

Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates [UG OBTL+](#) or [PG OBTL+](#)

If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to [Data Transformation Status](#) for more information.

Expected Implementation in Academic Year	AY2023-2024
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1 Semester 2
Course Author * Faculty proposing/revising the course	Ong Chi Wei
Course Author Email	chiwei.ong@ntu.edu.sg
Course Title	Medical Device Design (Core)
Course Code	BG4122
Academic Units	6
Contact Hours	162
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	BG3105 Biomedical Instrumentation
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This course aims to provide final-year students with the opportunity to work in teams to design and produce a medical device through integration and implement of knowledge in bioengineering. The student teams will learn a project's key features and will plan out major deliverables, to facilitate conceptualization and selection of designs to achieve the desired project goals. Then, they will demonstrate their proposed medical devices through prototypes produced in the lab.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Perform need specification and identify the need statement for a biomedical project
ILO 2	Apply ideation strategies towards conceptualisation of solutions to identified clinical problems
ILO 3	Assess strengths and weaknesses of generated concepts
ILO 4	Design and produce a prototype medical device
ILO 5	Write technical report on a product prototype
ILO 6	Manage a project within given time and financial constraints
ILO 7	Showcase your prototype through demonstrations and presentations
ILO 8	Work as an effective member of a team

Course Content

There will be no specific reading materials provided in the class. Suggested materials will be dependent on the project. The module is based on hands-on design work in the lab.

Reading and References (if applicable)

1. P.G. Yock, S. Zenios, J. Makower, T.J. Brinton, U.N. Kumar, & F.T. Jay Watkins, "Biodesign: the process of innovating medical technologies" 2nd Ed., Publisher Cambridge University Press.
2. Gail D. Baura. Medical Device Technologies: A Systems-based Overview using Engineering Standards. Amsterdam; Boston: Elsevier/Academic Press, 2012.
3. James E. Moore, Jr., Duncan J. Maitland. Biomedical Technology and Devices. Boca Raton: CRC Press, 2013.
4. Giuseppe Andreoni, Massimo Barbieri, Barbara Colombo. Developing Biomedical Devices: Design, Innovation and Protection. Cham: Springer, 2014.

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Sem 1 Week 1: Introduction to Course; overview of Biodesign methodology	1	None	In-person	attend lecture
2	Sem 1 Weeks 2-3: Need specification	1,2	Chapter 2.1-2.4 of textbook; Worksheet	In-person	Group discussion
3	Sem 1 Weeks 4-5: Concept generation	1,2,3	Chapter 3.1 of textbook	In-person	Group discussion
4	Sem 1 Weeks 6-7: Concept evaluation	1,2,3	Chapter 4.1 and 4.2 of textbook	In-person	Group discussion
5	Sem 1 Week 8: Proposal presentation on need specification and concept selection	1,2,3,4,5,6,7,8	None	In-person	Provide rationales and plan of the proposed biomedical project, indicating what are the deliverables, key requirements; share the first design of proposed prototype
6	Sem 1 Weeks 9-12: Lab sessions	1,2,3,4,5,6,7,8	None	In-person	Hands-on lab sessions, electrical circuit design, use of instruments, programming, 3D printing

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
7	Sem 1 Weeks 13-14: First interim demo	1,2,3 ,4,5, 6,7,8	None	In-person	Prepare demo setup, props, tools etc. Demo your progress. Q&A sessions, evaluation of project report
8	Sem 2 Week 1: Debrief and planning	1,2,3 ,4,5, 6,7,8	None	In-person	Team discussion, planning and revising
9	Sem 2 Weeks 2-6: Lab sessions	1,2,3 ,4,5, 6,7,8	None	In-person	Hands-on lab sessions, electrical circuit design, use of instruments, programming , 3D printing
10	Sem 2 Week 7: Second interim demo	1,2,3 ,4,5, 6,7,8	None	In-person	Prepare demo setup, props, tools etc. Demo your progress. Q&A sessions, evaluation of project report
11	Sem 2 Weeks 8-12: Lab sessions	1,2,3 ,4,5, 6,7,8	None	In-person	Hands-on lab sessions, electrical circuit design, use of instruments, programming , 3D printing

