MMAN1130	Design and Manufacturing
MATH1131	Mathematics 1A
MATH1231	Mathematics 1B
ENGG1300	Engineering Mechanics

ENGG1811

ENGG2600	Engineering Vertically Integrated Project
ENGG3001	Fundamentals of Humanitarian Engineering
ENGG3060	Maker Games
ENGG3600	Engineering Vertically Integrated Project
ENGG4600	Engineering Vertically Integrated Project
GEOS1111	Fundamentals of Geology
GMAT1110	Surveying and Geospatial Engineering
MANF4100	Design and Analysis of Product-Process Systems
MANF4430	Reliability and Maintenance Engineering
MANF4611	Process Modelling and Simulation
MANF6860	Strategic Manufacturing Management
MANF9400	Industrial Management
MANF9420	Operations and Supply Chain Management in Engineering
MANF9472	Production Planning and Control
MATH1081	Discrete Mathematics
MATS1101	

On successful completion of the AEROAH3707 program, graduates will be able to:

1. demonstrate proficiency of knowledge in the enabling sciences (mathematics, computer science and pen0 1 194.49ys

1.

Figure 2: BE (Hons) Aerospace -

there is perhaps a need to include a weighting factor for coursework based on the year-level of study.

A review of assessment distribution indicates that the stream has an overreliance on examination and quizzes, particularly in technical engineering science subjects. The remainder of the assessment is usually in the form of assignments/reports, most commonly associated with lab work or extended analysis calculations. For design courses, thesis and other professional engineering courses, there is a far greater spread of other assessment types, including major works and portfolios.

The School has implemented many processes to ensure that academic integrity is maintained:

- All exam papers are reviewed by another academic, along with worked solutions.
- Online exams use as much randomisation as practically possible for the question type (question banks, numerical input randomisation and in some cases multiple parallel versions of questions with slightly different solution paths)
- Students must upload working along with numerical answers. This is for marking purposes, but also can be a deterrent to some forms of contract cheating.
- Academics are encouraged to include open-ended elements in all their examination questions, with students answering short essay-style questions. This enables the marker to check the alignment between simple answers and comprehension.
- Reports are submitted using TurnItIn, which ensures that students are not plagiarising or colluding

- Both the School Education Committee and the Industry Advisory Network will review the curriculum mapping findings.
- Annual revisions to curriculum content, SLOs and mapping will be conducted by these committees.

UNSW Bachelor of Engineering (Honours) (Mechanical Engineering) is a four-year, full-time degree delivered by the School of Mechanical and Manufacturing Engineering. The degree is AQF level 8 and provides graduates with

.

BE (Hons) Mechanical is an accredited entry-to-practice degree which prepares students for the stunning breadth of career options available to Mechanical Engineers; systematically applying mathematics and the physical sciences to the design, analysis, manufacture and maintenance of mechanical systems. Almost every product or service in everyday life is influenced in by a mechanical engineer, so our graduates are prepared to apply their knowledge to solve contemporary and unfamiliar problems. They create future solutions in health care, energy, transportation, world hunger, space exploration, climate change, and more.

Mechanical Engineering continues to evolve as technology improves and the design and construction of machines is optimised or revolutionised. UNSW Mechanical Engineers are prepared with skills that can be used in power generation, transport, composite structures, building services, infrastructure, medical devices and more.

The UNSW Mechanical and Manufacturing Engineering, which offers the stream, is Australia's largest Mechanical and Aerospace School and is rated the highest in Australia on the three major university ranking indices. The School has a breadth of research strengths and offers students a high degree of flexibility for elective and thesis specialisation.

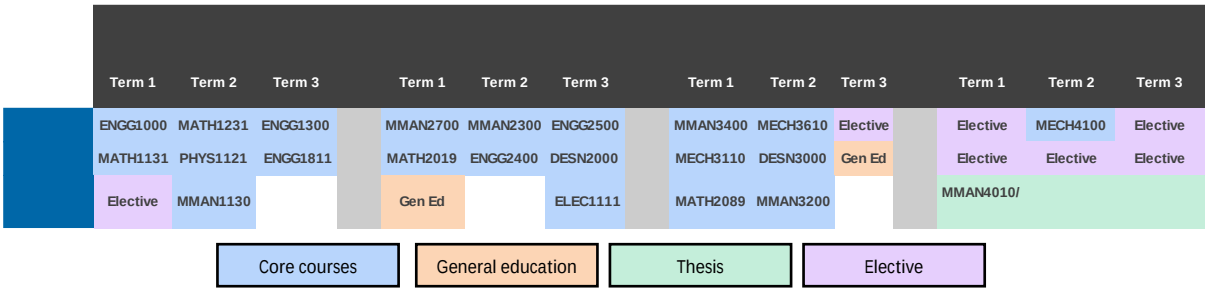

Figure 6: BE (Hons) Mechanical basic course plan

Table 3: Core course codes for BE (Hons) Mechanical

DESN1000	Introduction to Engineering Design and Innovation
ELEC1111	Electrical and Telecommunications Engineering
ENGG1300	Engineering Mechanics
ENGG1811	Computing for Engineers
MATH1131	Mathematics 1A
MATH1231	Mathematics 1B
MMAN1130	Design and Manufacturing
PHYS1121	Physics 1A

