



MODULE SPECIFICATION

Part 1: Information			
Module Title	Advanced Medical Engineering		
Module Code	USSKLE-30-3	Level	Level 6
For implementation from	2020-21		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Health & Applied Sciences	Field	Applied Sciences
Department	HAS Dept of Applied Sciences		
Module type:	Standard		
Pre-requisites	Applied Clinical Engineering 2020-21		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description
<p>Overview: This module examines the science and principles supporting Medical Engineering.</p> <p>Educational Aims: To learn fundamental principles, systems and methods in medical engineering, and apply them to specific areas of relevance in the students' own practice.</p> <p>Outline Syllabus: The syllabus covers:</p> <ul style="list-style-type: none"> Propagation of electrical signals in the human body Effects of electrical current on the human body Biomedical signals frequency and bandwidth Common mode rejection Isolation – importance and impact on design, data signals, power supplies and patient safety Sample and hold circuits and their importance in the collection of biomedical signals Detection and control systems used in medical devices Advantages and disadvantages of analogue and digital signal processing Display techniques Data storage and retrieval Electronic systems in clinical engineering Mechanical systems in clinical engineering Clinical engineering terminology

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Fault finding methodology
Principles of safety tests

Understands the range of principles used by medical equipment that underpins their operation. A typical list of the types of equipment that should normally be considered is:

Pressure measurement

Invasive

Non Invasive

Temperature Measurement

Monitoring or recording of Physiological signals which are electrical in origin:

Electrocardiogram (ECG), Electroencephalogram (EEG), Electromyogram (EMG)

Pulse Oximetry

Electrosurgery

Infusion devices

Suction devices

Gas analysers and Monitors

Endoscopic systems

Physiotherapy Equipment

Life support equipment:

Defibrillators, ventilators, Anaesthetic equipment

Parameters being measured:

Normal ranges

Limits

Use of alarms

External influences

Principles of operation of telemedicine applied to clinical engineering applications

Principles of equipment networking applied to clinical engineering applications

Principles of remote equipment monitoring applied to clinical engineering applications

Storage and transfer of data for analysis and reporting

Teaching and Learning Methods: There will be 3 weeks of contact time at UWE in 3 x 1 week blocks. Included in each block week are laboratory workshops, lectures and tutorials. The contact time will equate to approximately 12 hours per block (a total of 36 hours).

In addition to the allocated hours on campus learning, students will engage in synchronous and asynchronous online learning. This will comprise a total of approximately 36 hours of online engagement through a combination of lectures, synchronous online tutorials, synchronous and asynchronous discussions, online quizzes, and collaborative group work.

Theoretical material within the module will be presented to the students in the form of regular lectures throughout each of the semesters in the academic year. During those times of work based learning, these lectures will be delivered online and involve a number of technological enhancements. The learning of lecture content will be reinforced through time spent in independent learning by the directed reading of recommended texts and through the use of technology enhanced learning resources that will be provided online. This online learning and engagement will be delivered through several avenues:

Synchronous online tutorials in protected learning time where the student will contribute/attend an online activity appropriate to the content at the time at which the academic will be present online to facilitate and lead this scheduled/timetabled session.

Asynchronous discussions in the student's own time (or during protected time where permitted and appropriate) where they will engage/collaborate with other students on the course or in specified groups, and in which the academic is permitted to moderate where necessary, but is not expected to contribute.

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Synchronous surgery sessions timetabled for a specific time in which the academic will be available online to answer live questions via discussion boards/blogs/collaborate or to respond to questions posted/asked prior to the session.

Interactive, online formative quizzes made available either following a particular package of knowledge exchange/learning, or in specified sessions/time periods.

Lectures delivered online through a combination of one or more of the following: visual/audio/interactivity/personal formative assessment.

A number of relevant practical sessions will be incorporated during the campus based blocks in addition to the work based learning that must be achieved under supervision by a workplace supervisor. Practical sessions will both drive hands on learning and the acquisition of technical skills at both individual and group working level.

The remainder of the independent learning time allocated to the module should be spent preparing written assessments for submission (B), and undertaking revision for the exams (A).

Part 3: Assessment

Component A:

The written exam (1.5 hours) will provide students with an opportunity to demonstrate their knowledge on a broad range of topics.

Component B:

Component B is a case study. The case study will provide an opportunity for students to demonstrate their ability to apply the principles of their relevant area of clinical engineering.

Group discussions in workshops underpin the case study. Students are provided with formative feed-forward for their exam through a revision and exam preparation session and through the extensive support materials supplied through Blackboard.

First Sit Components	Final Assessment	Element weighting	Description
Examination - Component A	✓	50 %	Examination (1.5 hours)
Case Study - Component B		50 %	Case study integrated assignment (2000 words)
Resit Components	Final Assessment	Element weighting	Description
Examination - Component A	✓	50 %	Examination (1.5 hours)
Case Study - Component B		50 %	Case study integrated assignment (2000 words)

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Part 4: Teaching and Learning Methods																	
Learning Outcomes	<p>On successful completion of this module students will achieve the following learning outcomes:</p> <table border="1"> <thead> <tr> <th style="text-align: left;">Module Learning Outcomes</th> <th style="text-align: left;">Reference</th> </tr> </thead> <tbody> <tr> <td>Critically evaluate physiological signals, their production, characteristics and propagation</td> <td>MO1</td> </tr> <tr> <td>Critically evaluate the passage and effects of electric current through the human body</td> <td>MO2</td> </tr> <tr> <td>Critically evaluate the process of evaluation and selection of equipment</td> <td>MO3</td> </tr> <tr> <td>Critically evaluate the impact of control of infection on the purchase, use and disposal of medical devices</td> <td>MO4</td> </tr> <tr> <td>Describe how the equipment management lifecycle is applied by clinical engineers</td> <td>MO5</td> </tr> <tr> <td>Critically evaluate the various methods medical devices use to collect, process, store and transfer data</td> <td>MO6</td> </tr> </tbody> </table>	Module Learning Outcomes	Reference	Critically evaluate physiological signals, their production, characteristics and propagation	MO1	Critically evaluate the passage and effects of electric current through the human body	MO2	Critically evaluate the process of evaluation and selection of equipment	MO3	Critically evaluate the impact of control of infection on the purchase, use and disposal of medical devices	MO4	Describe how the equipment management lifecycle is applied by clinical engineers	MO5	Critically evaluate the various methods medical devices use to collect, process, store and transfer data	MO6		
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Reading List	<p><i>The reading list for this module can be accessed via the following link:</i></p> <p>https://uwe.rl.talis.com/modules/usskle-30-3.html</p>																

Part 5: Contributes Towards	
This module contributes towards the following programmes of study:	