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
12	Sem 2 Weeks 13-14: Final Demo	1,2,3 ,4,5, 6,7,8	None	In-person	Prepare demo setup, props, tools etc. Demo your product. Q&A sessions, evaluation of project report

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lecture	Lectures during the first semester will provide background on how to manage a biomedical project, with real life examples not detailed in textbooks / reference material. In the meantime, students will discuss the rationale and the details of the project during those lectures. Various approaches to complete the design will be discussed. Since this will be done in groups, students can form groups, discuss with their friends etc. All the other resources that will be available to the student to complete the project will also be elaborated.
Lab sessions	The project will be carried out in the lab, where you will have access to various instruments (oscilloscope, power supply, function generator, 3D printer, multi-meter, electronic components etc.). During these session we will have hands-on work on design and implementation of electrical circuits and signal processing. Every week during the lab session, students can discuss, debug their problems, brainstorm their idea on the implementation of special features in their product to the instruction of the module.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Presentation((a) Proposal presentation on need specification and concept selection)	1-3	EAB SLOs f,i,j,k	10	Team	Analytic	Extended Abstract
2	Continuous Assessment (CA): Others(Interim demo (x2))	4,6,7,8	EAB SLOs a, c, d, e, i, j	20	Individual	Analytic	Extended Abstract
3	Continuous Assessment (CA): Report/Case study(Interim project progress report)	1- 3,5,6,8	EAB SLOs a, b, c, d, e, f, i, j, k	15	Team	Analytic	Extended Abstract
4	Continuous Assessment (CA): Others(Final product demo)	4,6-8	EAB SLOs a, c, d, e, i, j	40	Individual	Analytic	Extended Abstract
5	Continuous Assessment (CA): Report/Case study(Final project report)	5,6,8	EAB SLOs a, b, c, d, e, f, i, j, k	15	Team	Analytic	Extended Abstract

Description of Assessment Components (if applicable)

Note: The course duration is 2 semesters. Students will have to register the course for both semesters. All assessments will be conducted in the 2nd Semester.

Formative Feedback

Every week in the lab sessions the students will get feedback on the progress in the project.
Mid-term demo: after mid-term demo the students will get feedback

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Communication	Advanced
Creative Thinking	Advanced
Problem Solving	Advanced
Project Management	Advanced
Critical Thinking	Advanced

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

This module requires you to engage in self-directed learning. You are expected to complete all online activities. You are expected to learn basic electronic circuit design, matlab/labview programming. You are expected to work in a group of 8-10 students. You need to plan and distribute the workload among all the members of the group. You are expected to take responsibility to follow up with other group members to complete task. You are expected to take necessary note and course related announcements. You are expected to participate in all discussions and activities.

Policy (Absenteeism)

Lab demons consists of 55% of students' course grade. Absence from lab demos without officially approved leave will result in no marks and affect students' overall course grade.

Policy (Others, if applicable)

Lab demo (mid-term and final): You are required to attend all the lab demos and submit reports.

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Last Updated By: Lai Ru Ying

Appendix 1: Assessment Criteria for Project Proposal

Grouping: Each project group consists of ~8-10 students.

Division of Work: Discuss with members on how the work should be divided. Declare each group members name and what part of the work they have done in the project reports. Your mark will be largely based on the quality of your own work and your group's performance.

