

Module Specification

Module Summary Information

1	Module Title	Research Methods in Science and Engineering
2	Module Credits	20
3	Module Level	5
4	Module Code	BMS5005

5	Module Overview
<p>Rationale:</p> <p>This module is designed to give you the necessary skills and knowledge required to design, execute and disseminate a research project in the biomedical sciences and clinically-related research fields. It will prepare you to:</p> <ul style="list-style-type: none"> • Critically analyse scientific/medical research literature • Assess ethical aspects like fraud, plagiarism, medical and academic misconduct • Evaluate research design including data management, • Statistical analysis • Develop presentation skills S • Scientific writing and • Publishing skills. <p>The module will build upon the quantitative and professional methods already applied in various first year modules, but will focus on learning to take decisions for the why and how of doing research yourself and will set you up to be effective and successful in your final year research project.</p> <p>Alignment with Programme Philosophy and Aims:</p> <p>Although focussed on your development into an independent, investigative scientist, many of the learning outcomes feed directly into developing key transferable skills that enhance employability. Critical appraisal of current knowledge, advanced analytical and presentation skills are invaluable assets or many professional careers. Classroom and on-line activities encourage reflection on the scientific and ethical issues encountered in the healthcare setting. This module will build upon the research principles that you have acquired at level 4 and will equip you with the research skills required in the Level 6 Research Project module and in science-based careers.</p> <p>Learning and Teaching Strategy:</p> <p>You will be taught using a mixture of lectures (made interactive through e.g. responseware technology), workshops and computer based tutorials. Your learning will be supported by online resources on Moodle, designed to support taught sessions. You will test your understanding using formative online and in-class quizzes. In the computer-based tutorials you will develop analytical skills and use them to interrogate data sets. Active and informed participation through pre- & post-session work will be an integral component of the module. Such engagement will enhance your learning experience.</p> <p>To achieve the required 20 credits for this module, you will need to dedicate at least 200 hours studying the module material. For this module, the time is broken down in an approximately 25:75 ratio (directed : self-directed). The scheduled learning activities will include lectures, tutorials, practical sessions and facilitated discussions; approximately 20% of this learning will take place in an online environment.</p>	

Assessment Strategy

Assessment 1. Ability to critically analyse and interpret data will be assessed by issuing students with experimental data. Students will be assessed on their ability to write an introduction outlining the study under investigation and use a combination of descriptive and inferential statistical methods to test their hypothesis. Students will be invited to critically evaluate the experimental design.

Assessment 2. Students will be required to design a questionnaire-based study. As part of this exercise, students must define a hypothesis and null hypothesis. Participant selection criteria, methodology, methods of data analysis, together with relevant ethical documentation must be included.

6 Indicative Content

Introduction to experimental design and clinical studies
 Identification of variables
 Sources of error and how to minimise them
 Descriptive statistics and how to use them to obtain a “birds-eye” view of data
 Inferential statistics and how to test a null hypothesis
 Understanding clinical trials
 Scientific integrity
 Introduction to ethics
 Good laboratory (GLP) and good clinical practice (GCP)
 Questionnaire design
 Risk assessments (COSHH, GMOs etc)

7 Module Learning Outcomes

On successful completion of the module, students will be able to:

1	Systematically analyse data to demonstrate competency in descriptive and inferential statistics in order to draw a preliminary conclusion.
2	Critically appraise relevant current literature in order to formulate an operational research hypothesis.
3	Demonstrate a critical awareness of ethical, legal and safety issues in research.

8 Module Assessment

Learning Outcome	Coursework	Exam	In-Person
1,2,3	x		

9 Breakdown Learning and Teaching Activities	
Learning Activities	Hours
Scheduled Learning (SL) includes lectures, practical classes and workshops, peer group learning, Graduate+, as specified in timetable	38
Directed Learning (DL) includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning, as directed on VLE	42
Private Study (PS) includes preparation for exams	120
Total Study Hours:	200