DESN2000	Engineering Design and Professional Practice
ENGG2400	Mechanics of Solids 1
ENGG2500	Fluid Mechanics for Engineers
MATH2019	Engineering Mathematics 2E
MATH2089	Numerical Methods and Statistics
MMAN2300	Engineering Mechanics 2
MMAN2700	Thermodynamics
MECH3110	Mechanical Design 1
MECH3610	Advanced Thermofluids
MMAN3000	Professional Engineering and Communication
MMAN3200	Linear Systems and Control
MMAN3400	Mechanics of Solids 2
MECH4100	Mechanical Design 2
MMAN4010	Thesis A
MMAN4020	Thesis B

Table 4: Elective course options for BE (Hons) Mechanical
(* indicates course was used in curriculum mapping)

AERO9500	Space Systems Architectures and Orbits
AERO9610	The Space Segment

MANF4430	Reliability and Maintenance Engineering
MANF4611	Process Modelling and Simulation
MANF6860	Strategic Manufacturing Management
MANF9400	Industrial Management
MANF9420	

5. design and implement innovative engineering solutions to complex problems in mechanical engineering based on rigorous analysis and application of critically evaluated current research.
6. lead and manage mechanical engineering projects, individually or as part of a team, in a systematic and professional manner.
7. apply distinct professional judgement that contributes to the ethical and sustainable practice of mechanical engineering.
8. communicate professionally and effectively within and outside of mechanical engineering.

The Stream Learning Outcomes (SLOs) were drafted by the School Education Committee, specifically the Stream Coordinators for each of our accredited BE and ME streams. The drafts were developed considering: benchmarking conducted for the 2021 accreditation report; feedback from industry partners; and expectations of graduate outcomes aligned with EA Stage 1 competencies.

The draft SLOs were reviewed and aligned by the Deputy Head of School (Education) before being presented to the School Education Committee for endorsement. Wider Industry Advisory Network (IAN) consultation was sought in writing, with a follow-up workshop.

The SLOs align with the Engineers DTQ0 1 464.14 679.42 Tm0 g0 G[su)-3(st)-3(ain)-5(a)9(b)-4(le)8( )1 E0 0 1

