Subject Description Form

Subject Code	BME34143
Subject Title	**MedTech Innovation and Entrepreneurship**
Credit Value	3
Level	3
Pre-requisite / Co-requisite	Nil
Objectives	With the significant changes in science, engineering, and medicine these days, medical technology innovation and entrepreneurship have become more important; therefore, our students should be adequately trained with business and inspirations for technical innovation. This subject aims to train students to (1) have a general understanding of technology innovation and entrepreneurship, (2) understand the current health care system and promote their thinking for the future, and (3) get inspiration for innovation ideas while converging with adjunct faculties such as engineering. The MedTech innovation and entrepreneurship includes the whole process of bringing disruptive technology to the market; that is, from the novel idea to commercial use. We expect that students with biology, medicine, or engineering background have an interest in the subject. They will interact with other fellows in the class through the course, exchanging ideas, manipulating the business model, etc. Students will be encouraged to think of real examples, the financial application process, and predict the trend of innovation in medicinal technology.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Clearly understand the business concepts and the business patterns that are used in MedTech innovation b. Demonstrate an understanding about the innovative technology producing processes c. Acquire the ability of critical thinking to innovate new medical products and technologies d. Identify the quality of ideas and familiar with the ways to find support for idea substantialization

Contribution to Programme Outcomes (Refer to Part I Section 10)	▪ Programme Outcome 5: Demonstrate an ability to understand the impact of BME solutions in a global and societal context, especially the importance of health, safety, and environmental considerations to both workers and the general public. (Teach & Practice) ▪ Programme Outcome 6: Demonstrate an ability to evaluate research and professional literature, and understand the principles and practice of conducting research in clinical and industrial environments relevant to BME. (Teach & Practice) ▪ Programme Outcome 10: Demonstrate an understanding of professional and ethical responsibility. (Teach & Practice) ▪ Programme Outcome 12: Demonstrate an ability to recognize the need for, and to engage in life-long learning. (Teach & Practice) ▪ Programme Outcome 13: Demonstrate an understanding of contemporary issues. (Teach & Practice) ▪ Programme Outcome 14: Demonstrate an understanding of entrepreneurship and leadership. (Teach & Practice)
Subject Synopsis / Indicative Syllabus	**Subject Synopsis** **1. <u>Entrepreneurship: introduction to business</u>** Students will learn about business fundamentals, including business analysis with business models, and most importantly, healthcare system business. This knowledge would help them to understand entrepreneurship more and have an idea of the market. **2. <u>Finding the problems to solve and innovate</u>** Students will be introduced to recent innovative technology and the skills about making the technique commercial. Moreover, the students would develop their ideas about disruptive innovation in medical technology. They will also learn about how to raise funding while facing investors and the skills to convince investors that the medical technique is worthwhile for investment. **3. <u>MedTech Case studies</u>** Students will be applied with recent examples, learning the innovative idea, the particular business environment in such period, and how the scientists apply the business models under the business environment. They will be encouraged to put themselves into a particular business environment, considering how to produce a novel idea and the pattern they would use to make the technique or equipment commercial. **Indicative Syllabus** Part 1: Entrepreneurship: Idea to Business ▪ Fundamental and Technical Analysis of Business and Entrepreneurship

	▪ Business Models and Environment ▪ Feasibility Analysis ▪ Fundamentals of the Health Care Business Part 2: Finding the Problems to Solve and Innovate ▪ Identifying Problems and Funding your Idea ▪ Disruptive Technology and Innovation in Business Model ▪ Instructor's Stories of Innovation ▪ Intellectual Property Part 3: MedTech Case Studies ▪ Neuro-implants ▪ Non-invasive Medical Diagnostics' Devices ▪ Application of Nanomaterials in Drug Delivery ▪ Co-operative Measurement with Biomedical Optics and Photonics ▪ Biomedical Imaging Techniques and Devices ▪ Devices for Bedside Diagnostics ▪ Application of Microfluidics in Drug Screening
Teaching and Learning Methodology	This course is an introductory course for students in Science and Engineering departments and interested in entrepreneurship to concreting innovative ideas. This course aims to provide business fundamentals and to inspire students to have innovative ideas for medical technology. The **lecture** introduces fundamental business concepts, business models, healthcare systems, the operating pattern of hospitals, and problem-solving skills to the students. Moreover, after students become familiar with the basic concepts, the recent innovative examples will be given by the visitors/lecturers, allowing students to think of how to apply the working pattern of the examples with their innovative ideas. Guests from industry will discuss about the ways of business start-ups and share success stories. **Quizzes will** test students' understanding of business concepts, business patterns, and healthcare systems; the **presentation** leads the students to read more and express their unique ideas with their understanding of entrepreneurship. For the presentation topic, students will be asked to do a case study, pick a MedTech company, and perform a case study on the companies to see what makes those companies successful. The students will present their findings in the group presentation. Also, the presentation will encourage students' critical thinking and idea exchange. In addition, **an essay** will allow students to apply the knowledge they have learned to address a present problem in the biomedical field. The students will present their findings and solutions in this essay.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
▪ Quizzes	50%	✓	✓		
▪ Presentation	25%	✓	✓	✓	✓
▪ Essay	25%	✓	✓	✓	✓
Total	100%				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Quizzes (individual): two quizzes will be used to assess the expected learning outcomes a and b.

Presentation (group): students will be grouped to give an oral presentation to demonstrate learning outcomes a, b, c and d.

Essay (individual): students are required to prepare an individual essay to demonstrate learning outcomes a, b, c, and d.

Student Study Effort Expected

Class contact:	
▪ Lectures	31 Hrs.
▪ Quizzes	5 Hrs.
▪ Visit	3 Hrs.
Other student study effort:	
▪ Assignment preparation	41 Hrs.
▪ Self-study	37 Hrs.
Total student study effort	117 Hrs.

Reading List and References	Textbooks: ▪ Bruce Barringer and R Ireland. Entrepreneurship: Successfully Launching New Ventures (6th edition). Pearson, 2018. ▪ Raphael Amit and Christoph. Business Model Innovation Strategy: Transformational Concepts and Tools for Entrepreneurial Leaders. Wiley, 2020. ▪ Craig Shimasaki, Biotechnology Entrepreneurship: Starting, Managing, and Leading Biotech Companies (1st edition). Academic Press, 2014. ▪ Bruce Barringer and R Ireland. Entrepreneurship: Successfully Launching New Ventures (6th edition). Pearson, 2018. ▪ Raphael Amit and Christoph. Business Model Innovation Strategy: Transformational Concepts and Tools for Entrepreneurial Leaders. Wiley, 2020. ▪ Craig Shimasaki, Biotechnology Entrepreneurship: Starting, Managing, and Leading Biotech Companies (1st edition). Academic Press, 2014.
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