Subject Description Form

Subject Code	BME32102
Subject Title	**Applied Clinical Engineering**
Credit Value	3
Level	3
Prerequisite	BME31114 Biomedical Instrumentation and Sensors
Objectives	To equip students with engineering and clinical knowledge in a range of medical equipment; life cycle management of medical equipment; development of analytical and problem solving skills in equipment management; and understanding of safety controls in equipment operation.
Intended Learning Outcomes	Upon completion of the subject, students will achieve knowledge/skills to: a. Identify the engineering principles and clinical use of a range of common medical equipment, faults/problems and safety precautions that may be encountered in clinical settings in the applications of these medical equipment; b. Identify the aspects of hospital engineering in healthcare environment; and comprehend the aspects of life cycle management for medical devices; c. Apply safety controls and identify engineering standards to ensure proper operation of medical devices; d. Distinguish the different modes of equipment maintenance; Interpret preventive maintenance procedures, safety testing and calibration of common medical equipment used in healthcare institutions; e. Be able to compile proper documentations for clinical engineering practice; f. Develop self-learning initiatives and integrate learned knowledge for problem solving.
Contribution to Programme Outcomes (Refer to Part I Section 10)	▪ Programme Outcome 1: Demonstrate an ability to apply knowledge of mathematics, science, and engineering appropriate to the Biomedical Engineering (BME) discipline. (Teach and Practice) ▪ Programme Outcome 4: Demonstrate an ability to identify, formulate, and solve BME problems. (Teach) ▪ Programme Outcome 8: Demonstrate an ability to use the computer/IT tools relevant to the BME discipline along with an understanding of their processes and limitations. (Teach)

<table>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>

Clinical engineering: an overview
Selection and procurement strategies for medical equipment
Maintenance and service management: elements of an equipment control program, determining and organizing technical workload, service quality, equipment maintenance and replacement planning and procedures
Hospital engineering plant and systems in a healthcare institution;
Safety and risk management to ensure proper function of medical equipment during service life cycle

Engineering principles, clinical applications, preventive maintenance, calibration and safety issues related to a range of common medical equipment will be used to achieve the objectives of this course, such as infusion devices, baby incubators, respiratory and pulmonary machines, anaesthetic machines, electrosurgery equipment, biomedical lasers, haemodialysis machines, radiation therapy machines, nuclear radiation detection systems, etc.
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<tr><td>Teaching and Learning Methodology</td><td>Lectures, demonstrations and small labs.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="8">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td></td><td></td></tr>
<tr><td>Assignments, tutorials and quiz</td><td>60%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>Final quiz and mini-project</td><td>40%</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td>√</td><td></td><td></td></tr>
<tr><td>Total</td><td>100%</td><td colspan="8"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
Different assignments will be used to guide the students toward the learning objectives of the subject contents. Mini-project is used to facilitate students in applying learned knowledge to solve real-life problems. Students are expected to demonstrate their understanding of related knowledge through a mid-term and a final quiz.
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Student Study Effort Required	Class contact:	
	▪ Lectures	21 Hrs.
	▪ Practical Workshops	15 Hrs.
	▪ Presentations	3 Hrs.
	▪ Self-study and other student study effort	87 Hrs.
	Total student study effort	126 Hrs.
Reading List and References	**<u>References</u>** ▪ David Y. (Ed.), Clinical Engineering, CRC Press, 2003. ▪ Dyro J. (Ed.), Clinical Engineering Handbook, Elsevier Academic Press, 2004. ▪ Geddes L.A., Medical Device Accidents and Illustrative Cases, Lawyers & Judges Pub. Co., 2002. ▪ Chan A., Medical Technology Management Practice, Charles C Thomas Pub Ltd., 2003.	
Date of Last Major Revision	31 August 2017	