

Subject Description Form

Subject Code	SN6006
Subject Title	Information Technology in Healthcare
Credit Value	3
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To equip students with basic yet essential knowledge of various (and state-of-the-art) information technologies that can be applied to healthcare and medicine applications, and to enable them to understand and participate in the design, development and implementation of healthcare applications by making use of these information technologies.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand basic yet essential knowledge of various (and state-of-the-art) information technologies that can be applied to healthcare and medicine applications, and understand and participate in the design, development and implementation of IT in their work places; b. Acquire a theoretical background in relevant aspects of basic scientific and healthcare disciplines that interact with the application of information science and technology for health-related and healthcare domains, in both health education and research and in patient care; c. Deal with and evaluate healthcare issues with insights from the perspective of IT and scientific methods, and engage in the design of information systems and experiments to tackle the issues; d. Understand the scientific basis of IT problems encountered in healthcare fields and have a better understanding of the use of IT.
Subject Synopsis/ Indicative Syllabus	<ol style="list-style-type: none">1. Electronic health records: terminology standards, information exchange standards, usability and evaluation2. Machine learning and medical image analysis: automatic medical image enhancement, detection, segmentation, registration, and basic knowledge of deep learning techniques and its applications in medical image analysis3. Virtual reality technology and application in health care4. Mobile and wearable applications in health care5. Clinical decision support systems: clinical decision making process, categories of clinical decision support system, knowledge-based and non-knowledge-based systems, active, semi-active and passive systems6. Health data privacy and security: security and privacy issues, security tools and solutions, data encryption methods

	7. Basic knowledge of bioinformatics																													
	8. Basic knowledge of public health informatics																													
Teaching/Learning Methodology	<p>Lectures:</p> <p>Lectures are given to introduce the application of information technology and technologies at large in healthcare and medicine, the fundamental concepts of the enabling technologies, and the design and implementation issues.</p> <p>Case study /Tutorial:</p> <p>Students are guided to discussed and criticize case studies concerning the research, design, and implementation of healthcare applications that employ information technologies or other technologies, in order to reinforce the concepts and principles introduced during the lectures.</p>																													
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="4">Intended subject learning outcomes to be assessed</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>1. Test</td> <td>40%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>2. Group Project and Presentation</td> <td>60%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Total</td> <td>100%</td> <td colspan="4"></td> </tr> </tbody> </table> <p>Written test: To assess students' level of understanding regarding the essential knowledge of technology applications in health care and the fundamental concepts of the enabling technologies.</p> <p>Group project and presentation: To provide students with an opportunity to demonstrate their understanding of the concepts and knowledge gained from the lectures. Students are required to critically review a contemporary work in healthcare application employing information technology or other technologies, or prepare a proposal from the perspectives discussed in lectures. They are also required to work in group and give a presentation.</p>		Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				a	b	c	d	1. Test	40%	✓	✓	✓	✓	2. Group Project and Presentation	60%	✓	✓	✓	✓	Total	100%				
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1. Test	40%	✓	✓	✓	✓																									
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Student Study Effort Expected	Class contact:																													
	▪ Lecture	23 Hrs.																												
	▪ Tutorial / Case study	16 Hrs.																												
	Other student study effort:																													
	▪ Pre-reading	13 Hrs.																												
	▪ Preparation of written test	26 Hrs.																												

	<ul style="list-style-type: none"> ▪ Preparation for term project and presentation 	32 Hrs.
	Total student study effort	110 Hrs.
Reading List and References	<p>Indicative Reading List:</p> <ol style="list-style-type: none"> 1. Williamson, John W. Healthcare Informatics and Information Synthesis: developing and applying clinical knowledge to improve outcomes. Thousand Oaks, Calif.: Sage Publications, 2002. 2. Shortliffe, Edward H. Medical Informatics: computer applications in health care and biomedicine. 3rd edition, New York, NY: Springer, 2006. 3. Eichelberg, M., Aden, T., Riesmeier, J., Dogac, A., and Laleci, G. B. A survey and analysis of Electronic Healthcare Record standards. ACM Computing Survey, 37, 4, pp. 277-315, 2005. 4. Lucas, Peter, "Bayesian analysis, pattern analysis, and data mining in health care," Current Opinion in Critical Care, 10(5):399-403, October 2004. 5. Curran, Christine R., "The informatics nurse: Helping to build the knowledge infrastructure for nursing," Nurse Leader, Volume 2 , Issue 3, Pages 26-29, 2004. 6. Siau, K. "Health care informatics," IEEE Transactions on Information Technology in Biomedicine, Volume: 7, Issue: 1, pp. 1- 7, 2003. 7. Riva, G, "Virtual Reality for Health Care: The Status of Research", Cyberpsychology & Behavior, Volume 5, Number 3, 2002, 219-225. 8. Krzysztof Zielinski K, Duplaga M, Ingram, D. Editors Information Technology Solutions for Healthcare, London: Springer-Verlag, 2006. 9. Cios, K.J., Data mining: a knowledge discovery approach. New York: Springer, 2007. 10. Graham S., Estrin D, Horvitz E., Kohane, I., Mynatt, E., Sim, I. Information Technology Research Challenges for Healthcare: From Discovery to Delivery, SIGHT Record, volume 1, issue 1, pp. 4-9, 2011. 11. Tiffany Veinot (Ed.). Proceedings of the 1st ACM International Health Informatics Symposium. ACM, New York, NY, USA, 2010. 12. Luo, G., Liu J. (Ed.). Proceedings of the 2nd ACM SIGHT International Health Informatics Symposium. ACM, New York, NY, USA, 2012. 13. Preim, Bernhard, Botha, Charl P. Botha. Visual computing for medicine: theory, algorithms, and applications. Second edition. Waltham, Mass.: Morgan Kaufmann, 2014 14. Wang B. Big data analytics in bioinformatics and healthcare, Hershey, PA, USA, 2015. 15. I. Goodfellow, Y. Bengio and A. Courville. Deep Learning, MIT Press, 2018. 	