



## MODULE SPECIFICATION

Part 1: Information			
Module Title	Advanced Rehabilitation and Renal Engineering		
Module Code	USSKLF-30-3	Level	Level 6
For implementation from	2021-22		
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 2021-22		
Excluded Combinations	None		
Co-requisites	None		
Module Entry Requirements	None		
PSRB Requirements	None		

Part 2: Description
<p><b>Overview:</b> This module contains two distinct units, namely:</p> <p>Unit 1: Advanced Rehabilitation Engineering</p> <p>Unit 2: Advanced Renal Technology</p> <p>Students complete one of these units as prescribed by their pathway. Unit 1 aligns to the Healthcare Science (Clinical Engineering) Rehabilitation Engineering pathway. Unit 2 aligns to the Healthcare Science (Clinical Engineering) Renal Technology pathway.</p> <p><b>Features:</b> Module Entry requirements: Level 5 (or equivalent) biomedical engineering qualification</p> <p><b>Educational Aims:</b> See Learning Outcomes.</p> <p><b>Outline Syllabus:</b> The syllabus covers:</p> <p>Advanced Rehabilitation Engineering (Rehabilitation Engineering pathway):</p>

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### Scope of Practice:

Scope of Rehabilitation Engineering  
Scope of Assistive Technology  
Range and roles of multidisciplinary teams

### Technology (Design and Manufacture, Materials and Equipment):

Rehabilitation Technology Design  
Mobility, wheelchairs and Special Seating Systems  
Prosthetics and Orthotics  
Electronic Assistive Technology (Environmental Control systems (EC), Functional Electrical Stimulation (FES), Augmentative and Alternative Communication systems (AAC), Switches, Integrated Systems)  
Architectural Barriers and Design  
Aids to Daily Living  
Information Technology (IT) in Rehabilitation Engineering  
Materials and Manufacturing

### Measurement Technology:

Gait Measurement  
Tissue Interface Measurement  
Outcome Measurement  
Digital Photography  
Physiological Measurement  
Transducers

### Biomechanics:

Biomechanical Analysis  
Biomechanical Models  
Biomechanics of major muscular-skeletal structures  
Tissue Biomechanics  
Wheelchair Biomechanics  
Biomechanics of Seating  
Biomechanics of Gait  
Prosthetic and Orthotic Biomechanics

### Disabling Pathologies:

International Classification of Functioning, Disability and Health (ICF)  
Sensation and Sensory Loss  
Congenital Pathologies  
Diabetes  
Pressure Sores  
Spinal Pathologies  
Continence and Control  
Joint and Muscle Pathologies  
Neurological Disorders  
Ageing  
Cardiovascular disease

### Workshop Practice:

Workshop Safety  
Production planning and processes  
Hand tools, machine tools and computer aided manufacture  
Fixing and fastening  
Materials: Metals, plastics, wood, ceramics, biomaterials  
Use drawing packages  
Understand engineering drawings  
Device fabrication methods  
Device construction processes  
Knowledge of engineering test

### Health and Safety in Rehabilitation and Assistive Technology:

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Control of Substance Hazardous to Health (COSHH)  
Manual Handling

Advanced Renal Technology (Renal Technology pathway):

Renal anatomy, physiology and pathology  
Cardiovascular system and the role of blood  
Biochemistry, microbiology and virology applied to renal replacement therapy  
Solutions and concentrations  
Fluid and chemical transport  
Equilibrium and acid dissociation  
Hydrogen ion regulation  
Electrolytes and buffers  
Chemicals in the renal environment  
Formation of urine, renal perfusion  
Glomerular filtration, tubular function; absorption and secretion  
Homeostasis  
The urinary system  
Functions of the kidney  
Metabolism in cells  
Control of body water distribution  
Renal disease  
Consequences of renal failure  
The artificial kidney  
The history and development of dialysis  
Dialysis techniques and technology  
Access, the permanent and temporary catheter  
The fistula  
Blood temperature and low temperature treatments  
The measurement of blood pressure the importance of monitoring blood pressure data  
Blood volume monitoring  
Dialysis adequacy tools  
Low and high flux dialysis  
Middle molecule clearance  
Degenerative bone disease and dialysis complications  
Dialysis treatment options, long hour, short hour, frequent, alternate day, daily

Water sources and treatment – Municipal systems:

Municipal water supplies  
Municipal water supply treatments  
Municipal water supply standards  
Sampling and testing

The importance of water quality  
Legislation, standards and guidance  
Renal replacement therapy treatment scientific developments  
Transplant, dialysers developments, impact of stem cell research and genetics, service delivery options

**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

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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. This tutorial will be themed/planned.

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.

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 an individual and group working level.

The remainder of the independent learning time allocated to the module should be spent preparing written assessments for submission (B1), and undertaking revision for the exams (A1, A2).

Scheduled learning includes lectures, seminars, tutorials, project supervision, demonstration, practical classes and workshops; fieldwork; external visits; work based learning; supervised time in studio/workshop.

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion. These sessions constitute an average time per level. Scheduled sessions may vary slightly depending on the module choices you make.

### Part 3: Assessment

The Assessment Strategy has been designed to support and enhance the development of both subject-based and more transferable graduate skills, whilst ensuring that the modules learning outcomes are attained, as described below.

Component A:

The written exam will provide students with an opportunity to demonstrate their knowledge and critical thinking across the syllabus.

Component B:

Component B will provide an opportunity for students to demonstrate their ability to apply the principles of their relevant area of clinical engineering to an unseen problem and/or case study and evidence their skills in approaching and interpreting it appropriately.

Formative feedback is available to students throughout the module through group discussions, and in workshops.

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Students are provided with formative feed-forward for their exam through a revision and exam preparation session prior to the exam and through the extensive support materials supplied through Blackboard.

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

### Part 4: Teaching and Learning Methods

Learning Outcomes	On successful completion of this module students will achieve the following learning outcomes:																														
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Contact Hours	<b>Independent Study Hours:</b>	
	Independent study/self-guided study	228
	<b>Total Independent Study Hours:</b>	228
	<b>Scheduled Learning and Teaching Hours:</b>	
	Face-to-face learning	72
	<b>Total Scheduled Learning and Teaching Hours:</b>	72
	<b>Hours to be allocated</b>	300
	<b>Allocated Hours</b>	300
Reading List	<p><i>The reading list for this module can be accessed via the following link:</i></p> <p><a href="https://uwe.rl.talis.com/modules/ussklf-30-3.html">https://uwe.rl.talis.com/modules/ussklf-30-3.html</a></p>	

### Part 5: Contributes Towards

This module contributes towards the following programmes of study: