<div align="center">**SUBJECT DESCRIPTION FORM**</div>

Subject Code	SN5307
Subject Title	Virtual Reality in Healthcare
Credit Value	3
Level	5
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To equip students with essential knowledge of virtual reality technologies with focus on their applications in healthcare, and to enable them to participate in the conceptualization and development of virtual reality applications for healthcare purposes.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Appreciate the application of virtual reality technologies in healthcare and medicine; b. Understand the fundamental concepts of virtual reality; c. Acquire knowledge of the hardware and software used in virtual reality applications; d. Understand the principles of virtual reality systems, with focus on healthcare applications; e. Acquire knowledge of virtual reality system evaluation and usability issues.
Subject Synopsis/ Indicative Syllabus	1. Concepts of virtual reality: Non-immersive and immersive virtual reality, web-based virtual reality, augmented reality, wearable computing. 2. Hardware interface and devices: Visual display devices, haptic interfaces, position and motion tracking, sensors. 3. Modelling and software: Shape modelling and representation, simulation techniques, generation of 3D virtual environment, graphics programming. 4. Healthcare applications: Rehabilitation, psychiatry, surgery, anatomical visualization, and medicine and healthcare education. 5. Evaluations and human factors: Performance measurement, usability, health and safety issues.
Teaching/Learning Methodology	<u>Lectures</u> Lectures are given to introduce the concepts and principles of virtual reality technologies, virtual reality applications in medicine and health care, system evaluation and usability issues. <u>Case study / Tutorial</u> Students are guided to discussed and criticize case studies concerning the research, and development of medical virtual reality applications to reinforce their understanding of the concepts and principles introduced during the lectures.

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
	1. Test	40%	√	√	√	√	√
	2. Term project & Presentation	60%	√			√	√
	Total	100%					

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

Written test:
To assess students' level of understanding regarding the essential concepts of virtual reality and their applications in health care, as well as the development and usability evaluation processes.

Term 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 virtual-reality healthcare application or prepare a proposal from the perspectives discussed in lectures. They are also required to work in group and give a presentation.

Projects:
To further strengthen the knowledge and skills learned by requiring the students to review contemporary work on the application of virtual reality in health care and to provide critical comments.

Student Study Effort Expected	Class contact	
	▪ Lecture	23 Hrs.
	▪ Case study/tutorial	16 Hrs.
	Other student study effort:	
	▪ Pre-reading	14 Hrs.
	▪ Preparation of written test	30 Hrs.
	▪ Preparation for term project and presentation	36 Hrs.
	Total student study effort	119 Hrs.

Reading List and References	1. Gerard K. Designing Virtual Reality Systems: The Structured Approach. London: Springer, 2005. 2. Burdea G. Virtual Reality Technology. 2nd ed., Hoboken, N.J.: Wiley-Interscience, 2003.

3. Stanney K. (Ed). Handbook of virtual environments: design, implementation, and applications. Mahwah, NJ: Lawrence Erlbaum Associates, 2002.

4. Sherman W.R. Understanding virtual reality: interface, application, and design, San Francisco, Calif.: Morgan Kaufmann, 2003.

5. Bowman D.A. et al. 3D User Interfaces: Theory and Practice, Boston: Addison-Wesley, 2005.

6. PRESENCE: Teleoperators and Virtual Environments, MIT Press Journal.

7. Virtual reality in orthopaedics. In: Clinical orthopaedics and related research, no. 442, Hagerstown, Md.: Lippincott Williams and Wilkins, 2006.

8. IEEE Transactions on Information Technology in Biomedicine

9. Computers in Biology and Medicine

10. Proceedings of Medicine Meets Virtual Reality

11. Proceedings of Computer Assisted Radiology and Surgery

12. Proceedings of Medical Image Computing and Computer-Assisted Intervention

13. IEEE Transactions on Biomedical Engineering

14. IEEE Transactions on Neural Systems Rehabilitation Engineering

15. IEEE Transactions on Visualization and Computer Graphics

16. IEEE Transactions on Medical Imaging

17. Medical Image Analysis