after being hired.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 5:

The experts take note that the University of Melbourne is convinced that the students' feed back is taken into consideration by teachers as a source of improvement of didactics and content. In its statement, the university offers several examples for changes that have been implemented based on students' feedback. The experts see a discrepancy between the comments of the students and the statement of the university. As a result, the expect the programme coordinators to talk to the students representatives and discuss with them if students' criticism regarding teaching methods and contents, delivered in the course of end of semester surveys is sufficiently taken into account or not.

The experts consider criterion5 to be mostly fulfilled.

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D Additional Documents

Before preparing their final assessment, the panel ask that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

- The experts kindly ask that a representative sample of final capstone projects/Master theses are made available to make an informed decision, whether the achieved student learning outcomes are consistently aligned to a Master level qualification.

- The expert team kindly asks the Faculty to provide a list of international exchange partners and to provide an overview how many students in both Master programs under review have actually engaged in international exchange.

- In order to reach a conclusion, whether experiments conducted in the Chemical and Biomedical Engineering wet-laboratories truly reach master level in terms of depth and widths requires reviewing manuals delivered otherwise to students for preparing and conducting respective experiments. The experts therefore kindly ask the Faculty to provide this information.

- The university is kindly requested to deliver a handbook on quality management for providing insight of instruments, the use of these instruments, and proof of effectiveness for these instruments in securing and improving quality of the study programs;

- The Faculty is kindly asked to provide statistical data regarding the two programs under review for admission, progression, drop-out rates and standard periods of studies for the past 3 student intakes/cohorts.

E Comment of the Higher Education Institution (31.08.2023)

The institution provided a statement as well as the following additional information:

The experts kindly ask that a representative sample of final capstone projects/Master theses are made available to make an informed decision, whether the achieved student learning outcomes are consistently aligned to a Master level qualification.

BE_Capstone –folder containing capstone projects/Master theses for the Master of Biomedical Engineering. If you have trouble opening the link, right click on the file and select Link -> Open link.

CE_Capstone – folder containing capstone projects/Master theses for the Master of Chemical Engineering. If you have trouble opening the link, right click on the file and select Link -> Open link.

The expert team kindly asks the Faculty to provide a list of international exchange partners and to provide an overview how many students in both Master programs under review have actually engaged in international exchange.

FEIT's international exchange partners

Please find below the mobility-related agreements that are FEIT and FEIT-plus-other-faculties specific, as well as our larger AOTULE (13 members) and GE3 (65 members) partnerships. There is occasionally crossover (e.g. Technion, Twente) between our partners and our group partnership members. What we have not included are the University of Melbourne general university-wide exchange partnerships. The list of 200-ish partners can be seen here, many of which also cover FEIT but are not solely FEIT-specific.

Country ↑	Agreement: Agreement Name	Agreement Type
Belgium	Catholic University of Louvain - Erasmus+ - FEIT	Mobility - Erasmus+
	Catholic University of Louvain - SEA - FEIT	Mobility - Postgraduate exchange
Canada	University of New Brunswick - SEA - FEIT	Mobility - UG & PG Exchange
China	Shandong University - LOI - FEIT Science	Broad Academic Collaboration - MOU
	Peking University - SEA - FEIT	Mobility - UG & PG Exchange
	Shandong University - MOU - FEIT Science	Broad Academic Collaboration - MOU
Denmark	Aalborg University - MOU - ABP FEIT	Broad Academic Collaboration - MOU
	Aalborg University - SEA - ABP FEIT	Mobility - UG & PG Exchange
Germany	University of Stuttgart - MOU Internship - ABP FEIT Science	Broad Academic Collaboration - MOU; Mobility - Internship/Placement
	University of Stuttgart - SEA Internship - ABP FEIT Science	Mobility - Internship/Placement; Mobility - UG & PG Exchange
India	Indian Institute of Technology Madras - MOU - FEIT Science	Broad Academic Collaboration - MOU
Israel	Technion – Israel Institute of Technology - MOU - ABP FEIT Science	Broad Academic Collaboration - MOU
	Technion – Israel Institute of Technology - SEA - ABP FEIT Science	Mobility - UG & PG Exchange
Japan	Asia-Oceania Top University League of Engineering - MOU - FEIT	Mobility - UG & PG Exchange - see below for membership details
Netherlands	University of Twente - MOU - FEIT Science	Broad Academic Collaboration - MOU
	Delft University of Technology - SEA - ABP FEIT Science	Mobility - UG & PG Exchange
	University of Twente - SEA - FEIT	Mobility - Postgraduate exchange
	University of Twente - Erasmus+ - FEIT	Mobility - Erasmus+
Singapore	Singapore Management University - Credit Articulation - FEIT	Teaching & Learning Partnership - Articulation
Sweden	Royal Institute of Technology - SEA - ABP FEIT Science	Mobility - UG & PG Exchange
Switzerland	Global Engineering Education Exchange Consortium - MOU - FEIT	Mobility - Postgraduate exchange - see below for membership details
United Kingdom	Imperial College London - SEA - FEIT	Mobility - UG & PG Exchange
Total	22	

Asia-Oceania Top University League of Engineering - MOU - FEIT (13 partners including UniMelb)		
Indonesia	Bandung Institute of Technology	Asia-Oceania Top University League of Engineering - MOU - FEIT
Thailand	Chulalongkorn University	Asia-Oceania Top University League of Engineering - MOU - FEIT
Vietnam	Hanoi University of Science and Technology	Asia-Oceania Top University League of Engineering - MOU - FEIT
Hong Kong	Hong Kong University of Science and Technology	Asia-Oceania Top University League of Engineering - MOU - FEIT
India		Asia-Oceania Top University League of Engineering - MOU - FEIT
Republic of Korea	Korea Advanced Institute of Science and Technology	Asia-Oceania Top University League of Engineering - MOU - FEIT
Singapore		Asia-Oceania Top University League of Engineering - MOU - FEIT
Taiwan	National Taiwan University	Asia-Oceania Top University League of Engineering - MOU - FEIT
Japan	Tokyo Institute of Technology	Asia-Oceania Top University League of Engineering - MOU - FEIT
China	Tsinghua University	Asia-Oceania Top University League of Engineering - MOU - FEIT
Malaysia	University of Malaya	Asia-Oceania Top University League of Engineering - MOU - FEIT
Sri Lanka	University of Moratuwa	Asia-Oceania Top University League of Engineering - MOU - FEIT

Global Engineering Education Exchange Consortium - MOU - FEIT		
Argentina	Instituto Tecnológico de Buenos Aires	Global Engineering Education Exchange Consortium - MOU - FEIT
Belgium	KU Leuven	Global Engineering Education Exchange Consortium - MOU - FEIT
China	University of Michigan - Shanghai Jiao Tong University Joint Institute	Global Engineering Education Exchange Consortium - MOU - FEIT
China	Xiamen University	Global Engineering Education Exchange Consortium - MOU - FEIT
Colombia	Universidad de los Andes	Global Engineering Education Exchange Consortium - MOU - FEIT
Denmark	DTU: Technical University of Denmark	Global Engineering Education Exchange Consortium - MOU - FEIT
Egypt	American University in Cairo	Global Engineering Education Exchange Consortium - MOU - FEIT
France	ENSEA: Ecole Nationale Supérieure de l'Electronique et de ses Applications	Global Engineering Education Exchange Consortium - MOU - FEIT
France	INSA Lyon: Institut National des Sciences Appliquées, Lyon	Global Engineering Education Exchange Consortium - MOU - FEIT
France	UTT: Université de Technologie de Troyes	Global Engineering Education Exchange Consortium - MOU - FEIT
Germany	Hamburg University of Applied Sciences	Global Engineering Education Exchange Consortium - MOU - FEIT

