MOLECULAR MEDICINE - 2024/5

Module code: BMSM020

Module Overview

In this module, students will work in teams and individually to evaluate and propose approaches to authentic, real-world, scenarios in biomedical research. The students will work with the academic facilitator to understand the basis of the research problem. The students will propose a critical experimental plan, incorporating a range of appropriate biochemical techniques. It is expected that the work will include details of cell lines or experimental models used, how experiments will be controlled, replicated, and evaluated, and which statistical models would be appropriate for the methods under discussion. We will keep a critical and evaluative research record of both team and individual efforts and students will have consolidation weeks to reflect on their experimental proposals and critically improve their work with our feedback. This module will require integration of knowledge you developed in the first 3 years of your program. In general, the module will help build valuable skills towards the Research Dissertation or Advanced Research Project Modules in this final year, as well as help you navigate challenges and scientific problems in your future workplace.

Module provider

School of Biosciences

Module Leader

ESPOSITO Maria Teresa (Biosciences)

Number of Credits: 15

ECTS Credits: 7.5

Framework: FHEQ Level 7

Module cap (Maximum number of students): N/A

Overall student workload

Workshop Hours: 6

Independent Learning Hours: 57

Seminar Hours: 9

Tutorial Hours: 3

Guided Learning: 66

Captured Content: 9

Module Availability

Semester 1

Prerequisites / Co-requisites

NA

Module content

Indicative content includes research problems in the following research areas:

- Cardiovascular science, hematology and tissue engineering
- Immunology and immunotherapy
- Innate Immunity
- Vaccinology

Assessment pattern

Assessment type	Unit of assessment	Weighting
Oral exam or presentation	GROUP PRESENTATION 1-Theme 1	5
Coursework	INDIVIDUAL SUMMARY 1-Theme 1	5
Oral exam or presentation	GROUP PRESENTATION 2- Theme 2	45
Coursework	INDIVIDUAL SUMMARY 3- Theme 3	45

Alternative Assessment

All students with valid ECs for group work or presentations may submit on an individual basis.

Assessment Strategy

The assessment strategy is designed to provide students with the opportunity to demonstrate team-based communication skills, writing skills, planning, evaluation, and critical analysis.

The summative assessment for this module consists of experimental questions that will be answered in team presentations and individual write-ups. The format provides opportunities for individual work and contribution to a team. Students submit their work after having several rounds of feedback and revision of their drafts.

The module contains 4 pieces of assessment:

- One presentation (Oral-type examination or presentation-5%) in Theme 1

- One write-up (coursework-5%) in Theme 1
- One group presentation for Theme 2 (Oral-type examination or presentation-45%).
- One write-up in Theme 3 (coursework-45%)

The work will include:

- Providing summaries of the experimental scenario posed and providing strategies to address the experimental task
- Critically evaluating experimental plans and expected outcomes
- Learning how to work with a budget and under ethical approval relevant for the workplace
- Considerations for suitable statistical evaluation of data
- Reflective evaluation of feedback and areas for improvement
- Analysis of limitations of the work proposed

Theme 1 has two elements of coursework, each worth 5% of the module mark which will help the students gain valuable feedback on how to present and write a formal report. Theme 2 and Theme 3 have separate units worth 45% of the mark each.

Specific feedback for the summative assessments will also be provided through SurreyLearn with the marks. We will also provide general feedback on the oral presentations. The students will consider the feedback as themes progress and we have consolidation weeks for further integration of our advice.

Formative assessment and Feedback:

We will provide feedback in an iterative mode, through discussions and refinement of solutions provided by the students. In class verbal feedback from peers and academic advisors (lecturers, PHD students) will be complemented with discussion boards attended by the Themes leaders and provision of blended material. One to one sessions and early draft revision will be provided in each theme. We develop resilience and resourcefulness important in the workplace.

Module aims

- Develop the students evaluative approach to experimental design and research based problem solving.
- Broaden the students critical appreciation of the applications and limitations of the biochemical methods discussed in the module.
- Enhance team working and team based communications skills.
- Encourage students to enhance their approach to the application of biochemical methods to novel research issues.

Learning outcomes

		Attributes Developed
001	On completion of this module students will be able to evaluate and critically assess biochemical methods as solutions to research-based problems. This is of particular importance for the workplace as laboratory scientists or evaluators.	KCT
002	Upon successful completion of this module students will be able to identify and critically explain the advantages and limitations of biochemical methods, in the context of the proposed research-based problem. We make emphasis in enhancing the critical knowledge of the students and expand their horizons towards identifying solutions for specific populations, decolonizing our research. Sustainable and feasible solutions are prioritized.	KCT
003	Through undertaking this module students will be able to work effectively as a team to undertake research and evaluation of the biochemical methods used in a proposed approach to a research-based biochemical problem. Here we also work on employability parameters since teamwork is paramount for research posts, as well as digital competency to enable collaboration and active solutions.	KPT

Attributes Developed

C - Cognitive/analytical

K - Subject knowledge

T - Transferable skills

P - Professional/Practical skills

Methods of Teaching / Learning

The learning and teaching strategy is designed to:

Provide a flipped learning environment, where students work with academic facilitators to approach research questions individually or in teams. In the session, students will initially work with provided materials which should stimulate discussion and provide a framework to allow exploration of the area in more detail. Guided learning toward understanding the problem posed will be provided in the form of manuscripts. Students will then expand their work independently by researching other manuscripts and methodologies adequate to answer the problems. The academic facilitators will then work together with the students to improve the solutions and the reports or presentations. The overall expectation is to have in-depth and critical discussions to examine the problems further and develop strategies to address them.

