ASIIN Seal & EUR-ACE® Label

Accreditation Report

Master's Degree Programmes

Architectural Engineering
Civil Engineering
Environmental Engineering
Digital Infrastructure Engineering

(incl. specialisations)

Provided by
University of Melbourne

Version: 25 September 2023

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Ma Master of Architectural Engineering (MC-ARCHENG)	—	ASIIN, EUR-ACE®	ASIIN, 30.09.2016 –30.09.2023	3, 11
Ma Master of Civil Engineering (MC-CIVENG) *Previously known as Master of Engineering (Civil) and Master of Engineering (Civil with Business)*	—	ASIIN, EUR-ACE®	ASIIN, 30.09.2016 –30.09.2023	3, 11
Ma Master of Digital Infrastructure Engineering (MC-DINFENG) *Previously known as Master of Spatial Engineering (2022) / Master of Engineering (Spatial)*	—	ASIIN, EUR-ACE®	ASIIN, 30.09.2016 –30.09.2023	3, 11
Ma Master of Environmental Engineering (MC-ENVENG) *Previously known as Master of Engineering (Environmental)*	—	ASIIN, EUR-ACE®	ASIIN, 30.09.2016 –30.09.2023	3, 11
Date of the contract: 25.08.2022 **Submission of the final version of the self-assessment report:** 30.05.2023 **Date of the onsite visit:** 12.-13.07.2023				

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

[2] TC: Technical Committee for the following subject areas: TC 03 - Civil Engineering, Geodesy and Architecture; TC 11 - Geosciences.

at: University of Melbourne, Melbourne Connect, Faculty of Engineering and Information Technology	
Expert panel: Prof. Dr.-Ing. Günter Rombach, Hamburg University of Technology (TUHH) Prof. Dipl.-Ing. Martin Weischer, University of Applied Sciences Münster Prof. Dr.-Ing. André Niemann, University of Duisburg-Essen Ms Melinda Lutton, Water Technology Pty Ltd Ms Aurica Pötz, student at Technical University of Applied Sciences Mittelhessen	
Representative of the ASIIN headquarter: Christian Daniels	
Responsible decision-making committee: Accreditation Commission for Degree Programmes	
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of May 02, 2022 Subject-Specific Criteria of Technical Committee 03 – Civil Engineering, Geodesy and Architecture as of June 26, 2020 Subject-Specific Criteria of Technical Committee 11 – Geosciences as of December 9, 2011	

B Characteristics of the Degree Programmes

a) Name	Final degree (original / English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double / Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Ma Master of Architectural Engineering (MC-ARCHENG)	Master of Architectural Engineering	—	EQF Level 7	Full-time or part-time; on campus	No	4.5 years or 9 Semesters (full time)	450 Credit Points	February 2017, biannually in February and July
Ma Master of Civil Engineering (MC-CIVENG)	Master of Civil Engineering	Business Energy Structural Transport Geotechnical Water Resources Project Management	EQF Level 7	Full-time or part-time; on campus	No	3 years or 6 Semesters (full time)	300 Credit Points	February 2022, biannually in February and July *Previously known as Master of Engineering (Civil) (2011) and Master of Engineering (Civil with Business) (2014)*
Ma Master of Digital Infrastructure Engineering (MC-DINFENG)	Master of Digital Infrastructure Engineering	Artificial Intelligence Business Communication Infrastructure Construction Energy Industry Information Systems Information Technology Land Mobility Smart Cities Water	EQF Level 7	Full-time or part-time; on campus	No	3 years or 6 Semesters (full time)	300 Credit Points	February 2023, biannually in February and July *Previously known as Master of Spatial Engineering (2022) / Master of Engineering (Spatial) (2011)*
Ma Master of Environmental Engineering (MC-ENVENG)	Master of Environmental Engineering	Earth Observation Energy Systems Water Systems	EQF Level 7	Full-time or part-time; on campus	No	3 years or 6 Semesters (full time)	300 Credit Points	February 2022, biannually in February and July *Previously known as Master of Engineering (Environmental (2011)*

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

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

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

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

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

In 2008, the University of Melbourne introduced a new degree structure called the "Melbourne Model". The Melbourne Model aims to be different from traditional undergraduate degree structures in Australia through emphasising breadth over depth, allowing students to customize their degrees, as well as by allowing them to transfer between majors and take subjects from different disciplines. The flexibility of this model is intended to enable students to adapt their studies in accordance with their abilities and goals.

For the Master's degree programme **Architectural Engineering**, the University has presented the following profile on the programme's website:

> "The Master of Architectural Engineering will produce graduates with a capacity to operate across the complementary disciplines of Architecture and Engineering. This program is distinct in its ambition to achieve dual accreditation and provide pathways to both professions.
>
> Master of Architectural Engineering students will be taught by staff from the Melbourne School of Engineering and the Faculty of Architecture, Building and Planning. The two main areas of study will be investigated via discipline-based subjects, while the linkages between the two will be explored via a dedicated architectural engineering capstone/thesis subject.

> Students entering via an undergraduate major in architecture will initially complete an 8 subject sequence in engineering. Students entering from engineering major will complete an 8 subject sequence in architecture. At the completion of first year, both groups will commence a shared second year sequence."

For the Master's degree programme **Civil Engineering**, the University has presented the following profile on the programme's website:

> "Graduates of Master of Civil Engineering would have developed unique skills and knowledge to apply to urban and infrastructure developments, environmental protection, water resource and energy conservation.
>
> Students will acquire core civil engineering skills in the areas of structural, geotechnical, transportation and hydraulic engineering, sustainability, environmental processes and project management. Students will also acquire generic skills in communication, teamwork, problem solving skills, design and innovation in civil engineering.
>
> Within the degree, students will have the opportunity to choose specialisation in structural, transport, geotechnical, energy, business systems, water resources and project management, and to participate in internship programs, industry-based projects and supervised research."

For the Master's degree programme **Digital Infrastructure Engineering**, the University has presented the following profile on the programme's website:

> "The professional Master of Digital Infrastructure Engineering is an (internationally accredited) (…) degree that provides students with the necessary knowledge and skills to enter the international workplace where engineering and information technology meet: Graduates are skilled in connecting the physical world with digital world principles, and in applying these skills to complex, open-ended engineering tasks and problems.
>
> Within the course, students will learn how to capture built and natural environments in digital representations and how to accurately position in these environments using satellites, robots, laser scanning, or radio-based methods. They will study how to sense these environments and integrate semantic data into consistent multi-scale models. They will apply statistical and machine learning for data analysis for pattern recognition, prediction, and simulation-based engineering. They will also gain knowledge on how to visualise and communicate spatial and temporal information, and to conceptualise and use the digital models of the physical world in an ethical manner. They apply this knowledge for interaction between this information and the physical world in digital twins, resource-aware management, resilient communities, and simulation-based engineering, supporting a more sustainable and liveable future."

For the Master's degree programme **Environmental Engineering**, the University has presented the following profile on the programme's website:

> "The Master of Environmental Engineering is an entry-to-practice degree that provides students with the necessary knowledge and skills to enter the international workplace as environmental engineers.
>
> Students in the Master of Environmental Engineering learn from staff active in research area specialisations such as hydrology, irrigation, water management, waste management, remote sensing, and energy systems, which will enable graduates to create sustainable solutions to environmental challenges. The Master of Environmental Engineering is a three-year full-time program (which can also be taken part-time) consisting of 300 credit points, with a strong focus on sustainability and project management. Students may also choose to undertake specialisations in areas including water systems, energy system and earth observation. The degree culminates in a capstone design and / or research experience. Students have the opportunity to participate in overseas study, industry-based projects and supervised research."

C Expert Report for the ASIIN Seal[4]

1. The Degree Programmes: Concept, content & implementation

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

Evidence:

- Self-Assessment Report (SAR) incl. Objective-Module Matrices
- Study Handbooks on University Website (here, here, here, here)
- Course Level Mapping according to Australian Qualification Framework (AQF)
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

Preliminary assessment and analysis of the experts:
Learning objectives (LO) are defined for all study courses under review on both a programme (course learning outcome, CLO) and module (subject's intended learning outcomes, SILO) level.

On the programme level, (C)LOs are delineated publicly accessible in the respective online handbooks, along with the generic skills the programmes seek to impart in their students (e. g. teamwork, problem-solving skills, and a capacity to life-long learning), as well as the attributes graduates of the University and FEIT should expect to have attained (e. g. interdisciplinarity. professionalism, global citizenship). Tabular mappings of linkages between modules and programme CLOs are likewise established in the self-assessment report for all programmes under scrutiny.

Besides the above, the Master of Engineering programs offered by the Faculty of Engineering and Information Technology (FEIT) aim to fulfil and surpass the Stage 1 Competencies of Engineers Australia. All of the above learning outcomes can be found in the appendix.

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

On the module level, learning objectives (CILOs) are defined in the individual entries for each course within the online module handbook. Their aligned with the requirements of the Australian Qualifications Framework (AQF) is outlined in the provided evidence. All in all, the experts attest that SILOs are defined clearly for every subject, and that continuous differentiation between course and subject learning outcomes is maintained.

Asked by the experts to further elaborate on the new programme entitled Architectural Engineering, the course coordinators explain that the programme aims to respond to a particular niche and is hence targeted towards a narrow subset of students, with only a few graduates to date, and eight currently enrolled. The programme is designed to satisfy both the requirements for graduates to register with Engineers Australia and the Australian Institute of Architects.

During the experts' exchanges with industry representatives, the latter especially commend the Faculty of Engineering and Information Technology's graduates' readiness to engage productively with their work environment swiftly after graduation. Likewise, attending alumni confirmed their ability to find employment quickly after graduation as well as an attained continuous learning mindset; tracing this back to the extensive support extended by staff to the students, as well as to industry nights and meetings with potential future employers.

In terms of desirable developments, the industry representatives remarked that there is a strong need to increase the output of engineers; for students to be raised into critical, self-reliant and creative thinkers, and to foster their development of networking skills despite the prominence of remote teaching. Moreover, they suggested that students should use their capstone projects as their "business cards", and commended the possibility of an extended internship in the students' last semester.

On their part, students of the programmes under review express an overall satisfaction with the programmes, their flexibility, the available specialisations, as well as future job perspectives.

Apart from the above, the experts are pleased about the establishment of so-called Industry Advisory Groups (IAGs) for all degree programmes under review, which, as documented in the Faculty's self-assessment report, advise on industry trends and their impact on the educational needs, potential collaborations and funding opportunities, support curriculum reviews within the Faculty. More on this is outlined under criterion 5.

In view of the provided student and industry feedback, the experts gain the impression that the imparted qualification profiles satisfy expectations on all sides, and allow the students to take up employment corresponding to their qualification.

Following their discussions during the audit and the documentation provided by the Faculty, the experts moreover judge that the outlined programme learning objectives of the abovementioned programmes are adequate for the intended levels of academic qualification, satisfy the subject-specific criteria for (SSC) determined by ASIIN's Technical Committees, and align with the requirements of the EUR-ACE® label.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report (SAR)
- Study Handbooks on University Website (here, here, here, here).

Preliminary assessment and analysis of the experts:
The titles of the Master's programmes under review are outlined in the University's self-assessment report and in the online handbook.

Following a review conducted in 2019 and to enhance clarity, the University decided to change the nomenclature of the standalone Master's programmes from "Master of Engineering (*Discipline*)" to "Master of *Discipline* Engineering" from 2022 onward.

In regard to the Master of **Architectural Engineering** programme, the expert group learns during the audit that its dichotomous title aims to reflect the intended balance of the two professions alluded to, in keeping with its Australian accreditation as both an engineering degree and an architectural degree. Concerning the previous Master of Spatial Engineering (before 2022: Master of Engineering (Spatial)), now entitled Master of **Digital Infrastructure Engineering**, the auditors learn that this change – both on a title and content level – has been pursued to reflect the increasing importance of digitalisation in the engineering profession, amongst other supported by the University's newly established D(igital)-Lab (see also Criterion 3.2).

In light of the provided documentation and the exchanges during the audit, the experts confirm that the names of the study programmes under review are appropriate and correspond to the programmes' intended aims and learning outcomes.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report (SAR)
- Study Handbooks on University Website (here, here, here, here)
- Statistical Data on Study Subjects, 2022

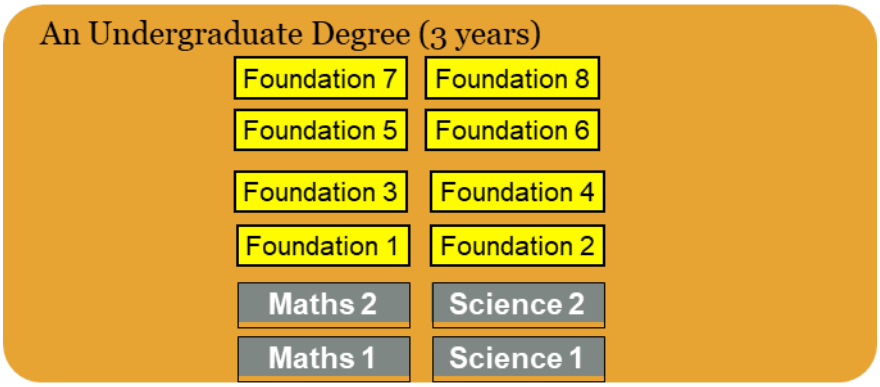
- Curriculum Reviews, 2016 & 2017
- Information Provided on Internships and Student Mobility
- ENGR90033 Internship Review, FEIT, 2022
- Curriculum Review, Graduate Engineering and IT Programs, Teaching and Learning Quality Assurance Committee (TALQAC), University of Melbourne, 2016
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

Preliminary assessment and analysis of the experts:
The curricula, structure and composition of the study programmes under review are presented in the University's SAR and its annex *A2.4 Statistical Data for 2022 Subjects,* and are moreover accessible publicly through in the programmes respective online "Handbooks".