Germany	HM Hochschule München University of Applied Sciences	Global Engineering Education Exchange Consortium - MOU - FEIT
Germany	RWTH Aachen University	Global Engineering Education Exchange Consortium - MOU - FEIT
Hong Kong	City University of Hong Kong	Global Engineering Education Exchange Consortium - MOU - FEIT
Hong Kong	Hong Kong Polytechnic University	Global Engineering Education Exchange Consortium - MOU - FEIT
Indonesia	Institut Teknologi Bandung	Global Engineering Education Exchange Consortium - MOU - FEIT
Israel	Technion – Israel Institute of Technology	Global Engineering Education Exchange Consortium - MOU - FEIT
Italy	Politecnico di Milano	Global Engineering Education Exchange Consortium - MOU - FEIT
Japan	Tohoku University	Global Engineering Education Exchange Consortium - MOU - FEIT
Malaysia	Universiti Teknologi PETRONAS	Global Engineering Education Exchange Consortium - MOU - FEIT
Mexico	Tecnológico de Monterrey	Global Engineering Education Exchange Consortium - MOU - FEIT
The Netherlands	University of Twente	Global Engineering Education Exchange Consortium - MOU - FEIT
New Zealand	University of Canterbury	Global Engineering Education Exchange Consortium - MOU - FEIT
Singapore	Nanyang Technological University	Global Engineering Education Exchange Consortium - MOU - FEIT
South Korea	Hanyang University	Global Engineering Education Exchange Consortium - MOU - FEIT
South Korea	KAIST: Korea Advanced Institute of Science & Technology	Global Engineering Education Exchange Consortium - MOU - FEIT
Spain	Universidad del Pais Vasco	Global Engineering Education Exchange Consortium - MOU - FEIT
Spain	Universidad Politécnica de Madrid	Global Engineering Education Exchange Consortium - MOU - FEIT
Spain	Universidad Pontificia Comillas	Global Engineering Education Exchange Consortium - MOU - FEIT
Sweden	Lund University	Global Engineering Education Exchange Consortium - MOU - FEIT
United Arab Emirates	Khalifa University of Science and Technology	Global Engineering Education Exchange Consortium - MOU - FEIT
United Kingdom	University of Leeds	Global Engineering Education Exchange Consortium - MOU - FEIT
United Kingdom	University of Sheffield	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Boise State University	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Case Western Reserve University	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	City College of New York	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Clemson University	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Drexel University	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Embry-Riddle Aeronautical University	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Franklin W. Olin College of Engineering	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Georgia Institute of Technology	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Illinois Institute of Technology	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Lehigh University	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Louisiana State University	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Mississippi State University	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Missouri University of Science & Technology	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	New Jersey Institute of Technology	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	New York University	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Rensselaer Polytechnic Institute	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Rose-Hulman Institute of Technology	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	Texas Tech University	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of Florida	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of Illinois, Urbana-Champaign	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of Miami	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of Michigan	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of Minnesota	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of New Hampshire	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of Pittsburgh	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of Portland	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of Rochester	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of Tulsa	Global Engineering Education Exchange Consortium - MOU - FEIT
United States	University of Wisconsin, Madison	Global Engineering Education Exchange Consortium - MOU - FEIT

The number of students from the Master of Biomedical Engineering and Master of Chemical Engineering who went on exchange are listed in the two tables below. In reading the tables below

- Coursework (Semester or longer) means that our students go on exchange and enrol in subjects at our partner institutions for one semester or longer.
- Coursework (short-term) are intensives run over the July or January holidays. Our biggest partners for these are

a. Peking University's Globex Program – a suite of about 16 – 18 subjects run over our winter break, some options of which are approved each year as a 12.5 point elective for various disciplines

b. Nanyang Technological University's Trailblazer Program – their Entrepreneurship and Innovation Asia has been approved for a number of years as a 12.5 point elective for various disciplines (usually IT/IS)

- Research (short-term) is when students go overseas for 10 – 12 weeks over our summer break to take research placements at partner institutions. They complete 3 months of research, then return to the University of Melbourne to complete the assessment components of the research-related subject for their discipline, thus receiving a grade/mark from the University of Melbourne. This summer we have students going to KAIST in Korea to take part in their Visiting Student Researcher program.

Biomedical Engineering Students Outbound 2018 – 2023

Biomedical Outbound Data	Year					
Row Labels	**2018**	**2019**	**2021**	**2022**	**2023**	**Grand Total**
Canada		**1**				**1**
Coursework		**1**				**1**
Semester or longer		1				1
China			**3**	**1**		**4**
Coursework			**3**	**1**		**4**
Short-Term			3	1		4
Ireland	**1**					**1**
Coursework	**1**					**1**
Semester or longer	1					1
Italy					**1**	**1**
Coursework					**1**	**1**
Semester or longer					1	1
Japan	**4**	**4**				**8**
Research	**4**	**4**				**8**
Short-Term	4	4				8
Singapore		**1**				**1**
Coursework		**1**				**1**
Short-Term		1				1
South Korea	**1**	**3**				**4**
Coursework	**1**	**3**				**4**
Semester or longer		1				1
Short-Term	1	2				3
Sweden				**1**		**1**
Coursework				**1**		**1**
Semester or longer				1		1
Switzerland					**1**	**1**
Coursework					**1**	**1**
Semester or longer					1	1
USA	**1**	**2**				**3**

Coursework	**1**	**2**				**3**
Semester or longer	1					1
Short-Term		2				2
Grand Total	**7**	**11**	**3**	**2**	**2**	**25**

Chemical Engineering Students Outbound 2018 - 2023

Chemical Engineering Outbound	Year			
Row Labels	**2018**	**2019**	**2023**	**Grand Total**
Canada		**1**	**1**	**2**
Coursework		**1**	**1**	**2**
Semester or longer		1	1	2
China		**1**		**1**
Coursework		**1**		**1**
Short-term		1		1
Denmark		**1**		**1**
Coursework		**1**		**1**
Semester or longer		1		1
Japan	**3**	**1**		**4**
Research	**3**	**1**		**4**
Short-term	3	1		4
Netherlands	**2**		**1**	**3**
Coursework	**1**		**1**	**2**
Semester or longer	1		1	2
Research	**1**			**1**
Short-term	1			1
New Zealand	**1**			**1**
Coursework	**1**			**1**
Short-term	1			1
Singapore			**1**	**1**
Coursework			**1**	**1**
Short-term			1	1
Sweden			**2**	**2**
Coursework			**2**	**2**
Semester or longer			2	2
Switzerland	**1**			**1**
Coursework	**1**			**1**
Semester or longer	1			1
USA	**2**			**2**
Coursework	**1**			**1**

Semester or longer	1			1
Research	**1**			**1**
Short-term	1			1
Grand Total	**9**	**4**	**5**	**18**

In order to reach a conclusion, whether experiments conducted in the Chemical and Biomedical Engineering wet-laboratories truly reach master level in terms of depth and widths requires reviewing manuals delivered otherwise to students for preparing and conducting respective experiments. The experts therefore kindly ask the Faculty to provide this information.

Biomedical Engineering WetLabs

The link to the folder containing further details on wet-laboratories for the Master of Biomedical Engineering can be found by clicking here Wet-labs. If you have trouble opening the link, right click on the file and select Link -> Open link.

There are 5 subjects which conduct wetlabs in the Biomedical Engineering programme.

BMEN30010 (Mechanics for Bioengineering) conducts a wet-lab practical session to train students in applying and analysing the mechanical behaviour of biological samples. The students are given a workshop handout that lists the procedures that students should follow to conduct a mechanical test. The intended learning outcomes of this workshop are (i) to learn how to measure mechanical properties of materials; (ii) to be able to describe different parts of stress-strain curves; (iii) to know how to calculate a Young's modulus; (iv) be able to compare and contrast differences in mechanical properties of engineering and soft biological materials. This content prepares them for further analysis of viscoelastic biological materials and nonlinear stress analysis that is necessary in the higher-level Biomechanics subjects. In their report, students are asked to evaluate the differences in the mechanical behaviour of the materials they tested. Through this exercise students are introduced to nonlinear stress-strain behaviour of biological tissues. They learn how to identify different regions of mechanical behaviour (linear elastic, plastic, strain hardening, failure etc.). They also apply their estimate of the Young's modulus from their experiments into their project-based assignment for designing a bionic limb.

Similarly, in BMEN30009 (Introduction to Biomaterials), students conduct a more extensive material evaluation (swelling, drug release, compression testing), having made a choice of the different combination of materials they will evaluate. Students are required to first identify an experimental question with associated hypothesis that they want to test. The test they apply is then determined by them to answer this hypothesis. All students then to present their results/conclusions and relate them to their driving hypothesis.

In our specialisation and elective subjects at the Masters level, there are three subjects conducting wetlabs: BMEN90040 (Process Eng for Biomedical Technologies), BMEN90036 (Biofluid Mechanics) and BMEN90011 (Tissue Engineering and Stem Cells), where this curiosity-driven approach is extended.

In BMEN90040, students conduct a diffusivity practical to analyse mass transfer. It requires deeper thought and analysis than simple application of subject knowledge, as they must build up the experiment, collect the data and then interrogate how the results will change under different conditions; specifically, they must apply kinetic theory equations to estimate the diffusivity under different conditions. This requires analysis of new systems and synthesis of theoretical and experimental information to meet the learning outcomes.

In BMEN90036, students are instructed to set up an experiment wherein they will use the data they collect to derive theoretical relationships between flow rate and frictional losses that occur with different Reynolds number regimes. The masters level elements specifically includes (i) the requirement to determine the ideal measurement apparatus to determine friction factors over a wide range of flow values, and (ii) translation and synthesis of these findings to analyse biological systems, including blood vessels and relevant forces acting in blood flow, and the influence of these factors on human physiology.