A curriculum map from

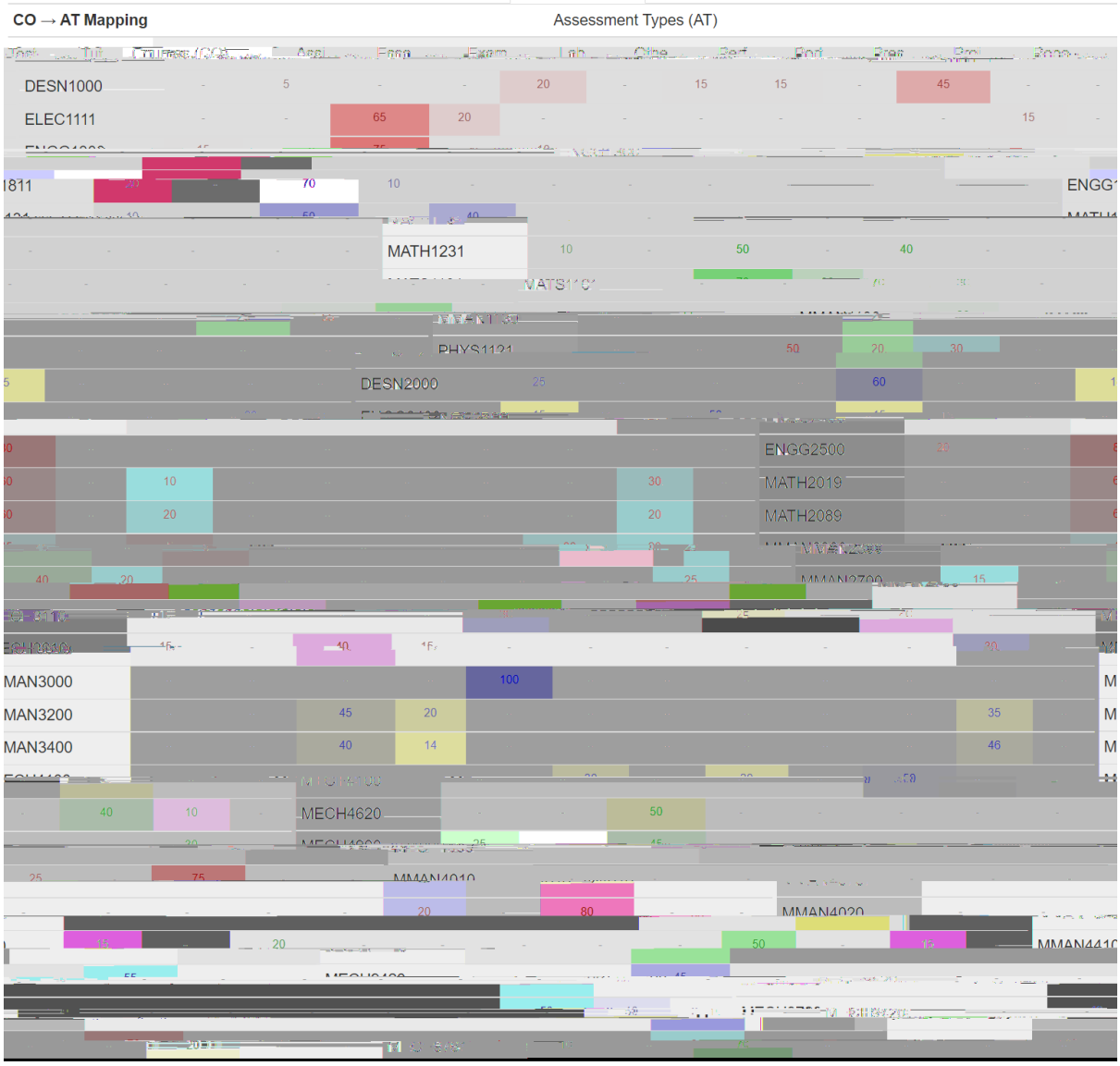

Figure 8: BE (Hons) Mechanical – Course Assessment Map

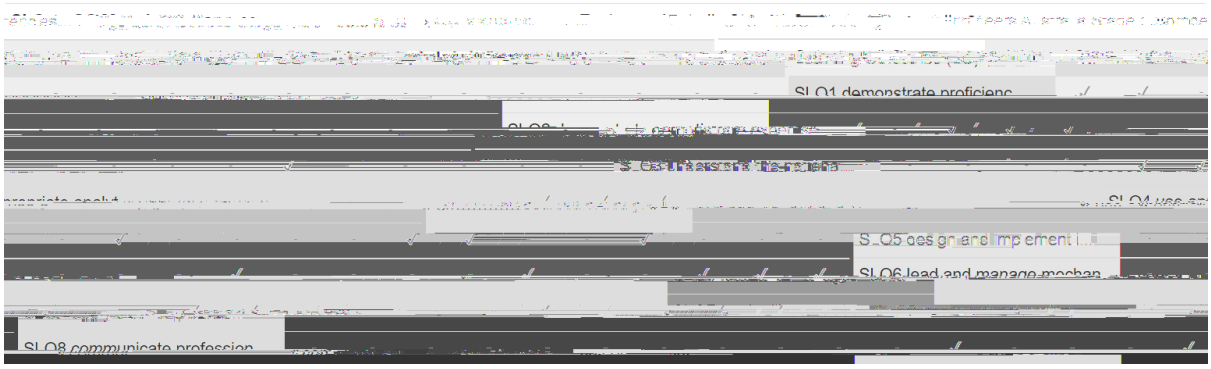

Figure 9: BE (Hons) Mechanical - SLO to EA Competency Mapping

there is perhaps a need to include a weighting factor for coursework based on the year-level of study.

One poorly mapped competency was 1.5. There is scope to enhance the development of this competency through the spine of design courses running through the degree (DESN1000, DESN2000, MMAN3000, MECH4100), which will be investigated with the School Education Committee. The knowledge associated with this competency is already in the curriculum, but needs to be more explicitly addressed through assessment and course learning outcomes.

A review of assessment distribution indicates that the stream has an overreliance on examination and quizzes, particularly in technical engineering science subjects. The remainder of the assessment is usually in the form of assignments/reports, most commonly associated with lab work or extended analysis calculations. For design courses, thesis and other professional engineering courses, there is a far greater spread of other assessment types, including major works and portfolios.

The School has implemented many processes to ensure that academic integrity is maintained:

- All exam papers are reviewed by another academic, along with worked solutions.
- Online exams use as much randomisation as practically possible for the question type (question banks, numerical input randomisation and in some cases multiple parallel versions of questions with slightly different solution paths)
- Students must upload working along with numerical answers. This is for marking purposes, but also can be a deterrent to some forms of contract cheating.
- Academics are encouraged to include open-ended elements in all their examination questions, with students answering short essay-style questions. This enables the marker to check the alignment between simple answers and comprehension.
- Reports are submitted using TurnItIn, which ensures that students are not plagiarising or colluding, but does not deter some forms of contract cheating.
- Model report/assignment rubrics have been provided to staff rewarding open-ended and creative solutions by students to discourage collusion and contract cheating. These have shown some initial promise, but there is a lot more evaluation and testing required.
- Important works, such as thesis, have two (or three) markers to ensure consistency.
- Some courses have taken on viva-style assessments for all students, but these have proved challenging at scale without centralised support for scheduling. The quality of vivas is also a concern, as most engineering academics have limited experience with this form of assessment.