Structure of the Programmes

Master of **Civil Engineering**, Master of **Digital Infrastructure Engineering** and Master of **Environmental Engineering** are hosted at the Department of Infrastructure Engineering, which is part of the School of Electrical, Mechanical and Infrastructure Engineering (EMI) at the University's Faculty of Engineering and Information Technology (FEIT). The Master's programme in **Architectural Engineering** is offered as an interdisciplinary degree in collaboration with the Melbourne School of Design, located at the University's Faculty of Architecture, Building and Planning.

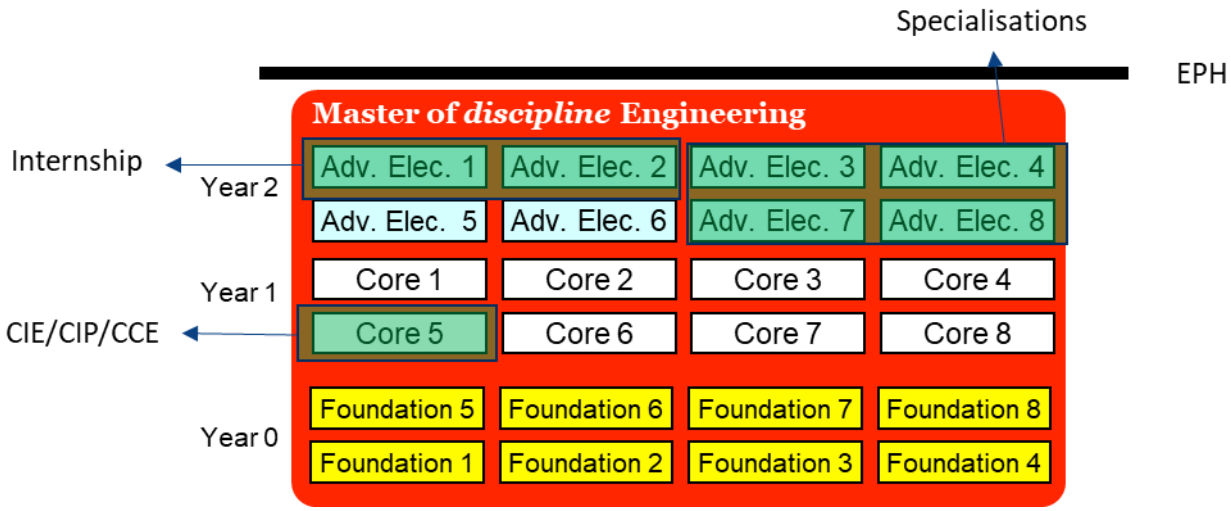
Within the University's "Melbourne Model", students first complete a non-professional, three-year Bachelor of Science programme, as opposed to the usual four-year duration at other Australian universities:



Source: Presentation, Faculty of Engineering and Information Technology (FEIT), University of Melbourne

After this, students are encouraged to pursue a further two-year Master's degree as a professional qualification. The curricula are subdivided into compulsory, selective; as well

as capstone (final) subjects. The overall structure of the Master's programmes' curricula is presented by the University as follows:



Source: Presentation, Faculty of Engineering and Information Technology (FEIT), University of Melbourne

The standard duration of study for Bachelor's graduates of the University of Melbourne – i. e. "pathway students", who are following the Melbourne curriculum – is 2 years (four semesters, i. e. "Year 1" and "Year 2" in the above visualisation); for students of the Ma Architectural Engineering three-and-a-half years (seven semesters).

Students who have obtained their undergraduate studies at other universities (i. e. "lateral entry students") need, depending on their attended undergraduate courses, to complete an additional foundational year (i.e. "Year 0" in the above visualisation) – partially or in full – of courses prior to commencing the Masters' core curricula (Year 1+2). Additional explanations in this regard are provided under Criterion 1.4

Master's students in Civil Engineering, Digital Infrastructure Engineering, and Environmental Engineering can decide to complete their degrees either with our without a specialisation, as listed under *B Characteristics of the Degree Programmes*. Students intending to choose a specialisation for their degree need to complete at least four modules from the respective (e. g. Energy) specialisation electives package.

Each semester has duration of 17 weeks, consisting of 12 teaching weeks, one mid-semester non-teaching week, one week of exam preparation, and three weeks of written examinations.

As a means of fostering skills and attributes such as problem-solving, ethics, communication, and teamwork, students are required to completed one of the modules "Critical Communications for Engineers" (CCE, ENGR90021), Creating Innovative Engineering (CIE, ENGR90034), or Creating Innovative Professionals (CIP, ENGR90039) in

their third semester; the latter two courses regularly involving joint projects with business or industry partners. The experts however observe that neither the modules CIE nor CIP appear to be available to students of the Master's in Architectural Engineering.

In view of the above and the following course-specific illustrations, the expert group confirms that modules within the given study programmes embody sensible teaching and learning units, respectively imparting distinct clusters of knowledge and competencies. Through both the variety of offered programmes as well as their elective components and specialisations, students are able to pursue individual pathways. This being said, the experts note that the number of subjects students are able to choose from in the respective specialisation electives packages varies.

Ma Civil Engineering, Ma Digital Infrastructure Engineering, Ma Environmental Engineering

For lateral entry students in need of attending the preceding foundational year, the first two semesters include Bachelor's level courses to ensure the foundational competencies required:

Programme	Focus	Foundation Year (Bachelor's Level) Subjects (Examples)
Ma Civil Engineering	Mathematics, Engineering Fundamentals	MAST20029 Engineering Mathematics, ENGR30002 Fluid Mechanics, ENGR20003 Engineering Materials and Mechanics, CVEN30009 Structural Theory and Design
Ma Digital Infrastructure Engineering	Sustainability, Spatial Analysis	CVEN20001 Sustainable Infrastructure Engineering, GEOM20013 Applying Digital Infrastructure, GEOM20015 Sensing and Measurement, GEOM30014 Integrating Digital Infrastructure
Ma Environmental Engineering	Mathematics, Environmental engineering challenges	ENEN20002 Earth Processes for Engineering, CVEN20001 Sustainable Infrastructure Engineering, ENEN30002 Intro to Sustainable Water Management, MAST20029 Engineering Mathematics, MAST20031 Analysis of Biological Data, ENGR30002 Fluid Mechanics

In the first year of the actual Master's curriculum, students then deepen their subject matter understanding on a Master's level, and commence specialised courses aiming to introduce them to the engineering profession as well as to engineering problem solving:

	Focus	First Year (Master's Level) Subjects (Examples)
Ma CE	Advanced technical subjects, project planning, engineering selective.	CVEN90044 Engineering Site Characterisation, CVEN90048 Transport Systems, CVEN90049 Structural Theory and Design 2, CVEN90050 Geotechnical Engineering, CVEN90051 Civil Hydraulics, CVEN90075 Transport Infrastructure Engineering, CVEN90045 Engineering Project Implementation, ENGR90021 Critical Communications for Engineers, ENGR90034 Creating Innovative Engineering, ENGR90039 Creating Innovative Professionals.

Ma DIE	Spatial data analytics, environmental, and social engineering issues, satellite positioning, laser scanning, photogrammetry, remote sensing, BIM, spatial data visualisation, digital twins.	GEOM90008 Spatial Data Management, GEOM90006 Spatial Data Analytics, GEOM90038 Advanced Imaging, GEOM90005 Remote Sensing, GEOM90033 Positioning Principles and Technologies, CVEN90062 Building Information Modelling, and GEOM90007 Information Visualisation, ENGR90021 Critical Communications for Engineers, ENGR90034 Creating Innovative Engineering.
Ma EE	Environmental monitoring, data analysis, modelling, basin management.	ENEN90038 Engineering Hydrology, GEOM90006 Spatial Data Analytics, ENEN90031 Quantitative Environmental Modelling, ENEN90037 International River Basin Management, ENEN30003 Environmental Systems Modelling and Design, CVEN90051 Civil Hydraulics, ENEN90028 Monitoring Environmental Impacts, ENEN90032 Environmental Analysis Tools.

In the second year of the actual Master's curriculum, students then deepen their subject matter understanding on a Master's level, and commence specialised courses aiming to introduce them to the engineering profession as well as to engineering problem solving:

	Focus	Second Year (Master's Level) Subjects (Examples)
Ma CE	Advanced Core Subjects, Design, Research, Electives.	CVEN90060 Integrated Design, CVEN90058 Construction Engineering, ENGR90033 Internship (optional), Capstone Project + Electives / Specialisation.
Ma DIE	Advanced Core Subjects, Project Management, Ethics, Electives.	CVEN90045 Engineering Project Implementation, COMP90087 The Ethics of Artificial Intelligence, LAWS90203 Science & AI: Legal and Ethical Challenges, ENGR90033 Internship (optional), Capstone Project + Electives / Specialisation.
Ma EE	Advanced Core Subjects, Project Management, Ethics, Electives.	CVEN90045 Engineering Project Implementation, ENEN90005 Environmental Management ISO14000, CVEN90045 Engineering Project Implementation, ENGR90033 Internship (optional), Capstone Project + Electives / Specialisation.

All abovementioned programmes include a capstone project as a final study performance accounting for 25 credits (approx. 13-16 ECTS), spanning the last two semesters. During the audit, the assessing experts learn that the Department's supervising staff aim to ensure that all capstone projects are inspired by actual industry needs. Ideally, capstone projects follow suggestions of industry partners and offer windows for collaboration. This being said, the programme coordinators emphasise that capstone project are first and foremost to be seen as an application-oriented demonstration of the students' obtained learning, and are not intended to be equivalent to a research-oriented master's thesis. Further discussion of the Capstone projects will be provided under Criterion 2.

Moreover, the above programme allows students to conduct a 320-hour internship accounting for 25 credits in their second year of Master's level studies, through which students can obtain with practical experience and opportunities to apply their learning in real-world environments.

In addition to the above, the Master's students in the abovementioned disciplines are required to pass so-called "hurdles", whose completion is documented in an e-portfolio. Besides subject-specific hurdle requirements, this also includes the so-called "Engineering Practice Hurdle" (EPH), which embodies the attainment of relevant industry experience (e. g. through internships) or of employment-relevant skills (e. g. through participation in the "Skills Towards Employment Program (STEP)").

Ma Architectural Engineering

The Master of Architectural Engineering's structure varies significantly from the Master of (Discipline) Engineering programmes due to its targeting of both engineering and architecture gradates. Following a foundation year covering subjects of the respectively other discipline, students then proceed to studying 3 ½ years of predetermined modules.

For students in the Master's of Architectural Engineering, modules in the first two semesters – depending on their undergraduate backgrounds – include the following:

Coming from…	Complementary Year
Engineering Background	ABPL90284/5 Master of Architecture Studio A/B, ABPL90288/9 Architectural Cultures 1/2, ABPL90286 Construction Methods, ABPL90287Design and Construction
Architectural Background	ENGR90021 Critical Communication For Engineers, CVEN20001 Sustainable Infrastructure Engineering, ENGR30002 Fluid Mechanics, MAST20029 Engineering Mathematics, ENGR20002 Earth Processes for Engineering, ENGR20003 Engineering Materials and Mechanics, CVEN30010 Geotechnical Modelling And Design, CVEN30009 Structural Theory and Design

Students who are neither graduates in engineering nor architecture, yet who can prove sufficient credits in mathematics and science obtained during their Bachelor's, may enter the Master's by completing *both* of the complementary years outlined above, hence prolonging their total expected study duration to 4 ½ years.

In the following years of the actual Master's curriculum, students then deepen their subject matter understanding in engineering and architecture on a Master's level, leading to a qualification allowing for recognition as both a chartered engineer and architect by the pertinent Australian bodies:

Sem.	Core Curriculum – Ma Architectural Engineering
1/2 Year 1	ABPL90142 Master of Architecture Studio C, ABPL90118 Applied Architectural Technology, CVEN90049 Structural Theory and Design 2, ABPL90143 Master of Architecture Studio D, CVEN90045 Engineering Project Implementation, CVEN90051 Structural Theory and Design 2
3/4 Year 2	ABPL90140 Architectural Practice, CVEN90044 Engineering Site Characterisation, CVEN90075 Transport Infrastructure Design, CVEN90050 Geotechnical Engineering, ABPL90115 Master of Architecture Studio E, ABPL90117 Twenty-first Century Architecture, CVEN90058 Construction Engineering

5 Year 3	ABPL90390 Architectural Engineering Thesis, ABPL90424 Introduction to High Performance Design, CVEN90060 Integrated Design - Civil.

The Ma Architectural Engineering include a capstone project as a final study performance accounting for 25 credit points (approx. 13-16 ECTS), spanning the last two semesters.

Content

Content

The curriculum enables students to achieve the intended learning outcomes.

Learning outcomes are defined for each module, which, in total, enable the achievement of the overarching programme objectives.