In BMEN90011, students are provided the goals of the practical work and a list of equipment and materials. They need to develop their own procedure drawing on information from the subject lectures, workshops, and literature sources; specifically identify the selection criteria for tissue engineering scaffold design, fabrication and biomaterials. They then conduct the practical work, culturing cells in different environments in the first session and assessing the outcomes in the second session. They collect data using multiple methods, use them to quantify aspects of their design, and then analyse and draw conclusions from this in a formal written technical report.

Chemical Engineering WetLabs

The link to the folder containing further details on wet-laboratories for the Master of Chemical Engineering can be found by clicking here CE_Labs. If you have trouble opening the link, right click on the file and select Link -> Open link.

Chemical engineering practicals are structured to align with a student's development through the Bloom's taxonomy of learning outcomes associated with a Master degree. The first-year subjects wet-laboratory practicals are aligned with outcomes associated with 'apply' and 'analyse' classifications. These practicals also ensure all students have the required laboratory and safety skills expected by the University of Melbourne, which students should have obtained during their prior Bachelor programs. The quality of the practicals can be seen in CHEN20010 Material and Energy Balances, which has practicals on the principles of latent heat and cooling tower operations, as well as CHEN20012 Fundamentals of Chemical Engineering, with the practical focused on heat exchange construction and testing. Year 2 practicals build on the students' knowledge by applying the 'analyse' and 'evaluate' classifications. Examples of this are in CHEN30001 Reactors and Catalyst practical on second order reactors, which requires students to have undertaken prior work in developing a suitable reactor model that they apply during their practical. CHEN90042 Thermal and Separation Design practicals are focused on providing the students with experience of large-scale equipment. This is necessary as most graduates will be working in the process industry where applying chemical engineering knowledge on such equipment is vital. Students in this subject's practical utilise large scale evaporators, gas absorption columns and ternary distillation columns.

Chemical engineering specialisation and elective subjects provide the practicals aligned with the 'create' classification of a Master's degree. For example, CHEN90027 Future Fuels and Petroleum have the students design, construct and test a water electrolyser for hydrogen generation, CHEN90011 Wastewater & Environmental Remediation has the students determine methods to treat wastewater from corn syrup production while CHEN90018 Particle Technology require students to trouble shot and operate a poorly designed desander hydrocyclone.

Students also achieve the 'create' in their internship or research project (CHEN90023 or CHEN90028). In these subjects' students are working on real industry identified problems and are required to develop solutions or students are working on cutting-edge research and are expected to produce a scholarly outcome research that expands knowledge in chemical engineering.

The practical program in Chemical Engineering is also undergoing a renovation aligned with the construction of the Next Tech Building (adjacent to the current Chemical Engineering building and department). This building has dedicated laboratory space for teaching facilities that will accommodate chemical engineering practicals as well as enable the location of former research focused pilot plants and associated equipment to site. As are result, practicals will be expanded to enable students to utilise these pilot facilities as part of their studies. An example of this is the novel-solvent carbon capture pilot plant, which was funded by Coal Innovation Australia, and instrumental in developing the intellectual property of the start-up KC8 Capture Technologies. The location of this pilot plant in the Next Tech Building will enable students as part of their practical in CHEN90027 to operate a 1 tonne per day CO2 capture plant, gaining experience in start-up, continual operations and shutdown of a large-scale process facility.

The new student laboratory in the Next Tech Building has been designed to exceed the safety and health requirements of a research facility. This is to ensure all students and staff will be safe in utilising this facility, minimise hazards and ensure separate working environments for the conduct of the practical and the associated documenting undertaken by the students.

The university is kindly requested to deliver a copy of the handbook on quality management for providing insight of instruments, the use of these instruments, and proof of effectiveness for these instruments in securing and improving quality of the study programs;

The quality of courses and subjects within FEIT is governed by various policies and processes.

AQF
The primary governance process is that all of our Master courses and subjects must be designed to abide by the AQF guidelines at level 9 of the AQF framework. This is accomplished via the following university Policies and Processes.

Policy
From the policy perspective, there are several policies that focus on the design of courses and subjects. The main policies across the design of courses and subjects that focus on quality are:

1. Courses, Subjects, Awards and Programs Policy (MPF1327) (https://policy.unimelb.edu.au/MPF1327/)

   The objectives of this policy are to:
   a) promote coherent course structures, course rules and clear course completion requirements;
   b) set clear responsibilities and accountabilities for the development, approval and review of courses and subjects;

c) ensure that course and subject learning outcomes (knowledge, skills, and application of knowledge and skills) are apparent for each qualification; and
d) meet all relevant national regulatory requirements, including the relevant standards.

2. Student Academic Integrity Policy (MPF1310) (https://policy.unimelb.edu.au/MPF1310/)

   The objectives of this policy are to:
   a) define and articulate the importance of maintaining academic integrity;
   b) outline what constitutes major or minor cases of breaches of academic integrity, and the procedures for dealing with each;
   c) provide a framework to ensure that academic standards and expectations are met;
   d) assist in identifying academic misconduct;
   e) ensure that student academic misconduct procedures are transparent, consistent, equitable and fair, and consistent with the principles of natural justice;
   f) identify responsibilities and accountabilities for decisions and processes;
   g) ensure that decision-making on academic misconduct is undertaken at appropriate levels of responsibility within the University;
   h) provide for the membership of committees formed to consider student academic misconduct; and
   i) define a framework of penalties which may be imposed for substantiated academic misconduct that are appropriate, proportionate and consistent.

3. Assessment and Results Policy (MPF1326) (https://policy.unimelb.edu.au/MPF1326/)

   The objective of this policy is to provide a framework for the design, delivery and implementation of assessment of students in award and non-award courses and subjects. Assessment is designed to contribute to high-quality learning by students, and to allow for quality assurance and the maintenance of high academic standards.

Process
From a process perspective, all new course and subject proposals and course and subject changes are governed by a process that occurs at several levels (See Figure 1).

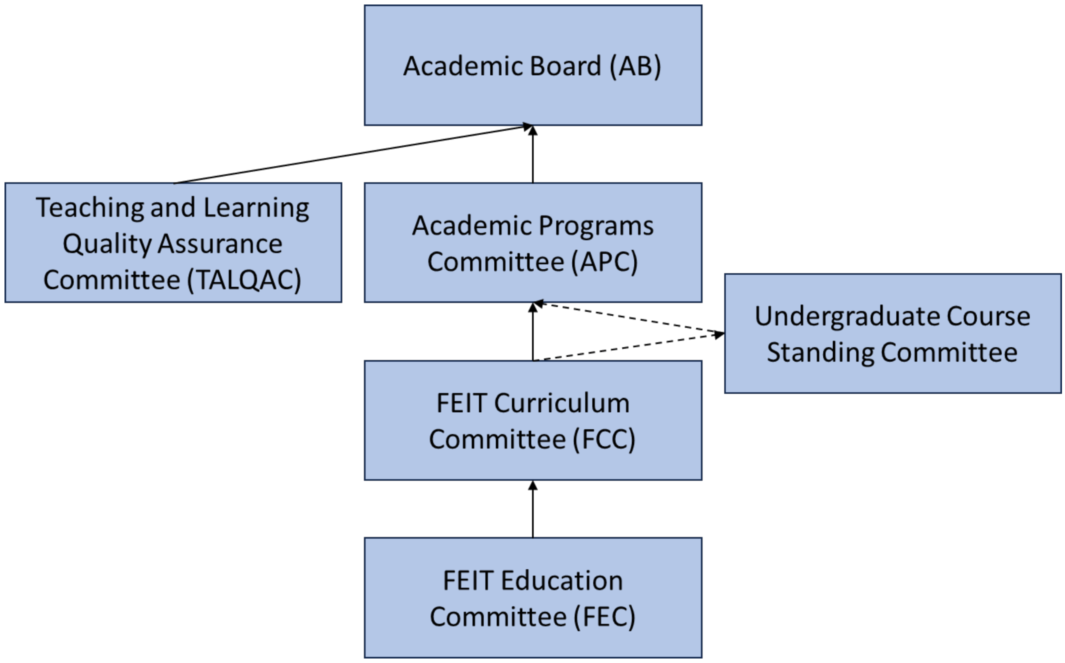

Figure 1: Committee Structure: Course and Subject Approvals

The **Academic Board (AB)** is the governing committee that ultimately approves all courses and subjects at the university[5]. In the main, this approval is delegated to the **Academic Programs Committee (APC)** which is an official committee of the Academic Board. The terms of reference for the APC are:

1. To develop policies, in consultation with the Academic Secretary and the Board officers on assessment and examinations, for recommendation to the Board, taking into account national and international best practice in order to ensure that academic programs are of high quality and standards.
2. To advise the Academic Board on resolutions, policy and procedures relating to all undergraduate and graduate coursework studies to ensure they are supporting the University's strategic objectives.
3. To recommend to the Academic Board policies and procedures regarding proposals for new, amended, discontinued and suspended coursework programs and courses, including criteria to be used in the development of proposals and the timeline for submission.
4. To review and make recommendations to the Academic Board regarding requirements to be satisfied by candidates for the award of a coursework degree, diploma or certificate.
5. To monitor and review delegations to deans to ensure that delegations related to course and subject approval are appropriately exercised and to make recommendations to the Board regarding those delegations
6. To monitor, for quality assurance and compliance purposes, non-award courses at undergraduate and graduate level offered under the name of the University.