<u>Criteria</u>	<u>Unsatisfactory: <40%</u>	<u>Borderline: 40% to 49%</u>	<u>Satisfactory: 50% to 69%</u>	<u>Very good: 70% to 89%</u>	<u>Exemplary: >90%</u>
Collate and present findings from Need Research (20%)	Material presented irrelevant and off topic	Material covered inadequate in two or three out of four topics listed above	Material covered adequate for proposal	Material covered adequately in all topics, with outstanding research in 1 or 2 topics	Outstanding research in all 4 topics
Synthesise information to obtain meaningful conclusions (20%)	No effort to analyse research	Analysis poorly substantiated	Major points captured in summary statements	Outstanding, unique insights obtained from research in 1 or 2 topics	Outstanding, unique insights in all 4 topics.
Describe concept and how it fits the criteria (20%)	Concept poorly described and unable to meet defined criteria	Concept poorly described or insufficient consideration for criteria	Concept adequately described and meets criteria	Concept elaborated with some unique features	Concept elaborated with unique features derived from insights
Provide analysis of IP position (20%)	IP search inadequately performed	IP search results missing critical patents	Logical search process yielding major relevant patents	Comprehensive search extending beyond patents	Comprehensive search extending beyond desktop research and presentation of logical risk mitigating steps

Provide analysis of regulatory position (20%)	Regulatory analysis contextually irrelevant (e.g. wrong geography)	Regulatory analysis performed with inappropriate justification	Logical presentation of device classification and identified pathway	Clear presentation of follow on steps from preliminary research	Comprehensively evaluated regulatory risks with sound regulatory plan
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Appendix 2: Assessment Criteria for Group Project

You will use your creativity and your knowledge about hardware and software design for prototyping shape and function of a medical device.

The module is based on hands-on design work in the lab.

Division of Work: Discuss with members on how the work should be divided. Declare each group members name and what part of the work they have done in the project reports. Your mark will be largely based on the quality of your own work and your group's performance in the interim and final demo. The formula for the overall grade is provided in appendix 4.

<u>Criteria</u>	<u>Unsatisfactory:</u> <u><40%</u>	<u>Borderline:</u> <u>40% to 49%</u>	<u>Satisfactory:</u> <u>50% to 74%</u>	<u>Very good:</u> <u>75% to 85%</u>	<u>Exemplary:</u> <u>>85%</u>
Knowledge & Comprehension Understanding of principles of biomedical signal processing to design biomedical device (25%)	Lacks understanding of the principles of biomedical signal processing and how to design medical device for heart rate monitoring.	Partial understanding of the principles of biomedical signal processing and how to design medical device for heart rate monitoring.	Good understanding of the principles of biomedical signal processing and how to design medical device for heart rate monitoring.	Good and comprehensive understanding of the principles of biomedical signal processing and how to design medical device for heart rate monitoring.	Very good and comprehensive understanding of the principles of biomedical signal processing and how to design medical device for heart rate monitoring.
Application Applying signal processing principles to solve problems (25%)	Not able to design filters to remove noises from the signal and amplify them.	Partially able to design filters to remove noises from the signal and amplify them.	Able to design filters to remove noises from the signal and amplify them.	Good design of the filters to remove noises from the signal and amplify them.	Excellent design of the filters to remove noises from the signal and amplify them.
Evaluation	Not able to choose of software and hardware to design	Partially able to choose software and hardware to design	Able to choose software and hardware to design	Good choice of software and hardware to design	Excellent choice of software and hardware to design

<p>Able to evaluate which software and hardware options will be most appropriate for designing the medical device (25%)</p>	<p>compact heart rate monitoring system.</p>	<p>compact heart rate monitoring system.</p>	<p>compact heart rate monitoring system.</p>	<p>compact heart rate monitoring system.</p>	<p>compact heart rate monitoring system.</p>
<p>Analysis Able to analyze problems, make reasonable assumptions, and choose appropriate methods (25%)</p>	<p>Unable to make reasonable assumptions and judgment according to the nature of the problems, uncertain about drawing any conclusions.</p>	<p>Can make reasonable assumptions and judgment, but the choice of methods are not appropriate, uncertain about the accuracy of the outcome.</p>	<p>Can make reasonable assumptions and judgment, can choose appropriate methods and predict the outcome mostly, but not necessarily the best choice.</p>	<p>Can make reasonable assumptions and judgment, can choose appropriate methods and predict the outcome, can draw reasonable conclusions.</p>	<p>Can make correct assumptions, can choose appropriate methods to solve the problem and draw conclusions. Can identify potential problems and tailor the process accordingly.</p>