DESN2000	Engineering Design and Professional Practice
ENGG2400	Mechanics of Solids 1
ENGG2500	Fluid Mechanics for Engineers
MATH2019	Engineering Mathematics 2E
MATH2089	Numerical Methods and Statistics
MMAN2300	

ENGG4600	Engineering Vertically Integrated Project
GEOS1111	Fundamentals of Geology
GMAT1110	Surveying and Geospatial Engineering
*MANF6860	Strategic Manufacturing Management
*MANF9400	Industrial Management
*MANF9420	Operations and Supply Chain Management in Engineering
*MANF9472	Production Planning and Control
MATH1081	Discrete Mathematics
MATS1101	Engineering Materials and Chemistry
MECH4100	Mechanical Design 2
MECH4305	Fundamental and Advanced Vibration Analysis
MECH4320	Engineering Mechanics 3
MECH4620	Computational Fluid Dynamics
MECH4880	Refrigeration and Air Conditioning 1
MECH4900	Mechanics of Fracture and Fatigue
MECH9325	

4. use critical thinking, best practice analytical techniques and detailed data to make engineering and financial management decisions, supported by detailed data and analysis.
5. apply product-system development and decision-making methods for product lifecycle management.
6. specify, design, integrate and improve systems for manufacturing and process automation (including measurement and feedback control), incorporating advanced digital, AI and IOT technologies.
7. lead and manage mechanical and manufacturing engineering projects, individually or as part of a team, in a systematic and professional manner.
8. link the impact of design, plan, and control decisions in different disciplines and apply distinct professional judgement that contributes to the ethical and sustainable practice of mechanical and manufacturing engineering.
9. communicate professionally and effectively within and outside of mechanical and manufacturing engineering.

The Stream Learning Outcomes (SLOs) were drafted by the School Education Committee, specifically the Stream Coordinators for each of our accredited BE and ME streams. The drafts were developed considering: benchmarking conducted for the 2021 accreditation report; feedback from industry partners; and expectations of graduate outcomes aligned with EA Stage 1 competencies.

A curriculum map from CLOs to SLOs to EA Stage 1 Competencies was developed using the CMAP2 tool, described in the Faculty report. The specific mappings for BE (Hons) Mechanical and Manufacturing are included here.