[5] For information on the role of the Academic Board please see https://about.unimelb.edu.au/__data/assets/pdf_file/0027/19395/A-Quick-Guide-to-the-Academic-Board_2022.pdf

7. To obtain information or reports from any faculty, school or department, the Library or other academic unit on academic matters relating to coursework studies as requested by the committee.
8. To provide advice to the Academic Registrar on academic issues on the conduct and monitoring of examinations, including examination conditions.
9. To refer to the Teaching and Learning Quality Assurance Committee (TALQAC) matters concerning appropriateness and quality of assessment including quality assurance of examination and assessment processes.
10. To receive reports from its sub-committees, Melbourne Custom Programs Committee and the Examinations sub-committee.
11. To periodically review these terms of reference and make recommendations to the Board to provide for the regulation of its own procedures

At a typical APC meeting, courses and subject proposals are assessed by at least 2 committee members, plus assessed by the chair of the committee. Committee members also look at these proposals and any member of the committee can comment on any proposal being made. The focus of this checking process is on whether the proposal fits within the policies of the university (and hence TEQSA and the AQF guidelines).

Prior to course and subject proposals (new and changes) being forwarded to APC for approval these must first be approved internally within FEIT at two levels. First, all new courses must be approved at the strategic level by the Faculty Education Committee (FEC). The primary focus here is to ensure that there is faculty-wide agreement with the new course. Second, all proposals for courses and subjects must be approved by the Faculty Curriculum Committee (FCC). Within this committee,

each course and subject taught at FEIT undergoes a shepherding process whenever it is initially proposed or changed. This is the initial quality assurance check to ensure that all courses and subjects abide by the university policies and are at an appropriate level within the Australian Quality Framework in terms of learning objectives, type of assessment, and amount of assessment etc.

In addition to these processes for new or changed course and subject proposals, the University also undertakes a quality review of all courses and subjects on a cyclic basis that ensures that each course is assessed at least once every 6-7 years. This is undertaken by the Teaching and Learning Quality Assurance Committee (TALQAC). The terms of reference for TALQAC are:

1. To advise the Academic Board on quality assurance policy for teaching and learning in undergraduate and graduate award courses and subjects, including
    - course structure and coherence;
    - appropriateness and quality of assessment;
    - assessment and examination policies;
    - course management, learning support and student progress.
2. To advise the Academic Board on resolutions, policy and procedures relating to all undergraduate and graduate coursework studies to ensure they are supporting the University's strategic objectives.
3. In collaboration with Academic Divisions, related Academic Board committees, the Centre for the Study of Higher Education, the Business Intelligence and Reporting Unit and the Provost, to develop, monitor and review the use of appropriate qualitative and quantitative measures of performance of teaching and learning, taking into account national and international recommended practices, including the quality framework of the Tertiary Education Quality and Standards Agency (TEQSA).
4. To advise the Academic Board on priority areas for evaluation and quality assurance of academic programs and associated student support programs.

5. In collaboration with the Provost to recommend the annual schedule of cyclical evaluations of academic units and areas of teaching and learning to review and evaluate quality in teaching and learning of all award courses and programs, and associated student support services and programs.
6. To make recommendations to the Academic Board on appropriate actions to improve the quality of teaching and learning in courses and programs following the evaluations referred to at 5.
7. To monitor and evaluate systems and structures for the effective interaction between
academic divisions, Board committees and University Services in the development and use of measures to encourage adoption of good practice in academic programs.
8. To advise and liaise with the Provost, the Director of the Centre for the Study of Higher Education, Deans, Course Standing Committee Chairs, related Board and academic division committees, and associated student and administrative supporting programs and services on matters within the committee's terms of reference.
9. To monitor the quality and effectiveness of programs designed to facilitate the transition of students into undergraduate and postgraduate courses and from courses into careers.
10. To receive final reports provided by Professional Associations on course accreditation on behalf of the Board.

All of the Engineering Degrees covered by the Eur-Ace Accreditation are also undergoing TALQAC assessment in November 2023.

IAG
The industry advisory groups for each of the courses also play a role in ensuring that the content of courses and subjects are relevant in the industry environment. The IAGs provide valuable insights into our teaching programs and each member provides a link to their broad network and advises on ways to strengthen teaching and research activities through industry engagement. The goals of the IAGs relevant to teaching include increasing industry involvement in course design, including input into:
- The curriculum
- Presentation of guest lectures
- Real-world case studies
- Industry-based projects
- Site visits

The Faculty is kindly asked to provide statistical data regarding the two programs under review for admission, progression, drop-out rates and standard periods of studies for the past 3 student intakes/cohorts.

The numbers requested for the Master of Biomedical Engineering and Master of Chemical Engineering are shown below. Do bear in mind that all students enrolled into these two programs have done quite well in their undergraduate degrees with a 65% average mark.

Commencing students (number of students starting the program for each calendar year)

Name of degree	2020	2021	2022

Master of Biomedical Engineering	78	75	74
Master of Chemical Engineering	62	41	72

Withdrawals (student who withdraw from the program)

Name of degree	2020	2021	2022
Master of Biomedical Engineering	4 (2 withdrew in 2020 and 2 in 2021)	7 (4 in 2021 and 3 in 2022)	3 (all from 2022)
Master of Chemical Engineering	3 (2 withdrew in 2020 and 1 in 2021)	8 (2 in 2021 and 6 in 2022)	0 (none had withdrawn)

Distribution of Grades for the Master of Biomedical Engineering. The table below shows the percentage of grades (H1, H2A etc) awarded for 2020, 2021 and 2022 in the Master of Biomedical Engineering. For example, in 2021, 33% of the grades awarded to all the students enrolled in the Master of Biomedical Engineering is H1, 17% is H2B etc.

	2020	2021	2022
H1 (80 and above)	40%	33%	26%
H2A (75-79)	23%	22%	22%
H2B (70-74)	18%	17%	19%
H3 (65-69)	8%	12%	14%
P (50-64)	8%	9%	16%
N (Fail)	2%	4%	2%

Distribution of Grades for the Master of Chemical Engineering. The table below shows the percentage of grades (H1, H2A etc) awarded for 2020, 2021 and 2022 in the Master of Chemical Engineering. For example, in 2022, 32% of the grades awarded to all the students enrolled in the Master of Biomedical Engineering is H1, 11% is H3 etc.

	2020	2021	2022
H1 (80 and above)	38%	38%	32%
H2A (75-79)	19%	17%	17%
H2B (70-74)	16%	18%	18%
H3 (65-69)	12%	11%	11%
P (50-64)	14%	15%	18%
N (Fail)	2%	2%	4%

For the Master of Biomedical Engineering, of the students who completed their degree between 2020-2022
46 students (27% of total completions) completed their degree within 2 years
56 students (33% of total completions) completed their degree between 2-2.5 years
35 students (21% of total completions) completed their degree between 2.5-3 years
16 students (10% of total completions) completed their degree between 3-3.5 years
7 students (4% of total completions) completed their degree between 3.5-4 years
8 students (5% of total completions) completed their degree between in more than 4 years

For the Master of Chemical Engineering, of the students who completed their degree between 2020-2022
99 students (52% of total completions) completed their degree within 2 years
43 students (22.5% of total completions) completed their degree between 2-2.5 years
25 students (13% of total completions) completed their degree between 2.5-3 years
13 students (7% of total completions) completed their degree between 3-3.5 years
6 students (3% of total completions) completed their degree between 3.5-4 years
5 students (2.5% of total completions) completed their degree between in more than 4 years

In this section, we address concerns raised by the ASIIN panel in the draft accreditation report sent to us on 24th August 2023.

Criterion 1.1 Objectives and learning outcomes of a degree program (intended qualifications profile)
Page 12 - "…. Keeping track of the success of national and international graduates on the labor market."

Master of Chemical Engineering

The Department of Chemical Engineering retains the contact details and employment outcomes of our graduates and has done so for the last 12 years. This information enables the department to retain in contact with our alumni. The department has noticed a change in the chemical engineering environment over the last decade, as reflected in the industries that employ our graduates. This trend is shown in Figure 1.1. The oil and gas industry has become a minor employer of our graduates, with significant uptake of graduates in bioprocessing, pharmaceutical and sustainability sectors, as well as sustained employment in the mining and material processing sectors. Increasingly our graduates are being employed in non-engineering industries, such as logistics and finances, which have come to appreciate our graduates' expertise in processes and systems. These industries are looking for flexibility and well-round graduates, with depth of knowledge across a range of chemical engineering fields. This ideally suits the Master degree programs offered by the University of Melbourne in chemical engineering, especially our three specialisations.

