MODULE SPECIFICATION

Part 1: Information			
Module Title	Research and Diagnostic Methodologies		
Module Code	USSJYT-30-M	Level	Level 7
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	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: See Learning Outcomes

Outline Syllabus: Core technology relevant to all students reading for MSc in Biomedical Sciences:

Molecular biology (3h)
Isolation of nucleic acids, DNA extraction from bacteria, DNA extraction from animal cells, Isolation and purification of RNA, Restriction enzymes, Gel electrophoresis, DNA sequencing, Southern blotting, RFLP, In situ hybridisation, Recombinant DNA, Polymerase chain reaction, Reverse transcriptase PCR, Real-time PCR, DNA microarray.

Electrophoresis (1h)
Principles, Polyacrylamide, Agarose, Capillary, Isoelectric focusing.

Microscopy (2h)
Transmitted light microscopy, Dark field, Phase contrast, Fluorescence, Confocal, Inverted, Electron, Optical tweezers, Digital imaging and processing (empty magnification/image manipulation).

Students also learn methods that are relevant for their specialism. These are delivered as specialist methods such as:

Immunohistochemistry, immunocytochemistry, in-situ hybridisation (2h)
Cellular Pathology, Haematology, Applied Immunology.

Immunoassays (2h)
Latex immunoassay, Immunonephelometry, Radioimmunoassay, ELISA - Haematology, Clinical Biochemistry, Applied Immunology.

Flow cytometry (1h)
Cell cycle, DNA content analysis, T cell subset analysis and enumeration, Immunophenotyping – Leukaemia and lymphoma analysis, Stem cell enumeration, Use of biomarkers for diagnosis and prognosis (surface and internal biomarker staining), Cell sorting -stem cells, sperm (Haematology, Applied Immunology).

Spectroscopy (2h)
Mass spectrometry, MALDI-TOF - Clinical Biochemistry, Haematology, Medical Bacteriology, Applied Immunology.

Chromatography (1h)
High performance liquid chromatography, Gas-liquid chromatography, Two-dimensional - Clinical Biochemistry, Haematology.

Point of care testing (2h)
Standards and guidelines, Advantages and limitations, Evaluating a POCT device, Use of POCT devices, Quality and POCT, Technical or analytical validation (limits of linearity, analytical specificity and sensitivity, accuracy, precision), Clinical evaluation and validation - Clinical Biochemistry, Medical Bacteriology, Haematology, Applied Immunology.

Principles of good experimental design.
Methods for the assessment of data quality and method validation.
Descriptive statistics.
Inferential statistics and hypothesis testing.
Statistical significance, variance, regression, covariance.
Selecting the appropriate statistical method.

Effective literature searching strategies.
Critical reading skills.
Scientific writing skills.
The peer review process as applied to research papers and grant applications.

Evidence based medicine.
Introduction to bioethics.
An understanding of how Ethics Committees work.

Teaching and Learning Methods: The module will have a mixture of traditional lectures to cover the core scientific principles, supported by talks from researchers on the use of the core methods in the research sector. Coverage of the use of the scientific methods in the diagnostic sector will be supported by video presentations by diagnostic sector staff, and supported by visits to diagnostic laboratories where possible.

The statistics teaching will be by computer-based workshops delivered by expert staff.

72 hours of structured activity delivered across the 11 week semester

Part 3: Assessment			
The MSc BMS Programme has a programme level assessment strategy (see Programme Specification appendix 1), and all modules have their assessments designed to relate to that document. For parity across all routes the specialist subject modules on the MSc BMS programme have a 50:50 weighting of course work to final exam – this module is one of the specialist modules. Therefore the coursework has been designed in line with the programme assessment strategy. The assessments are marked to the BBAS standard PG marking criteria, and students are full briefed on the assessment both in writing and through a tutorial session.			
First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Set Exercise - Component B		30 %	Data interpretation exercise
Written Assignment - Component B		20 %	1500 word project proposal
Examination (Online) - Component A	✓	50 %	Online examination (24 hours)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Examination (Online) - Component A	✓	50 %	Online examination (24 hours)
Set Exercise - Component B		50 %	Data interpretation exercise

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	**Reference**
Show a detailed understanding of the theory that underpins a range of scientific methods	MO1
Demonstrate an awareness of the use of a range of scientific methods in both research and diagnostic settings including the evaluation of their role and limitations	MO2
Review critically the scientific literature (including national standard methods and standard operating proceedures) in relation to biomedical science methodological choices	MO3
Demonstrate a critical awareness of the principles of good experimental design in biomedical research	MO4
Select and perform appropriate statistical techniques for the analysis of experimental data	MO5

Contact Hours

Independent Study Hours:

Independent study/self-guided study	228

	Total Independent Study Hours:	228
	Scheduled Learning and Teaching Hours:	
	Face-to-face learning	72
	Total Scheduled Learning and Teaching Hours:	72
	Hours to be allocated	300
	Allocated Hours	300
Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ussjyt-30-m.html	

Part 5: Contributes Towards
This module contributes towards the following programmes of study: Biomedical Science [Sep][FT][Frenchay][1yr] MSc 2020-21 Biomedical Science (Medical Microbiology) [Sep][FT][Frenchay][1yr] MSc 2020-21 Biomedical Science (Medical Genetics) [Sep][FT][Frenchay][1yr] MSc 2020-21 Biomedical Science (Immunology) [Sep][FT][Frenchay][1yr] MSc 2020-21 Biomedical Science (Haematology) [Sep][FT][Frenchay][1yr] MSc 2020-21 Biomedical Science (Clinical Biochemistry) [Sep][FT][Frenchay][1yr] MSc 2020-21 Biomedical Science (Cellular Pathology) [Sep][FT][Frenchay][1yr] MSc 2020-21