If an internship is included in the programme, it is well-integrated into the curriculum. The higher education institution assumes responsibility for the quality of the internship in terms of its content and structure. To this end, the university coordinates with the participating companies and supervises the students during the internship.

Based on the provided documentation and the discussions during the audit, the expert group assesses that learning outcomes for each module within the given study programmes have been clearly defined or explained properly, allowing students to understand what they will gain from each module.

They also attest the smooth integration of an internship window in the students' final year of studies, which is expressly welcomed by the industry. As confirmed by students, the University provides support in securing suitable internships, e. g. through lecturer's individual efforts, as well through online resources and student clubs. In connection to this, the experts welcome the thorough SWOT analysis of the Internship Programme undertaken by the University in late 2022, and commended the attention the Faculty invests to promote internships, both credited (curricular) and non-credited (non-curricular) as a safe and insightful experience for both students and industry partners.

Upon further inquiry concerning the subjects of the Ma Architectural Engineering, the expert group learns that – as a consequence of the programme's aim to be recognised by both the professional engineering and architecture associations of Australia – its curriculum is in various regards determined by the respective associations' requirements; explaining components such as "Geotechnical Engineering" or "Fluid Mechanics", which the experts would not have expected in an architecture-related study course otherwise.

Asking about the integration of safety and sustainability aspects in the curricula, the experts are, as an example, pointed toward CVEN90058 Construction Engineering, which also seeks

to address matters of occupational health and safety as well as environmental sustainability issues.

As a central concern, however, the auditors find that – in view of the Melbourne Model's express focus on breadth and flexibility, the described nature of the programme's capstone project, as well as their reading of the provided curricula – there is some uncertainty as to whether the presented programmes live up to expectations reasonably to be applied to Master's-level degree programmes in terms academic depth and qualification.

Before making their final assessment, the experts hence ask the programme coordinators to provide an additional statement, in which they outline how they see the contents of their respective programmes to be appropriately demanding on a Master's level in terms of difficulty, imparting of academic competencies, depth and up-to-dateness of contents; as well as linkage to current research. Moreover, the experts ask for a statement by the Faculty in which way the curricula of Civil and Environmental Engineering integrate the topics of water treatment, advanced wastewater treatment, surface water modelling, sustainable construction practices, and lifecycle management.

Lastly, albeit the accreditation procedure's focus on engineering, the experts would like to be provided with architecture-sided (APBL) course contents of the Ma Architectural Engineering before providing their concluding feedback.

Student Mobility

Based on the provided documentation and confirmed during the discussions with students during the audit, the auditors learn that study abroad opportunities are promoted within the study programmes, and that mobility windows can be integrated without prolonging study timelines, timely planning provided.

While the COVID-19 pandemic has brought an expected slowdown of student mobility numbers, statistics provided from 2019 indicate that destinations abroad within Asia (especially China, Singapore, Japan, in an apparent link to the Faculty's significant, Asian-rooted student body) are of special prominence amongst FEIT students, followed by the USA and Europe.

Students interested in conducting a mobility abroad are supported through Education Abroad Advisers employed at the University's dedicated "Study Overseas" office.

All in all, the experts find that various avenues for student mobility exist for students of the mentioned programmes, both in the form of short- and long-term mobilities.

Periodic Review of the Curriculum

On a macro (i. e. curricular) level, periodic reviews of all curricula offered FEIT are conducted by the University's Teaching and Learning Quality Assurance Committee (TALQAC), with the next review due in late 2023. In comparing the provided results of the 2016 curriculum review and the identified status quo, the expert group finds that the Faculty appears to be responsive to the recommendations made in the course of these reviews, as will be expanded on under criterion 1.6 and criterion 5.

On a course level, feedback is collected through standardised end-of-semester student surveys for every subject, which also include a free text form for students to provide additional comments. As per the programme coordinators, student course feedback is regularly commented on, made available online, and discussed with students of the next class. During the discussion between the auditors and students, the latter however commented that – while some lecturers indeed discuss previous student feedback – this was not consistently the case. The experts hence see space for improvement in this regard.

All in all, however, the experts are content with the provided information concerning the respective programmes' curricular review procedures.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Report
- University Website (here)
- Selection and Admission Policy (MPF1295), University of Melbourne
- Credit, Advanced Standing and Accelerated Entry Policy (MPF1293), University of Melbourne
- Student & Graduate Statistics
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

Preliminary assessment and analysis of the experts:

All aspects pertaining to selection, admission and course recognition are governed by detailed and extensive policies by the University of Melbourne.

Entry into the study subjects under review is possible through a number of pathways, which to various degrees depend on the specific subject. These pathways will be illustrated further below. On a general level, the following basic requirements apply:

- Individuals seeking to enrol into graduate engineering programmes at FEIT are required to have completed a three-year Bachelor's degree in any area of study, provided that they have archived the equivalent of 25 Melbourne (approx. 12 ECTS on the undergraduate level) credits in both mathematics and sciences (the latter subject to course-specific specifications), respectively, during their undergraduate studies.
- Usually, the final average of the obtained degree must be equivalent to a Melbourne score of at least 65%. For graduates of higher education institutions, however, other thresholds may apply.
- Students enrolling in the Masters programmes from courses where English is not the medium of instruction must also fulfil the English language requirements. There are several methods to meet these requirements, which include tests such as IELTS, TOEFL, the Pearson Test of English (Academic), and the Cambridge Certificate of Advanced English (CAE).

Interested individuals can obtain detailed information on the application process and requirements in accordance with their respective pathways through the University's website.

As per the provided enrolment data for 2022, foreign students account for a range of 40% (for Ma Civil Engineering) to 70% (for Ma Digital Infrastructure Engineering, Ma Environmental Engineering) of admitted students. At the same time, enrolment numbers for the subjects under review have dropped substantially from the onset of the COVID-19 pandemic, largely down to the decrease in international students.

According to the University's self-assessment report, the assessment of applications for entry into Master's programme at FEIT involves three individuals: Initially, a professional staff member examines the basic eligibility criteria. Subsequently, a senior engineering academic from the discipline stream assesses the student's performance for discipline-specific ability. Lastly, the Associate Dean (Academic) reviews the application to ensure overall quality. During the audit, the expert group learns that, out of the approximately 2000 engineering-related applications received each year, approx. 800 are admitted.

Ma Civil Engineering, Ma Digital Infrastructure Engineering, Ma Environmental Engineering

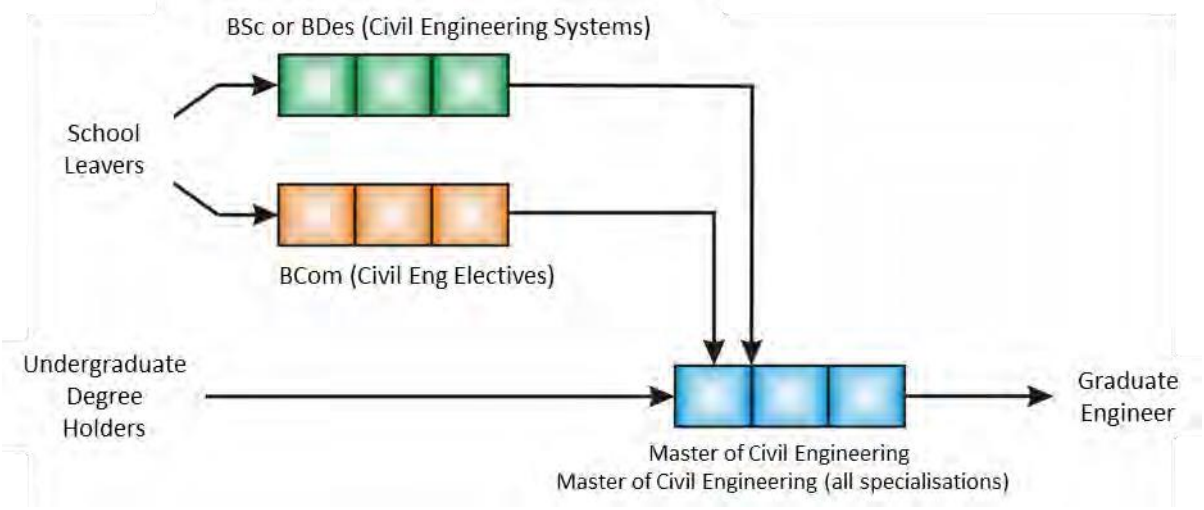
As illustrated above, the Melbourne Model envisages students to complete a three-year non-professional Bachelor's degree, followed by a three-year professional Master's degree.

Students who have obtained their Bachelor's from the University of Melbourne in a subject identical to the envisaged Master's subject are generally able to skip the first, foundational,

Bachelor's-level year of the Master's curriculum, an hence only need to complete two years to obtain their Master's degree. These students are considered "pathway students".

Students from diverging Bachelor's subjects or other universities (subject to the requirements specified above) undergo a thorough checking of their obtained undergraduate qualifications, and are subsequently waived first-year courses whose equivalent they have already completed, hence shortening their studies to the degree possible. These students are considered "lateral entry students".

An example of this process from the University's SAR is displayed below:



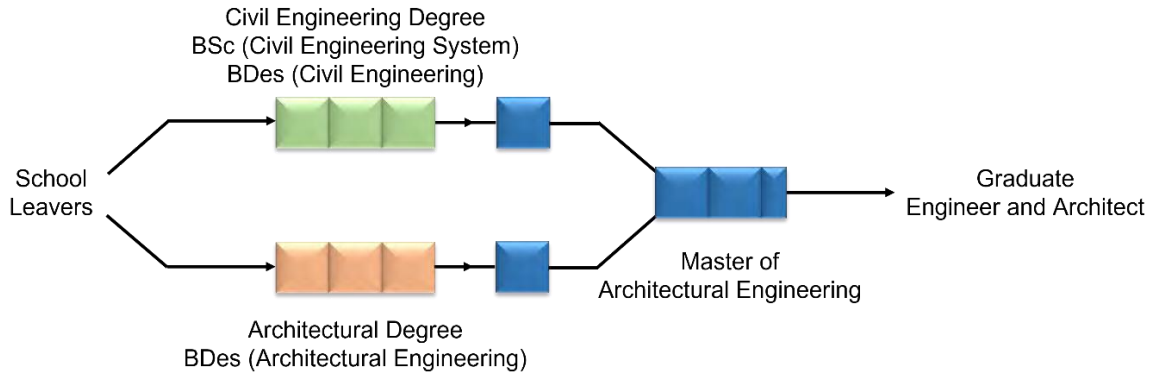
Source: Self-Assessment Report, Faculty of Engineering and Information Technology (FEIT), University of Melbourne. Each rectangle represents one year of studies.

During their audit discussions, the expert group learns that about 75-80% of students admitted to the Masters' are pathway students (i. e. follow the two-year track), while only 20-25% are "lateral entry students" (i.e. follow the three-year track).

Ma Architectural Engineering

Due to its interdisciplinary nature, admission and study pathways for the Ma Architectural Engineering differ from those of the other degree programme under scrutiny outlined above. In view of the curricular combination of engineering and architecture components, a foundational year is required of each entering student, covering the necessary basics of the respective student's complementary discipline. Graduates in architecture complete a foundation year in basic engineering, while graduate in engineering complete a foundation year in architecture. Students who come from neither discipline (but fulfil the general requirements outlined above) need to complete both foundational years first.

This initial year is then followed by a two-and-a-half-year study duration on the Master's level, as is depicted in the visualisation below:



Source: Self-Assessment Report, Faculty of Engineering and Information Technology (FEIT), University of Melbourne. Each rectangle represents one year of studies.

In light of the submitted documentation and further explanations provided during the audit, the auditors find the terms of admission to be comprehensive, binding and transparent.

Criterion 1.5 Workload and Credits

Evidence:

- Self-Assessment Report (SAR)
- Study Handbooks on University Website (here, here, here, here)
- Statistical Data on Study Subjects, 2022
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

Preliminary assessment and analysis of the experts:

Disregarding the foundational year(s) (see again above), the Master's programmes under review consist of 200 credit points; with the exception of the Ma Architectural Engineering, which consists of 250 credit points.

The common number of credits awarded per individual module is 12.5 credit points. Some modules such as the final-year capstone projects or those based on industry or research may however account for 25 points instead, and may be completed within one semester or a full year. As a rule, each semester accounts for 50 credit points, or four subjects.

The University of Melbourne uses a credit system to track student progress and achievement. At the University of Melbourne, one standard 12.5-credit point subject on a Master's level equates to 200 hours of workload, i. e. about 6-8 ECTS. A full semester equates to 800 hours of workload (or about 30 ECTS), accordingly. This includes lectures,

tutorial classes, workshops, laboratory sessions, assignments, report preparation, private reading, homework, private study and examinations.

Upon further inquiry of the auditors during the audit, they learn that, in order to monitor students' course workload, the end-of-course survey comprises a question probing whether the students felt "appropriately challenged." Additionally, grade distribution is considered in the Examination Board to determine whether it is necessary to adapt the difficulty of a given course. Feedback on perceived workload is also gathered from student representatives and graduates during their exit interviews. All in all, the students spoken to during the audit stated the workload to be generally manageable and consistent, with sporadic instances where the workload and credits appear imbalanced.

In view of the above, the experts, while commending the monitoring mechanisms already in place, recommend that a more time-bound assessment of workload – instead of perceived or apparent difficulty – to be implement, to establish a clearer link between the awarded credits and the hours certified through them.