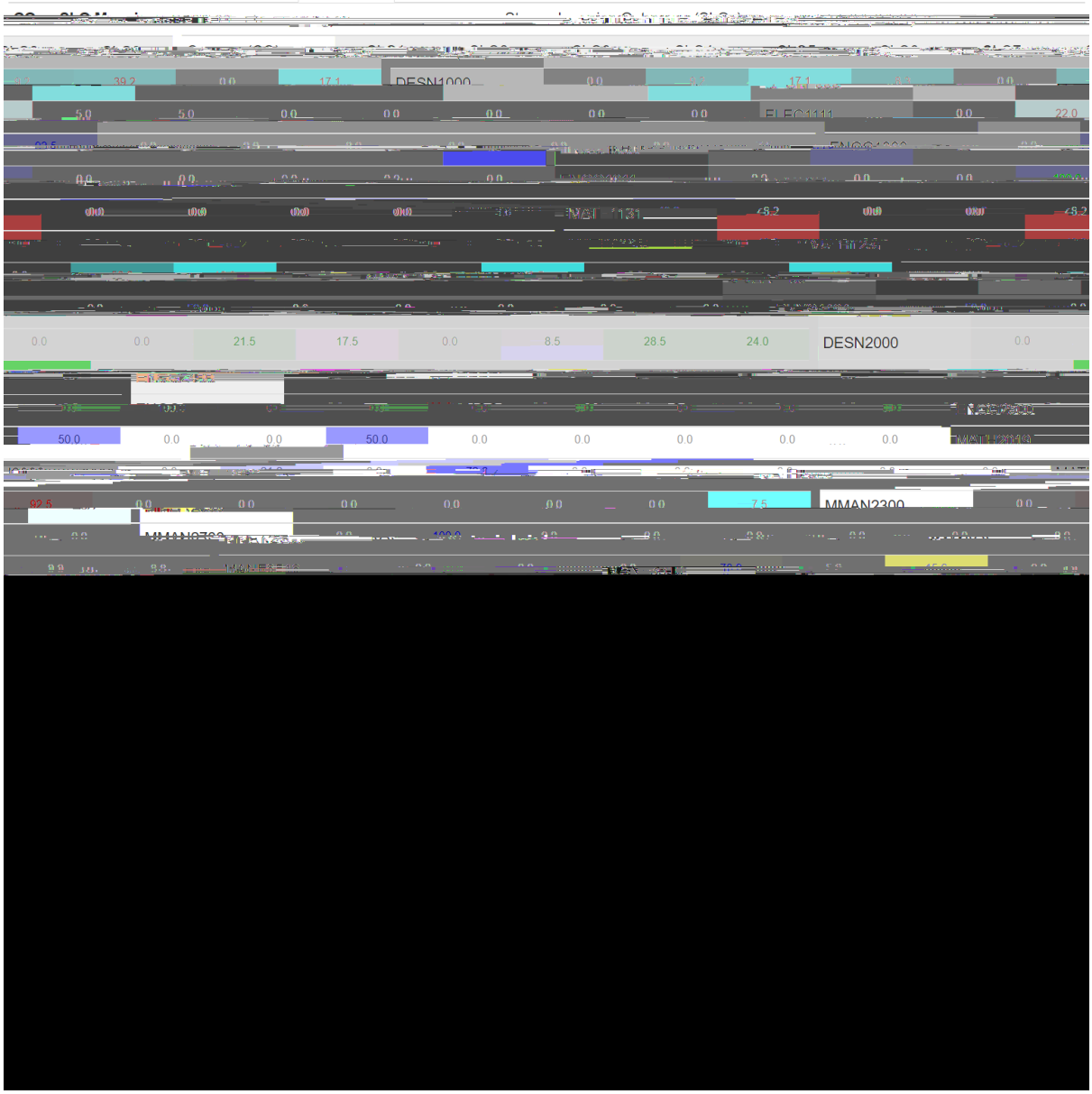

Figure 12: BE (Hons) Mechanical and Manufacturing - CLO to SLO Mapping

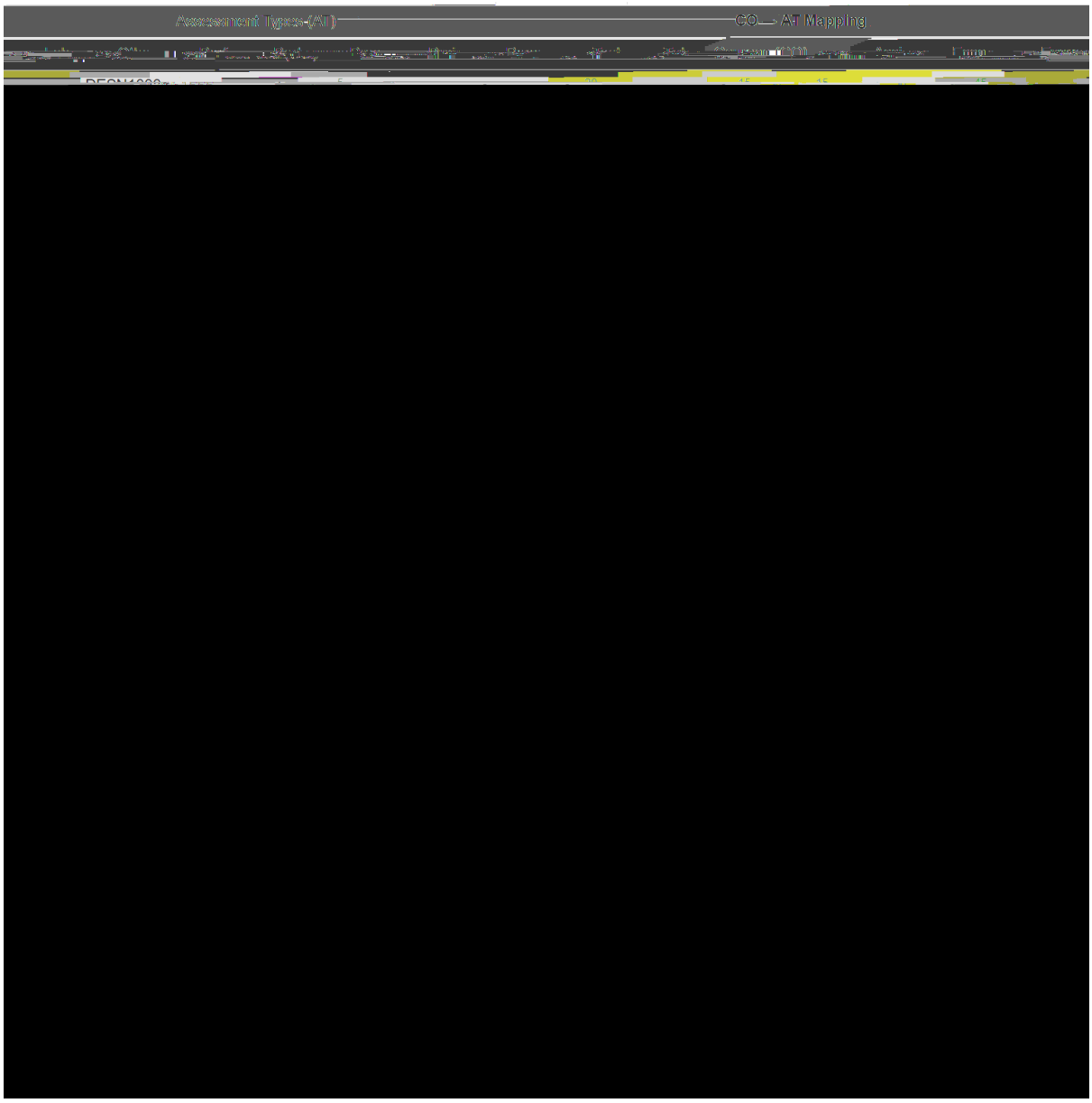

Figure 13: BE (Hons) Mechanical and Manufacturing – Course Assessment Map

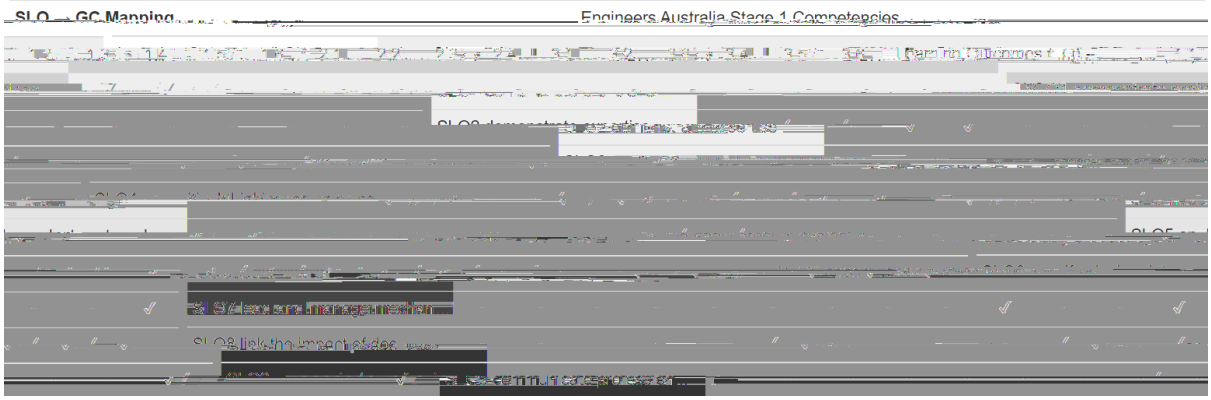

Figure 14: BE (Hons) Mechanical and Manufacturing - SLO to EA Stage 1 Competency Mapping

Figure 15: BE (Hons) Mechanical and Manufacturing - CLO to EA Competency Curriculum Map

Course learning outcomes in the Mechanical and Manufacturing Engineering stream

there is perhaps a need to include a weighting factor for coursework based on the year-level of study.

There are a cluster of (relatively) poorly developed competencies our professionalism, ethics and norms (1.6, 3.1, 3.5). A review of the mapping matrix identifies that these topics are addressed by many courses (>15) but with low weightings in each course. This dispersed approach to professional knowledge and skills has been actively pursued by the MANFBH stream coordinator, but there is perhaps a problem with how assessment and course

UNSW Bachelor of Engineering (Honours) (Mechatronic Engineering) is a four-year, full-time degree delivered by the School of Mechanical and Manufacturing Engineering. The degree is AQF level 8 and provides graduates with

.

BE (Hons) Mechatronic is an accredited entry-to-practice degree which intertwines mechanical engineering, control engineering and software development, especially for controlling sophisticated smart machines. Mechatronic engineers work across all aspects of smart machines – from design and testing through to manufacture in industries such as robotics, medical and assistive technology, human-machine interaction, manufacturing, unmanned aerial and ground vehicles and education. Graduates understand the conception, design, construction, maintenance, integration and repair of smart machines. These machines range from humble consumer goods to integrated robotic production systems at factory scale.

