Subject Code	SN5119
Subject Title	Healthcare Innovation
Credit Value	3
Level	5
Prerequisite	Nil
Objectives	To provide students with the essential knowledge about the elements and the processes of innovations in healthcare, which includes innovative healthcare applications and the enabling technologies; conceptualization and design practice; market research, value proposition, business models, and entrepreneurship; diffusion of innovation and societal impact; clinical evaluation; basic understanding of intellectual property and patent.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. appreciate the significance, needs and benefits of innovations in healthcare to the society; b. understand the basic concepts as well as values and roles of technologies in enabling innovations in healthcare; c. delineate the elements and process of healthcare innovations, as well as the business and social aspects of the innovations; d. understand the issues of healthcare innovations, including safety, clinical evaluation, intellectual property rights, and professional ethics; and e. demonstrate the ability to take part in innovations for healthcare.

Subject Synopsis/ Indicative Syllabus	1. Innovative healthcare applications with technologies in the areas of:
	   a. rehabilitation engineering, including assistive technologies, prosthesis and orthotics;
	   b. medical imaging;
	   c. biosensors;
	   d. social network and communication; and
	   e. virtual reality.
	2. Elements of the innovation process, including:
	   a. user centred design;
	   b. user journey;
	   c. market research and analysis;
	   d. user analysis;
	   e. value proposition;
	   f. business model and financing;
	   g. user behaviour, channels and acceptance;
	   h. pitching; and
	   i. entrepreneurship.
	3. Clinical evaluation, trials and FDA registration, safety and professional ethics.
	4. Value and protection of intellectual property, a general overview of the patent

	application and legal issues. 5. Social innovation: research on social challenges and opportunities to cultivate inter-disciplinary innovative design solution for social impact and societal change in healthcare.
Teaching and Learning Methodology	Students are introduced to the processes and issues of innovations in healthcare through lectures on the basis, case studies, guest talks by practitioners in the industry, and student-direct groups projects. Active learning is emphasized through discussions and critiques. • The lectures cover the concepts and processes of innovations in healthcare, the business models, marketing strategies, entrepreneurship, societal impacts, clinical concerns, and intellectual property rights. • Case studies of healthcare innovations are provided to illustrate the elements and issues involved in the innovation processes to reinforce the basic concepts discussed in the lectures. • The student-directed group projects provide an opportunity for students to put theory in practice and reinforce the knowledge they have gained in the classes. The project groups will be formed with students of different backgrounds to nurture interdisciplinary learning from peers and to stimulate innovative ideas. The students will conceptualize a potential innovation for healthcare in the project, carrying it through from idea to market.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
Written Test	30%		√	√	√	
Group project presentation	70%	√	√	√	√	√
Total	100%					

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

The performance of the students is evaluated based on a written test and their group projects by continuous assessment. The written test will be arranged at the end of the semester to assess the students' understanding of basic concepts and knowledge introduced in the lectures.

The assessments of the group projects are made in the two stages of the learning process:

• Interim presentation: Students will pitch their idea of healthcare innovation in a clear and concise manner about the motivations, significance and the intended outcomes. They will also delineate the structure and components, and demonstrate that considerable deliberations have been made and the feasibility of the project.

• Final presentation: Students will give a complete and comprehensive presentation

Student Study Effort Expected	Class contact:	
	Lectures, seminars and invited talks	21 Hrs.
	Tutorials and Presentations	16 Hrs.
	Test	2 Hrs.
	Other student study effort:	
	Student group project and report writing	33 Hrs.
	Self-directed study	38 Hrs.
	Total student study effort	110 Hrs.

of the proposed healthcare innovation, addressing all aspects of the innovation from idea to market in details. A poster is required to vividly highlight the main points of the innovation.

Reading List and References

References

1. Akay M (Editor), Handbook of Neural Engineering, Wiley, 2007.

2. Akay M (Editor), Wiley Encyclopedia of Biomedical Engineering, Wiley, 2006.

3. Hampton JR, The ECG Made Easy, 6th ed., Churchill Livingstone, 2003.

4. Webster JG (Editor), Bioinstrumentation, John Wiley & Sons, 2004.

5. Webster JG (Editor). Medical Instrumentation Application and Design, 4th ed., John Wiley & Sons, New York, 2009.

6. Ogrodnik, PJ, Medical Device Design: Innovation from Concept to Market. Oxford: Academic Press, 2013.

7. Trott, Paul. Innovation Management and New Product Development. Harlow, England; New York: Financial Times/Prentice Hall, 2012.

8. Griffin, R. W. and Ebert, R. J. Business Essentials. 10th ed. Prentice Hall, 2014.

9. Lesonsky, R. (2015) Start Your Own Business. 6th ed. Entrepreneur Press.

10. McMillan, A. Teach Yourself Entrepreneurship. McGraw-Hill, 2007.

11. Osterwalder, A. Business Model Generation: a Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons, 2010.

12. Osterwalder, A. Value Proposition Design: How to Create Products and Services Customers Want. Wiley, 2014.

13. Venkatesh, V. 2015. Technology Acceptance Model and the Unified Theory of

Acceptance and Use of Technology. Wiley Encyclopedia of Management. 7:1–9, 2015.

14. Wisdom, Jennifer P., et al. "Innovation adoption: a review of theories and constructs." Administration and Policy in Mental Health and Mental Health Services Research 41.4: 480-502, 2014

15. LivePlan: Business Plan Software (http://www.liveplan.com/features/build-your-business-pitch)

16. User-Centered Design Basics (http://www.usability.gov/what-and-why/user-centered-design.html)

17. Useful Value Proposition Examples (http://conversionxl.com/value-proposition-examples-how-to-create/)

18. Strategyzer: Business Model Generation (http://www.businessmodelgeneration.com/canvas/bmc)

19. Pitchenvy Gallery: A gallery of startup pitch decks (http://www.pitchenvy.com/pitches/)