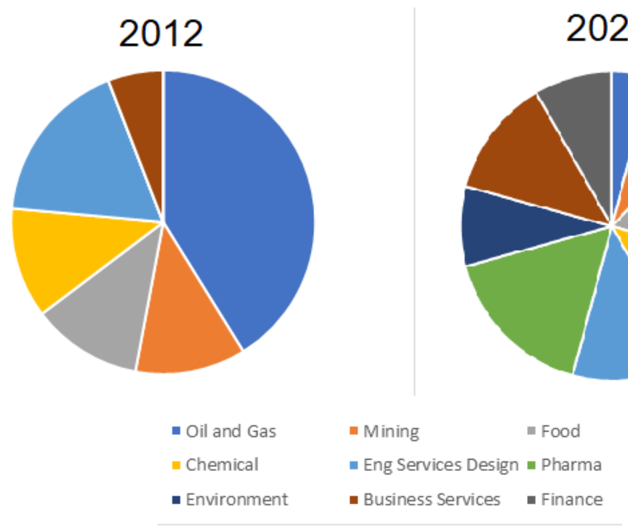

Fig. 1.1 – Comparison of University of Melbourne chemical engineering graduate employment by industrial sector.

Criterion 1.3 Curriculum

Page 21 – "…recommend that the Faculty should use all options for helping students having graduated as Bachelor of Science from the University of Melbourne or related study programs, to apply via meaning internet portals from a sufficiently available number of offered internships, preferentially covering their expenses."

We feel that there is a miscommunication with the students here and we believe the understanding of the experts are incorrect. We stress that we do not approve or promote domestic internships that students are required to pay for. We do not charge any fee for this service. For the internships that we source for our students, there is already (only) one internet portal (which we call Careers Online) that all our eligible Master of *discipline* Engineering students have access to (in order to apply for ENGR90033 and CHEN90028 internships).

If students wish to self-source their internship outside of the subject, we generally direct them to STOP 1 to explore their options with a careers advisor and attend our professional skills series workshops. We stress again here that we do not charge any extra fee for these services.

Criterion 2 Exams: System, concept and organisation

Page 30 – "…recommend that the faculty should seek every option available for reducing the number of examinations to one per day……Students who fail would be pleased in receiving more help than offered at the moment, for identifying individual weakness…."

We strive to ensure better spread of exam sittings for our students. However, being such a large university, this is not always possible. The University does state, however that no student should have more than 2 exams in 1 day, and more than 3 exams across a 2 day period. In an event where this is not possible for a particular student, then that student will be given alternative exam arrangements (where one of the exams is moved for them and they would sit at an alternate time).

The breakdown of assessment for each subject is available in the university handbook. For each non exam assessment item students are provided a marking guide that breaks down the assessment tasks so that they are aware of what we are looking for from that assessment item. Our students have the ability to view the marking of exams and ask for feedback on all assessment items. However, we acknowledge that this might not be well communicated to all our students. This is another aspect of our program that we will strive to improve.

Criterion 3.1 HR Resources, Staff Development and Student Support

Page 34 – "…recommend to increase the number of teaching in laboratory courses that have expert of relevant knowledge in the appropriate laboratory task ……there were teaching staff that were not knowledgeable of the laboratory tasks…"

We thank the experts for this feedback. We will investigate this issue but as far as we are aware all teaching staff are properly trained and are knowledgeable of the laboratory tasks that they are teaching. We will explore the possible increase of staff to assist with the experiments and ensure there is sufficient staff that are able to assist all students if needed.

Criterion 3.1 HR Resources, Staff Development and Student Support

Page 34 – "…the experts share the opinion of the teaching staff, that using the results of these questionnaires for the purpose of career development and promotion of teachers should be reconsidered."

The faculty is aware of this issue and is working with the university of increase the response rate of the questionnaires. The outcome of these questionnaires is used by the University to assess the performance of the faculty. Hence, we cannot ignore the results of these questionnaires. Having said that, the faculty acknowledges that there are other tools that can be used to judge the teaching performance of academic staff in the faculty and we will be working with our newly formed Teaching and Learning Laboratory (TLL) to encourage staff to use these tools to put their teaching in the most positive light in the promotion application process.

Criterion 3.1 HR Resources, Staff Development and Student Support

Page 36 – "…the expert team recommends evaluating whether the number of staff and the infrastructure suffices for providing adequate support to students facing mental health issues….students prefer being contacted via social media instead of the existing e-mailing system"

We are aware that students accessing our mental health assist mechanism increased dramatically during the COVID pandemic. As many organisations, we were unprepared of this sudden demand. We believe that the "supply/demand" ratio for assisting students in this area is now back to more acceptable level. We will be monitoring this situation and we are confident the University will increase appropriate staff if needed.

Regarding avenues for contacting students, we can say that student communications is being addressed at university wide level with an evidence based framework for aligning messages to the most effective communication channel is being introduced

Criterion 3.2 Funds and equipment

Page 38 – " ….the Faculty must therefore ensure that protective gloves are available in suitable quantity and in adequate quality for reliably protecting students in respective experiments from hazards imposed by chemicals handled….."

The safety of our students is our top priority. We have always ensured that good quality gloves are available. During the day of the lab tour, we did not have any classes scheduled pre or post the lab tour hence gloves and other consumables were packed away. We would like to reiterate that we have a range of gloves that our students have access to during their labs, mainly nitrile however we do have some latex and latex free, in sizes XS, S,M,L,XL. These are always placed out on the bench in the labs in advance of a lab class.

Criterion 3.2 Funds and equipment

Page 38 – " ….In the Chemical Engineering Laboratory more than one exits for leaving laboratory in case of emergency existed. In visiting Biomedical Engineering laboratories only a single existed. The experts therefore insist that the Faculty/University has to make sure, that laboratories used for conducting experiments are equipped with more than one safety exit. Although during the visit, tables allowing students to take notes were available, none of the visited laboratories had desks positioned in separated space, for documenting data without directly being in touch by the experimental set-up. The experts also point out that the laboratories are too congested (little separation), safe working issues and the equipment is mainly old or with reduced functions"

All our buildings are built to comply with the Australian building codes. For the Baterial and Mamalian labs, these spaces are small and hence the Australian building codes require only 1 exit.

We do admit that our spaces are small but we avoid congestion by allowing only a small amount of students in the labs at any one time. We also timetable the classes so that they are far enough apart to ensure that only very limited number of students are there at any instant in time.

The suggestion of having a table to allow students to take notes and documenting data is a good idea. We have not thought of this in the past and we will take this comment to the working group for our new buildings. Please note that we do have a new building scheduled for Chemical and Biomedical Engineering which will include new teaching labs. We will take into account all comments raised by the assessors when we build these new laboratories.

Criterion 4.1 Module descriptions

Page 40 – "…The experts request to review this in order to ensure that the teaching methods for the mentioned modules are publicly accessible,…"

At this stage, our university does not require all subjects/modules to explicitly write down their teaching methods (the manner in which they will deliver subject content). As noted by the experts, this is an optional entry and some subject coordinators have chosen to write down the method that they will be delivering their subjects (while many other have not). While we feel that this is a good idea, it has the disadvantage of affecting the flexibility for a new subject coordinator to deliver the subject in a new and innovative manner. We are of the opinion that subject coordinators should have the freedom to choose the teaching methods that best suits them as long as they ensure the attainment of all the learning outcomes (which is a compulsory entry in our handbook).

Criterion 5 Quality management: quality assessment and development

Page 45- "Students almost unanimously are of the opinion that their criticism regarding teaching methods and contents, delivered in the course of end of semester surveys, is not considered by teachers as source for improving didactics and content."

For both the Master of Chemical Engineering and Biomedical Engineering, the perception that student feedback is not considered by educators as a source of improvement of didactics and content is incorrect. Most of the changes and modifications to various subjects are due to feedback and insights provided from the Staff-Student Liaison committee, as this provides an open forum for students to voice their concerns, as well as participate in determining solutions to the raised problems. This forum also has a much wider participation than the end-of-subject questionnaires, as students actively seek feedback from their peers. Examples of changes to subjects due to feedback from this forum are as follows:

CHEN20012 Fundamentals of Chemical Engineering: improvements to the practical and communication with the Telstra Creator Space team.

CHEN30001 Reactors and Catalyst: restructuring of assessment schedule during semester to reduce the workload on students due to competing assessments from other subjects.

CHEN30015 Safety and Sustainability Case Studies: rearrangement of workshop timetables to ensure students have adequate time to complete assessment tasks.

CHEN90022 Chemical Engineering Design Project: decrease in the plant location and layout expectations for the process development report assessment, to reduce the workload burden on students.

