Academic Year	AY2019/2020		**Semester**	1		
Author(s)	Lee Yong Tsui					
Course Code	EG9003					
Course Title	***Product Development Challenge***					
Pre-requisites	Admission subject to interview. Mutually exclusive with MA3179.					
Pre-requisite for	NIL					
No of AUs	3					
Contact Hours	Lectures	0	TEL (Online Videos)	0	Project work	117
Proposal Date	1 November 2018					

Course Aims

The objective is for you to undertake a sizeable project which will challenge you to utilize your knowledge in different areas of engineering to analyze, design and construct a predetermined product within a specified timeframe. You will learn to identify your own problems and seek your own solutions to execute the project, beyond the prescription of lectures and text books.

Intended Learning Outcomes (ILO)

Upon successful completion of this course, you shall be able to:

1. Identify and analyse a problem, mainly but not restricted to engineering problem.
2. Seek your own solution to the problem.
3. Execute design methodologies to design a product that solves the problem.
4. Use the associated tools, including CAD, analytical tools, manufacturing tools, and so forth, and produce a prototype for the product.
5. “Sell” your product in a report and/or an oral presentation

Course Contents

	Topics	LAMS (Hours)	Example Class (2-hr session)
	The course involves you, either singly or in a team, to execute a project, which may be pre-defined or self-proposed. Each project team will be assigned one or two mentors, who are NTU professors or practising engineers. They will also act as the assessors.		
	Total		

Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weightage	Team/ Individual	Assessment Rubrics
1. Problem identification and project plan	1, 2	b, d, k, l	10%	Both*	
2. Concept development	1, 2, 3	a, b, c, d, f, g, h, k	20%	Both*	
3. The design	2, 3, 4	a, b, c, d, e, g, i	25%	Both*	
4. The prototype and its construction	2, 3, 4	a, b, c, d, e, g, i	25%	Both*	
5. Project submission, either a report or a presentation or both	5	a, b, c, d, g, h, i, j, k	20%	Both*	
Total			100%		

*The project will be either Team-based or Individual. As the focus of the course is multi-disciplinary, a team of three or more students from at least two different schools is preferred. However, in exceptional circumstances where a student has a specific multi-disciplinary project that can be pursued by one person, the instructor may decide to admit the student and the project.

A team will be assessed collectively on each of the components above, i.e. all team members will receive the same score, for 50% of the assigned score. The remaining 50% is for individual contributions. Therefore, the score for a student = team score + individual score.
If you did not contribute to the team, your team score will be zero.

Note: The Satisfactory/Unsatisfactory (S/U) option cannot be used for this course.

Mapping of Course SLOs to EAB Graduate Attributes

Course Student Learning Outcomes	Cat	EAB's 12 Graduate Attributes*												EAB requirements
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	
EG9003 ***Product Development Challenge***	Core	●	●	●	●	◐	◐	●	●	●	◐	●	◐	
Overall Statement	This course aims to challenge students to think and work independently, either individually or in a team, through the rigour of assessing, analyzing and experimenting with developing a product, taking it from concept to prototyping. The students will find the problems and solutions by themselves, as in real-life engineering. They will experience the actual processes of developing a new product, as professional engineers do.													Open to all students in COE
1. Identify a problem worth solving	a, b, d, f, g, h, i, k, l													
2. Conceptualise a solution	a, b, c, d, g, i, k													
3. Analyse design options and make design selections	a, b, c, d, e, g, h, i, k													
4. Build a prototype	a, c, d, e, g, i, k													
5. Report and presentation	i, j													

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

*The graduate attributes as stipulated by the EAB, are:

(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 Solution**s: 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.

Formative feedback

Formal feedback from the mentors will be in two forms:

- During the regular meetings, the team's mentors will discuss the progress and offer critical insights into the work that has been done.
- At the final presentation, all the mentors will be present and they will provide their comments and assessment on the work done and the product.
- Additionally, where a report is submitted, the mentors will also provide feedback on the work presented in the report.

Informal feedback:

- The team is encouraged to meet and discuss with the mentors whenever you have ideas or difficulties that require advice or critical evaluation.

Feedback from the team:

- The team is required to submit a reflection paper (separate from the project report) on the course at the end, critically evaluating their own work and the conduct of the course.

Learning and Teaching approach

Approach	**How does this approach support students in achieving the learning outcomes?**
Independent research and development	Challenge you to work independently and in small groups, develop your skills in research and brain storming possible problems and solutions.
Team meetings without mentors	You get to learn to work in a team without mentors, and assess options based on your own knowledge and ability, exercise independence of thought and learn leadership skills.
Team meeting with mentors	Mentors inject their knowledge and experience and advise your team on the feasibility of your solution, thereby help your team to learn the quality of your choice.

Reading and References

There are no fixed reading or reference materials, which depend on the project you pursue.

Course Policies and Student Responsibilities

As a student of the course, you are required to abide by both the University Code of Conduct and the Student Code of Conduct. The Codes provide information on the responsibilities of all NTU students, as well as examples of misconduct and details about how students can report suspected misconduct. The university also has the Student Mental Health Policy. The Policy states the University's commitment to providing a supportive environment for the holistic development of students, including the improvement of mental health and wellbeing. These policies and codes concerning students can be found in the following link.
http://www.ntu.edu.sg/SAO/Pages/Policies-concerning-students.aspx

Academic Integrity

Good academic work depends on honesty and ethical behavior. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honor 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, and 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. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors

Instructor	Office Location	Phone	Email
A/P Lee Yong Tsui as course coordinator	N3.2-02-87	6790 5493	mytlee@ntu.edu.sg

Planned Weekly Schedule

There is no teaching schedule for this course. However, there are guidelines for team meetings and meetings with mentors, and submission of interim outcomes.

Week	Topic	Course LO	Reading	Example Class Activities
1 -3	Project conceptualisation	1, 2	Depend on project	Team meeting weekly to brain storm problem. Meet mentor every other week.
3-6	Initial design	2, 3	Depend on project	Team meeting weekly to initiate then refine solution. Meet mentor every other week.
5-7	Final Design	3	Depend on	Team meeting weekly to initiate

			project	then refine design. Meet mentor every other week.
7	Interim report	5	N/A	Interim report on current status and future plan to mentor
6-10	Building of prototype	3, 4	Depend on project	Team divided to deal with sub-tasks in building prototype. Consult mentor and lab staff where appropriate
8-12	Finalising of prototype	4	Depend on project	Component assembly and refining product
11-13	Preparation of report/presentation and final submission	5	N/A	Writing and preparing the presentation. Consult mentor where appropriate.