Apart from this, the experts assess that a credit system, which is centred around student workload, is in place. This workload encompasses both contact hours and self-study time. All obligatory elements of the study programme are incorporated into this system. For each individual module, credits are granted in accordance with the associated workload.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Self-Assessment Report (SAR)
- Study Handbooks on University Website (here, here, here, here)
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

Preliminary assessment and analysis of the experts:
Teaching staff in the programmes under review utilise a variety of teaching methods in alignment with the respective modules with student-centred learning in mind.

The primary teaching methods described in the online course handbook encompass lectures involving case studies by academic staff and industry professionals, tutorials to supplement lectures with problem-solving exercises, workshops, presentations, project-based work, fieldwork, laboratory demonstrations, as well as design exercises.

Classes are offered in various "Delivery Modes": Campus-based (in-person), online, as blended synchronous learning (BSL), or as dual-delivery subjects. Blended synchronous

courses enable students to attend either online or in-person at the same time. Dual-delivery course allow students to pursue – in various capacities – class components either online or in person upon prior indication in the University's online course timetable.

In addition to the remote attendance options outlined above, the expert learn that all lectures are recorded and made available to the course participants.

During the audit, lecturers of the given programmes inform the auditors that industry experts are incorporated into subjects as guest lecturers, and that moreover most faculty members maintain connections to the industry and the relevant professional associations.

On the subject of student excursions, the lecturers state that their ability to conduct excursions – while pursued to the degree possible – is limited due to cost and insurance-related aspects.

In terms of consultation of students throughout their study journey, the experts were explained by the lecturers that all students are regularly allocated a mentoring lecturer they can turn to, and that each study specialisation has a coordinator who can be approached for guidance. On their part, students confirm the usually high availability and responsiveness of lecturers both in person and via email.

All in all, the expert group considers the teaching methods and instruments to be suitable to support the students in achieving the intended learning outcomes. In addition, they commend the variety of delivery modes and confirm that the study concept comprises a variety of teaching and learning forms.

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

The experts thank the Faculty of Engineering and Information Technology (FEIT) for the detailed statement and additional capstone projects provided, as well as for the additional course outlines and materials regarding the architecture-sided (APBL) course contents of the Ma Architectural Engineering made available.

Level of Qualification and Alignment with EUR-ACE® Criteria

Upon scrutiny of the abovementioned additional information, the experts conclude that the learning outcomes of the programmes under review correspond to level 7 (Master) of the European Qualification Framework (EQF), and suffice the respective Subject-Specific Criteria of the ASIIN Technical Committees 03 Civil Engineering, Geodesy and Architecture and 11 Geosciences. Furthermore, based on the Faculty's provided documentation, the discussions during the audit, as well as the additional statements and evidence provided, the experts conclude that the degree programmes are aligned with the EUR-ACE®

Framework Standards and Guidelines (EAFSG) for engineering programmes. The EUR-ACE® Framework Standards and Guidelines requires that engineering programmes cover the following seven competence areas: Knowledge and Understanding, Engineering Analysis, Engineering Design, Investigations, Engineering Practice, Making Judgements Communication and Team-working, and Lifelong Learning.

Assessment of Course Workload

In relation to the comments provided to the Faculty, the experts emphasise that their concerns pertain to the *assessment* of the individual course workload, not its documentation. The experts acknowledge the Faculty's existing mechanisms to monitor course workload based on students' perceived level of "intellectual stimulation" and grade distribution, however maintain that a more time-bound measurement of course workload – e. g. through surveying students' perceived weekly time commitment per subject - would be recommendable.

In summary, however, the experts see this criterion as fulfilled.

2. Exams: System, Concept and Organisation

Criterion 2 Exams: System, concept and organisation

Evidence:

- Self-Assessment Report (SAR)
- Study Handbooks on University Website (here, here, here, here)
- Assessment and Results Policy (MPF1326), University of Melbourne
- Academic Progress Review Policy (MPF1291) , University of Melbourne
- End-of Semester Examination Schedule for Semester 2, 2022
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

Preliminary assessment and analysis of the experts:

All aspects pertaining to examinations, including their assessment, criteria, grading, and feedback to be provided concerning these are governed by multiple detailed policies by the University of Melbourne.

All subjects at FEIT involve continuous assessment – i. e. both formative and summative – throughout the term, to allow students track their progress and to enable staff to identify

students facing difficulties. It is not permitted for a subject to employ one means of assessment only.

Generally, two modes of course evaluation are used: Entirely assignment-, project-, or lab-based assessments on the one hand; or an end-of-semester exam paired with either an assignment or a mid-semester test. Feedback on assessments is usually given within three weeks, and plagiarism checks are conducted where sensible using Turnitin.

The types of examinations and relevant expectation for each course specified publicly in the individual online handbooks; along with their weighting towards the overall grade, expected timing during the semester, as well as the learning outcomes to be evaluated by the respective examination. Types of examination may not be changed after the course has commenced.

All Departments hold Examiners' Meetings at the end of each semester before releasing final results. During these meetings, noteworthy aspects of concerning student performance and potential areas for improvement.

Students are awarded numerical grades ranging from 0 to 100 for every subject, final grades are made accessible to the students through the University's electronic academic information system. Should a student fail, the assessment is re-marked by a second examiner. Students who fail a core subject must retake the subject; re-sits or second examinations are only permitted under exceptional circumstances, such as sudden severe illness or family bereavement. For students with an ongoing medical condition, special provisions may be made, such as additional reading/writing time.

End-of-semester exams are centrally scheduled by the University over a 13-day period, ensuring that no student faces more than two written exams in a single day, or more than three exams in a 48-hour span.

The internship module (ENGR90033) is assessed through a series of assignments including an initial reflection, multiple progress reports, a recorded presentation, an oral presentation of no longer than ten minutes as well as a final written reflection.

As a final study performance, all student in the **Ma Civil Engineering**, **Ma Digital Infrastructure Engineering**, and **Ma Environmental Engineering** are required to complete a capstone project comprising 400 hours of workload (25 credits, approx. 13-16 ECTS) in their final year, intended as a demonstration of the students' technical and non-technical learning obtained in the course of their degree programme. The capstone project aims to test the students' ability for design, required research and assessment of viable solutions.

In the **Ma Architectural Engineering**, the final study performance is represented through the module ABPL90390 Architectural Engineering Thesis, equally accounting for 400 hours

of workload (25 credits, approx. 13-16 ECTS). It intends to serve as a demonstration of the students' ability to synthesise architecture and engineering, and was created specifically for the Master's course. In line with the programme's interdisciplinary composition, it is supervised jointly from FEIT and the University's Faculty of Architecture, Building and Planning (ABP).

In the course of their perusal of various capstone projects, the experts judge these as adequate. During their exchanges with the programme coordinators, they were explained that these projects, being specific to the profession-oriented Master of Engineering degrees, are not intended to compare to publication-oriented Master's theses found in Master of Science degrees at the University of Melbourne.

During their exchanges with current degree students, the experts are told repeatedly that – while no grave shortcomings regarding workload and the conduct of examinations are perceived – a better dispersal of exam dates would be desirable, so as to avoid occurring agglomerations of examinations on the same or subsequent days. Moreover, students indicate that – while lecturers frequently do provide feedback on the received course evaluations – this was not case for all teaching staff. Lastly, the students hinted that marking systems for subject were not always clear. The auditors recommend the programme coordinators and lecturers to pay attention to the above points accordingly.

Besides these, however, the experts find that examinations are defined for every module in a transparent manner, that the employed examination types serve to impart the intended learning objectives, and that extensive clear regulations for the conduct of examinations exist. Finally, the auditors confirm that all curricula include a final project at an adequate level. Following the above, the expert group sees this criterion as fulfilled.

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

The experts thank the Faculty of Engineering and Information Technology (FEIT) for the provided statement concerning criterion 2.

Concerning the matters of closing student feedback loops and making assessment/marking criteria transparent, the auditors acknowledge the Faculties comments, however maintain their recommendations in this regard in view of the student feedback during the audit.

In regard to the dispersion of examination dates, the experts acknowledge that optimal dispersion is not always feasible in view of invariably limited resources of time and facilities. Still, in view of the student feedback received, the experts equally uphold their encouragement for the Faculty to look into avenues of improved exam dispersion; moreover so given that the Faculty's stated policy of "no student should have more than 2

exams in 1 day, and more than 3 exams across a 2 day period" may, depending on the examinations in question, not suffice to ensure adequate conditions under which the students can perform in line with their capabilities.

In summary, however, the experts see this criterion as fulfilled.

3. Resources

Criterion 3.1 Staff and Development

Evidence:

- Self-Assessment Report (SAR)
- Staff CVs
- Special Studies Program (SSP) Guidelines and Process Faculty of Engineering and Information Technology
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

Preliminary assessment and analysis of the experts:
Staff in the study programmes under scrutiny consists of teaching staff and professional staff. **Teaching staff** are categorised as Tutor or Senior Tutor, Lecturer, Senior Lecturer, Associate Professor, and Professor, with promotions being partially based on student feedback.

FEIT currently employs about 270 Teaching and Research (T&R) and Education Specialist permanent staff (in 2018: 180), as well as 266 fixed-term (or "casual") staff members (in 2018: 250). Teaching and Research staff are expected to teach 2 to 2½ subjects per year, while Education Specialist staff are expected to teach up to 4 subjects per year. Permanent staff (T&R and Education Specialists) account for the bulk of FEIT's teaching activities, however a considerable amount is also fulfilled by fixed-term staff.

During the audit, the Faculty explained that moving away from casual toward continuing staff was a target. Moreover, lecturers confirmed to handle one to two subjects per semester, and that workload concessions are granted for staff with additional duties or engagements. At the same time, the lecturers highlight that a significant amount of additional time investment goes toward student engagement and answering inquiries.

Following various efforts within the last years, the percentage of female staff at FEIT has increased from 21% in 2018 to 25% in 2022. Staff-student ratio has improved both due to the increase in staff as well as the post-COVID decrease in students.

The University's **professional staff** composition has recently been restructured and encompasses areas such as Operations Management, Academic Programme support, Student Enrichment (e.g. mobility, industry placements), Future Students (student recruitment and admissions handling) facility management as well occupational health and safety, Human Resources, Marketing and Communications, research Services, as well as IT services. FEIT employs more than 80 staff in the above areas; excluding IT services, which are administered centrally by the University.

FEIT offers various continuous teacher training programmes to its staff facilitated by the University's Centre for the Study of Higher Education, such as the Melbourne Teaching Certificate (MTC) and the Graduate Certificate in University Teaching (GCUT).

The MTC is a semester-long programme that seeks to provide teaching staff with comprehensive understanding of the specific teaching environment at the University of Melbourne as well as the wider Australian higher education context. It aims to encourage reflection on effective teaching, learning, and assessment principles in higher education.

The GCUT is a part-time programme; usually across multiple semesters, targeting staff who seek to build upon and enhance their existing expertise in university teaching. The course integrates research-informed theoretical seminars with practical activities including peer review of teaching and personalised projects.

Besides the above, FEIT has set up a so-called Teaching and Learning Laboratory (TLL) in 2021, which aims to support the professional development of its academic staff, e.g. in regard to topics such as curriculum design, the usage of education technology and AI in education, project-based learning, or gender inclusion. Training is delivered through a series of seminars and workshops seeking to foster evidence-supported best practice.

In the course of their discussions with FEIT staff during the audit, the auditors were moreover impressed to learn about the Faculty's Special Studies Program (SSP), which allows academic staff meeting a number of requirements to be granted a paid six-month leave including additional financial support, with the aim of advancing individual as well as strategic objectives of the Faculty relating to research, teaching, innovation or collaboration.

In view of the above, the expert group comes to the conclusion that the composition and qualifications of the teaching staff are appropriate to successfully implement the degree programmes under review; and that opportunities for continued professional and didactic

growth are available. Moreover, the auditors commend the positive developments relating to staff capacities since the previous accreditations in 2011 and 2017; as well as the high level of engagement of the Faculty's teaching staff not only displayed during the audit exchanges, but as also confirmed by students and alumni during their respective discussions.

Criterion 3.2 Funds and equipment

Evidence:

- Self-Assessment Report
- Visitation of participating institutes and laboratories during the audit
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

Preliminary assessment and analysis of the experts:

As per the University's self-assessment report, the financial resources of the Faculty mainly stem from its teaching and learning activities (i.e. tuition fees), followed by income generated from research and other sources.

This income is utilised to cover staff expenses, along with university charges related to facilities (i. e. spaces, library, information technology, property and buildings) as well as services (e.g. student services, marketing, recruitment and admissions).

Within the last years, the Faculty has invested significantly in infrastructure to enhance its teaching and research activities, including laboratories and, especially, FEIT's presence at the Melbourne Connect hub, building at which the audit was hosted. The Faculty moreover maintains presences at other locations, is scheduled to open a new campus in 2025.

Melbourne Connect. Source: University of Melbourne.

Lecture halls at FEIT's various campuses are equipped with modern audio-visual facilities, allowing for blended synchronous learning and the automated recording and upload of lectures. Furthermore, the Faculty mains an array of laboratories for research and teaching activities of its various Schools and Departments, collaborative learning spaces

Laboratories, FEIT, University of Melbourne. Source: ASIIN.

