ASIIN Seal & European Labels

Accreditation Report

Master's Degree Programmes
Master of Engineering (Biochemical)
Master of Engineering (Biomedical)
Master of Engineering (Biomedical with Business)
Master of Engineering (Chemical)
Master of Engineering (Chemical with Business)

Provided by
University of Melbourne

Version: 29 September 2017

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 Engineering (Biochemical)	n/a	ASIIN, EUR-ACE® Label	ASIIN, 28.06.2011 – 30.09.16, under the name Master of Engineering (Biomolecular)	01, 09, 10
Master of Engineering (Biomedical)	n/a	ASIIN, EUR-ACE® Label	ASIIN, 28.06.2011 – 30.09.16	01, 10
Master of Engineering (Biomedical with Business)	n/a	ASIIN, EUR-ACE® Label	none	01, 06, 10
Master of Engineering (Chemical)	n/a	ASIIN, EUR-ACE® Label	ASIIN, 28.06.2011 – 30.09.16	01, 09
Master of Engineering (Chemical with Business)	n/a	ASIIN, EUR-ACE® Label	none	01, 06, 09
Date of the contract: 10.07.2015 **Submission of the final version of the self-assessment report:** March 2016 **Date of the onsite visit:** 17. + 18.05.2016 **at:** Melbourne School of Engineering, Parkville Campus.				
Peer panel: Prof. Dr. Hermann Englberger, Hochschule München				

[1] ASIIN Seal for degree programmes; EUR-ACE® Label: European Label for Engineering Programmes; EUR-Inf®: Label European Label for Informatics; Eurobachelor®/Euromaster® Label: European Chemistry Label

[2] TC: Technical Committee for the following subject areas: TC 01 – Mechanical Engineering/Process Engineering; TC 02 – Electrical Engineering/Information Technology); TC 03 – Civil Engineering, Surveying and Architecture; TC 04 – Informatics/Computer Science); TC 05 – Physical Technologies, Materials and Processes); TC 06 – Industrial Engineering; TC 07 – Business Informatics/Information Systems; TC 08 – Agronomy, Nutritional Sciences and Landscape Architecture; TC 09 – Chemistry; TC 10 – Life Sciences; TC 11 – Geosciences; TC 12 – Mathematics; TC 13 – Physics.

Prof. Dr. Jürgen Grotemeyer, Universität Kiel Prof. Dr.-Ing. Manfred Hampe, Technische Universität Darmstadt Dr. Julia Schmidt, BASF SE[3] Prof. Dr. Hans-Joachim Wagner, Universität Tübingen John-Paul Benbow Student, University of Western Australia	
Representative of the ASIIN headquarter: Dr. Iring Wasser	
Responsible decision-making committee: Accreditation Commission for Degree Programmes	
Criteria used: European Standards and Guidelines as of 15.05.2015 ASIIN General Criteria, as of 28.03.2014 Subject-Specific Criteria of Technical Committee 01 – Mechanical Engineering/Process Engineering Subject Specific Criteria of Technical Committee 06 – Industrial Engineering Subject Specific Criteria of Technical Committee 09 - Chemistry Subject Specific Criteria of Technical Committee 10 – Life Sciences	

[3] Did not participate in the onsite visit

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[4]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Master of Engineering (Biochemical)	ME (Biochemical)	None	EQF Level 7	Full time or part time; on campus	no	3 years or 6 Semesters (full time)	12.5 local credit points per subject	Late February and late July every year First intake Feb 2011
Master of Engineering (Biomedical)	ME (Biomedical)	None	EQF Level 7	Full time or part time; on campus	no	3 years or 6 Semesters (full time)	12.5 local credit points per subject	Late February and late July every year First intake Feb 2011
Master of Engineering (Biomedical with Business)	ME (Biomedical with Business)	None	EQF Level 7	Full time or part time; on campus	no	3 years or 6 Semesters (full time)	12.5 local credit points per subject	Late February and late July every year First intake Feb 2014
Master of Engineering (Chemical)	ME (Chemical)	None	EQF Level 7	Full time or part time; on campus	no	3 years or 6 Semesters (full time)	12.5 local credit points per subject	Late February and late July every year First intake Feb 2011
Master of Engineering (Chemical with Business)	ME (Chemical with Business)	None	EQF Level 7	Full time or part time; on campus	no	3 years or 6 Semesters (full time)	12.5 local credit points per subject	Late February and late July every year First intake Feb 2014

The degree programme Master of Engineering (Biochemical) is characterized on the university website as follows:

In the next few decades, Biochemical Engineering will provide solutions to some of the world's most pressing problems in relation to energy, food and water. Biochemical engineers explore the development of large-scale processes using microbial, plant or animal cells. You will learn to design novel bioprocesses that will have applications in the production of bio-products as diverse as cosmetics, cheese, bio-ethanol, beer and drugs, led by international leaders in dairy innovation, bioremediation and bio-fuel production. You will benefit from interaction with industry representatives and work

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

on a design and a research project, which may take the form of an industrial placement. You will design novel bio-products and bioprocesses that will have applications in food engineering, pharmaceutical production and environmental remediation or processes. This course will provide you with a formal qualification in biochemical engineering at the Masters level. This course will prepare you to enter a variety of industries including: food processing in areas such as bulk dairy manufacture and fast moving consumer goods; pharmaceutical manufacture; cosmetics; biological waste treatment and bioremediation.

For the Master's degree programme Master of Engineering (Biomedical) the following profile is described:

Biomedical Engineering has enormous potential to make a positive impact on human health. Biomedical engineers address healthcare problems from a unique perspective, blending an understanding of biomedical science with specialist knowledge of engineering techniques and problem-solving skills. You will focus on human systems, the design and operation of devices and processes, and the application of engineering skills to new medical treatments, instruments and machines. Our reputation for biomedical innovation in areas such as developing the bionic ear and eye, and targeted drug delivery systems, ensures you are learning from leaders in the field, who are working on exciting projects aimed at solving major health dilemmas. The Master of Engineering (Biomedical) will provide you with a formal qualification in biomedical engineering at the Masters level.

Biomedical engineers develop new drug therapies, study the electrical and mechanical activity of organs such as the brain, heart and muscle, build artificial organs, limbs, heart valves and bionic implants to replace lost function, and grow living tissues to replace failing organs. You can expect to work in the biotechnology, biomedical, pharmaceutical, medical device and equipment industries, in research and innovation, in the health services, hospitals, or in government and consulting

For the Master of Engineering (Biomedical with Business) the following intended learning outcomes are formulated:

The Master of Engineering (with Business) is designed to provide students with a formal qualification in engineering at the masters level, with a business specialization that recognizes the need for engineers to understand the management and workings of

modern professional organizations. Graduates will have a grounding in financial, marketing and economic principles enabling them to work efficiently in any organization, as well as the ability to apply the technical knowledge, creativity and team work skills learnt in their engineering training. This combination of knowledge and skills will be a powerful asset in the workplace.

Key Features:

- Combine a technical specialization with exposure to the business and management skills that can help fast-track your career.
- Benefit from subjects co-developed by Melbourne Business School and tailored specifically for engineering students.
- Tight integration of subjects ensures that you understand the business side of engineering applications.
- Be empowered with strong technical skills, as well as the business skills to understand how organizations work.

Biomedical engineers develop new drug therapies, study the electrical and mechanical activity of organs such as the brain, heart and muscle, build artificial organs, limbs, heart valves and bionic implants to replace lost function, and grow living tissues to replace failing organs. You can expect to work in the biotechnology, biomedical, pharmaceutical, medical device and equipment industries, in research and innovation, in the health services, hospitals, or in government and consulting.

For the Master of Engineering (Chemical) the following competence profile is described:

Chemical engineers invent, design and implement processes through which raw materials are converted into valuable products, such as petrol, plastics, food additives, fertilizers, paper and pharmaceuticals. The program promotes development of practical, laboratory-based skills, combined with expertise in computing and simulation. You will develop expertise under the guidance of staff known internationally for their research in areas such as nanotechnology, carbon capture and storage, minerals and materials, natural gas processing and solvent extraction. Our degrees provide a range of opportunities for students to actively engage with industry, through a variety of collaborative programs such as projects and internships. This allows students to gain both theoretical and real-world knowledge within their field of engineering. The Master of Engineering (Chemical) will provide you with a formal qualification in chemical engineering at the Masters level.

Career opportunities in the field are extensive and exist in petrochemical, minerals processing, mining, chemical manufacturing, environmental consulting, natural gas, explosives and fertilizer production.

For the Master of Engineering (Chemical with Business) the website gives the following description:

The Master of Engineering (with Business) is designed to provide students with a formal qualification in engineering at the masters level, with a business specialization that recognizes the need for engineers to understand the management and workings of modern professional organizations. Graduates will have grounding in financial, marketing and economic principles enabling them to work efficiently in any organization, as well as the ability to apply the technical knowledge, creativity and team work skills learnt in their engineering training. This combination of knowledge and skills will be a powerful asset in the workplace.

Key Features

- Combine a technical specialization with exposure to the business and management skills that can help fast-track your career.
- Benefit from subjects co-developed by Melbourne Business School and tailored specifically for engineering students.
- Tight integration of subjects ensures that you understand the business side of engineering applications.
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C Peer Report for the ASIIN Seal[5]

1. The Degree Programme: Concept, content & implementation

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

Evidence:

- University of Melbourne, Melbourne School of Engineering, Self-assessment for the ASIIN-Seal Chapter 1.
- http://www.mech.unimelb.edu.au/study/graduate.html (Accessed 01.06.2016)
- Master of Engineering (Biochemial): http://www.eng.unimelb.edu.au/study/degrees/master-engineering-biochemical/overview (Accessed 01.06.2016)
- Master of Engineering (Biomedical): http://www.eng.unimelb.edu.au/study/degrees/master-engineering-biomedical/overview (Accessed 01.06.2016)
- Master of Engineering (Biomedical with business): http://www.eng.unimelb.edu.au/study/degrees/master-engineering-biomedical - business/overview (Accessed 01.06.2016)
- Master of Engineering (Chemical): http://www.eng.unimelb.edu.au/study/degrees/master-engineering-chemical/overview (Accessed 01.06.2016)
- Master of Engineering (Chemical with Business): http://www.eng.unimelb.edu.au/study/degrees/master-engineering-chemical-business/overview (Accessed 01.06.2016)
- Objectives-Module-Matrices as part of self-assessment report
- Discussions with management, staff, students, graduates and employers during on-site visit.