The learning and teaching methods include:

Flipped classroom seminars in which the students will examine the details of biochemical problems in various research subdisciplines and develop and propose strategies by which these may be addressed. It also includes guided and Independent learning as students search for the best solutions for their problems.

Academic facilitators will then work with the students to further guide them toward the best solutions addressing the limitations and strengths of the problems proposed.

Finally, the solutions must consider the limitations and advantages of any methods suggested and will provide a broad understanding of the cross-disciplinarity of the Biochemical techniques.

Activities Description:

In this module students are expected to engage with current literature to provide their own solutions and update their knowledge,

actively discuss with the academic facilitators, listen and implement their instructions and interact as well as share materials. It is essential to come to all scheduled sessions and work effectively in teams.

The Module will begin with a introduction to Molecular medicine and a presentation about Problem 1 for Theme 1. An on-demand lecture will also be provided with further molecular details about Problem 1. Students have one week to propose initial strategies in groups. In this reflection week, we will provide a package of 4 hours, in which we will cover detecting Gene and protein defects with a strong component of GWAS studies and mathematical methods, as well as guided learning on modern methods for protein production. These complementary lectures will help students who have not covered these elements in their degree so far.

Next, we will go deeper into Problem 1 with a guided exercise towards answering the questions and preparing the oral and written reports. At this stage, the strategies begin to solidify, and students will work further to perfect the answers. During this final week, there will be one-to-one tutorials to advance the strategy.

To assess the solutions we will have a session in which students will present their work and learn from their peers, followed by a feedback face-to-face session.

We have implemented a consolidation week free of tasks before embarking in Theme 2.

For Theme 2 we will have a similar iteration process, with a presentation followed by another week of independent work, next guided exercise and a tutorial towards answering the questions and preparing an oral presentation. For Theme 2 we will have a 3h presentation day in which students will present their work and learn from their peers. After Theme 2 we have another consolidation week free of activities.

Finally, for Theme 3 we will have a presentation, one week of independent work, followed by guided exercise, another week of independent work and a tutorial towards answering the questions and preparing a written report to be submitted one week later.

Indicated Lecture Hours (which may also include seminars, tutorials, workshops and other contact time) are approximate and may include in-class tests where one or more of these are an assessment on the module. In-class tests are scheduled/organised separately to taught content and will be published on to student personal timetables, where they apply to taken modules, as soon as they are finalised by central administration. This will usually be after the initial publication of the teaching timetable for the relevant semester.

Reading list

https://readinglists.surrey.ac.uk
Upon accessing the reading list, please search for the module using the module code: BMSM020

Other information

Alignment to five pillars:

Resourcefulness & resilience:

We use seminars, workshops and presentations to evaluate students' progress as they solve important questions. The students propose all the solutions and become resourceful as the module develops. There is a strong element of resilience in their work across 3 themes on different topics. The students work in groups and become critical and able to gauge their progress and understanding of lab-work and experimental design.

Global & cultural capabilities:

Our themes cover inflammation, stem cells, blood and vaccination applicable to a variety of diseases of global importance and of special relevance in today's world. Our Module covers genetic association studies and human variation across the world, and we actively encourage students to address these differences in their solutions.

Sustainability:

We deal with Molecular Medicine and development of skills in key diseases and solutions to specific questions. We work in line with OneHealth approach towards good health and wellbeing. Our work focuses on real world scenarios and students work on providing solutions that can be implemented in real life.

Digital capabilities:

We use of various digital programs such as Surreylearn and Panopto for online interaction and review of content. We provide online access to textbooks and relevant scientific manuscripts. Students make ample use of literature databases, tools to design primers and searches to work on their problems. There is a high content of digital external resources to support lectures such as Journal articles and videos.

Employability:

The module is exceptionally designed with a laboratory scientist in mind. We solve problems by creating comprehensive strategies with solid background, technical solution, statistics, and budget in mind. The work by the students meet employers' expectations towards self-learning ability, critical analysis, specific scientific and molecular knowledge and problem-solving skills. The work is fast paced and helps student develop resilience.

Programmes this module appears in

Programme	Semester	Classification	Qualifying conditions
Biochemistry MSci (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Biomedical Science MSci (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module