Besides the above, the experts welcomed the visitation of the Faculty's "Telstra Creator Space" as well as the D(igital)-Lab. The creator space, opened in 2021, is an accessible fabrication lab situated at the University's Melbourne Connect hub, which is open to both FEIT staff and students. Following mandatory training, students can access a multitude of tools, laser cutters, 3D printers to encourage innovative thinking and entrepreneurial thinking, as well as to provide a space for industry collaboration.

D-Lab (left), Telstra Creator Space (right), University of Melbourne. Source: ASIIN.

As presented to the auditors, the University's D(igital)-Lab serves to support the interleaving of advancements in the field of digitalisation within the Faculty's teaching, research, and industry collaborations with regards to e. g. simulation, monitoring, and digital twins.

All students have access to the University of Melbourne library system, which includes over 47.000 books and 14.100 volumes of international engineering journals, numerous subscriptions, as well as copies of crucial textbooks. Students can access the library's electronic resource system, which bundles access to databases such as SciFinder Scholar, ScienceDirect, Web of Science, ENGINE, Proquest, Compendex Web, SAI Global, Kluwer Online Journals, and Knovel.

In terms of IT capacities, the experts moreover learn during the audit that staff can access high-capacity, cloud-based processing and data storage services. From the students side, sporadic capacity limitations when accessing software through the Citrix-based remote access were reported. The experts recommend the Faculty to look into the latter matter, also in continuation of the corresponding recommendation provided during the previous accreditation in 2017.

In view of the above, however, the experts all in all judge funding for the facilitation of the programmes under review to be sufficiently secured, and commend the modern, future-oriented facilities available to the students.

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

The experts thank the Faculty of Engineering and Information Technology (FEIT) for the provided statement concerning criterion 3.2 and their acknowledgement of the mentioned IT-related limitations. In view of this, the experts maintain their abovementioned recommendation.

In summary, the experts see this criterion as fulfilled.

4. Transparency and documentation

Criterion 4.1 Module descriptions

Evidence:

- Self-Assessment Report (SAR)
- Study Handbooks on University Website (here, here, here, here)
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

Preliminary assessment and analysis of the experts:

The module handbooks provided for all Master's programmes under review as provided in the University's online handbook are found to contain almost all of the required information, and to be presented in a visually clear format.

This being said, the experts observe that a large number of module descriptions apparently do not outline any »Learning and Teaching Methods« (under "Further Information" / "Subject Notes" in the individual course entries within the online handbook):

ABPL90041, ABPL90064, ABPL90090, ABPL90115, ABPL90117, ABPL90118, ABPL90130, ABPL90131, ABPL90140, ABPL90142, ABPL90143, ABPL90246, ABPL90284, ABPL90285, ABPL90286, ABPL90287, ABPL90288, ABPL90289, ABPL90290, ABPL90292, ABPL90293, ABPL90312, ABPL90313, ABPL90324, ABPL90335, ABPL90390, ABPL90424, ATOC90002, AGRI30045, BUSA90473, BUSA90485, COMP90074, COMP90086, COMP90087, CVEN20001, CVEN30011, CVEN90051, CVEN90058, CVEN90060, CVEN90061, CVEN90062, CVEN90063, CVEN90066, CVEN90068, CVEN90069, CVEN90071, CVEN90073, CVEN90074, CVEN90075, ELEN90088, ELEN90093, ENEN30002, ENEN30003, ENEN90037, ENEN90038, ENEN90039, ENEN90040, ENGM90011, ENGM90012, ENGR20004, ENGR20005, ENGR90033, ENGR90034, ENGR90036, ENGR90037, ENGR90038, ENGR90039, EVSC90025, EVSC90033, GEOG90003, GEOG90019, GEOG90020, GEOM30014, GEOM90008, GEOM90045, LAWS90203, MAST20029, MAST20031, MCEN90032, MGMT90225, PLAN90003.

The auditors ask the Faculty to look into this, and to ensure that teaching methods are accessible publicly for the abovementioned courses, as far as these course descriptions are within the responsibility of the Faculties offering the study programmes under review here.

In view of the above, the experts judge the criterion to be partially fulfilled.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Report (SAR)
- Sample Diploma Supplement for each degree programme

Preliminary assessment and analysis of the experts:

The auditors confirm that the students of all Master's degree programmes under review are awarded a Diploma ("testamur"), Transcript of Records, as well as a Diploma Supplement upon graduation. The Diploma Supplement is embodied through the Australian Higher Education Graduation Statement (AHEGS), which contains all necessary information about the degree programme, including awards (extracurricular and co-curricular) as well information on the Australian Higher Education System and Qualifications Framework. The academic transcript lists all the courses that the graduate has completed, the achieved credits, grades, and cumulative GPA, and mentions the seminar titles.

While the experts note that the inclusion of more extensive information concerning the graduates' profiles and achieved learning outcomes in the Diploma Supplement (i. e. the AHEGS) would be desirable, they understand that this document is determined by

Government regulations, as was already determined in the previous accreditation, and hence cannot be modified at will.

The criterion is thus considered fulfilled.

Criterion 4.3 Relevant rules.

Evidence:

- Self-Assessment Report (SAR)
- University of Melbourne Policy Library Website (here)

Preliminary assessment and analysis of the experts:
As outlined in the Faculty's self-assessment report, the University of Melbourne's policies and regulations are documented through an extensive library of detailed documents, some of which are listed in the following:

- Academic Freedom of Expression Policy (MPF1224)
- Academic Progress Review Policy (Coursework) (MPF1291)
- Assessment and Results Policy (MPF1326)
- Courses, Subjects, Awards and Programs Policy (MPF1327)
- Credit, Advanced Standing and Accelerated Entry Policy (MPF1293)
- Enrolment and Timetabling Policy (MPF1294)
- Establishment and Award of Student Awards Policy (MPF1062)
- Selection and Admission Policy (MPF1295)
- Student Academic Integrity Policy (MPF1310)
- Student Appeals Policy (MPF1323)
- Student Complaints and Grievances Policy (MPF1066)
- Student Conduct Policy (MPF1324)
- Student Loans, Fees, and Charges Policy (MPF1325)
- Supervisor Eligibility and Registration Policy (MPF1322)

In view of the above, the auditors confirm that the rights and duties of both the University and the students are defined clearly and bindingly. All rules and regulations are published on the University's website and hence available to all relevant stakeholders.

The criterion is hence fulfilled.

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

The experts thank the Faculty of Engineering and Information Technology (FEIT) for the provided statement concerning criterion 4.1.

While the experts have no intention of stifling flexibility and innovation in teaching, they nevertheless note that students and other interested stakeholders need to be able to have access to this information, or at least must not be presented with no information at all in this regard. Accordingly, the aspect of teaching methodology must be documented in the relevant module descriptions as a mandatory formal requirement.

In conclusion, the experts see this criterion as partially fulfilled.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report (SAR)
- Sample Diploma Supplement for each degree programme
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

Preliminary assessment and analysis of the experts:
At the University of Melbourne, quality assurance (QA) processes are implemented at multiple levels, including the University, School, Department, and Subject levels.

All study programmes are regularly reviewed by the Teaching and Learning Quality Assurance Committee (TALQAC). The last comprehensive curriculum review of the engineering and IT programmes offered at the Faculty of Engineering and Information Technology was undertaken in 2016. The next curriculum review is scheduled for late 2023.

Major changes to any given course such as to its learning outcomes, assessment, or timing of offering needs to be approved by the University's Academic Program Committee.

Students are asked to provide feedback on each of their attended courses through a standardised course evaluation survey ("End of Subject Survey (ESS)"). As explained to the experts during the audit and outlined under criterion 1.3, lecturers are asked to discuss the received feedback and any action taken as a result with students of the next class.

Aside the above, students can report feedback or concerns about their subjects as well during the semester through the Staff-Student Liaison Committees. Furthermore, the committee is tasked with the monitoring of subject delivery, relevance of curricula, course prerequisites and student workload.

To foster industry the integration of industry perspectives, FEIT has established Industry Advisory Groups (IAGs) for all Master of Engineering degrees, comprised of a broad spectrum of industry representatives. Through the IAGs, the University invites feedback on course design, curriculum development, guest lecture presentations, as well as real-world case studies, industry-based projects, and site visit opportunities.

Apart from these described internal quality assurance mechanisms, the Faculty also seeks recurring external accreditation through pertinent national and international subject-relevant institutions and labels, such as the Australian Institute of Architects, the Architects Registration Board of Victoria, the Commonwealth Association of Architects, the Royal Institution of Chartered Surveyors, Engineers Australia, ASIIN, and the EUR-ACE® label.

In summary, the expert group assesses that the study programmes undergo regular internal and external quality assurance processes involving all relevant stakeholders.

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

In the absence of further comments regarding criterion 5 in the Faculty's provided statement, the auditors maintain their observations outlined above.

In summary, the experts see this criterion as 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:

D 1. An statement by the Faculty of Engineering and Information Technology, outlining how the study programmes under review (**Ma Architectural Engineering, Ma Civil Engineering, Ma Environmental Engineering, Ma Digital Infrastructure Engineering**) satisfy expectations appropriate on a Master's level in terms of difficulty, imparting of academic competencies, depth and up-to-dateness of contents; as well as linkage to current research.

D 2. A statement by the Faculty outlining in which ways the curricula of **Civil and Environmental Engineering** integrate the topics of advanced wastewater treatment, surface water modelling, sustainable construction practices, and lifecycle management.

D 3. Albeit the accreditation procedure's focus on engineering, the experts would like to be provided with architecture-sided (APBL) course contents of the **Ma Architectural Engineering** before providing their concluding feedback.

E Comment of the Higher Education Institution (31.08.2023)

The institution provided the following additional documents

- Detailed outline of architecture-sided (APBL) modules in the **Ma Architectural Engineering**.
- Sample of architecture-sided (APBL) course contents in the **Ma Architectural Engineering.**

as well as the following detailed statement:

„**D 1**

A statement by the Faculty of Engineering and Information Technology, outlining how the study programmes under review (Ma Architectural Engineering, Ma Civil Engineering, Ma Environmental Engineering, Ma Digital Infrastructure Engineering) satisfy expectations appropriate on a Master's level in terms of difficulty, imparting of academic competencies, depth and up-to-dateness of contents; as well as linkage to current research.

Before we provide specific respond to this question, we would like to point out that all our programs have been accredited by ASIIN with the EUR-ACE ("European Accredited Engineer") professional quality label since 2011. Our curriculum have been assessed by two independent ASIIN panels to be at AQF (Australian Qualifying Framework) level 9 (which is equivalent to EQF (European Qualifications Framework) level 7 according to the Industry Qualifications Accreditation International) since 2011. The level of difficulty, academic competency and depth of all our subjects/modules have pretty much remain the same. Granted, some content has been updated following feedback from our Industry Advisory Groups, but these changes were made with rigor and care that maintains our subjects/modules to deliver knowledge consistent with AQF level 9.

We also would like to reiterate that the 300 points / 3-year Master of *discipline* Engineering courses consist of one year of undergraduate subjects – allowing lateral students to catch up with the fundamentals – and then consists of 200 points of master level subjects (comparable to the Bologna model expecting a 2-year master program). These 200 points are strictly limited to "Level 9" in the Australian Qualifications Framework by TEQSA, the Tertiary Education Quality and Standards Agency of the Australian Government. The AQF Level 9 criteria[5] are as follows:

> **Summary**
>
> Graduates at this level will have specialised knowledge and skills for research, and/or professional practice and/or further learning.
>
> **Knowledge**
>
> Graduates at this level will have advanced and integrated understanding of a complex body of knowledge in one or more disciplines or areas of practice.
>
> **Skills**
>
> Graduates at this level will have expert, specialised cognitive and technical skills in a body of knowledge or practice to independently:
>
> - analyse critically, reflect on and synthesise complex information, problems, concepts and theories
> - research and apply established theories to a body of knowledge or practice
> - interpret and transmit knowledge, skills and ideas to specialist and non-specialist audiences
>
> **Application of knowledge and skills**
>
> Graduates at this level will apply knowledge and skills to demonstrate autonomy, expert judgement, adaptability and responsibility as a practitioner or learner.

The Industry Qualifications Accreditation International[6] maps AQF Level 9 to European Qualifications Framework (EQF) Level 7 – professional level[7].

In contrast, our undergraduate subjects are labelled Level 2 ("Graduates at this level will have knowledge and skills for work in a defined context and/or further learning" – second-year undergraduate level) and Level 3 ("Graduates at this level will have theoretical and

[5] https://www.aqf.edu.au/framework/aqf-levels
[6] https://iqa-international.com/
[7] https://iqa-international.com/wp-content/uploads/2019/08/International-Qualification-Framework-Mapping.pdf

practical knowledge and skills for work and/or further learning." – third-year undergraduate level).

Students in the Master of *discipline* Engineering are either:

- coming through our undergraduate programs, where they would have taken the 100 points undergraduate subjects and do get credit for their first year of the three-year master program;
- coming in by lateral entry (from elsewhere), where they are individually assessed for credit towards the 100 points undergraduate subjects – their program is anything between 3 years long (no credit) and 2 years (credit for all 100 points of undergraduate subjects in the Master).