BMEN30006 Circuits & Systems: insufficient time in class to complete workshop assignment led to extension of contact hours from 2-3 hours. Subsequent student feedback has been very positive on this change.

BMEN90038 Biomechanics: restructuring of the assessment schedule more evenly spread the workload on students due to competing assessments from other subjects (particularly around mid-semester break).

Multiple codes: introduction of industry site visits to promote future employment opportunities.

F Summary: Expert recommendations (08.09.2023)

Taking into account the additional information and the comments given by the university the experts summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Master of Biomedical Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2029
Master of Chemical Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2029

Requirements

For both Master's degree programs

A 1. (ASIIN 2) The Faculty needs to make sure that the final capstone project are consistently aligned with Master level 7 (EQF) or Master level 9 (Australian QF) learning outcomes .

A 2. (ASIIN 3.2) Make sure that experiments conducted in the Chemical and Biomedical Engineering wet-laboratories truly reach master level in terms of depth and widths.

A 3. (ASIIN 4.1) The module descriptions need to include information on the applied learning and teaching methods.

A 4. (ASIIN 5) The Faculty should make sure that a sufficient number of students take part at the satisfaction surveys and that the results are discussed with the students. The feedback cycles need to be closed and corrective measures, in case of critique, need to be undertaken.

Recommendations

For both Master's degree programs

E 1. (ASIIN 1.3) It is recommended increasing the number of (preferably paid) internships. Students should be informed in more detail on criteria for assessing internships.

E 2. (ASIIN 1.3) It is recommended providing additional opportunities to students for international student exchange (outgoing mobility) by appropriate means.

E 3. (ASIIN 1.3, 1.4) It is recommended to consider whether the organisation and responsibility for promoting the engineering programs should not be delegated in similar proportion also to the school of engineering next to the science department currently in charge, for allowing pupils and other interested persons to receive profound information on perspectives for graduates upon qualifying.

E 4. (ASIIN 2) It is recommended giving more substantiated feedback to students on their various assignments/exams.

E 5. (ASIIN 3.1) It is recommended increasing the number of laboratory assistants in the pursuit of increasing quality of teaching in laboratory courses.

E 6. (ASIIN 3.1) It is recommended reconsidering the use of student satisfaction surveys for the purpose of career development/ promotion of staff given the current low response rates.

E 7. (ASIIN 3.1) It is recommended offering additional support to staff for career development/the promotion process.

E 8. (ASIIN 3.1.) It is recommended increasing support measures regarding mental health problems among students.

E 9. (ASIIN 3.1.) It is recommended using increasingly social media as a means to spread information among students.

E 10. (ASIIN 3.2.) It is recommended reviewing the procedure for renewing software licenses and to consider the use of open access surveys along the lines described in this report.

E 11. (ASIIN 4.2) It is recommended issuing an additional Diploma Supplement according to the Bologna regulations.

G Comment of the Technical Committees (07.09.2023)

Technical Committee 01 – Mechanical Engineering/Process Engineering (07.09.2023)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and follows the assessment of the auditors without any changes.

Assessment and analysis for the award of the EUR-ACE® Label:

The Technical Committee agrees with awarding the EUR-ACE label to both degree programmes.

The Technical Committee 01 – Mechanical Engineering/Process Engineering recommends the award of the seals as follows:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
Master of Biomedical Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2029
Master of Chemical Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2029

Technical Committee 09 – Chemistry, Pharmacy (05.09.2023)

Assessment and analysis for the award of the ASIIN seal:

The university's feedback on the draft report is already available, only the final statement of the expert group is still missing. If significant changes are still desired, the Technical Committee will be informed by circulation. Overall, the Technical Committee shares the positive evaluation of the two Master's programmes, which are now to be reaccredited for the second time. Nevertheless, four requirements are to be imposed, concerning the practical laboratory work, the final theses, module descriptions, and feedback on the teaching evaluations. The requirement on the final theses is to be imposed because exemplary theses were not available to the experts at the time of the audit. In addition, 11 recommendations are to be made. The Technical Committee discusses the procedure and is somewhat surprised that a requirement for laboratory experiments is imposed for a second reaccreditation, but trusts the expertise of the expert group. Requirement A1 regarding the final papers may possibly be waived if the expert group is satisfied with the quality of the submitted final papers. In summary, the Technical Committee agrees with the assessment of the experts.

The Technical Committee 09 – Chemistry, Pharmacy recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Master of Chemical Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2029

Technical Committee 10 – Life Sciences (04.09.2023)

Assessment and analysis for the award of the ASIIN seal:

The university's feedback on the draft report is already available, only the final statement of the expert group is still missing. If significant changes are still desired, the Technical Committee will be informed by circulation. Overall, the Technical Committee shares the positive evaluation of the two Master's programmes, which are now to be reaccredited for the second time. Nevertheless, four requirements are to be imposed, concerning the practical laboratory work, the final theses, module descriptions, and feedback on the teaching evaluations. The requirement on the final theses is to be imposed because exemplary theses were not available to the experts at the time of the audit. In addition, 11 recommendations are to be made. The Technical Committee discusses the procedure and is somewhat surprised that a requirement for laboratory experiments is imposed for a second reaccreditation, but trusts the expertise of the expert group. However, the Technical Committee votes to delete recommendations E3 and E9, as these are considered superfluous. In addition, two grammatical corrections are made to requirements A2 and A4. Otherwise, the Technical Committee agrees with the assessment of the experts.

The Technical Committee 10 – Life Sciences recommends the award of the seals as follows:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
Master of Biomedical Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2029

H Decision of the Accreditation Commission (22.09.2023)

Assessment and analysis for the award of the ASIIN seal:

The Accreditation Commission discusses the procedure and decides to change requirement A4 because the university cannot force the students to take part at the satisfaction questionnaires. In order to be consistent with other accreditation procedures at the University of Melbourne, the Accreditation Commission decides to change recommendation E9 (Diploma Supplement) into a requirement. The changes as proposed by the Technical Committee 10 are accepted.

Assessment and analysis for the award of the EUR-ACE® Label:

The Accreditation Commission agrees with awarding the EUR-ACE label to both degree programmes.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Master of Biomedical Engineering	With requirements for one year	30.09.2030	EUR-ACE® Upon confirmation by ENAEE	30.09.2029
Master of Chemical Engineering	With requirements for one year	30.09.2030	EUR-ACE® Upon confirmation by ENAEE	30.09.2029

Requirements

For both Master's degree programs

A 1. (ASIIN 2) The Faculty needs to make sure that the final capstone project are consistently aligned with Master level 7 (EQF) or Master level 9 (Australian QF) learning outcomes .

A 2. (ASIIN 3.2) Make sure that experiments conducted in the Chemical and Biomedical Engineering wet-laboratories truly reach master level in terms of depth and extent.

A 3. (ASIIN 4.1) The module descriptions need to include information on the applied learning and teaching methods.

A 4. (ASIIN 5) The Faculty should take appropriate measures to ensure that more students take part in the satisfaction surveys and that the results are discussed with the students. The feedback cycles need to be closed and corrective measures, in case of critique, need to be undertaken.

A 5. (ASIIN 4.2) It is required to issue an additional Diploma Supplement according to the Bologna regulations.

Recommendations

For both Master's degree programs

E 1. (ASIIN 1.3) It is recommended increasing the number of (preferably paid) internships. Students should be informed in more detail on criteria for assessing internships.

E 2. (ASIIN 1.3) It is recommended providing additional opportunities to students for international student exchange (outgoing mobility) by appropriate means.

E 3. (ASIIN 2) It is recommended giving more substantiated feedback to students on their various assignments/exams.

E 4. (ASIIN 3.1) It is recommended increasing the number of laboratory assistants in the pursuit of increasing quality of teaching in laboratory courses.

E 5. (ASIIN 3.1) It is recommended reconsidering the use of student satisfaction surveys for the purpose of career development/ promotion of staff given the current low response rates.

E 6. (ASIIN 3.1) It is recommended offering additional support to staff for career development/the promotion process.

E 7. (ASIIN 3.1.) It is recommended increasing support measures regarding mental health problems among students.

E 8. (ASIIN 3.2.) It is recommended reviewing the procedure for renewing software licenses and to consider the use of open access surveys along the lines described in this report.

Appendix: Programme Learning Outcomes and Curricula

According to the Self-assessment Report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Biomedical Engineering:

Master of Biomedical Engineering

The Intended Learning Outcomes for the Master of Biomedical Engineering are:

CLO 1. Acquire knowledge and practice in medical technologies, health informatics and healthcare that has societal and economic impact through innovation, translation and commercialisation;

CLO 2. Gain knowledge and practice in the design and operation of devices and processes, and the application of engineering skills to new medical treatments, instruments and machines;

CLO 3. Acquire knowledge and practice in anatomy and physiology, biomechanics, biofluid mechanics, biomaterials, electronic circuits, bioinstrumentation, and biomedical engineering regulation;

CLO 4. Acquire knowledge and practice in advanced biomedical engineering topics which might include computational biomechanics, medical imaging, neural information processing, computational genomics, tissue and soft matter engineering, and systems and synthetic biology;

CLO 5. Develop problem solving and trouble shooting skills that may be applied in professional practice;

CLO 6. Gain knowledge and practice in biomedical engineering management including economics, intellectual property, ethics, regulation, and the law as it applies to the biomedical engineering profession;

CLO 7. Acquire the ability to complete a piece of original research either within an industrial setting or in a laboratory, involving the collection of data, its quantitative analysis and interpretation.