[5] 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.

Preliminary assessment and analysis of the peers

The Melbourne School of Engineering as the main unit within the university responsible for the programmes under review has defined the objectives and intended learning outcomes for the overarching Master of Engineering degree which consists of a total of altogether 11 disciplines. The five specializations **Biochemical, Biomedical, Biomedical with Business, Chemical, Chemical with Business** form part of cluster A, dealt with in this report.

The panel acknowledges the existence of rather generic objectives and learning outcomes of the Master of Engineering program as described in the self assessment report but notes that comparable competence profiles were unfortunately not available for the specializations under review. The course information on the website cannot be seen as a substitute as they provide very limited information about the specific learning outcomes the School had in mind for each of the disciplines. Reference was made by the school to so-called “technical specifications” for the sub-disciplines with specific qualification profiles of graduates; those were however not made available to the peers. Accordingly, the differentiation between the programmes under review could not be fully made.

The panel nevertheless considers the information assembled in the self assessment report matching the overarching Master of Engineering learning outcomes against the 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) still to be helpful.

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. In 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 unknown, make an assessment of applicable methods and 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.

During the discussions with the employers as well as graduates the panel is able to confirm that soft skills in general are a strength of the programs under review. Students interviewed during the on-site visit proved to be very outspoken, communicative and exposed a high level of self confidence in their own abilities. English language capabilities of foreign students (see below) remain however a concern.

In summary, the peers come to the preliminary conclusion that the subject specific criteria of ASIIN are covered in the learning objectives of the Master of Engineering. The peers however also point out that the final qualification profile of a biochemical, biomedical, chemical engineer as well as those two with a business combination will differ considerably. This differentiation does not become sufficiently transparent in the presented learning outcomes description of meta-objectives for the Master of Engineering. Overall, in order to finalize their assessment, the panel therefore asks that a clear description of the subject-specific programme level learning outcomes as well as expected professional profiles for all programmes and disciplines be submitted.

This is also necessary to allow for the final analysis of the programme objectives in terms of student learning outcomes against the corresponding EUR-ACE® (European Accredited Engineer) Label standards, which the University of Melbourne had also applied for.

The presented learning outcomes do correspond to the qualification descriptors relevant to level 7 (Master) of the European Qualifications Framework for Lifelong Learning.

The peers inquire how the learning objectives of the Master of Engineering with regard to specializations under review had been developed and revised and which stakeholder groups have been involved. The University of Melbourne explained in this context that there has been a shift in the vision and strategic orientation of the university towards stronger cooperation with industry. The cooperation between businesses and professors from the University of Melbourne takes place in the framework of so called “Industry Advisory Groups” which have been formed for all the Departments. These groups provide advice on the strategic planning of the University as well as on the design and modernisation of teaching and research programs. Representing a broad spectrum of industries, each member provides a link to the external stakeholders who represent their field of expertise. The University provides a list of members of these advisory groups for each

specialization. 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 peers 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 peers 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 finishing their degree in one of the five specializations under review, the point is made that the “Melbourne model” has only been introduced into the Australian higher education landscape/labor market five years ago. At the beginning the additional benefit of a Master graduate had not always been evident to the companies. Businesses with research orientation appreciate Master’s graduates and like to employ them because of their “critical thinking” capacities. But students, graduates/alumni and some business representatives also voiced their concern that it is currently not easy to find adequate employment because the competences of Master’s graduates are still not well enough known among employers. The peers therefore recommend keeping track of the employment record of Master of engineering graduates, collecting data with regard to the acceptance of the competence profile (which positions they fill, transfer time from university to job etc.) and to adjust where necessary.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-assessment report
- University website: http://www.eng.unimelb.edu.au/study/degrees (Accessed 01.06.2016)

Preliminary assessment and analysis of the peers:

The panel considers the names and degrees of the programme Master of Engineering in its various specialisations (Biochemical, Biomedical, Biomedical with Business, Chemical, Chemical with Business) to well reflect the intended aims and learning outcomes. Compared to the the first ASIIN accreditation in 2011, the name of the biochemical specialisation had been introduced instead of the term “biomolecular”, as the latter was not widely

known in the Australian context and as result of interventions on the part of students and other stakeholders.

The programs with Business specializations are characterized by the fact that altogether five engineering business subjects (primarily taught by the Melbourne Business School) are taught.

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

Criterion 1.3 Curriculum

Evidence:

- University of Melbourne, Melbourne School of Engineering, Self-assessment for the ASIIN-Seal Chapter 1.
- Objective-Matrices provided in the Self-Assessment Report, Chapter 1.
- Sequence of Modules and Curricula provided in the Self-Assessment Report, Chapter 1.
- Course Descriptions:
- Master of Engineering (Biochemical): http://www.eng.unimelb.edu.au/study/degrees/master-engineering-biochemical/overview (Accessed 01.06.2016)
- Master of Engineering (Biomedical): http://www.eng.unimelb.edu.au/study/degrees/master-engineering-biomedical/overview (Accessed 01.06.2016)
- Master of Engineering (Biomedical with business): http://www.eng.unimelb.edu.au/study/degrees/master-engineering-biomedical -business/overview (Accessed 01.06.2016)
- Master of Engineering (Chemical): http://www.eng.unimelb.edu.au/study/degrees/master-engineering-chemical/overview (Accessed 01.06.2016)
- Master of Engineering (Chemical with Business): http://www.eng.unimelb.edu.au/study/degrees/master-engineering-chemical-business/overview (Accessed 01.06.2016)

Preliminary assessment and analysis of the peers:

On the webpage of the Melbourne School of Engineering the different specializations are published under the respective academic departments. The peers welcome that each

subject-specific webpage entails the description of the curriculum and the course descriptions.

The general structure of the curriculum of the three year Master of Engineering programs is designed such that the underlying principles of the discipline are learned in the first year, the core discipline-based material consolidated in the second year and the program concluded with a capstone project and electives in the final year.

The peers understand that the first two semesters are not compulsory for all students but need to be taken only by those who do not meet the requirements to register for the second year (compare criterion 1.4). In the first year, students have to take the subject "Engineering Practice and Communication", which familiarizes students with engineering problem solving, addresses questions of professional ethics and academic honesty as well as focuses on written and oral communication skills and team work. Additionally, students extend their maths knowledge with "Engineering Mathematics" and are required to take up a number of biochemical, chemical and chemical engineering core subjects in areas such as material and energy balances, reactions and synthesis, transport processes, fluid mechanics, process dynamics and control e.g.. With these introductory courses the foundation is laid to then study the more advanced topics in the second and third year of the Master of Engineering in their different specializations.

The peers base their assessment whether the curricula of the different specializations are designed in a way to achieve the intended learning outcomes on the course descriptions and the module-objective matrices. The peers appreciate that the University of Melbourne provided a module-objective matrix for each specialization illustrating the alignment with the Subject-Specific Criteria (SSC) of ASIIN.

The ***Master of Engineering (Chemical)*** builds on the learning outcomes conveyed in the first "bridging" year. In the second year, four technical subjects ("reactor engineering", heat and mass transport processes", "bioprocess engineering" and "advanced thermodynamics" emphasize knowledge and understanding as well as analysis and application of core chemical processes. Soft skills are especially trained in the "chemical engineering management" course, where students are familiarized with aspects of project management, sustainable development, safety and ethical issues. Engineering Practice and Design Capabilities are trained at the end of the second year, where students have the choice of either undertaking a laboratory-based- or an industry-based research and design project depending on whether they intend to rather pursue a career in a research or choose the pathway into industry.

The subject "Safety, Environment and Design" is specifically designed to develop the students´ problem solving skills. Students are confronted with real world problems of the

type that they might be asked to solve in industry. These ill-defined problems can lead into the final capstone design projects where students first complete a feasibility study followed by a comprehensive design report. After completing material and energy balances of a complex process, they also have to demonstrate a detailed mechanical design of one piece of equipment.

In as far as the ***Master of Engineering (Biochemical***) is concerned, knowledge and understanding is imparted, building on the courses for the first "bridging year", by core subjects such as "biochemical and pharmaceutical engineering and reactor engineering", "food engineering", "particle mechanics and processing", "process equipment design" and electives such as "carbon capture and storage", "biochemical and pharmaceutical engineering", "tissue engineering" and "stem cells".

Engineering analysis and design capabilities are trained especially in courses such as "process engineering", "safety, environment and design" as well as the final capstone design project. Students pointed out that especially the "process engineering course", while considered challenging and time consuming, provides the best basis for developing independent design competences.

Engineering practice skills and competences are core intended learning outcomes especially in the biochemical engineering research project and Industry project, at least one of which has to be completed by the students. These projects are particularly suited to familiarize students with methodical and systematical examination of the new and unknown. Soft skills are particularly part of the core subjects engineering practice and communication, mentioned above, as well as part of the STEP program within the Masters (see below) and the capstone design project.

As regards the Master of Engineering (Biomedical), it is important to note that as of 2016 a new project-based subject titled "BioDesign Innovation" has been introduced, challenging the students to conceive and design innovative medical devices. This "real world course" is taught by a combination of faculty, entrepreneurs, corporate executives, intellectual property attorneys and venture capitalists over a period of one year and consequently encompasses 50 credit points. It is a collaborative subject bringing together teams of students from the Melbourne school of engineering, the faculty of medicine, dentistry and health sciences and the Melbourne business school. BioDesign innovations combines lectures, practical training and a guided project and focuses on identifying clinical needs, brain-storming and concept creation. In the second part concept development and business implementation is at the core of the course bringing together teams of 2-3 students from varying educational backgrounds. The peers commend the school of engi-

neering for this curricular innovation as this educational offer has the potential to accomplish the intended learning outcomes in a particularly successful fashion.

The two specializations **"with Business"** combine a technical specialisation with exposure to the business and management skills. The students benefit from subjects co-developed by Melbourne Business School and tailored specifically for engineering students. The integration of technical and managerial subjects should ensure that students understand the business side of engineering applications. The peers concluded that this "with Business" component was a sensible combination of business and technical skills.

The peers preliminarily conclude that the Master of engineering in the five specialisations mentioned above 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.