This way, all students enrolled in the second and third year of the Master of *discipline* Engineering have the same foundational knowledge. Accordingly, the second-year subjects in the Master of *discipline* Engineering can go deep into their respective discipline knowledge. Further, the third-year subjects in the Master of *discipline* Engineering build on the second-year subjects, and either go deeper into a specialization, eventually bringing all the knowledge together to conduct research or solutions to complex engineering problems in the form of the capstone subject (ENGR90037/38).

So far, this response is generic across all Master of *discipline* Engineering.

We have also asked the course coordinators of the four Master of *discipline* Engineering under Panel A (Master of Architectural Engineering, Master of Civil Engineering, Master of Digital Infrastructure Engineering and Master of Environmental Engineering) to address the request specifically for their programs.

Master of Architectural Engineering:

The Master of Architectural Engineering shares similar engineering subjects with the Master of Civil Engineering. Hence the comments below for the Master of Civil Engineering will also apply for the Master of Architectural Engineering. In addition, further information about some of the architecture subjects that contribute to the Master of Architectural Engineering can be found in the accompanying document (see page 6 onwards of the accompanying document).

Master of Civil Engineering:

In addition to the two slots for the required capstone *research* project (*ENGR90037 Engineering Capstone Project Part 1* and *ENGR90038 Engineering Capstone Project Part 2*) the Master of Civil Engineering has also an additional *professional design* capstone subject

CVEN90060 Integrated Design – Civil. The other eight core subjects at Level 9 in Master of Civil Engineering are:

- CVEN90075 Transport Infrastructure Design
- CVEN90044 Engineering Site Characterisation
- CVEN90049 Structural Theory and Design 2
- CVEN90050 Geotechnical Engineering
- CVEN90045 Engineering Project Implementation
- CVEN90051 Civil Hydraulics
- CVEN90058 Construction Engineering
- CVEN90048 Transport Systems

These eight subjects are all AQF Level 9 subjects according to TEQSA criteria, such that students are taught, trained, and assessed for specialised skills for research, and/or professional practice, and/or further learning.

These core subjects are based on up-to-date professional practice and ensure that students are equipped with professional knowledge and skills required at Level 9. They are drawing directly from both professional practice and current research (as coordinators of all Level 9 subjects are required to be at the PhD level with combined Research/Teaching appointments).

In addition, the Master of Civil Engineering has four electives that deepen the knowledge and in some subjects link very effectively to current research and industry practice. The electives are grouped into seven bundles (specialisations) for the Master of Civil Engineering (Structural, Geotechnical, Transport, Water Resources, Business, Energy, and Project Management). Students can either choose the bundle or pick freely from the electives across all specialisations. Students taking a bundle would get advanced master-level skills and deep knowledge in one specialised area of interest.

For example, in the Structural specialisation, CVEN90026 Extreme Loading of Structures and CVEN90017 Earthquake Resistant Design of Buildings are examples of subjects that are informed by current research and developed because of the research strengths of the group and continually updated to reflect current research. In the Transport specialisation, CVEN90063 Transport System Modelling equips our students with advanced modelling skills, database programming and procedural algorithms drawn directly from research and used immediately in real-world problems. Similar is true for most elective subjects offered at the Masters AQF Level 9.

Master of Digital Infrastructure Engineering:

Core digital infrastructure engineering subjects of Year 2 of the Master of Digital Infrastructure Engineering are:

- GEOM90008 Spatial Data Management
- GEOM90005 Remote Sensing
- GEOM90038 Advanced Imaging
- GEOM90033 Positioning Principles and Technologies
- GEOM90006 Spatial Data Analytics
- GEOM90007 Information Visualisation
- CVEN90062 Building Information Modelling

These core subjects draw directly from both professional practice and current research, and would not be taught in an undergraduate digital infrastructure major in this form. These subjects are built upon the foundational knowledge of the first-year subjects (Levels 2 and 3) – which students have completed in their prior studies. They provide a deep, professional knowledge and skill set on the capture, modelling, management, analysis, and communication of geospatial and spatiotemporal data.

Based on this second year, several third-year subjects build on this core body of professional knowledge: On one hand, the capstone (research) project, and on the other hand the four elective subjects.

It is the elective subjects where students (in this degree) learn to create an impact to real world challenges. The elective subjects (potentially bundled in specialisations) challenge students to translate and apply their core knowledge in geospatial engineering and IT to application domains of digital infrastructure engineering. This structure will ensure the advancement of knowledge and skills into professional skills, considering deep academic competencies and up-to-dateness of the content.

Master of Environmental Engineering

Core environmental engineering subjects of Year 2 and Year 3 of the masters:

- CVEN90051 Civil Hydraulics
- ENEN90031 Quantitative Environmental Modelling
- ENEN90037 International River Basin Management
- GEOM90006 Spatial Data Analytics
- ENEN90028 Monitoring Environmental Impacts
- ENEN90032 Environmental Analysis Tools
- ENEN90038 Engineering Hydrology

Four of the above subjects, *Quantitative Environmental Modelling (ENEN90031)*, *International River Basin Management (ENEN90037)*, *Spatial Data Analytics (GEOM90006)*, and *Environmental Analysis Tools (ENEN90032)*, would not normally be taught in an undergraduate Environmental Engineering degree. The *International River Basin Management (ENEN90037)* subject is delivered jointly with the top Chinese university, Tsinghua University, where the subject is for Master and PhD students. Lectures in the subject are delivered online from the two universities, followed by a one-week joint field trip each year alternately in Australia and China.

Two of the above subjects, *Monitoring Environmental Impacts (ENEN90028)* and *Engineering Hydrology (ENEN90038)*, are at an advanced level, as reflected in the Intended Learning Outcomes and Assessment (see handbook for details).

The remaining two subjects, *Civil Hydraulics (CVEN90051)* and *Environmental Systems Modelling & Design*, are foundation subjects for the master's degree.

As an example of up-to-dateness of the content, Python coding is integrated in *Quantitative Environmental Modelling (ENEN90031)*, *Spatial Data Analytics (GEOM90006)*, *Environmental Analysis Tools (ENEN90032)* and *Engineering Hydrology (ENEN90038)*. As examples of linkages to current research, *Quantitative Environmental Modelling (ENEN90031)* and *Engineering Hydrology (ENEN90038)* learn and apply hydrological models developed by the research group, and *Monitoring Environmental Impacts (ENEN90028)* connect with the Murray-Darling Basin environmental monitoring and assessment research project.

D 2

A statement by the Faculty outlining in which ways the curricula of Civil and Environmental Engineering integrate the topics of advanced wastewater treatment, surface water modelling, sustainable construction practices, and lifecycle management.

As a preamble, the department found lifecycle management so fundamentally important that it introduced a common subject in all three degrees – Civil, Environmental, and Digital Infrastructure Engineering:

- CVEN20001 Sustainable Infrastructure Engineering

This subject brings together concepts around building and constructing sustainably by incorporating the principles of life cycle analysis, circular economy and triple-bottom-line assessments through case studies. This is deliberately designed as a foundational Level 2 subject, and is actually the first subject all our students take. More advanced subjects are able to build on this knowledge.

For Civil Engineering:

The ground for above topics is laid already in two undergraduate (Level 2 and 3) subjects:

- ENEN30003 Environmental Systems Modelling and Design
- ENEN20002 Earth Processes for Engineering

Then, at master level, multiple of the mentioned topics are covered mostly in the specialisation on water resources engineering. However, some of these areas are covered by core subjects. In detail:

With regards to surface water modelling and wastewater treatment:

- CVEN90051 Civil Hydraulics (core)

  Which has the followings as indicative content:

  - River Hydraulics: revision of basic concepts of steady-state open channel flow and extend this with applications in natural river channels, time dependent behaviour and flood hydraulics
  - Coastal Hydraulics: basic wave theory and processes including in the surf zone
  - Sediment Transport and Water Quality: mechanisms and models of particulate and solute transport in rivers and coastal environments.
- CVEN90058 Construction Engineering (core) – Students are tasked with the design of both retention and detention basins for a large earthworks construction project (such as a road bypass). Students use flood frequency estimation models to determine retardation basin volumes, design outfall pipe sizes and design subsequent sediment basin sizing and dimensions to ensure it meets design requirements.
- ENEN90029 Water and Waste Water Management (core in the MC-CIVENG water resources engineering specialisation, and elective in MC-CIVENG) – covering water treatment and wastewater treatment including advanced treatment for wastewater recycling
- EVSC90025 Water Sensitive Urban Design (core in the MC-CIVENG water resources engineering specialisation, and elective in MC-CIVENG) – covering waste water recycling and desalination.

With regards to sustainable construction practice:

- CVEN90058 Construction Engineering (core MC-CIVENG) – covering economic, social and environmental sustainability as applied to construction methods. Sustainable construction practices feature throughout Construction Engineering, but most predominantly in an optioneering assessment for large infrastructure

projects whereby environmental and social sustainability metrics are considered when comparing options in order to recommend a preferred solution.
- CVEN90060 Integrated Design -Civil (core MC-CIVENG) – covering economic, social and environmental sustainability from design perspective

With regards to lifecycle management:

- ENEN90014 Sustainable Buildings (core in the MC-CIVENG energy specialisation, and elective in MC-CIVENG)

For Environmental Engineering:

The mentioned topics are all present in our degree. However, some of these areas are covered by core subjects, while others are covered by electives. More specifically,

Advanced wastewater treatment –

- ENEN90029 Water and Waste Water Management – covers in detail the water treatment and wastewater treatment including advanced treatment for wastewater recycling.

Surface water modelling –

- ENEN90031 Quantitative Environmental Modelling (core) – covers in detail model conceptualisation, parameter calibration, model evaluation, sensitivity and uncertainty analysis. Monthly and daily rainfall-runoff models are used as examples
- ENEN90038 Engineering Hydrology (core) – covers precipitation, evaporation and transpiration, soil water, runoff processes, rainfall-runoff modelling, flood modelling, flood frequency analysis, groundwater and modelling, contaminant transport
- ENEN90039 Advanced Hydrological Solutions – cover river network and catchment delineation using QGIS, rainfall-runoff modelling, SWAT spatially distributed hydrological modelling, HEC-RAS hydrodynamic modelling

Lifecycle management –

- ENEN90006 Solid Wastes to Sustainable Resources – covers material cycle, life cycle assessment
- ENEN90011 Energy Efficiency Technology – covers life cycle energy analysis
- ENEN90014 Sustainable Buildings – covers life cycle analysis
- ENGM90007 Project Management Practices - covers system life cycle

D 3

Albeit the accreditation procedure's focus on engineering, the experts would like to be provided with architecture-sided (APBL) course contents of the Ma Architectural Engineering before providing their concluding feedback.

Please see accompanying document.

In this section, we address some concerns raised by the ASIIN panel in the draft accreditation report sent to us on 17th August 2023.

Criterion 1.3 Curriculum

Page 12 - "…. The experts note that the number of subjects students are able to choose from in the respective specialisation electives pages varies."

We agree that there are inconsistencies in how students complete specialisations across our degree programs. We will be reviewing this situation and will attempt to find a more uniform mechanism across all our degrees as soon as possible.

Criterion 1.5 Workload and Credits

Page 23 – "…recommend that a more time-bound assessment of workload – instead of apparent difficulty – to be implemented, to establish a clearer link between the awarded credits and the hours certified through them."

We are surprised by this comment. The time-bound workload for all our subjects is clearly stated in our handbook. See for example the commitment for *Structural Theory and Design 2 (CVEN90040)* https://handbook.unimelb.edu.au/2023/subjects/cven90049/dates-times reproduce below for the convenience of the reader. The total time commitment is clearly stated. Similar entries can be found for all subjects pertaining to the Master of *discipline* Engineering.

Criterion 2 Exams: System, concept and organisation

Page 26 – "…a better dispersal of exam dates,….feedback on course evaluations….marking systems for subject were not always clear."

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

At the start of semester, it is university policy that staff provide feedback on the previous semesters course evaluation, and what changes have been made in the course. However, we do acknowledge that some staff might not give this feedback. We will work on improving this aspect of our program.

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

Criterion 3.2 Funds and equipment

Page 30 – "…sporadic capacity limitations when accessing software through Citrix-based remote access"

We acknowledge that we have some challenges with our IT systems and will do all we can to improve student access to the software they need in order to complete their degree program.

Criterion 4.1 Module descriptions

Page 31 – "…to ensure that teaching methods are accessible publicly for the abovementioned courses,…"

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

F Summary: Expert recommendations (01.09.2023)

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

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ma Master of Architectural Engineering (MC-ARCHENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Civil Engineering (MC-CIVENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Digital Infrastructure Engineering (MC-DINFENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Environmental Engineering (MC-ENVENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030

Requirements

For all degree programmes

A 1. (ASIIN 4.1) Ensure that **teaching methods are described and accessible** publicly for all subjects, as far as these course descriptions are within the responsibility of the Faculties offering the study programmes under review.

Recommendations

For all degree programmes

E 1. (ASIIN 1.5) It is recommended that a **more time-bound, course-specific assessment of workload** is implemented, to establish a clearer link between the awarded credits and the hourly workload certified through them.

E 2. (ASIIN 2) It is recommended that the Faculty looks into **dispersing exam dates better** to avoid occurring agglomerations of examinations on the same or subsequent days. Moreover, it is recommended that the Faculty **re-emphasises the importance of closing course feedback loops** with the students, and ensures that **assessment/marking criteria are transparent** for course participants.