CLO 8. Develop effective verbal and written communication skills that enable a meaningful contribution to the biomedical engineering community and broader society;

CLO 9. Develop effective team membership and leadership skills

CLO 10. Know and epitomize professional ethical behaviour and responsibilities towards the profession and community, including having positive and responsible approaches to personal safety, management of information and professional integrity.

The following curriculum is presented:

Master Biomedical Engineering

YEAR 1					
Semester 1			Semester 2		
	Foundation Selective	12.5		Foundation Selective	12.5
BMEN20003	Applied Computation in Bioengineering	12.5	BMEN20002	Anatomy and Physiology for Bioengineering	12.5
BMEN30010	Mechanics for Bioengineering	12.5	BMEN30009	Introduction to Biomaterials	12.5
BMEN30006	Circuits and Systems	12.5	BMEN30008	Biosystems Design	12.5

YEAR 2					
Semester 3			Semester 4		
BMEN90038	Biomechanics	12.5	BMEN90036	Biofluid Mechanics	12.5
BMEN90037	Bioengineering Data Analytics	12.5	BMEN90035	Biosignal Processing	12.5
BMEN90033	Bioinstrumentation	12.5		Engineering Selective	12.5
BMEN90039	Biomedical Eng Management & Regulations	12.5		Bioengineering Elective	12.5

YEAR 3					
Semester 5			Semester 6		
BMEN90018	Biomedical Engineering Capstone Project*				25
	Bioengineering Elective	12.5		Bioengineering Elective	12.5
	Bioengineering Elective	12.5		Bioengineering Elective	12.5
	Approved Elective†	12.5		Approved Elective†	12.5

* Students may replace BMEN90018 and 2 Bioengineering Electives with BMEN90030 BioDesign Innovation, a 50-point year-long subject. An application and approval process is required for enrolment into BioDesign Innovation.

† An Approved Elective is any Masters-level Engineering and IT subject. Students may also take non-FEIT subjects with Course Coordinator approval.

Bioengineering Electives (select 62.5 points)		
BMEN90002	Neural Information Processing	12.5
BMEN90011	Tissue Engineering and Stem Cells	12.5
BMEN90021	Medical Imaging	12.5
BMEN90022	Computational Biomechanics	12.5
BMEN90027	Systems and Synthetic Biology	12.5
BMEN90029	Soft Tissue and Cellular Biomechanics	12.5
BMEN90040	Process Eng for Biomedical Technologies	12.5
CHEN90039	Pharmaceutical & Biochemical Production	12.5
COMP90014	Algorithms for Functional Genomics	12.5
COMP90016	Computational Genomics	12.5

Foundation Selective (select 25 points)		
Subjects should be selected to make up for missing foundational knowledge in biology, chemistry, or engineering mathematics.		
BIOL10008 OR BIOL10009	Introductory Biology: Life's Machinery OR Biology: Life's Machinery	12.5
CHEM10003	Chemistry 1	12.5
MAST20029	Engineering Mathematics	12.5
Engineering Selective (select 12.5 points)		
ENGR90021	Critical Communication for Engineers	12.5
ENGR90034	Creating Innovative Engineering	12.5
ENGR90039	Creating Innovative Professionals	12.5

Master Biomedical Engineering (Business)

YEAR 1					
Semester 1			Semester 2		
	Foundation Selective	12.5		Foundation Selective	12.5
BMEN20003	Applied Computation in Bioengineering	12.5	BMEN20002	Anatomy and Physiology for Bioengineering	12.5
BMEN30010	Mechanics for Bioengineering	12.5	BMEN30009	Introduction to Biomaterials	12.5
BMEN30006	Circuits and Systems	12.5	BMEN30008	Biosystems Design	12.5

YEAR 2					
Semester 3			Semester 4		
BMEN90038	Biomechanics	12.5	BMEN90036	Biofluid Mechanics	12.5
BMEN90037	Bioengineering Data Analytics	12.5	BMEN90035	Biosignal Processing	12.5
BMEN90033	Bioinstrumentation	12.5	ENGM90006	Engineering Contracts and Procurement	12.5
BMEN90039	Biomedical Eng Management & Regulations	12.5		Bioengineering Elective	12.5

YEAR 3					
Semester 5			Semester 6		
BMEN90018	Biomedical Engineering Capstone Project*				25
ENGM90013	Strategy Execution for Engineers	12.5	ENGM90012	Marketing Management for Engineers	12.5
ENGM90011	Economic Analysis for Engineers	12.5		Bioengineering Elective	12.5
	Approved Elective†	12.5		Approved Elective†	12.5

* Students may replace BMEN90018 and 2 Bioengineering Electives with BMEN90030 BioDesign Innovation, a 50-point year-long subject. An application and approval process is required for enrolment into BioDesign Innovation.

† An Approved Elective is any Masters-level Engineering and IT subject. Students may also take non-FEIT subjects with Course Coordinator approval.

Bioengineering Electives (select 25 points)		
BMEN90002	Neural Information Processing	12.5
BMEN90011	Tissue Engineering and Stem Cells	12.5
BMEN90021	Medical Imaging	12.5
BMEN90022	Computational Biomechanics	12.5
BMEN90027	Systems and Synthetic Biology	12.5
BMEN90029	Soft Tissue and Cellular Biomechanics	12.5
BMEN90040	Process Eng for Biomedical Technologies	12.5
CHEN90039	Pharmaceutical & Biochemical Production	12.5
COMP90014	Algorithms for Functional Genomics	12.5
COMP90016	Computational Genomics	12.5

Foundation Selectives (select 25 points)		
Subjects should be selected to make up for missing foundational knowledge in biology, chemistry, or engineering mathematics.		
BIOL10008 OR BIOL10009	Introductory Biology: Life's Machinery OR Biology: Life's Machinery	12.5
CHEM10003	Chemistry 1	12.5
MAST20029	Engineering Mathematics	12.5

According to the Self-assessment Report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Chemical Engineering:

Master of Chemical Engineering

The Intended Learning Outcomes for the Master of Chemical Engineering are:

CLO 1. Have gained knowledge and practice in chemical engineering fields of material and energy balances, fluid mechanics, momentum, heat and mass transport, reaction engineering, separation processes, process dynamics and control, bioprocess engineering and process equipment design;

CLO 2. Have gained knowledge and practice in advanced chemical engineering topics which might include particles processing and handling, advanced thermodynamics, computational fluid dynamics, minerals processing, materials, and carbon capture and storage;

CLO 3. Be able to apply their knowledge to analyse and design chemical engineering products, processes, and processing facilities and procedures;

CLO 4. Have developed problem solving and trouble shooting skills that may be applied in professional practice;

CLO 5. Be able to demonstrate proficiency over established and emerging engineering methods and tools to solve practical engineering problems;

CLO 6. Understand the basic principles underlying the management of physical, human, and financial resource;

CLO 7. Be able to undertake a piece of original research either within an industrial setting or in a laboratory, involving the collection of data, its objective analysis and interpretation;

CLO 8. Have effective verbal and written communication skills that enable them to make a meaningful contribution to the changes facing society;

CLO 9. Be conversant with important issues relevant to sectors influenced by chemical engineering, such as the sustainability of resources, the efficient operation of all processes, the rise of automation and intelligent processes, and privacy and security in the age of the internet, and

CLO 10. Know and epitomize professional ethical behaviour and responsibilities towards their profession and the community, including having positive and responsible approaches to sustainable development, process and personal safety, management of information and professional integrity.