Criterion 1.4 Admission requirements

Evidence:

- University of Melbourne, Melbourne School of Engineering, Self-assessment for the ASIIN-Seal Chapter 1.4.
- https://policy.unimelb.edu.au/ (Accessed 01.06.2016)

Preliminary assessment and analysis of the peers:
The peers learn that students have to hold a Bachelor's degree of at least 3 years full time duration if they are applying for the Master of Engineering. Students who successfully complete the Bachelor of Science degree in the relevant major at the University of Melbourne with an average of 65% are given 100 points credit which means that they are exempt from attending the first year in the 3-year Master programs. Students who complete the sequence of subject specific technical engineering subjects in their Bachelor of Commerce degree are given at least 50 points credit meaning that they must complete between 2 and 2½ years of the 3-year Master of Engineering program.

Entry into the Biochemical, Chemical or Chemical with Business specialisations of the Master of Engineering thus presupposes the successful completion of either the Chemical systems major in the Bachelor of Science degree or the completion of a series of additional electives in the Bachelor of Commerce programme.

Students seeking entry into either the Biomedical or Biomedical with business specialisations must consequently complete either the bioengineering systems major in the Bachelor of Science degree, the bioengineering system major in the Bachelor of Biomedicine degree or a series of subjects in the Bachelor of Commerce program.

The peers understand that the first year of the Master program is a year of adaptation to make sure that all students have the same engineering knowledge base when entering the second and the third year of the Master program. They also like this idea due to the fact that most students interviewed at the beginning of their studies were not quite sure which specialization to take up.

Students admitted from other institutions also must have attained a grade equivalent to 65 at Melbourne and satisfy the same requirements described above.

The peers welcomed the strict technical admission requirements for the Master of Engineering and concluded that these requirements support that the admitted students are able to achieve the intended learning outcomes.

Students entering the Master of Engineering programs must also satisfy the English language requirements. During the audit visit the peers are confronted with evidence that language capabilities are a major concern especially due to the fact that a majority of students comes from non-English speaking native countries. Unfortunately, apart from one no other foreign students were present during the interviews. The native students however reported difficulties with engaging in group work (there is a commendable practice of establishing tandems of English and non-English speaking students), lecturers admitted that in some seminars comprised primarily by Chinese students, language is an issue. Students added during the audit, that a number of foreign students are very shy and do not feel comfortable to speak English. The University of Melbourne indicated to be aware of this challenge and indicated plans to have more balanced student groups from different countries.

The peers welcome this intention but also recommend reviewing admission rules in order to ensure that all students have an appropriate level of English to follow the professional classes and are able to express themselves orally and in writing.

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

The peers positively acknowledged the feedback of the university. With regard to their request for specialization-specific programme outcomes in terms of graduates learning outcomes, the peers could not, however, find the adequate information on the websites mentioned. Apart from one sentence per specialization about the working field of graduates in the respective specialization, no list of specific programme learning outcomes was made available. While the panel acknowledged that learning outcomes had been drafted on the level of individual subjects (modules), they pointed out that programme level de-

scriptions were essential in order to allow all interested stakeholders to gain a concrete picture of the programme at hand.

The peers took note of the explanations of the institution regarding their tracking of graduates. This is further analysed within criterion 6, quality assurance, below.

Concerning the university's proposed efforts to enhance the admission requirements for students from non-English speaking countries, the peers considered these to be a well-worth but essential effort in order to ensure that all students can successfully contribute to and profit from the teaching at hand. The peers pointed out that the capacity of students to converse in English had a great influence on the successful implementation of the didactic concept.

Overall, the panel considered criterion 1 to be fulfilled apart from the above mentioned aspects (programme-specific objectives and learning outcomes, language admission requirements).

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Degree structure available online: http://www.eng.unimelb.edu.au/study/degrees (Accessed 01.06.2016)
- Statistics about student mobility in SAR
- Admission and progression policy, available online: http://unimelb.edu.au/__data/assets/pdf_file/0005/1655726/r111a2.pdf (Accessed 01.06.2016)
- Discussions with staff and students during onsite visit

Preliminary assessment and analysis of the peers:

The panel analysed the curricular structure and acknowledges that all study programs are fully modularized and each course earns the same number of credit points. All courses can be completed within a semester except for the capstone projects which run over two semesters. Additionally, the Master of Engineering programs allow students to commence their studies either in Semester 1 around early March or in Semester 2 around late July. The structure of all Master of Engineering streams, including the "with business"

streams, is designed in a way that students can switch until about halfway through the programme.

The peers appreciate this **flexible structure of the curriculum** not least due to the fact, that almost all students interviewed needed some time for orientation at the beginning of their Master studies. Students overall reported no issues with regard to the structure of the specializations or the courses. Based on the analysis of the sequence of courses and the respective course descriptions the peers conclude that the structure of the specializations ensures that the learning outcomes can be reached.

As regards the **topic of electives**, there is no structured consulting system for students who exercise their free choice, with only a small minority making use of individual course advice. Students in each of the specializations are able to choose and complete at least four electives which allow them to follow their interests; this is judged positively by the peers.

The panel intensively discussed the questions of **(international) mobility**, in particular in light of the large number of international students. The point was made that, as a major part of the student body is coming from abroad, this can be seen as international mobility in itself. In spite of the fact that each department in the University of Melbourne, does have an exchange coordinator, national students enrolled at the school of engineering usually were not particularly interested in longer term international exchange programs, and if they were, they departed during the summer semester/break for shorter periods abroad for internships in industry or as part of their research projects. In essence statistics provided by the University of Melbourne, demonstrate that a comparatively small number of students from the School of Engineering indeed did participate in some kind of international mobility, though this number had increased in the last years. The peers however were eventually convinced that the University of Melbourne does provide sufficient opportunities for international exchange.

Industry placements (not a requirement of Engineers Australia) within the programme proved to be a challenge for the school of engineering. Companies are contacted at least 6 weeks prior to the placement with potential projects (for the industry of the research project) and students are able to mark their preferences. At the same time students reported that not always enough industry projects are available (e.g. in the case of chemical engineering there is a bottleneck especially in the second semester). Efforts are however under way to remedy this situation.

As regards the r**ules for recognition** the school of engineering underlined that students are normally encouraged to arrange learning agreements with their supervisors and the respective department to ascertain the recognition of credits. Besides, the University of

Melbourne publishes all rules and regulations on its webpage of university policies. In Regulation 11.1.A2 - Courses, Selection, Admission and Assessment, Part 5 – Academic Credit the peers could verify that the rules of recognition of credits are clearly defined and are in line with the Lisbon Convention, to which Australia is a signatory. In the discussions with the students, they reported that as a standard procedure, everybody gets a letter, indicated which prior knowledge is credited.

Criterion 2.2 Work load and credits

Evidence:

- Subject descriptions available online: https://handbook.unimelb.edu.au/faces/htdocs/user/search/SearchResults.jsp#postgraduateSubject (Accessed 01.06.2016)
- Subjects and Credit Points Policy: https://policy.unimelb.edu.au/MPF1015 (Accessed 01.06.2016)
- Discussions with staff and students during onsite visit

Preliminary assessment and analysis of the peers:
The peers are informed that the standard full time load at the school of engineering amounts to 100 credits per year. Each subject is worth 12.5 credits or a multiple of this. In the course descriptions the student work load is clearly outlined, differentiating between various forms of their time commitment (contact hours, time for self study, total time commitment).

The panel takes note that issues of workload could be discussed during the staff-student liaison committee meetings but were not specifically monitored, for example in subject evaluations or student questionnaires. Overall, students however affirmed the adequacy of the credit point calculations with some notable exceptions such as the course in process engineering, which students considered to be the most challenging and time consuming. After discussion in the staff student liaison committee the assigned load in this course has been adjusted, signalling that the system of work load adjustment is indeed working.

It is worth noting that the student workload associated with each credit has been increased since the last accreditation following a recommendation to review its adequacy. For all Master programmes, one such subject is now estimated at 200 hours (for the second and third year) of student workload with more time allocated for students' self-learning as well as assessment. Accordingly, students normally complete four subjects per semester, receiving 50 credits in the process.

The panel considers the workload and credit system to be very clear and straight-forward. In particular, the panel appreciates the modifications made since the first accreditation bringing the annual workload of approximately 1600 hours in the range typical also for European degrees.

Criterion 2.3 Teaching methodology

Evidence:

- Subject descriptions available online: https://handbook.unimelb.edu.au/faces/htdocs/user/search/SearchResults.jsp#postgraduateSubject (Accessed 01.06.2016)
- Discussions with staff and students during onsite visit

Preliminary assessment and analysis of the peers:
The teaching methodology of each subject is determined by the teaching staff and stipulated in the subject descriptions, thus made very transparent to students and other interested stakeholders. The general approach of the university is to put a higher emphasis on project based learning – an approach that was confirmed to be implemented by the students. Additionally, team work was found to play an important role

With regard to research skills, additional research training is also offered. However, the panel also learned during the discussions that team work is not always easy to implement, in particular for the international students originating from regions which did not place a high emphasis on self-regulated – individual or group-based – learning in the previous studies. Accordingly, students' lack of prior teamwork skills and timidity, sometimes in addition to language difficulties, is considered to be an ongoing issue in the implementation of various teaching methods. The panel acknowledges the efforts to ensure that such essential engineering skills are imparted to all students but considered that additional intercultural coaching might be worthwhile.

The panel furthermore discusses the question of engineering ethics and is positive that the topic is taught and assessed in a number of lectures and workshops placing real-life scenarios to students. In particular, the subjects in the "with business" streams use different teaching methods such as case-studies to deal with issues of business governance, ethics (for example in marketing) as well as professional development topics such as communication, teamwork and leadership.

Overall, the panel is satisfied that a sufficient variety of didactic methods was used at an adequate level of teaching.

Criterion 2.4 Support and assistance

Evidence:

- Information about student services available online: http://services.unimelb.edu.au/finder (Accessed 01.06.2016)
- Discussions with staff and students during onsite visit
- University of Melbourne, Melbourne School of Engineering, Self-assessment for the ASIIN-Seal Chapter 2.4

Preliminary assessment and analysis of the peers:

The peers examine the services webpage as well as the subject specific webpage of the different specializations of the Master of Engineering and gain the conviction that all relevant information about the study programs and the University services are available.