This degree builds knowledge and skills in areas including building services, computer-controlled plant, manufacturing, robotics and autonomous vehicles. It emphasises the application of engineering science, development and management in these fields. UNSW Mechatronic engineers

Figure 16: BE (Hons) Mechatronic basic course plan

Table 7: Core course codes for BE (Hons) Mechatronic

COMP1511	Programming Fundamentals
COMP1531	Software Engineering Fundamentals
DESN1000	Introduction to Engineering Design and Innovation
ELEC1111	Electrical and Telecommunications Engineering
ENGG1300	

BIOM1010	Engineering in Medicine and Biology
BIOS1301	Ecology, Sustainability and Environmental Science
CEIC1000	Sustainable Product Engineering and Design
CHEM1011	Chemistry A: Atoms, Molecules and Energy
CHEM1021	Chemistry B: Elements, Compounds and Life
CHEM1811	Engineering Chemistry 1A
CHEM1821	Engineering Chemistry 1B
COMP1521	Computer Systems Fundamentals
*COMP3141	Software System Design and Implementation
COMP3331	Computer Networks and Applications
COMP3431	Robotic Software Architecture
COMP9417	Machine Learning and Data Mining
COMP9444	Neural Networks and Deep Learning
COMP9517	Computer Vision
CVEN1701	Environmental Principles and Systems
ELEC4633	Real-Time Engineering
ENGG1200	Undergraduate Special Projects
ENGG1400	Engineering Infrastructure Systems
ENGG2600	Engineering Vertically Integrated Project
ENGG3001	Fundamentals of Humanitarian Engineering
ENGG3060	Maker Games
ENGG3600	Engineering Vertically Integrated Project
ENGG4600	

MINE1010	Mineral Resources Engineering
*MMAN4200	Additive Manufacturing
MMAN4400	Engineering Management
PHYS1231	Higher Physics 1B
PSYC1001	Psychology 1A

The draft SLOs were reviewed and aligned by the Deputy Head of School (Education) before being presented to the School Education Committee for endorsement. School Industry Advisory Network (IAN) consultation was sought in writing, with a follow-up workshop.

The SLOs align with the Engineers Australia expectations for a graduate engineer but are articulated in a Mechatronic Engineering context. Reference is made to both Mechatronic specific knowledge and skills.

A curriculum map from CLOs to SLOs to EA Stage 1 Competencies was developed using the CMAP2 tool, described in the Faculty report. The specific mappings for BE (Hons) Mechatronic are included here.

Figure 17: BE (Hons) Mechatronic - CLO to SLO Mapping

Figure 18: BE (Hons) Mechatronic -Course Assessment Map

Figure 19: BE (Hons) Mechatronic - SLO to EA Competency Mapping

There are no low outlier competencies in the Mechatronics stream, although a few categories are slightly below expectation (1.4, 2.4, 3.4).

A review of assessment distribution indicates that the stream has an overreliance on examination and quizzes, particularly in technical engineering science subjects. The remainder of the assessment is usually in the form of assignments/reports, most commonly lab work or extended analysis. Design courses, thesis and other professional engineering courses use a far greater spread of other assessment types, including major works and portfolios.

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- Academics are encouraged to include open-ended elements in all their examination questions, with students answering shortsis in al

Curriculum Revision

- Review the development of EA competencies 1.4, 2.4 and 3.4. These capabilities are addressed within the program, but need to be explicitly linked to assessment and learning outcomes.

Assessment

- Assessment structures need review and refinement to improve integrity in a post-COVID environment.
- The School is piloting models which allow for more individualised (non-exam) assessment, including open-ended projects, portfolios and vivas.

Continuous Improvement

- Both the School Education Committee and the Industry Advisory Network will review the curriculum mapping findings.
- Annual revisions to curriculum content, SLOs and mapping will be conducted by these committees.

UNSW Master of Engineering (Mechanical Engineering) is a two-year (full-time equivalent) flexible degree delivered by the School of Mechanical and Manufacturing Engineering. The degree is AQF level 9 and provides graduates with

ME Mechanical is a flexible postgraduate degree lets graduates specialise in many aspects of mechanical engineering through diverse elective choices. The degree is an accredited entry-to-practice under the Washington accord. Graduates gain in-depth knowledge and technical ability built around a core of design and research skills. A key differentiator of the ME program is a greater focus on management and leadership skills. Graduates gain the theory, tools and strategies to design engineering systems and manage a product's full life-cycle. An integrated research project enables students to gain valuable skills in critical analysis, interpretation and communication of results.

Mechanical Engineering continues to evolve as technology improves and the design and construction of machines is optimised or revolutionised. Masters level Mechanical Engineers at UNSW are prepared with skills to manage and lead projects in power generation, transport, lightweight structures, building services, infrastructure, medical devices and more.

The UNSW Mechanical and Manufacturing Engineering, which offers the stream, is

Table 10: Disciplinary Elective course options for ME Mechanical
(* indicates course was used in curriculum mapping)

*MANF4430	Reliability and Maintenance Engineering
*MECH4305	Fundamental and Advanced Vibration Analysis
MECH4320	Engineering Mechanics 3
*MECH4620	Computational Fluid Dynamics

3. evaluate and create analytical and computational tools, both general and specialised, to solve advanced problems in mechanical engineering.
4. create innovative engineering solutions to complex problems in mechanical engineering based on rigorous analysis and synthesis of current research.
5. develop and implement management strategies for multidisciplinary engineering projects.
6. lead mechanical engineering projects, individually or as part of a team, in a systematic and professional manner.
7. advance the ethical and sustainable practice of mechanical engineering.
8. communicate professionally and effectively across multi-disciplinary engineering teams.