E 3. (ASIIN 3.2) It is recommended that the Faculty looks into **apparent bottlenecks concerning critical software capacities** and their sufficient remote accessibility.

E 4. (ASIIN 5) It is recommended to develop criteria to measure **how the programmes under review contribute to the fulfilment of the 2025 FEIT aims**.

For the Ma Architectural Engineering

E 5. (ASIIN 1.3) It is recommended to make the **modules Creating Innovative Engineering (CIE, ENGR90034) and Creating Innovative Professionals (CIP, ENGR90039)** available to students of the Master's in Architectural Engineering.

G Comment of the Technical Committees

Technical Committee 03 – Civil Engineering, Geodesy and Architecture (04.09.2023)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure by circulation and follows the assessment of the auditors without any 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 comply with the engineering-specific parts of Subject-Specific Criteria of the Technical Committee 03 – Civil Engineering, Geodesy and Architecture.

The Technical Committee 03 – Civil Engineering, Geodesy and Architecture recommends the award of the seals as follows:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
Ma Master of Architectural Engineering (MC-ARCHENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Civil Engineering (MC-CIVENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Digital Infrastructure Engineering (MC-DINFENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Environmental Engineering (MC-ENVENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030

Technical Committee 11 – Geosciences (14.09.2023)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure by circulation and follows the assessment of the auditors without any 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 comply with the engineering-specific parts of Subject-Specific Criteria of the Technical Committee 11 – Geosciences.

The Technical Committee 11 – Geosciences recommends the award of the seals as follows:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
Ma Master of Architectural Engineering (MC-ARCHENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Civil Engineering (MC-CIVENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Digital Infrastructure Engineering (MC-DINFENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Environmental Engineering (MC-ENVENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030

H Decision of the Accreditation Commission (22.09.2023)

Assessment and analysis for the award of the ASIIN seal:

The AC discusses the procedure and largely follows the suggestions of the experts and the TC 03 (Civil Engineering, Geodesy and Architecture) and 11 (Geosciences). With respect to the original recommendation E4 regarding the programmes' linkages to the 2025 FEIT strategy, however, the AC finds it to be too generic and to be issued without any apparent necessity, and hence decides to discard it. As an editorial change, the AC decided to divide recommendation E2 into two separate recommendations in alignment with the respectively underlying criteria. In the course of the AC's discussion of all clusters reviewed at the University of Melbourne, the Commission moreover finds that the issuance of a Diploma Supplement aside the existing AHEGS is necessary. While the AC understands that the AHEGS itself cannot be changed, it highlights that the pertinent requirement as per ASIIN's criterion 4.2 still needs to be met, including all information listed therein, if necessary through an additional document.

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

The Accreditation Commission finds that the intended learning outcomes of the degree programmes comply with the engineering-specific parts of Subject-Specific Criteria of the Technical Committees 03 and 11.

The Accreditation Commission decides to award the following seals:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
Ma Master of Architectural Engineering (MC-ARCHENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Civil Engineering (MC-CIVENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ma Master of Digital Infrastructure Engineering (MC-DINFENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
Ma Master of Environmental Engineering (MC-ENVENG)	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030

*Subject to the approval of the ENAEE Administrative Council

Requirements

For all degree programmes

A 1. (ASIIN 4.1) Ensure that teaching methods are described and accessible publicly for all subjects, as far as these course descriptions are within the responsibility of the Faculties offering the study programmes under review.

A 2. (ASIIN 4.2) Issue an additional Diploma Supplement that contains detailed information about the educational objectives, intended learning outcomes, the structure and the academic level of the degree programme as well as about the individual performance of the student.

Recommendations

For all degree programmes

E 1. (ASIIN 1.5) It is recommended that a more time-bound, course-specific assessment of workload is implemented, to establish a clearer link between the awarded credits and the hourly workload certified through them.

E 2. (ASIIN 2) It is recommended that the Faculty looks into distributing exam dates better to avoid clustering of exam dates on the same or subsequent days.

E 3. (ASIIN 3.2) It is recommended that the Faculty looks into apparent bottlenecks concerning critical software capacities and their sufficient remote accessibility.

E 4. (ASIIN 5) It is recommended that the Faculty re-emphasises the importance of closing course feedback loops with the students, and ensures that assessment/marking criteria are transparent for course participants.

For the Ma Architectural Engineering

E 5. (ASIIN 1.3) It is recommended to make the modules Creating Innovative Engineering (CIE, ENGR90034) and Creating Innovative Professionals (CIP, ENGR90039) available to students of the Master's in Architectural Engineering.

.

Appendix: Programme Learning Outcomes and Curricula

According to the University's self-assessment report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved:

All programmes: Stage 1 Competencies of Engineers Australia

"**1. KNOWLEDGE AND SKILL BASE**

1.1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.

1.2. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.

1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.

1.4. Discernment of knowledge development and research directions within the engineering discipline.

1.5. Knowledge of engineering design practice and contextual factors impacting the engineering discipline.

1.6. Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline.

2. ENGINEERING APPLICATION ABILITY

2.1. Application of established engineering methods to complex engineering problem solving.

2.2. Fluent application of engineering techniques, tools and resources.

2.3. Application of systematic engineering synthesis and design processes.

2.4. Application of systematic approaches to the conduct and management of engineering projects.

3. PROFESSIONAL AND PERSONAL ATTRIBUTES

3.1. Ethical conduct and professional accountability.

3.2. Effective oral and written communication in professional and lay domains.

3.3. Creative, innovative and pro-active demeanour.

3.4. Professional use and management of information.

3.5. Orderly management of self, and professional conduct.

3.6. Effective team membership and team leadership.

Ma Architectural Engineering

"The Intended Learning Outcomes for the Master of Architectural Engineering are listed below. (…)

CLO 1. Advanced knowledge of the principles of engineering underpinning the provision of infrastructure.

CLO 2. Advanced knowledge of design based on architectural history, theory, and contemporary practice.

CLO 3. Knowledge of current practice contexts, including environmental, technological, regulatory, and project-delivery systems

CLO 4. A knowledge of research and design-research methodologies and methods, including empirical and advanced research methods drawn from the sciences and humanities relevant to the disciplines of architecture and civil engineering.

CLO 5. The cognitive and creative skills to develop and evaluate a design concept that demonstrates the exercise of theoretical reflection, critical choice, imagination, and professional responsibility, through the exploration, testing and refinement of different technical and aesthetic alternatives.

CLO 6. Technical and communication skills to design, evaluate, implement, analyse, theorise about developments that contribute to professional practice or scholarship in the fields of engineering and architecture.

CLO 7. The technical and creative skills to produce output that demonstrates an appreciation of economic factors, environmental issues, social and cultural issues, building systems and materials.

CLO 8. The technical research skills to justify and interpret theoretical propositions, methodologies, conclusions, professional and business decisions to specialist and non- specialist audiences.

CLO 9. The skills to generate design and contractual documentation that clearly conveys information to both specialist and non-specialist audiences and that enables a project to be realised.

CLO 10. Development of skills in research principles and methods relevant to engineering and architecture.

CLO 11. Cognitive, technical, and creative skills to investigate, analyse and synthesise complex information, problems, concepts, and theories and to apply established theories to different bodies of knowledge or practice related to architecture and engineering.

CLO 12. Demonstrate application of knowledge and skills in the fields of engineering and architecture, and an ability to operate effectively across the disciplines.

CLO 13. Use of cross-discipline knowledge to solve problems that span interdisciplinary space in professional practice.

CLO 14. The ability to think strategically at different environmental and urban scales.

CLO 15. The ability to establish and evaluate requirements and priorities in new project situations and contexts.

CLO 16. The ability to work individually and collaboratively to prepare and deliver a project.

CLO 17. The ability to prepare, structure, schedule, evaluate and deliver a substantial research or design research project.

CLO 18. Cognitive skills to demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practice of engineering and architecture."

The following **curriculum** is presented:

YEAR 1 (for students with a prior engineering major)						
Semester 1				*Semester 2*		
ABPL90284	Master of Architecture Studio A	25		ABPL90285	Master of Architecture Studio B	25
ABPL90288	Architectural Cultures 1	12.5		ABPL90287	Design and Construction	12.5
ABPL90286	Construction Methods	12.5		ABPL90289	Architectural Cultures 2	12.5
YEAR 1 (for students with a prior architectural major)						
Semester 1				*Semester 2*		
ENGR90021	Critical Communication For Engineers	12.5		ENGR20002	Earth Processes for Engineering	12.5
CVEN20001	Sustainable Infrastructure Engineering	12.5		ENGR20003	Engineering Materials and Mechanics	12.5
ENGR30002	Fluid Mechanics	12.5		CVEN30010	Geotechnical Modelling And Design	12.5
MAST20029	Engineering Mathematics	12.5		CVEN30009	Structural Theory and Design	
YEAR 2						
Semester 3				*Semester 4*		
ABPL90142	Master of Architecture Studio C	25		ABPL90143	Master of Architecture Studio D	25
ABPL90118	Applied Architectural Technology	12.5		CVEN90045	Engineering Project Implementation	12.5
CVEN90049	Structural Theory and Design 2	12.5		CVEN90051	Structural Theory and Design 2	12.5
YEAR 3						
Semester 5				*Semester 6*		
ABPL90140	Architectural Practice	12.5		ABPL90115	Master of Architecture Studio E	25
CVEN90044	Engineering Site Characterisation	12.5		ABPL90117	Twenty-first Century Architecture	12.5
CVEN90075	Transport Infrastructure Design	12.5		CVEN90058	Construction Engineering	12.5
CVEN90050	Geotechnical Engineering	12.5				
YEAR 4						
Semester 7						
ABPL90390	Architectural Engineering Thesis	25				
ABPL90424	Introduction to High Performance Design	12.5				
CVEN90060	Integrated Design - Civil	12.5				

The curriculum has been colour-coded by the University as follows:

Core Discipline Subject	Elective Discipline Subject
Selective Discipline Subject	Supporting Science Subject
Core Engineering Specialisation Subject	Approved Elective

Ma Civil Engineering

"The Intended Learning Outcomes for the Master of Civil Engineering are:

CLO 1. Demonstrate advanced knowledge and practice in civil engineering fields of mechanics and materials, structural engineering, construction, transport systems, geotechnical engineering, water resources engineering and sustainable infrastructure engineering.

CLO 2. Apply their knowledge to analyse and design civil engineering systems and facilities;

CLO 3. Apply analytical, problem solving and design skills that may be applied in professional practice;

CLO 4. Demonstrate proficiency over established and emerging engineering methods and tools to solve practical engineering problems;

CLO 5. Apply the basic principles underlying the management of physical, human and financial resource;

CLO 6. Undertake a piece of original research either within an industrial setting or in a laboratory, involving development of research questions, method and methodology and the collection of data, its objective analysis and interpretation;

CLO 7. Use the mathematical and computational skills for the solution and theoretical problems in civil engineering professions and for further personal and professional development;

CLO 8. Communicate effectively in verbal and written form that enable them to make a meaningful contribution to the changes facing society;

CLO 9. Converse with important issues relevant to sectors influenced by civil engineering, such as the sustainable design and practice, environmental processes, ethics in engineering, the efficient operation of all infrastructure, the rise of automation and privacy and security in the age of the internet;

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

The following **curriculum** is presented:

YEAR 1					
Semester 1			*Semester 2*		
CVEN20001	Sustainable Infrastructure Engineering	12.5	ENGR20003	Engineering Materials and Mechanics	12.5
ENGR30002	Fluid Mechanics	12.5	CVEN30009	Structural Theory and Design	12.5
MAST20029	Engineering Mathematics	12.5	ENEN20002	Earth Processes for Engineering	12.5
CVEN30008	Engineering Risk Management	12.5	CVEN30010	Geotechnical Modelling and Design	12.5
YEAR 2					
Semester 3			*Semester 4*		
CVEN90049	Structural Theory and Design 2	12.5	CVEN90045	Engineering Project Implementation	12.5
CVEN90044	Engineering Site Characterisation	12.5	CVEN90051	Civil Hydraulics	12.5

CVEN90075	Transport Infrastructure Engineering	12.5	CVEN90048	Transport Systems	12.5
CVEN90050	Geotechnical Engineering	12.5		Engineering Selective	12.5
YEAR 3					
Semester 5			*Semester 6*		
ENGR90037	Engineering Capstone Project Part 1	12.5	ENGR90038	Engineering Capstone Project Part 2	12.5
CVEN90060	Integrated Design	12.5	CVEN90058	Construction Engineering	12.5
	Civil Engineering Elective / Specialisation subject	12.5		Civil Engineering Elective / Specialisation subject	12.5
	Civil Engineering Elective / Specialisation subject	12.5		Civil Engineering Elective / Specialisation subject	12.5

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

Specialisations

Students may choose one of the following specialisations or alternatively, students can complete their degree with "no specialisation". They freely choose four subjects from the list of subjects available in the specialisations. All subjects are 12.5 credit points unless otherwise specified.