It is worth noting in this context that there has been a major reform of student services in recent times. On the university level around 500 service positions have been cut in the departments during the process. The University of Melbourne explained during the onsite visit that they had introduced the concept of the "Stop 1", a centralized advisory service which is the first reference point for all students. Prior to this concept, different advisors had been in place, a system said not to have proven its effectiveness. This "Stop 1" advisor tries to provide first assistance and only if the requested support cannot be provided the student is sent to specific service institutions of the University or for content-related questions to the Deputy Dean (Academic) and the other staff members who usually are very supportive as the students underlined.

The panel discussed the impact of this change extensively with staff and students. They understand that the new system of centralized services has been introduced in order to streamline students' inquiries and answer a majority of questions, specifically those of a more administrative nature. The centralization of students services is however currently seen also as a potential area of distress (there is a document on display titled "Support for Teaching: A Survival Guide") not least by the lectures and/or the academic dean to which students turn in search of advice and support in the absence of academic advisors on the department level. At the same time it is acknowledged that the system has taken only effect as of January 2016 and that more time is needed to evaluate the consequences of the move towards centralization.

Furthermore, the students highlighted that for each subject they had a tutorial; tutors are normally PhD candidates and teaching assistants and are active in the tutorials and labs so that student groups can be smaller.

Apart from academic support, the University provides child care facilities at two locations adjacent to the University, Counselling and Psychological Services, Student Equity and Disability Support, Financial Aid as well as Health Care Services. The auditors conclude that there are adequate resources available to provide individual assistance, advice and support for all students.

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

The peers welcomed the efforts made by the university to increase the number of industrial placement opportunities, as already mentioned during the visit.

The reduction of assignments in the course in process engineering as well as the efforts to improve the intercultural integration was also positively acknowledged by the panel.

With regard to the support and assistance provided to students, the peers welcomed that a few additional measures, such as the designation of a discipline leader and the set-up of online communities, had been initiated. Nevertheless, the panel considered it worthwhile to monitor the further development of changes in student support caused by the introduction of Stop 1.

Overall, the peers concluded that the expectations for criterion 2 had been met.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- Subject descriptions available online: https://handbook.unimelb.edu.au/faces/htdocs/user/search/SearchResults.jsp#postgraduateSubject (Accessed 01.06.2016)
- Selection of assessment policies and procedures : Academic Performance Policy, Coursework Assessment Policy, Special Consideration Policy, Assessment Procedure, Extensions Procedure, Examinations Procedures, Grading Scheme Procedures, Coursework Assessment Design and Methods Procedure (appendix to SAR)
- Information for students with disabilities on website: http://services.unimelb.edu.au/disability (Accessed 01.06.2016)
- Statistical data about subject pass rates (appendix to SAR)
- Sample exam schedule (appendix to SAR)

- Review of exams during onsite visit
- Discussions with management, staff, students, graduates and employers during on-site visit

Preliminary assessment and analysis of the peers:
The peers consider the assessment methods used and the information provided about the assessments in each of the subject descriptions. The peers confirm that there is a clear indication of the type, expectations, timing and weighting of every element of assessment in the course descriptions. There are assignments or project based assessments where students are assessed based upon their project work or end of semester exam and either assignment or mid-semester test. The peers note the absence of a compulsory individual Master thesis, but were informed that there are substitute methods in place to reach the intended learning outcomes: for students in the research pathway, they can take up a second research project translating with a combined 50 credits attached. Students also can combine the industry project with the research project so that in this cumulated way, the capacity for individual research on the master level can be demonstrated.

A wide range of types of examinations including multi-choice quizzes, group assignments, laboratories with pre-lab questions etc. are used to assess student performance. The peers however note that hardly any oral examinations are foreseen during the course of study. Oral exam are only mandatorily effectuated as part of the research and industry project; in view of the diverse student population with close to 50% coming from abroad and before the background, that Master graduates in their future job environment need to have excellent oral presentation skills, the peers recommend to introduce more oral assignments as part of the examination scheme to reach the intended learning outcomes.

The peers in general also see virtue in group working experience but they wonder how the individual contribution of each team member can be assessed. The students explained that each team member has to make an individual presentation on the final project. However, the students admitted that the work was distributed unevenly among the team members and in some cases intercultural issues cropped up if foreign students could not speak proper English.

As regards the so-called e-portfolio which had started to be implemented at the time of the first ASIIN accreditation in 2011, it has been discontinued since then, since it did not prove to be as successful as expected as a tool to foster students' interdisciplinary and professional skills. In its place, the Skills towards Employment Program (STEP) had been introduced as a substitute form of assessment for non-technical skills; STEP however also is currently under revision.

With regard to exam administration and organisation, the panel considers the policies in use to be suitable. All exams are scheduled centrally over a thirteen-day period at the end of each semester in a manner that students have no more than two written examinations scheduled on one day and no more than three examinations in a 48-hour period. A Board of Examiners, including all academics of a department, looks into the grade distribution of each subject before the publication of results. Failed exams are always assessed by a second examiner. These measures are intended to ensure that grading is done in a fair manner. The students unanimously reported that the exam load is manageable.

The experts also discuss the failure rates, which they considered to be very low at an average of a reported 5-7%, and the mechanisms for repeating failed exams. Students who receive a failing grade in a subject are required to complete the subject the next time it is offered. The University does not offer re-sits or second examinations except under very special circumstances. While a retake is normally not foreseen, there are support systems in place to assist students to advance. As the university allows students to follow a subject for which a failed subject was a prerequisite, no significant prolongation of the study time would occur. Additionally, a special re-sit is offered if only one subject of the final year has been failed. Students with short-term illness or disabilities and chronic illness will benefit from so-called special consideration. Overall, the peers consider the measures to be reasonable.

Exam corrections are reported by all parties involved to be done in a timely manner. However, staff acknowledged that there is a problem with plagiarism, partly said to be related to different cultural backgrounds and varying state of awareness of scientific principles in different student populations. The department has therefore reinforced its precautions, putting all student work through “turnitin”; in case of academic misconduct, there are different escalation steps taken by the academic misconduct committee starting from a zero mark in the first instance to dismissal from school in repeated instances.

The peers also analyzed examinations, assignments, (capstone) project work provided by the University, and conclude that they are of a high standard.

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

The peers were pleased that the university plans to follow their recommendation of increasing the number of oral exams.

The means described to assess individuals’ contributions to group work became more transparent to the peers. They considered them to be adequate, in particular as provi-

sions were taken in case of significant discrepancies between team members' performance evaluations.

The peers also acknowledged that the university plans to more closely monitor the failure rates in order to ensure that quality will not deteriorate.

Overall, the panel considered the programmes to be compliant with criterion 3.

4. Resources

Criterion 4.1 Staff

Evidence:

- CVs of teaching staff (appendix to SAR)
- Information about Melbourne School of Engineering research online: http://www.eng.unimelb.edu.au/#research (Accessed 01.06.2016)
- Discussions with management, staff, students, graduates and employers during on-site visit

Preliminary assessment and analysis of the peers:
The panel considered the composition and qualification of the teaching staff based on the CVs provided as well as the additional information about their research activities. The team members gain the impression that the staff members are very well qualified. In particular, the panel laude the collaboration with the Melbourne Business School staff in developing the subjects for the "with business" streams. The subjects in the field of business are taught by engineers with significant industry experience. Generally, the panel considered the additional involvement of guest speakers from companies to be beneficial for the practice-orientation and relevance of the programmes.

During the visit, the panel discussed the large increase in student numbers with the students, staff and management. While students reported some issues caused by staff shortages, for example changes in the schedules, the university considers that their staff rates are growing more quickly than the student numbers (the latter expected to grow by 40%), a statement which could not be fully checked by the review team based on its impression that student numbers had already increased while staff numbers were more in a planning stage. It was acknowledged positively that the School planned to hire up to 100 additional qualified teaching staff in the next four to five years.

In the presentation, school management pointed out that this would contribute to reducing the current student-staff ratio from 28 to 22 per staff while at the same time plans

were portrayed to reduce the student drop our rates. Thus far, the average teaching load of professors amounts to 4-5 contact hours. There is however concern that if numbers of students are getting bigger, the same subjects have to be taught several times to student cohorts, split in small groups, as is already the case in big classes.

The university also did not share the panel's concern about potential difficulties in finding sufficiently qualified applicants for the planned expansion over the next couple of years. A highly attractive work environment, the reputation of the University of Melbourne and its engineering school as well as international recruitment with the help of head hunters are said to guarantee a high level of staff qualifications.

Criterion 4.2 Staff development

Evidence:

- University of Melbourne, Melbourne School of Engineering, Self-assessment for the ASIIN-Seal Staff Handbook and chapter 4.2
- http://melbourne-cshe.unimelb.edu.au/ (Accessed 01.06.2016)
- List of recent participation in Graduate Certificate in University Teaching in SAR
- Discussions with staff during onsite visit

Preliminary assessment and analysis of the peers:
Overall there are no complaints in this area; a high level of satisfaction among staff is displayed in the course of the audit. There is a performance evaluation taking place every year; promotions on average take place every four years; no further incentives are deemed necessary, as there is said to be a collegial spirit which discourages low performance. Staff members are entitled to a sabbatical every 7-8 years. The newly introduced possibility for sabbaticals in cooperation with industry is viewed favourably.

The "University's Centre for the Study of Higher Education" is providing services to university staff seeking to develop their expertise, scholarship, and leadership skills in university teaching. The Centre offers a broad variety of courses for professional development. Additionally, the School supports the participation in relevant research conferences.

The Graduate Certificate in University Teaching course is mandatory for all new teaching staff members during their first two years of teaching. Additionally, the Engineering Learning Unit also supports the training of seasonal staff including tutors and demonstrators in the framework of the so called "Tutor and Demonstrator Development" program which is run every semester for all new tutors and demonstrators who have never taught within the School before. Attendance for these staff members again is mandatory.

The peers overall gain the impression that the offers for staff development and support mechanisms available for teaching staff are commendable.

Criterion 4.3 Funds and equipment

Evidence:

- University of Melbourne, Melbourne School of Engineering, Self-assessment for the ASIIN-Seal Staff Handbook and chapter 4.2
- Visit of facilities during onsite visit
- Discussions with management, staff, students, graduates and employers during on-site visit

Preliminary assessment and analysis of the peers:

In the presentation at the outset of the on site visit, an overview was given regarding the financial situation of the School of Engineering, which was portrayed to be very comfortable and convenient and paying for the considerable expansion planned in the course of the next couple of years. Income is primarily generated from tuition fees and third party funding; furthermore the School profits from high interest rates on the schools assets. It is pointed out that the school can afford to limit its enrolment to a maximum of 6500 students which would generate more than enough income to cover its financial obligations.