The Stream Learning Outcomes (SLOs) were drafted by the School Education Committee, specifically the Stream Coordinators for each of our accredited BE and ME streams. The drafts were developed considering: benchmarking conducted for the 2021 accreditation report; feedback from industry partners; and expectations of graduate outcomes aligned with EA Stage 1 competencies.

The draft SLOs were reviewed and aligned by the Deputy Head of School (Education) before being presented to the School Education Committee for endorsement. School Industry Advisory Network (IAN) consultation was sought in writing, with a follow-up workshop.

The ME(Mechanical) and BE(Mechanical) share a common core of knowledge but aim to different levels of mastery and achievement. The similarities and differences in the graduate outcomes are reflected in the respective SLOs. In many cases, the topics are similar, yet the level is reflected through more advanced verbs to describe a greater mastery of the topic and/or professional skill.

A curriculum map from CLOs to SLOs to EA Stage 1 Competencies was developed using the CMAP2 tool, described in the Faculty report. The specific mappings for ME Mechanical are included here.

Figure 22: ME Mechanical - CLO to SLO Mapping

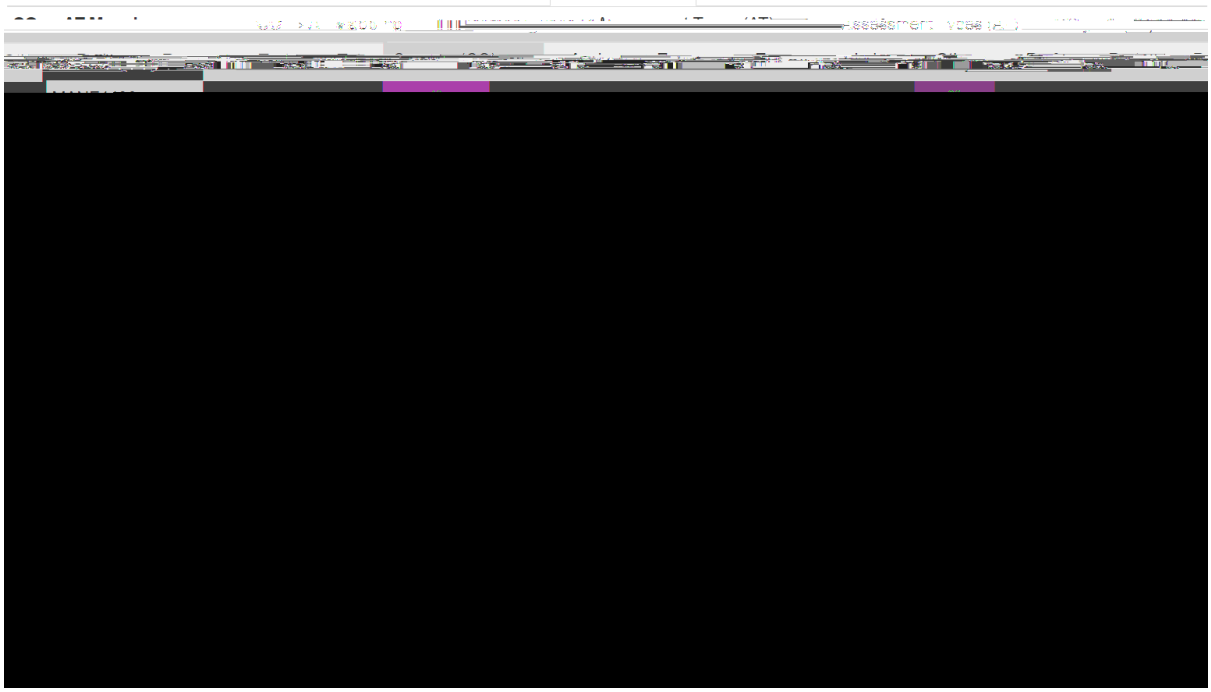

Figure 23: ME Mechanical – Course Assessment Map

Figure 24: ME Mechanical - SLO to EA Competency Mapping

Figure 25: ME Mechanical - CLO to EA Competency Curriculum Map

The course learning outcomes in the Masters of Mechanical Engineering (MECHBS) are somewhat uniformly developed across the different EA Stage 1 Competencies. More so than the undergraduate streams, there is substantial weight allocated to application focussed capabilities (Cat 2), with less emphasis on knowledge development (Cat 1).

- The breadth of assessment types in MECHBS needs to be expanded.
- The School is piloting models which allow for more individualised (non-exam) assessment, including open-ended projects, portfolios and vivas.

Continuous Improvement

- Both the School Education Committee and the Industry Advisory Network will review the curriculum mapping findings.
- Annual revisions to curriculum content, SLOs and mapping will be conducted by these committees.