Appendix 3: Assessment Criteria for Group Project Report

Criteria (Team)		Unsatisfactory (1)	Satisfactory (4)	Good (7)	Exemplary (10)	Score (1-10)
Quality of written communication	Language and format (10%)	No scientific language, with grammatical and spelling errors, poorly constructed sentences; incorrect use of referencing; report is not properly formatted	Some use of scientific language, with grammatical and spelling errors; correct use of referencing in most of the report; report is properly formatted	Use of scientific language, with few grammatical and no spelling errors; correct use of referencing throughout; properly constructed sentences, well-organized chapters and properly formatted report	Use of stylish scientific language, with no grammatical or spelling errors; properly formatted report; correct use of referencing throughout; report is very well written and draws you to read more	
	Figures and tables (10%)	Errors in figure legends; no formatting is done; cannot tell the different contents apart	No errors; standard figure format; no efforts to improve the appearance of the figures	Free of any errors; clear efforts to make the figures more readable and attractive	Free of any errors; various designs (shapes and colors) are incorporated in the figures and tables	
Design and implementation (30%)		The medical device design is not described; Choices of parameters and implementation details are missing	The medical device design is described but without much details; Choices of parameters and implementation details are provided minimally	The medical device design is described in details; Choices of parameters and implementation details are provided	The medical device design is described in extreme details; Choices of parameters and implementation details are provided meticulously	

Project Management (10%)		No project objectives presented; no schedule on milestones for tasks provided	No project objectives presented; no schedule on milestones for tasks provided	No project objectives presented; no schedule on milestones for tasks provided	Project objectives clearly stated and explained; concise and feasible schedule on milestones for tasks provided; project completed ahead of schedule	
Experimental results and Analysis	Quality and relevance of results (30%)	No results presented;	Results are poor;	Results are good;	Results are excellent;	
	Analysis of the results (10%)	no analysis	analysis is poorly done	proper analysis was done	in depth analysis was done	

Appendix 4: Assessment Criteria for Peer Evaluation

Each student in the group is required to rate the contribution of other group members. All evaluations are held in confidence so no student will know how other group members rate his/her contribution. You are to evaluate other group members fairly and objectively, bearing in mind the implications for the other members' grades (explained below). It is absolutely essential for you to submit your peer evaluation form to get marks. To factor peer evaluations into the marks for your homework assignment, the following computation will be used:

- If, on average, a student receives a rating of 9 or more, that student receives 100% of the group's grade.
- If, on average, a student receives a rating of less than 9, that student receives a specific percentage of the group's grade to be determined by the formulae below:

An average rating of 8 to < 9 = $90\% + (\text{average rating obtained} - 8) \times 10$

An average rating of 7 to < 8 = $80\% + (\text{average rating obtained} - 7) \times 10$

An average rating of 6 to < 7 = $70\% + (\text{average rating obtained} - 6) \times 10$

An average rating of 5 to < 6 = $60\% + (\text{average rating obtained} - 5) \times 10$

An average rating of 4 to < 5 = $50\% + (\text{average rating obtained} - 4) \times 10$

An average rating of 3 to < 4 = $40\% + (\text{average rating obtained} - 3) \times 10$

An average rating of < 3 will be investigated by your instructor and the student may receive 0-40% of group grades.

Example 1:

Assume the overall group assignment is 30 marks, and out of 30 your group got 30 marks. A student with an average rating of 9.10 gets 100% of 30 marks, i.e., 30 marks. An average rating of 6.29 means that a student gets 72.9% (or $70\% + (6.29 - 6) \times 10$) of 30 marks, i.e., 21.87 marks.