During the onsite visit the panel also gained a positive impression of the facilities available for students, especially the laboratories. The peer found the facilities to be well suited for the implementation of the programmes under review. Students confirmed their satisfaction with the library, resources and the working spaces. The review team noted particularly the investments which were committed to increase and improve the infrastructure in light of the quickly and largely growing student numbers. It was confirmed that not all new facilities were in place yet but that the School had identified this as an area of priority.

Cooperation with external institutions existed mainly in the form of arrangements with international universities for exchange programmes. The panel finds these to be working well for the limited number of student mobility (see above, section 2.1), specifically since students were encouraged to implement their mobility only in the frame of the pre-arranged programmes.

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

The panel took note of the additional information provided about the increase in staff and student numbers and the corresponding expected improvement in staff/student ra-

tio. The peers encouraged the university to implement the planned staff increases in the described manner.

Overall, the panel considered the quality expectations for criterion 4 to be fully met.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Subject descriptions available online: https://handbook.unimelb.edu.au/faces/htdocs/user/search/SearchResults.jsp#postgraduateSubject (Accessed 01.06.2016)

Preliminary assessment and analysis of the peers:
The peers can confirm that complete course descriptions are published for every specialisation of the Master of Engineering and are thus available for all interested stakeholders. The descriptions contain all necessary information about the subjects including formal and administrative details (code, level, dates of teaching, prerequisites, coordinator and contact, fee information and related courses, amendment date, use and applicability for different programmes), information about credits and workload, and content-related information such as participation requirements, teaching content, literature and reading material, intended learning outcomes as well as assessment forms and their respective contribution towards the subject grades (there is also a backlog of subject descriptions available).

The learning outcomes are implicitly subdivided into knowledge, skills, and competences; additionally, generic skills are outlined, explaining which additional non-technical skills shall be obtained in the respective module. However, the peers recommend that the descriptions in the course descriptions should be revised, using a suitable taxonomy, such as Blooms taxonomy (certain verbs such as “should appreciate”, “be familiar with”, “know” are too unspecific to appropriately describe a learning outcome).

They peers positively acknowledge that staff and students use the handbook actively to provide and gather information about the subjects.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Sample of AHEGS Statement (Australian Higher Education Graduation Statement)

Preliminary assessment and analysis of the peers:
The Australian Higher Education Graduation Statement (AHEGS) issued by the University of Melbourne to each of its graduates is provided to the peers as an equivalent to the Diploma Supplement Bologna style. The AHEGS provides information about the issuing institution, the programme studied, the individual graduate's achievements, including a key to the grading scheme in use as well as information about the Australian higher education system and Australian Qualifications Framework.

The panel notes however that the information about the programme information is rather generic and that the competence profile in terms of subject-specific (on the level of the stream selected by the student) learning outcomes is absent in the document. In order to ensure that future employers and other stakeholders receive detailed information about the chosen track of the student and its related competences, this information should be added. Additionally, in European practice in the Diploma Supplement of the European Higher Education Area, statistical data about the final grades of a student cohort is provided in order to allow an external stakeholder to assess the value of the final grade. The peers suggest that this could also be beneficial for the AHEGS.

Criterion 5.3 Relevant rules

Evidence:

- https://policy.unimelb.edu.au/ (Accessed 01.06.2016)

Preliminary assessment and analysis of the peers:
The peers verified that policies and procedures of the University of Melbourne can be found in the Melbourne Policy Library website. The website is open to all interested stakeholders. The peers confirm that the rights and duties of both the higher education institution and students are clearly defined and binding. All relevant course-related information is available in the language of the degree program and accessible for anyone involved. The peers welcome that this document had been introduced and are of the opinion that the related recommendation of the prior ASIIN accreditation is fulfilled.

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

Concerning the revision of the subject descriptions based on a suitable taxonomy, the peers welcomed that the university accepted their proposal. The peers pointed out the importance of this approach to enhance quality and comparability of descriptions.

With regard to the AHEGS Statement, the panel understood that the university cannot unilaterally alter the national model. Nevertheless, the peers considered the provision of

specific programme learning outcomes together with such a document to be an important element to improve international comparability of degrees and mobility of students and graduates. Therefore, they considered it necessary that the university devises additional means of providing such information, in addition to the planned publication of the website.

Apart from this aspect, the peers considered criterion 5 to be fulfilled.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Quality of Teaching and Learning Course Review Procedure: https://policy.unimelb.edu.au/MPF1197 (Accessed 01.06.2016)
- Quality of Teaching and Learning Subject Review Procedure
- https://policy.unimelb.edu.au/MPF1198 (Accessed 01.06.2016)
- UNIVERSITY OF MELBOURNE, Teaching and Learning Quality Assurance Committee, A committee of the Academic Board http://about.unimelb.edu.au/__data/assets/pdf_file/0011/923789/TALQAC_ToRs_17-10-13_final.pdf (Accessed 01.06.2016)
- Teaching and Learning Quality Assurance Committee (TALQAC) review report
- Results of Student Experience Surveys
- Discussions with management, staff, students, graduates and employers during on-site visit

Preliminary assessment and analysis of the peers:
The university relies on a number of important bodies with different functions as well as various instruments which together constitute the backbone of a comprehensive quality management system of the institution.

A cornerstone of the internal quality assurance structure of the university is the so called **Teaching and Learning Quality Assurance Committee (TALQAC).** This body is charged with monitoring the quality and effectiveness of all study programmes on a regular basis while at the same time developing and reviewing qualitative and quantitative indicators

of performance of teaching and learning as well as reviewing reports and assessments of quality in teaching and learning.

The peers were able to attest to the fact that recommendations emanating from TALQACs past review reports (e.g. suggested improvements of infrastructure, recognition of credits, and impartiality of assessment) had indeed been followed up and led to the improvement of the programmes under review.

The Staff-Student Liaison Committee for each discipline was cited throughout the onsite visit as a particularly important body of interaction, particularly suited to provide feedback on subject- and program-level issues and to tackle problems in a timely and efficient manner. According to the information gathered, the committee is convened several times throughout the semester. In the discussion with the panel, students confirmed that the committee was an adequate platform to place complaints and make recommendations for improvement which are also taken into account by the respective staff/heads of department.

Other important quality management platforms of the institution are the so called ***Industry Advisory Groups***. These groups are a valuable source of information whether graduates successfully have achieved the intended learning outcomes of the study programmes under review in general and are successful on the labour market. They are also consulted with regard to the strategic planning of the University; and teaching and research programs (compare criterion 1.1).

As regards the ***alumni***, the peers noted that links to this important stakeholder group are less well developed. A ***course experience questionnaire*** is regularly distributed to graduates three months after receiving their diplomas, but there is no mechanism in place to track the professional developments of graduates in a systematic manner. This seems all the more relevant as during the discussions with alumni and employers it became clear that graduates are currently experiencing bigger challenges than before to find adequate positions in a competitive Australian labour market in a timely manner.

Another important quality assurance instrument in place is the so-called ***Subject Experience Survey*** (SES) carried out every semester to gather feedback/record the opinion from students about the quality of teaching and learning with questions focussing on the usefulness, assessment and feedback mechanisms as well as learning experiences in their subjects. 10 standardized questions have to be scored on a 5-point scale assessing the "Subject Delivery Scale" and the "Student Learning Scale". The results are made available on department level. There is however concern that the response rates for the SES are very low so that mechanisms have to be found to increase them.

The panel notes that the results for the department were generally at or slightly above the average and remained rather steady over the two years for which data were available. The panel moreover notes that information generated out of the SES are indeed used for quality management purposes: staff members with below average marks in the SES are offered a meeting with the assistant dean and could benefit from mentoring, for example. The panel also acknowledged that the results of the SES play a role in staff promotion. Results of the SES and from the committee meetings were also confirmed to be mandatorily published in the internal learning management system so as to close a feedback loop for students.

The University of Melbourne furthermore carries out the so called ***"Melbourne Experience Survey"*** which is a University of Melbourne survey which seeks to understand the current students' overall University experience as well as students' experience of their course. The overall Satisfaction outcomes for the Master of Engineering were well above the faculty and University average, with the percentage rating "Very Good" or "Excellent".

Overall, the peers confirm that the methods employed and data analysed are suitable for the purpose and used to continue improving the degree programme, especially with a view to identifying and resolving weaknesses.

The feedback loops however could still be further improved by systematically gathering a track record of graduate employment. Additionally, the University should consider appropriate measures to better integrate foreign students who due to cultural differences refrain from voicing their issues.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:

In relation to gathering feedback from graduates in the continuous further development of the degree programmes, the panel welcomed the four initiatives mentioned by the university.

The peers furthermore took note of the information regarding response rate and encouraged the university to continue the efforts to increase these rates.

Overall, apart from the issue of graduates' follow-up, the peers considered criterion 6 to be fulfilled.

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:

No additional documents needed

E Comment of the Higher Education Institution (15.08.2016)

The following quotes the comment of the institution:

„We thank the ASIIN organization for their time and consideration of the programs in Cluster A. We value the comments from our peers provided in the draft ASIIN Accreditation report. We find the report very instructive and the recommendations useful for us to improve the quality of our graduates. We will do our best to implement the recommended changes as outlined below.

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

We thank the peers for the positive comments on the importance we have placed on the development of soft skills in all our programs. We realise that this is an important aspect of all engineering programs and we have already made plans to strengthen this aspect of all our Master of Engineering disciplines.

We agree that the learning objectives for the various specialisations on our website are very generic. The information on our public website are meant to be generic so that incoming students are able to understand what they are going to study. More details of the subject-specific programme level learning outcomes, as well as the expected professional profiles for all five specializations can be found in our handbook which is available online at https://handbook.unimelb.edu.au. The relevant pages are as follows:

Biochemical: https://handbook.unimelb.edu.au/view/2016/%21MC-ENG-SPC%2B1001

Biomedical: https://handbook.unimelb.edu.au/view/2016/%21H05-AA-SPC%2B1000

Biomedical with Business: https://handbook.unimelb.edu.au/view/2016/%21MC-ENG-SPC%2B1010

Chemical: https://handbook.unimelb.edu.au/view/2016/%21H05-AA-SPC%2B1002

Chemical with Business: https://handbook.unimelb.edu.au/view/2016/%21MC-ENG-SPC%2B1002

We hope that this level of detail clearly shows the differences in the qualifying profile of our disciplines.