Structural:
CVEN90051 Civil Hydraulics is replaced by CVEN90016 Design of Sustainable Structures, and four specialisation subjects: Selectives – choose three of:
CVEN90035 Steel and Composite Structures Design
CVEN90017 Earthquake Resistant Design of Buildings
CVEN90018 Structural Dynamics and Modelling
CVEN90024 High Rise Structures
CVEN90026 Extreme Loading of Structures
and one of:
CVEN90027 Geotechnical Applications
CVEN90051 Civil Hydraulics
CVEN90062 Building Information Modeling
CVEN90071 Offshore Wind Geotechnical Engineering
CVEN90073 Integrated Design Studio
ENEN90014 Sustainable Buildings

Business:
The Engineering Selective is replaced by ENGM90006 Engineering Contracts and Procurement, and four specialisation subjects:
ENGM90011 Economic Analysis for Engineers
ENGM90012 Marketing Management for Engineers
ENGM90013 Strategy Execution for Engineers
ENGM90015 Management and Leadership for Engineers

Energy:
Four specialisation subjects:
ENEN90011 Energy Efficiency Technology
ENEN90014 Sustainable Buildings
ENEN90027 Energy for Sustainable Development
ENEN90033 Solar Energy

Water Resources:
Four specialisation subjects:
EVSC90025 Water Sensitive Urban Design
CVEN90066 Metocean Engineering
ENEN90038 Engineering Hydrology
ENEN90029 Water and Waste Water Management

Project Management:
Four specialisation subjects:
ENGM90007 Project Management Practices
ENGR90026 Engineering Entrepreneurship
ENGM90006 Engineering Contracts and Procurement
ENGM90012 Marketing Management for Engineers

Transport:
Four specialisation subjects:
CVEN90061 Freight Systems
CVEN30011 Smart Transportation
CVEN90063 Transport System Modelling
ABPL90090 Public Transport Network Planning

Geotechnical:
Four specialisation subjects:
CVEN90074 Computational Geotechnical Engineering
CVEN90071 Offshore Wind Geotechnical Engineering
CVEN90027 Geotechnical Applications
and one of:
CVEN90062 Building Information Modelling
CVEN90066 Metocean Engineering
CVEN90026 Extreme Loading of Structures

The curriculum has been colour-coded by the University as follows:

Core Discipline Subject	Elective Discipline Subject
Selective Discipline Subject	Supporting Science Subject
Core Engineering Specialisation Subject	Approved Elective

Ma Digital Infrastructure Engineering

"The Intended Learning Outcomes for the Master of Digital Infrastructure Engineering are:

CLO 1. Apply and further develop a body of knowledge that includes the understanding of recent developments in spatial engineering fundamentals and practice;

CLO 2. Appreciate research principles and methods applicable to a field of work or learning;

CLO 3. Demonstrate the cognitive skills to master theoretical knowledge and to reflect critically on theory and professional practice or scholarship;

CLO 4. Investigate, analyse and synthesise complex information, problems, concepts and theories and apply established theories to different bodies of knowledge or practice;

CLO 5. Generate and evaluate complex ideas concepts at an abstract level;

CLO 6. Justify and interpret theoretical propositions, methodologies, conclusions and professional decisions to specialist and non-specialist audiences;

CLO 7. Summarise the design,evaluation, implementation, analysis, or theory about developments that contribute to professional practice or scholarship;

CLO 8. Use creativity and initiative to new situations in professional practice and/or for further learning;

CLO 9. Demonstrate high level personal autonomy and accountability;

CLO 10. Plan and execute a substantial research-based project, capstone experience and/or piece of scholarship."

The following **curriculum** is presented:

YEAR 1					
Semester 1			*Semester 2*		
CVEN20001	Sustainable Infrastructure Eng	12.5	GEOM20015	Sensing and Measurement	12.5
GEOM20013	Applying Digital Infrastructure	12.5	GEOM30012	Digital Infrastructure Systems Capstone	12.5
CVEN30008	Engineering Risk Analysis	12.5	GEOM30014	Integrating Digital Infrastructure	12.5
GEOM30009	Imaging the Environment	12.5		First Year Selective	12.5
YEAR 2					
Semester 3			*Semester 4*		
GEOM90008	Spatial Data Management	12.5	GEOM90005	Remote Sensing	12.5
GEOM90006	Spatial Data Analytics	12.5	GEOM90033	Positioning Principles and Technologies	12.5
GEOM90038	Advanced Imaging	12.5	CVEN90062	Building Information Modelling	12.5
	Engineering Selective	12.5	GEOM90007	Information Visualisation	12.5
YEAR 3					
Semester 5			*Semester 6*		
	SPECIALISATION SUBJECT 1 or elective	*12.5*		*SPECIALISATION SUBJECT 3 or elective*	12.5
	SPECIALISATION SUBJECT 2 or elective	12.5		SPECIALISATION SUBJECT 4 or elective	12.5
	Third Year Selective	12.5	CVEN90045	Eng Project Implementation	12.5
ENGR90037	Engineering Capstone Project Part 1	12.5	ENGR90038	Engineering Capstone Project Part 2	12.5

Engineering Selective		
ENGR90021	Critical Communication for Engineers	12.5
ENGR90034	Creating Innovative Engineering	12.5
ENGR90039	Creating Innovative Professionals	12.5
Third Year Selective		
COMP90087	The Ethics of Artificial Intelligence	12.5
LAWS90203	Science & AI: Legal and Ethical Challenges	12.5

First Year Selective		
COMP20005	Intro to Numerical Computation in C	12.5
ENGR20005	Numerical Methods in Engineering	12.5

Specialisations

Students may choose one of the following specialisations, or can complete their degree with "no specialisation" by freely choosing four subjects from the list of subjects available in the specialisations. All subjects are 12.5 credit points unless otherwise specified.

Artificial Intelligence:
COMP90038 Algorithms and Complexity
COMP90049 Introduction to Machine Learning
COMP90051 Statistical Machine Learning
and one of:
COMP90054 AI Planning for Autonomy
COMP90086 Computer Vision

Business:
Choose four of:
ENGM90006 Engineering Contracts and Procurement
ENGM90011 Economic Analysis for Engineers
ENGM90012 Marketing Management for Engineers
ENGM90013 Strategy Execution for Engineers
ENGM90015 Management and Leadership for Engineers

Communication Infrastructure:
Choose four of:
ELEN90054 Probability and Random Models
ELEN90057 Communication Systems
ELEN90061 Communication Networks
ELEN90088 System Optimisation & Machine Learning
MCEN90032 Sensor Systems

Construction:
ABPL90292 Construction of Buildings
ABPL90313 Management of Construction
ABPL90324 Materials and Structures
and one of:
ABPL90290 Fundamentals of Built Environment Law
ABPL90293 Steel and Composite Construction Systems
ABPL90312 Cost Management
ABPL90335 Contract Management

Energy:
ENEN90011 Energy Efficiency Technology
ENEN90014 Sustainable Buildings
ENEN90027 Energy for Sustainable Development
ENEN90033 Solar Energy

Industry:
ENGR90026 Engineering Entrepreneurship
ENGR90033 Internship (25 credit points) and one of:
BUSA90473 Business Practicum
BUSA90485 Global Business Practicum
MGMT90225 Business Model Innovation

Information Systems:
ISYS90026 Concepts in Information Systems
ISYS90038 IS Strategy and Governance
ISYS90048 Managing ICT Infrastructure
ISYS90050 IT Project and Change Management

Information Technology:
COMP90007 Internet Technologies
COMP90015 Distributed Systems
COMP90038 Algorithms and Complexity
COMP90074 Web Security

Land:
ABPL90041 Property Law (PG)
GEOM90041 Cadastral Surveying
GEOM90045 Residential Land Development and one of:
ABPL90130 Planning Law & Statutory Planning
GEOG90019 Indigenous Land Management

Mobility:
Choose four of:
ABPL90090 Public Transport Network Planning
CVEN90048 Transport Systems
CVEN90061 Freight Systems
CVEN90063 Transport System Modelling
MCEN90028 Robotics Systems

Smart Cities:
ATOC90002 Climate Science for Decision-Making
ENEN90006 Solid Wastes to Sustainable Resources
EVSC90033 Air Quality Monitoring
GEOG90020 Participatory Risk Management

Sustainable Cities:
ABPL90064 Urban Sustainability and Climate Change
ABPL90131 Strategic Plan Making
ABPL90246 The Economies of Cities and Regions
PLAN90003 City Leadership

Water:
ENEN90029 Water and Waste Water Management
ENEN90031 Quantitative Environmental Modelling
ENEN90032 Environmental Analysis Tools
GEOG90003 Integrated River & Catchment Management

The curriculum has been colour-coded by the University as follows:

Core Discipline Subject	Elective Discipline Subject
Selective Discipline Subject	Supporting Science Subject
Core Engineering Specialisation Subject	Approved Elective

Ma Environmental Engineering

"The Intended Learning Outcomes for the Master of Environmental Engineering are:

CLO 1. develop advanced knowledge of the principles of environmental engineering underpinning sustainable development including systems thinking and critical thinking for environmental issues;

CLO 2. develop research principles and methods in the field of environmental engineering;

CLO 3. demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practice of environmental engineering;

CLO 4. investigate, analyse and synthesise complex information, problems, concepts and theories and to apply established theories to different bodies of knowledge or practice in environmental engineering;

CLO 5. model and evaluate complex ideas and concepts at an abstract level;

CLO 6. develop advanced knowledge in environmental planning, management, compliance and review;

CLO 7. justify and interpret theoretical propositions, methodologies, decisions; and to design, evaluate, implement, analyse developments that contribute to professional practice or scholarship in the field of environmental engineering;

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

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

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

The following **curriculum** is presented:

YEAR 1					
Semester 1			*Semester 2*		
CVEN20001	Sustainable Infrastructure Engineering	12.5	ENEN30001	Environmental Eng Systems Capstone	12.5
ENEN30002	Intro to Sustainable Water Management	12.5	ENEN20002	Earth Processes for Engineering	12.5
ENGR30002	Fluid Mechanics	12.5	MAST20029	Engineering Mathematics	12.5
MAST20031	Analysis of Biological Data	12.5		Engineering Selective	12.5
YEAR 2					
Semester 1			*Semester 2*		
ENEN90038	Engineering Hydrology	12.5	ENEN30003	Environmental Systems Modelling and Design	12.5
GEOM90006	Spatial Data Analytics	12.5	CVEN90051	Civil Hydraulics	12.5
ENEN90031	Quantitative Environmental Modelling	12.5	ENEN90028	Monitoring Environmental Impacts	12.5
ENEN90037	International River Basin Management		ENEN90032	Environmental Analysis Tools	12.5

YEAR 3					
Semester 1			*Semester 2*		
ENG90037	Engineering Capstone Project Part 1	12.5	ENGR90038	Engineering Capstone Project Part 2	12.5
	Third Year Selective	12.5		Environmental Engineering Electives	12.5
	Environmental Engineering Electives	12.5		Environmental Engineering Electives	12.5
	Environmental Engineering Electives	12.5		Environmental Engineering Electives	12.5

Engineering Selective		
ENGR90021	Critical Communication for Engineers	12.5
ENGR90034	Creating Innovative Engineering	12.5
ENGR90039	Creating Innovative Professionals	12.5
Third Year Selective		
ENEN90005	Environmental Management ISO14000	12.5
CVEN90045	Engineering Project Implementation	12.5

Environmental Engineering Electives					
AGRI30045	Applications in Precision Agriculture	12.5	ENEN90039	Advanced Hydrological Solutions	12.5
CVEN90066	Metocean Engineering	12.5	ENEN90040	Water Planning & and Uncertain Future	12.5
CVEN90068	Port Access and Navigation	12.5	ENGM90006	Engineering Contracts and Procurement	12.5
CVEN90069	Dredging Engineering	12.5	ENGM90007	Project Management Practices	12.5
ELEN90088	System Optimisation & Machine Learning	12.5	ENGR90036	Leadership for Innovation	12.5
ELEN90093	Microprocessor Design Clinic	12.5	ENGR90033	Internship	12.5
ENEN90006	Solid Wastes to Sustainable Resources	12.5	EVSC90025	Water Sensitive Design	12.5
ENEN90011	Energy Efficiency Technology	12.5	GEOM90005	Remote sensing	12.5
ENEN90014	Sustainable Buildings	12.5	GEOM90007	Information Visualisation	12.5
ENEN90027	Energy for Sustainable Development	12.5	GEOM90008	Spatial Data Management	12.5
ENEN90029	Water and Waste Water Management	12.5	GEOM90038	Advanced Imaging	12.5
ENEN90033	Solar Energy	12.5			12.5

A student can specialize by choosing 62.5 credit points (5 subjects) of electives from one of the three specialisations below. FEIT is currently working on harmonizing the definition of a specialisation to be four subjects.

Earth Observation	Energy Systems	Water Systems
GEOM90005 Remote sensing	ENEN90033 Solar Energy	ENEN90039 Advanced Hydrological Solutions
GEOM90008 Spatial Data Management	ENEN90027 Energy for Sustainable Development	ENEN90040 Water Planning & and Uncertain Future
GEOM90007 Information Visualisation	ENEN90011 Energy Efficiency Technology	EVSC90025 Water Sensitive Design
GEOM90038 Advanced Imaging	ENEN90014 Sustainable Buildings	ENEN90029 Water and Waste Water Management
AGRI30045 Appns in Precision Agriculture	ENEN90006 Solid Wastes to Sustainable Resources	ENGR90024 Computational Fluid Dynamics
		GEOL90005 Remote sensing

The curriculum has been colour-coded by the University as follows:

Core Discipline Subject	Elective Discipline Subject
Selective Discipline Subject	Supporting Science Subject
Core Engineering Specialisation Subject	Approved Elective