Example 2:

Assume the overall group assignment is 30 marks, and out of 30 your group got 20 marks. A student with an average rating of 9.10 gets 100% of 20 marks, i.e., 20 marks. An average rating of 6.29 means that a student gets 72.9% (or $70\% + (6.29 - 6) \times 10$) of 20 marks, i.e., 14.58 marks.

Your instructor reserves the right to review the student ratings for questionable circumstances, which include, but are not limited to, acts of discrimination or malice.

Criteria	Yourself	Member 1	Member 2	Member 3	Member 4	Member 5
Contributed the fair share of work (Score: 0 to 10)						
TOTAL						
Comments, if any						

Appendix 5: The EAB (Engineering Accreditation Board) Accreditation SLOs (Student Learning Outcomes)

- a) **Engineering knowledge:** Apply the knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems
- b) **Problem Analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- c) **Design/development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- d) **Investigation:** Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- e) **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
- f) **The engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- g) **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for the sustainable development.
- h) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- i) **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.
- j) **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- k) **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and economic decision-making, and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- l) **Life-long Learning:** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Mapping of Course ILOs to EAB Graduate Attributes

Course Code & Title	BG4122 Medical Device Design
Course Type	Core module

Overview											
(a)	●	(b)	●	(c)	●	(d)	●	(e)	●	(f)	●
(g)	●	(h)	●	(i)	●	(j)	●	(k)	●		
Legend:											
● Fully consistent (contributes to more than 75% of Student Learning Outcomes)											
◐ Partially consistent (contributes to about 50% of Student Learning Outcomes)											
○ Weakly consistent (contributes to about 25% of Student Learning Outcomes)											
Blank Not related to Student Learning Outcomes											

Course ILOs		EAB Graduate Attributes
1)	Perform need specification and identify the need statement for a biomedical project	a,b,c,d,e,f,g,h,i,j,k
2)	Apply ideation strategies towards conceptualisation of solutions to identified clinical problems	a,b,c,d,e,f,g,h,i,j,k
3)	Assess strengths and weaknesses of generated concepts	a,b,c,d,e,f,g,h,i,j,k
4)	Design and produce a prototype medical device	a,b,c,d,e,f,g,h,i,j,k
5)	Write technical report on a product prototype	a,b,c,d,e,f,g,h,i,j,k
6)	Manage a project within given time and financial constraints.	a,b,c,d,e,f,g,h,i,j,k
7)	Showcase your prototype through demonstrations and presentations	a,b,c,d,e,f,g,h,i,j,k

EAB Graduate Attributes

- a) **Engineering Knowledge:** Apply the knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialisation as specified in WK1 to WK4 respectively to the solution of complex engineering problems.
- b) **Problem Analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences with holistic considerations for sustainable development. (WK1 to WK4)
- c) **Design / Development of Solutions:** Design creative solutions for complex engineering problems and design systems, components or processes that meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required. (WK5)
- d) **Investigation:** Conduct investigations of complex problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- e) **Modern Tool Usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering problems, with an understanding of the limitations. (WK2 and WK6)
- f) **The Engineer and the World:** When solving complex engineering problems, analyse and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks and the environment (WK1, WK5, and WK7).
- g) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (WK9).
- h) **Individual and Collaborative Team Work:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face-to-face, remote and distributed settings (WK9).
- i) **Communication:** Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions, taking into account cultural, language, and learning differences.
- j) **Project Management and Finance:** Demonstrate knowledge and understanding of engineering management principles and economic decision-making, and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- k) **Life-long Learning:** Recognise the need for, and have the preparation and ability to (i) engage in independent and life-long learning, and (ii) adapt to new and emerging technologies, and (iii) think critically, in the broadest context of technological change (WK8).

No	Knowledge Profile
WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences
WK2	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline
WK5	Knowledge including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts that supports engineering design and operations in a practice area
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
WK7	Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline such as the professional responsibility of an engineer to public safety and sustainable development.
WK8	Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues
WK9	Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc with mutual understanding and respect, and of inclusive attitudes

Reference: [EAB Accreditation Manual](#)