We note the recommendation from the peers to keep track of the employment record of Master of engineering graduates. We will aim to improve our performance in this respect, using a combination of four approaches:

a) We already ask students within the Chemical, Biochemical and Chemical with Business programs to complete a form at the time of submission of their final year project. This form records whether the student has found work at this point in time and if so, for which company. Further, the form records an email address for each student for ongoing contact, allowing us to follow up on their progress at a later date. We will continue to collect this data and extend the approach to the biomedical programs.

b) The Graduate Destination Survey is issued to all graduates around three months after the completion of their degree by the Australian government (at the same time as the Course Experience questionnaire). This provides generic information regarding the employment status of all graduates at this point in time. However, it should be noted that the response rate on this survey is quite low and only information regarding employment status is recorded i.e. there is no information regarding the sector in which the graduate is employed.

c) We have recently established a 'Chemical and Biochemical Alumni' LinkedIn group. This allows us to track the employment status of our graduates over a longer timeframe. The group currently has 440 members, allowing access to the employment profiles of these alumni. We will continue to grow this group, specifically by issuing invitations to join the group when students graduate. We will also extend the approach to the Biomedical specialisations.

d) In specific response to the panel's concerns, we will aim to send an email to all graduates one year after the completion of their program to further identify employment outcomes. This will rely upon the use of the email address collected as above during submission of the final year project.

Criterion 1.2 Name of the degree programme

We thank the peers for their positive comments regarding the name of the degree.

Criterion 1.3 Curriculum

We thank the peers for their positive comments on our curriculum. We are very glad to see the peers find that the Masters of Engineering in all five specialisations 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.'

Criterion 1.4 Admission requirements

We can confirm that the admission requirements outlined in this section are correct. The Master of Engineering is set up as a 3 year program. To gain entry into this program, students must have completed an undergraduate degree with relevant subject (units) in science and maths. Students who have successfully completed a cognate undergraduate degree (Bachelor of Science or Bachelor of Engineering from a good university) will get 1 year (100 points) of credit and can complete the Master of Engineering in 2 years.

As there are students from different countries with distinctive cultural background enrolled in the Master of Engineering, we are aware that there is an issue with students with different ability in communicating in English. We have begun thinking about what we should do to overcome this problem. Some of the options we are considering are:

- Increase our English language entry requirement (increase the IELTS and TOEFL scores)
- Ask that all foreign students take an English diagnostic test when they arrive at the University of Melbourne. Students that score below a certain threshold will be offered an English language course.
- Include a hurdle component based on the English language for our *Engineering Practice and Communication* (ENGR90021) subject.

ENGR90021 is currently being re-developed and expanded. From 2017, this subject will be retitled *Core Professional Development*, and will be a compulsory unit for every Engineering Masters student. The school will seek to employ external English language education specialists and consultants to assist in delivering rigorous mandatory training in written and oral communication.

We will also continue our existing practice of requiring group work to be based on teams of mixed cultural background. Cultural integration is also encouraged through the activities of the two student societies and through the MSE Student Wellbeing Committee. We will seek to expand cultural integration mechanisms through these student societies and the broader activities of the Student Wellbeing Committee.

Criterion 2.1 Structure and modularity

We are delighted to read that the peers are happy with the structure and flexibility of our programs. We aim to maintain the ability for the students to switch between the "with Business" and the "technical" streams.

We note the comments from the peers regarding their being insufficient industry projects, particularly in Semester 2. As noted by the peers we are actively working to increase the number of projects, particularly though engagement with our Industry Advisory groups. We are also trying to provide more flexibility in the scheduling of our subjects, so that more students can take an industry project in Semester 1. One mechanism is our Engineering Internship (ENGR90033) subject, where students can receive credit for work undertaken during an industry placement. A salary during the placement is optional for the employer, and placements may be offered during semesters 1 and 2 as well as over the end-of-year summer break.

Criterion 2.2 Workload and credit points

We note that the peers are satisfied that the student workload associated with each credit has been increased since the last accreditation following a recommendation to review its adequacy. We agree with the peers that the course in process engineering was found by students to be perhaps excessive in workload and as noted, we have taken action to reduce the number of assignments in this subject.

Criterion 2.3 Teaching methods

We are happy to see that the panel is satisfied that a sufficient variety of didactic methods was used at an adequate level of teaching.

We agree that language and intercultural issues can hinder the effectiveness of problem based learning. We have given options that we are considering to overcome these issues in the discussion of Criterion 1.4.

Critrion 2.4 Support and assistance

We are pleased that the auditors conclude that there are adequate resources available to provide individual assistance, advice and support for all students.

We will continue to publish the Chemical and Biochemical Engineering Survival Guide, to supplement the resources available through Stop1. We will also aim to extend this approach to the biomedical disciplines.

A Biomedical Engineering discipline leader has been designated as a primary point of contact for students requiring further course advice and support in the Biomedical disciplines, supplementing the resources available through Stop1. In addition, both a Biomedi-

cal Engineering Community and a Chemical and Biochemical Community have been created through our university's web-based Learning Management System (LMS). These online resources provide students with up-to-date information about study opportunities, exchange programs, seminars, jobs, projects and social activities.

Criterion 3 Exams: System, concept & implementation

It is pleasing to note that the peers found that the examinations, assignments and capstone project work provided by the University were of a high standard.

We note the request by the peers for more oral assignments as part of the examination scheme to reach the intended learning outcomes. We agree with this recommendation and will seek to increase the number of oral assessments.

We note the concerns of the peers as to how the individual contribution of each team member can be assessed in group work. In fact, while it may not have come across during the visit, we believe that we have robust processes in place to evaluate this contribution. Specifically, in all team based work, each team member is asked to submit a 'peer assessment' of each of their fellow team members. This is a sequence of questions that evaluate how much each team member contributed to the work. These assessments are reviewed by the subject coordinator and if there is a significant discrepancy between team members, then a meeting is held to clarify any issues with the entire team present. Following this moderation, the marks for the team assessment are then adjusted to reflect the final peer assessment. Thus for example, if the team mark was 72%, the team member(s) who were shown to contribute more would have their mark increased, while other team members would have their mark reduced. However, the average mark for the team would remain at 72%.

Peer review is also being facilitated through PRAZE, an anonymous web-based peer review system that automates and manages the peer assessment process. This system promotes effective learning by providing students with prompt and diverse feedback, and can engage students in critical analysis and self-reflection. This system has been shown to be particularly effective in cases of large class sizes.

We note that concerns of the peers regarding low failure rates (5-7%) but also confirm that in cases not involving special consideration, a failure means that the student must retake the entire subject. Indeed, we do intend to more closely monitor, and possibly increase, the failure rate for first year Masters subjects to ensure that students without adequate English do not progress (please also see our response to Criterion 1.4)

Criterion 4.1 Staff

We note the panel's concern that the large increase in student numbers is not yet being matched by increases in staffing. The Melbourne School of Engineering is in the process of hiring more academic staff and this will improve our staff/student ratio from 27.3 in 2015 to 22.1 in 2025. We agree that as the student numbers increase, we will need to teach the same subjects twice that are currently only taught once. However, by implication, this will lead to smaller class sizes overall, which will improve the quality of the student experience.

We share the peers' concern that there may be difficulties in finding sufficiently qualified applicants for the planned expansion over the next couple of years. However, as noted in the draft report, a highly attractive work environment, the reputation of the University of Melbourne and its engineering school as well as international recruitment with the help of head hunters should help to address this concern. If necessary, we will employ contract teaching staff as a temporary measure until staff of sufficient quality are identified.

Criterion 4.2 Staff development

We note the peers' positive comments on this Criterion and have nothing else to add.

Criterion 4.3 Funds and equipment

We note the peers' positive comments on this Criterion and have nothing else to add.

Criterion 5.1 Module descriptions

We thank the peers for praising us on the high level of detailed information in the subject descriptions. We note their suggestion that the descriptions in the course descriptions should be revised, using a suitable taxonomy, such as Blooms taxonomy to be more specific. We will endeavour to revise these course descriptions accordingly.

Criterion 5.2 Diploma and Diploma Supplement

We note the concerns of the panel regarding the generic nature of the Australian Higher Education Graduation Statement (AHEGS). However, the panel has incorrectly indicated that this statement is provided by the university. In fact, the statement is issued by the Australian government. As such, we are unable to freely adapt the statement to include competency profiles in terms of subject-specific learning outcomes or statistical data about the final grades of a student.

However, we are in full agreement that the competency profile in terms of subject-specific learning outcomes for each specialisations of the Master of Engineering would be useful for employers, potential and current students, and our colleagues from other insti-

tutions. We will be developing such statements and putting these up on our website for easy access to anyone who might be interested to read them.

Criterion 5.3 Relevant rules

We are happy to hear that the peers find our documentation of the rules and policies of our programs to be easily accessible, clear and concise. We are also glad to hear that the peers now consider that the recommendation from the first accreditation has been fulfilled.

Criterion 6 Quality management: quality assessment and development

It is pleasing to see that the peers endorse the quality management processes employed at the University of Melbourne including TALQAC, the Student-Staff Liaison Committee and our Industry Advisory groups.

We note the need to track the professional development of graduates in a more systematic manner, and have provided a response to this concern under Criterion 1.1.

As noted in the report, while the response rates can be low for the Student Experience Survey (SES) across the university, the response rates in the five specializations under consideration in Cluster A are reasonable. In particular, the response rates for Biomedical, Chemical and Biochemical engineering subjects are consistently above 50%, which is above the university average.

We are pleased that the peers acknowledge our management of staff members with below average SES scores. In the Biomedical Engineering disciplines, we are also introducing a scheme whereby academic staff members with outstanding SES scores attend classes of staff members with below-average scores to provide to them feedback, support and mentorship.