The following curriculum is presented:

Master Chemical Engineering

YEAR 1					
Semester 1			Semester 2		
MAST20029	Engineering Mathematics	12.5	ENGR30002	Fluid Mechanics	12.5
CHEN20012	Fundamentals of Chemical Engineering	12.5	CHEN30016	Momentum, Mass, and Heat Transfer	12.5
CHEN20010	Material and Energy Balances	12.5	CHEN20011	Digitisation in the Process Industries	12.5
	Engineering Selective	12.5	CHEN30015	Safety and Sustainability Case Studies	12.5
YEAR 2					
Semester 1			Semester 2		
CHEN90007	Chemical Engineering Thermodynamics	12.5	CHEN90012	Design and Construction of Equipment	12.5
CHEN90042	Thermal and Separation Design	12.5	CHEN90020	Chemical Engineering Management	12.5
CHEN30001	Reactors and Catalysis	12.5	CHEN90028, or CHEN90023	Chemical Engineering Research Project, Chemical Engineering Internship	25
	Elective	12.5			
YEAR 3					
Semester 1			Semester 2		
CHEN90013	Process Engineering	12.5	CHEN90022	Chemical Engineering Design Project	25
CHEN90032	Process Simulation and Control	12.5			
	Elective	12.5		Elective	12.5
	Elective	12.5		Elective	12.5

Chemical Electives		
CHEN90010	Sustainable Minerals and Recycling	12.5
CHEN90011	Wastewater and Environmental Remediation	12.5
CHEN90018	Particle Technology	12.5
CHEN90027	Future Fuels and Petroleum	12.5
CHEN90031	Sustainable Processing	12.5
ENGR90024	Computational Fluid Dynamics	12.5
CHEN90028	Chemical Engineering Internship	12.5
CHEN90023	Chemical Engineering Research Project	12.5
CHEN90040	Sustainable Food Processing	12.5
CHEN90041	Energy, Emissions and Pollution Control	12.5
CHEN90043	High Performance Materials	12.5
CHEN90038	Product Design and Analysis	12.5
CHEN90039	Pharmaceutical & Biochemical Production	12.5
CHEN90035	Downstream Bioprocessing	12.5

Engineering Selectives		
ENGR90021	Critical Communication for Engineers	12.5
ENGR90034	Creating Innovative Engineering	12.5
ENGR90039	Creating Innovative Professionals	12.5

Master Chemical Engineering (Business)

YEAR 1					
Semester 1			Semester 2		
MAST20029	Engineering Mathematics	12.5	ENGR30002	Fluid Mechanics	12.5
CHEN20012	Fundamentals of Chemical Engineering	12.5	CHEN30016	Momentum, Mass, and Heat Transfer	12.5
CHEN20010	Material and Energy Balances	12.5	CHEN20011	Digitisation in the Process Industries	12.5
	Engineering Selective	12.5	CHEN30015	Safety and Sustainability Case Studies	12.5
YEAR 2					
Semester 1			Semester 2		
CHEN90007	Chemical Engineering Thermodynamics	12.5	CHEN90012	Design and Construction of Equipment	12.5
CHEN90042	Thermal and Separation Design	12.5	CHEN90020	Chemical Engineering Management	12.5
CHEN30001	Reactors and Catalysis	12.5	ENGM90006	Engineering Contracts and Procurement	12.5
ENGM90013	Strategy Execution for Engineers	12.5	ENGM90012	Marketing Management for Engineers	12.5
YEAR 3					
Semester 1			Semester 2		
CHEN90013	Process Engineering	12.5	CHEN90022	Chemical Engineering Design Project	25
CHEN90032	Process Simulation and Control	12.5			
CHEN90028, or CHEN90023	Chemical Engineering Research Project, Chemical Engineering Internship	25		Elective	12.5
				Elective	12.5

Chemical Electives		
CHEN90010	Sustainable Minerals and Recycling	12.5
CHEN90011	Wastewater and Environmental Remediation	12.5
CHEN90018	Particle Technology	12.5
CHEN90027	Future Fuels and Petroleum	12.5
CHEN90031	Sustainable Processing	12.5
ENGR90024	Computational Fluid Dynamics	12.5
CHEN90028	Chemical Engineering Internship	12.5
CHEN90023	Chemical Engineering Research Project	12.5
CHEN90040	Sustainable Food Processing	12.5
CHEN90041	Energy, Emissions and Pollution Control	12.5
CHEN90043	High Performance Materials	12.5
CHEN90038	Product Design and Analysis	12.5
CHEN90039	Pharmaceutical & Biochemical Production	12.5
CHEN90035	Downstream Bioprocessing	12.5

Engineering Selectives		
ENGR90021	Critical Communication for Engineers	12.5
ENGR90034	Creating Innovative Engineering	12.5
ENGR90039	Creating Innovative Professionals	12.5

Master Chemical Engineering (Materials and Minerals)

YEAR 1					
Semester 1			Semester 2		
MAST20029	Engineering Mathematics	12.5	ENGR30002	Fluid Mechanics	12.5
CHEN20012	Fundamentals of Chemical Engineering	12.5	CHEN30016	Momentum, Mass, and Heat Transfer	12.5
CHEN20010	Material and Energy Balances	12.5	CHEN20011	Digitisation in the Process Industries	12.5
	Engineering Selective	12.5	CHEN30015	Safety and Sustainability Case Studies	12.5

YEAR 2					
Semester 1			Semester 2		
CHEN90007	Chemical Engineering Thermodynamics	12.5	CHEN90012	Design and Construction of Equipment	12.5
CHEN90042	Thermal and Separation Design	12.5	CHEN90020	Chemical Engineering Management	12.5
CHEN30001	Reactors and Catalysis	12.5	CHEN90028, CHEN90023	Chemical Engineering Research Project, Chemical Engineering Internship	25
CHEN90043	High Performance Materials	12.5			

YEAR 3					
Semester 1			Semester 2		
CHEN90013	Process Engineering	12.5	CHEN90022	Chemical Engineering Design Project	25
CHEN90032	Process Simulation and Control	12.5			
	Elective	12.5	CHEN90018	Particle Technology	12.5
	Elective	12.5	CHEN90010	Sustainable Minerals and Recycling	12.5

Chemical Electives		
CHEN90010	Sustainable Minerals and Recycling	12.5
CHEN90011	Wastewater and Environmental Remediation	12.5
CHEN90018	Particle Technology	12.5
CHEN90027	Future Fuels and Petroleum	12.5
CHEN90031	Sustainable Processing	12.5
ENGR90024	Computational Fluid Dynamics	12.5
CHEN90028	Chemical Engineering Internship	12.5
CHEN90023	Chemical Engineering Research Project	12.5
CHEN90040	Sustainable Food Processing	12.5
CHEN90041	Energy, Emissions and Pollution Control	12.5
CHEN90043	High Performance Materials	12.5
CHEN90038	Product Design and Analysis	12.5
CHEN90039	Pharmaceutical & Biochemical Production	12.5
CHEN90035	Downstream Bioprocessing	12.5

Engineering Selectives		
ENGR90021	Critical Communication for Engineers	12.5
ENGR90034	Creating Innovative Engineering	12.5
ENGR90039	Creating Innovative Professionals	12.5

Master Chemical Engineering (Sustainability and Environment)

YEAR 1					
Semester 1			Semester 2		
MAST20029	Engineering Mathematics	12.5	ENGR30002	Fluid Mechanics	12.5
CHEN20012	Fundamentals of Chemical Engineering	12.5	CHEN30016	Momentum, Mass, and Heat Transfer	12.5
CHEN20010	Material and Energy Balances	12.5	CHEN20011	Digitisation in the Process Industries	12.5
	Engineering Selective	12.5	CHEN30015	Safety and Sustainability Case Studies	12.5

YEAR 2					
Semester 1			Semester 2		
CHEN90007	Chemical Engineering Thermodynamics	12.5	CHEN90012	Design and Construction of Equipment	12.5
CHEN90042	Thermal and Separation Design	12.5	CHEN90020	Chemical Engineering Management	12.5
CHEN30001	Reactors and Catalysis	12.5	CHEN90011	Wastewater and Environmental Remediation	12.5
CHEN90031	Sustainable Processing	12.5	CHEN90041	Energy, Emission and Pollution Control	12.5

YEAR 3					
Semester 1			Semester 2		
CHEN90013	Process Engineering	12.5	CHEN90022	Chemical Engineering Design Project	25
CHEN90032	Process Simulation and Control	12.5			
CHEN90028, or CHEN90023	Chemical Engineering Research Project, Chemical Engineering Internship	25		Elective	12.5
				Elective	12.5

Chemical Electives		
CHEN90010	Sustainable Minerals and Recycling	12.5
CHEN90011	Wastewater and Environmental Remediation	12.5
CHEN90018	Particle Technology	12.5
CHEN90027	Future Fuels and Petroleum	12.5
CHEN90031	Sustainable Processing	12.5
ENGR90024	Computational Fluid Dynamics	12.5
CHEN90028	Chemical Engineering Internship	12.5
CHEN90023	Chemical Engineering Research Project	12.5
CHEN90040	Sustainable Food Processing	12.5
CHEN90041	Energy, Emissions and Pollution Control	12.5
CHEN90043	High Performance Materials	12.5
CHEN90038	Product Design and Analysis	12.5
CHEN90039	Pharmaceutical & Biochemical Production	12.5
CHEN90035	Downstream Bioprocessing	12.5

Engineering Selectives		
ENGR90021	Critical Communication for Engineers	12.5
ENGR90034	Creating Innovative Engineering	12.5
ENGR90039	Creating Innovative Professionals	12.5