Finally, we note the need to consider appropriate measures to better integrate foreign students who due to cultural differences refrain from voicing their issues. We will work to address this as already described in our response to Criterion 1.4. “

F Summary: Peer recommendations (26.08.2016)

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

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Master of Engineering (Biochemical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Biomedical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Biomedical with Business)	With requirements	EUR-ACE®	30.09.2021
Master of Engineering (Chemical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Chemical with Business)	With requirements	EUR-ACE®	30.09.2021

Requirements

For all degree programmes

A 1. (ASIIN 1.1) Draft the educational objectives/learning outcomes per sub-discipline so that they describe the academic, subject-specific and professional classification of the qualifications gained in the degree programmes

A 2. (ASIIN 1.3, 5.1) Revise the description of subject descriptions in the handbook, using also a suitable taxonomy.

A 3. (ASIIN 1.4) Ascertain that the admission rules ensure that students, who are admitted, have an appropriate level of English to follow the classes and are able to express themselves orally and in writing.

A 4. (ASIIN 5.2) Ensure that the Diploma Supplement contains detailed information about the educational objectives, intended learning outcomes as well statistical data to allow readers to categorise the individual results.

Recommendations

For all degree programmes

E 1. (ASIIN 2.4) It is recommended to closely monitor the performance of central student services.

E 2. (ASIIN 3) It is recommended to introduce more oral exams.

E 3. (ASIIN 2.2, 6) It is recommended to systematically close the feedback loops and involve all relevant stakeholders in the quality management system. In particular, a systematic follow up on the graduates and track of the professional life of the graduates (i.e. which positions they take, how long it takes to start employment) is recommended to ensure that the programmes match labour market requirements. Additionally, it is recommended to monitor whether the workload of the individual subjects and the programme as a whole is in line with the expected hours.

G Comment of the Technical Committees

Technical Committee 01 – Mechanical Engineering and Process Engineering (06.09.2016)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee fully comprehends the requirements and recommendations. The Technical Committee only suggests an amendment for recommendation number 2. The Technical Committee thinks that the recommendation dealing with the inclusion of graduates is too detailed and suggests shortening it as described below. Apart from this the Technical Committee accepts the suggestions of the peers without changes.

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

The Technical Committee deems that the intended learning outcomes of the degree programmes do comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee 01.

The Technical Committee 01 recommends the award of the seals as follows:

Degree Programme	**ASIIN seal**	**Subject-specific Label**	**Maximum duration of accreditation**
Master of Engineering (Biochemical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Biomedical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Biomedical with Business)	With requirements	EUR-ACE®	30.09.2021
Master of Engineering (Chemical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Chemical with Business)	With requirements	EUR-ACE®	30.09.2021

E 3. (ASIIN 2.2, 6) It is recommended to systematically close the feedback loops and involve all relevant stakeholders (e.g. graduates) in the quality management system.

Technical Committee 06 – Industrial Engineering (08.09.2016)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure. It judges the assessment of the peers as well as the proposed requirements and recommendations to be adequate.

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

The Technical Committee deems that the intended learning outcomes of the degree programmes do comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee.

The Technical Committee 06 recommends the award of the seals as follows:

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Master of Engineering (Biomedical with Business)	With requirements	EUR-ACE®	30.09.2021
Master of Engineering (Chemical with Business)	With requirements	EUR-ACE®	30.09.2021

Technical Committee 09 - Chemistry (13.09.2016)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure. It proposed to sharpen recommendation E1 and to separate recommendation E3 into two separate statements.

The Technical Committee 09 recommends the award of the seals as follows:

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Master of Engineering (Biochemical)	With requirements	EUR-ACE®	30.09.2023

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Master of Engineering (Chemical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Chemical with Business)	With requirements	EUR-ACE®	30.09.2021

E 1. (ASIIN 2.4) It is recommended to improve the performance and accessibility of central student services.

E 3. (ASIIN 2.2, 6) It is recommended to systematically close the feedback loops and involve all relevant stakeholders in the quality management system. In particular, a systematic follow up on the graduates and track of the professional life of the graduates (i.e. which positions they take, how long it takes to start employment) is recommended to ensure that the programmes match labour market requirements.

E 4. (ASIIN 2.2, 6) It is recommended to monitor whether the workload of the individual subjects and the programme as a whole is in line with the expected hours.

Technical Committee 10 – Life Sciences (02.09.2016)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee fully concurs with the proposals of the peer panel.

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

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Master of Engineering (Biochemical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Biomedical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Biomedical with Business)	With requirements	EUR-ACE®	30.09.2021

H Decision of the Accreditation Commission (30.09.2016)

Assessment and analysis for the award of the subject-specific ASIIN seal:

The Accreditation Commission made a few editorial changes to the requirements 1, 3-4 to make them clearer and to streamline them for all clusters. The Commission partially followed the changes proposed by the Technical Committees for further editorial changes to the recommendations.

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

The Accreditation Commission deemed that the intended learning outcomes of the degree programmes do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committees 01 and 06.

The Accreditation Commission for Degree Programmes decided to award the following seals:

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Master of Engineering (Biochemical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Biomedical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Biomedical with Business)	With requirements	EUR-ACE®	30.09.2021
Master of Engineering (Chemical)	With requirements	EUR-ACE®	30.09.2023
Master of Engineering (Chemical with Business)	With requirements	EUR-ACE®	30.09.2021

Requirements

A 1. (ASIIN 1.1) Revise the educational objectives/learning outcomes per sub-discipline so as to describe the academic, subject-specific and professional classification of the qualifications gained in the core disciplines.

A 2. (ASIIN 1.3, 5.1) Revise the description of subject descriptions in the handbook, using also a suitable taxonomy.

A 3. (ASIIN 1.3) Ensure that students, who are admitted, have an appropriate level of English to follow the classes and are able to express themselves orally and in writing.

A 4. (ASIIN 5.2) Ensure that the Diploma Supplement contains detailed information about the educational objectives, intended learning outcomes as well statistical data to allow readers to categorize the individual results.

Recommendations

E 1. (ASIIN 2.4) It is recommended to monitor the performance and accessibility of central student services.

E 2. (ASIIN 3) It is recommended to introduce more oral exams.

E 3. (ASIIN 2.2, 6) It is recommended to systematically close the feedback loops and involve all relevant stakeholders in the quality management system.

E 4. (ASIIN 2.2, 6) It is recommended to monitor whether the workload of the individual subjects and the programme as a whole is in line with the expected hours.

I Fulfilment of Requirements: Decision of the Accreditation Commission (29.09.2017)

Requirements

For all degree programmes

A 1. (ASIIN 1.1) Revise the educational objectives/learning outcomes per sub-discipline so as to describe the academic, subject-specific and professional classification of the qualifications gained in the core disciplines.

Initial Treatment	
Peers	fulfilled Justification: The objectives and learning outcomes for all of the five programmes have been completely rewritten and now include subject-specific and professional details for each discipline.
TC 01	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 06	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 09	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 10	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.

A 2. (ASIIN 1.3, 5.1) Revise the description of subject descriptions in the handbook, using also a suitable taxonomy.

Initial Treatment	
Peers	fulfilled The intended learning outcomes have been rewritten and in the new version include Bloom's taxonomy using concepts such as "analyse, synthesise, create" instead of "understand, appreciate".
TC 01	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 06	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.

TC 09	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 10	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.

A 3. (ASIIN 1.3) Ensure that students, who are admitted, have an appropriate level of English to follow the classes and are able to express themselves orally and in writing.

Initial Treatment	
Peers	fulfilled Justification: The requirements of the Melbourne School of Engineering are in line with the general entry requirements of the Melbourne University as a whole. The peers can see no justification for more stringent requirements for engineers. However, in recognition of remaining problems especially with students from the far east, the school is offering language support courses and has implemented mechanisms to monitor their success.
TC 01	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 06	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 09	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 10	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.

A 4. (ASIIN 5.2) Ensure that the Diploma Supplement contains detailed information about the educational objectives, intended learning outcomes as well statistical data to allow readers to categorize the individual results.

Initial Treatment	
Peers	partly fulfilled Justification: Due to restrictions mandated by the Australian Government, the School of Engineering is not free to change the Diploma Supplement as stipulated. However, the School has tried to compromise and conform to the ASIIN requirement by introducing

	a reference to a website of its School that contains the required information]
TC 01	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 06	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 09	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.
TC 10	fulfilled Justification: The Technical Committee acknowledges the assessment of the peers and agrees to this judgement.

Draft resolution for the AC Programmes on 29.09.2017:

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Master of Engineering (Biochemical)	All requirements fulfilled	EUR-ACE®	30.09.2023
Master of Engineering (Biomedical)	All requirements fulfilled	EUR-ACE®	30.09.2023
Master of Engineering (Biomedical with Business)	All requirements fulfilled	EUR-ACE®	30.09.2021
Master of Engineering (Chemical)	All requirements fulfilled	EUR-ACE®	30.09.2023
Master of Engineering (Chemical with Business)	All requirements fulfilled	EUR-ACE®	30.09.2021

Appendix: Programme Learning Outcomes and Curricula

For the Master of Engineering degree programmes (all specializations) the institution has presented the following profile in the Student Handbook online:

“The ME programs have as their objectives that graduates should:

1) have a sound fundamental understanding of the scientific principles underlying technology;

2) have acquired the educational and professional standards of the professional institutions and boards with which the School's courses are accredited;

3) possess a broad knowledge base of their chosen discipline, and of other disciplines so as to facilitate effective communication with those other professionals with whom engineers routinely communicate;

4) understand the basic principles underlying the management of physical, human and financial resources;

5) have acquired the mathematical and computational skills necessary for the solution of theoretical and practical problems for further professional development and for meeting future changes in technology;

6) possess analytical, problem-solving and, where relevant, design skills, including those appropriate for sustainable development;

7) have verbal and written communication skills that enable them to make a meaningful contribution to the changes facing our society;

8) have developed professional ethics and responsibility towards the profession and the community;

9) have an appreciation of the interpersonal and management skills required by engineers in undertaking professional activities; and.

10) understand the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development.”

The following **curricula** are presented:

Master of Engineering (Biochemical)

YEAR 1					
Semester 1			*Semester 2*		
CHEN20010	Material and Energy Balances	12.5	CHEN20011	Chemical Process Analysis	12.5
ENGR90021	Engineering Practice and Comm.	12.5	CHEN20009	Transport Processes	12.5
CHEM20018	Reactions and Synthesis	12.5	CHEN90032	Process Dynamics and Control	12.5
MAST20029	Engineering Mathematics	12.5	ENGR30002	Fluid Mechanics	12.5

YEAR 2					
Semester 3			*Semester 4*		
CHEN30001	Reactor Engineering	12.5	CHEN90037	Safety, Environment and Design	12.5
CHEN30005	Heat and Mass Transport Processes	12.5	BIEN90004	Biochemical and Pharmaceutical Eng.	12.5
CHEN90020	Chemical Engineering Management	12.5		Biochemical Engineering Project Elective	25.0
CHEN90031	Bioprocess Engineering	12.5			

YEAR 3					
Semester 5			*Semester 6*		
CHEN90012	Process Equipment Design	12.5	BIEN90002	Biochemical Engineering Design Project	25.0
CHEN90013	Process Engineering	12.5		Biochemical Engineering Elective	12.5
CHEN90018	Particle Mechanics & Processing	12.5		Biochemical Engineering Elective	12.5
FOOD90029	Food Engineering	12.5			

Biochemical Engineering Project Elective (Select 1)		
BIEN90001	Biochemical Engineering Research Project	25.0
CHEN90028	Industry Project	25.0

Biochemical Engineering Electives (Select 25.0 points)		
BIEN90003	Biochemical Engineering Minor Thesis	25.0
CHEN90028	Industry Project	25.0
CHEN90007	Adv Thermo & Reactor Engineering	12.5
CHEN90010	Minerals, Materials and Recycling	12.5
CHEN90011	Bioenvironmental Engineering	12.5
CHEN90019	Adv Heat & Mass Transport Processes	12.5
CHEN90027	Carbon Capture and Storage	12.5
CHEN90035	Adv Topics in Chemical Engineering	12.5
CHEN90036	Recent Adv's in Separation Processes	12.5
BMEN90011	Tissue Engineering & Stem Cells	12.5
BMEN90012	Soft Matter Engineering	12.5
ENGR90024	Computational Fluid Dynamics	12.5
ENGR90026	Engineering Entrepreneurship	12.5
ENGR90033	Internship	25.0

Master of Engineering (Biomedical)

YEAR 1					
Semester 1			*Semester 2*		
BMEN20001	Biomechanical Physics & Comput.	12.5	BMEN30007	Biotransport Processes	12.5
BMEN30005	Introduction to Biomechanics	12.5	BMEN30008	Biosystems Design	12.5
BMEN30006	Circuits and Systems	12.5	ENGR90021	Engineering Practice and Comm.	12.5
MAST20029	Engineering Mathematics	12.5		Biomedical Science Elective	12.5

YEAR 2					
Semester 3			*Semester 4*		
ELEN30009	Electrical Network Analysis & Design	12.5	BMEN90023	Biomaterials	12.5
BMEN90026	Clinical Trials and Regulations	12.5	BMEN90028	Anatomy & Physiology for Engineers	12.5
	Bioengineering Elective	12.5		Bioengineering Elective	12.5
	Bioengineering Elective	12.5		Bioengineering Elective	12.5

YEAR 3					
Semester 5			*Semester 6*		
	Biomedical Engineering Project Electives				50.0
BMEN90019	Biomedical Engineering Management	12.5			
BMEN90027	Biosystems Modelling	12.5			
	Approved Elective	12.5		Approved Elective	12.5

Biomedical Science Elective
Students with a background in chemistry or physics must take BIOL1004 as their elective while students with a background in biology must take CHEN10003.

Biomedical Engineering Project Elective		
Select either both		
BMEN90017	Biomedical Engineering Design Project	25.0
BMEN90018	Biomedical Engineering Capstone Project	25.0
Or select		
BMEN90030	BioDesign Innovation	50.0

Biomedical Engineering Electives (Select as required)		
BMEN90002	Neural Information Processing	12.5
BMEN90003	Clinical Engineering	12.5
BMEN90011	Tissue Engineering & Stem Cells	12.5
BMEN90012	Soft Matter Engineering	12.5
BMEN90021	Medical Imaging	12.5
BMEN90022	Computational Biomechanics	12.5
BMEN90029	Soft Tissue & Cellular Biomechanics	12.5
COMP90014	Algorithms for Functional Genomics	12.5
COMP90016	Computational Genomics	12.5

Master of Engineering (Biomedical with Business)

YEAR 1					
Semester 1			*Semester 2*		
BMEN20001	Biomechanical Physics & Comput.	12.5	BMEN30007	Biotransport Processes	12.5
BMEN30005	Introduction to Biomechanics	12.5	BMEN30008	Biosystems Design	12.5
BMEN30006	Circuits and Systems	12.5	ENGR90021	Engineering Practice and Comm.	12.5
MAST20029	Engineering Mathematics	12.5		Biomedical Science Elective	12.5

YEAR 2					
Semester 3			*Semester 4*		
ELEN30009	Electrical Network Analysis & Design	12.5	BMEN90023	Biomaterials	12.5
BMEN90026	Clinical Trials and Regulations	12.5	BMEN90028	Anatomy & Physiology for Engineers	12.5
	Bioengineering Elective	12.5	ENGM90006	Engineering Contracts & Procurement	12.5
ENGM90014	World of Engineering Management	12.5	ENGM90012	Marketing Management for Engin's	12.5

YEAR 3					
Semester 5			*Semester 6*		
	Biomedical Engineering Project Electives				
BMEN90019	Biomedical Engineering Management	12.5			50.0
BMEN90027	Biosystems Modelling	12.5			
ENGM90011	Economic Analysis for Engineers	12.5	ENGM90013	Strategy Execution for Engineers	12.5

Biomedical Science Elective
Students with a background in chemistry or physics must take BIOL1004 as their elective while students with a background in biology must take CHEN10003.

Biomedical Engineering Project Elective		
Select either both		
BMEN90017	Biomedical Engineering Design Project	25.0
BMEN90018	Biomedical Engineering Capstone Project	25.0
Or select		
BMEN90030	BioDesign Innovation	50.0

Biomedical Engineering Electives (Select as required)		
BMEN90002	Neural Information Processing	12.5
BMEN90003	Clinical Engineering	12.5
BMEN90011	Tissue Engineering & Stem Cells	12.5
BMEN90012	Soft Matter Engineering	12.5
BMEN90021	Medical Imaging	12.5
BMEN90022	Computational Biomechanics	12.5
BMEN90029	Soft Tissue & Cellular Biomechanics	12.5
COMP90014	Algorithms for Functional Genomics	12.5
COMP90016	Computational Genomics	12.5

Master of Engineering (Chemical)

YEAR 1					
Semester 1			*Semester 2*		
CHEN20010	Material and Energy Balances	12.5	CHEN20011	Chemical Process Analysis	12.5
ENGR90021	Engineering Practice and Comm.	12.5	CHEN20009	Transport Processes	12.5
CHEM20018	Reactions and Synthesis	12.5	CHEN90032	Process Dynamics and Control	12.5
MAST20029	Engineering Mathematics	12.5	ENGR30001	Fluid Mechanics	12.5

YEAR 2					
Semester 3			*Semester 4*		
CHEN30001	Reactor Engineering	12.5	CHEN90037	Safety, Environment and Design	12.5
CHEN30005	Heat and Mass Transport Processes	12.5	CHEN90007	Adv. Thermo. & Reactor Engineering	12.5
CHEN90020	Chemical Engineering Management	12.5		Chemical Engineering Project Elective	25.0
CHEN90031	Bioprocess Engineering	12.5			

YEAR 3					
Semester 5			*Semester 6*		
CHEN90012	Process Equipment Design	12.5	CHEN90022	Chemical Engineering Design Project	25.0
CHEN90013	Process Engineering	12.5		Chemical Engineering Elective	12.5
CHEN90018	Particle Mechanics & Processing	12.5		Chemical Engineering Elective	12.5
CHEN90019	Adv Heat & Mass Transport Processes	12.5			

Chemical Engineering Project Elective (Select 1)		
CHEN90023	Chemical Engineering Research Project	25.0
CHEN90028	Industry Project	25.0

Chemical Engineering Electives (Select 25.0 points)		
CHEN90030	Chemical Engineering Minor Thesis	25.0
CHEN90028	Industry Project	25.0
CHEN90010	Minerals, Materials and Recycling	12.5
CHEN90011	Bioenvironmental Engineering	12.5
CHEN90027	Carbon Capture & Storage	12.5
CHEN90035	Adv Topics in Chemical Engineering	12.5
CHEN90036	Recent Adv's in Separation Processes	12.5
BIEN90004	Biochemical and Pharmaceutical Eng.	12.5
FOOD90029	Food Engineering	12.5
BMEN90011	Tissue Engineering & Stem Cells	12.5
BMEN90012	Soft Matter Engineering	12.5
ENGR90024	Computational Fluid Dynamics	12.5
ENGR90026	Engineering Entrepreneurship	12.5

Master of Engineering (Chemical with business)

YEAR 1					
Semester 1			*Semester 2*		
CHEN20010	Material and Energy Balances	12.5	CHEN20011	Chemical Process Analysis	12.5
ENGR90021	Engineering Practice and Comm.	12.5	CHEN20009	Transport Processes	12.5
CHEM20018	Reactions and Synthesis	12.5	CHEN90032	Process Dynamics and Control	12.5
MAST20029	Engineering Mathematics	12.5	ENGR30001	Fluid Mechanics	12.5

YEAR 2					
Semester 3			*Semester 4*		
CHEN30001	Reactor Engineering	12.5	CHEN90037	Safety, Environment and Design	12.5
CHEN30005	Heat and Mass Transport Processes	12.5	ENGM90012	Marketing Management for Engin's	12.5
CHEN90031	Bioprocess Engineering	12.5		Chemical Engineering Project Elective	25.0
ENGM90014	World of Engineering Management	12.5			

YEAR 3					
Semester 5			*Semester 6*		
CHEN90012	Process Equipment Design	12.5	CHEN90022	Chemical Engineering Design Project	25.0
CHEN90013	Process Engineering	12.5	ENGM90006	Engineering Contracts & Procurement	12.5
CHEN90018	Particle Mechanics & Processing	12.5	ENGM90013	Strategy Execution for Engineers	12.5
ENGM90011	Economic Analysis for Engineers	12.5			

Chemical Engineering Project Elective (Select 1)		
CHEN90023	Chemical Engineering Research Project	25.0
CHEN90028	Industry Project	25.0