

CELLULAR AND MOLECULAR PATHOLOGY - 2024/5

Module code: BMSM028

Module Overview

This module is designed to cover the pathogenesis aspects of a broad range of diseases that affect cells; tissues, and organs. Emphasis is placed on pathological conditions (both cancer and non-cancer disease) which are prevalent in various societies and cultures, and different genders, how these diseases emerge at molecular levels and what type of anomalies they cause together with the clinical challenge to detect and treat them. You will familiarise themselves with various clinical and laboratory diagnostic techniques, together with research that aims to improve your understanding of these diseases at the cellular and molecular level and their diagnoses. This will be vital in developing critical thinking about disease aetiology, their progression and how they can be targeted through novel therapies. A range of transferrable and professional skills are included in the module, including pathological evaluation, and the use of reference ranges in identifying abnormal results. Expert lecturers (both clinically trained and basic scientists) will cover detailed case studies of different diseases, with assessments designed to encourage independent further study of diseases not covered in the main lecture Programme. This blend of lectures from expert clinicians/non-clinicians supplemented by highly focused tutorials will ensure that you not only develop an advanced understanding of the molecular mechanisms underlying the emergence of diseases but are able to assess, appraise, criticize, and formulate hypotheses on how to develop next generation of highly effective precision medicine-based treatment approaches for disease diagnosis and treatment. This module complements other modules at level 7, namely Molecular Medicine and Infectious diseases and provides an excellent synergy in developing critical thinking on disease diagnosis, prognosis and therapeutics.

Module provider

School of Biosciences

Module Leader

ASIM Mohammad (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: 85

Lecture Hours: 16

Tutorial Hours: 7

Guided Learning: 18

Captured Content: 18

Module Availability

Semester 1

Prerequisites / Co-requisites

BMS3046 Pathology and Medicine and/or BMS3063 Cancer – Pathogenesis and Therapeutics

Module content

Introduction to cytopathology

Cancer diagnosis and prognosis

Benign prostate hyperplasia and prostate cancer

Molecular pathology, treatment, biomarkers and therapeutics targets in prostate cancer

Breast cancer

Next-generation approaches to identify cancer driver genes and biomarkers

Pathophysiology and causes of pancreatitis

Molecular genetics aspects of gynaecological disease

Diagnosis and treatment of pancreatic cancer

Liver cirrhosis: pathophysiology, causes, diagnosis

Neurological disorders such as dementia

Disorders of various blood cells

Clinical genomics

Head and Neck Cancer

Pathological case reports

Assessment pattern

Assessment type	Unit of assessment	Weighting
Coursework	Case Study Exercise	60
Oral exam or presentation	Poster Presentation	40

Alternative Assessment

None

Assessment Strategy

The assessment strategy is designed to provide you with the opportunity to demonstrate:

1. Knowledge and understanding of the pathogenesis, and clinical management of a range of cell; tissue, and organ disease
2. Ability to describe the principles of biomedical cellular pathology methods to diagnose disease and detect biomarkers of disease
3. Ability to critically evaluate, for specific disease examples, the role of cellular and molecular pathology in making differential diagnoses
4. Ability to identify and critically evaluate limitations of current diagnostic methods, and research that is intended to overcome these limitations
5. Explain molecular subtypes of diseases and their role in disease diagnosis and prognosis

Based on the above, the summative assessment for this module consists of:

- Case study exercise/coursework: Investigation of two different disease cases (weighted at 30% each)

The case study/assignment exercise fosters a deep understanding of clinical and scientific principles that underpin disease pathology, its diagnosis and treatment. The scenarios provided in the case studies/assignment include realistic and authentic challenges. They are designed to promote the development of independent and critical thinking and urge you to carry out research from varied sources, primarily from original research papers and review articles. This assessment covers Learning Outcomes 2; 3; 4.

- Poster presentation: Individual assignment, to be presented to class members during a poster/seminar session

The poster presentation assessment evaluates recent research in cellular and molecular pathology of the disease. How does research into pathogenesis reveal biomarkers and therapeutic targets for improved diagnostic methods and treatment strategies respectively? Based on their teaching content, you will choose a specific disease area and research recent scientific literature to discuss the limitations of current diagnostic methods and therapy, together with research developments that aim to improve these. This assesses Learning Outcomes 1; 2; 4; 5.

Formative assessment: Formative assessment is integral to this module and will be provided by a specific tutorial to discuss the coursework assessments, and during lectures, by using questions and discussions throughout.

Feedback: You are given plenty of room to initiate and engage in discussions as individuals and as team, and receive verbal feedback during lectures on the lecture topic. Detailed feedback is given for summative coursework assessment by extensive annotation of the written assessment reports, and by a feedback report for the poster presentation assessment.

Module aims

- Study the pathogenesis and clinical management of a range of diseases of cells; tissues, and organs

- Study the principles of biomedical cellular pathology investigations used to diagnose and detect disease biomarkers
- Highlight the scope and limitations of biomedical cellular and molecular pathology investigations in the context of making differential diagnoses
- Describe diagnostic and prognostic research in cytopathology and histopathology investigation
- Discuss subtypes of diseases with emphasis on various types of cancers

Learning outcomes

		Attributes Developed
001	Explain the pathogenesis, and clinical management of a range of cell, tissue, and organ diseases	KC
002	Understand the principles of biomedical cellular pathology methods to diagnose disease and detect biomarkers of disease	KC
003	Discuss, for specific disease examples, the role of cellular and molecular pathology in making differential diagnoses	KCP
004	Identify limitations of current diagnostic methods, and explain examples of research which is intended to overcome these limitations	KCT
005	Explain molecular subtypes of disease and how this can complement disease diagnosis and prognosis	KCPT

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:

1. Provide specialist lectures about the pathogenesis and clinical management of a range of diseases of cells; tissues, and organs.
2. Familiarise with fundamental concepts of the role of clinical investigations in the diagnosis and prognosis of diseases
3. Facilitate the development of independent critical thinking in disease pathology via an in-depth understanding of the most pressing problems in disease diagnosis and treatment.
4. Encourage student engagement with lecturers and industrial colleagues to gain critical feedback to develop their coursework allowing them to gain intellectually nurturing opportunities culminating in students developing novel perspectives on disease pathogenesis.

This will be introduced through lectures and consolidated through class discussions/tutorials.

The teaching methods therefore include:

A lecture programme, complemented by several tutorials to facilitate coursework assessments and class discussion on biomarker developments and case report studies.

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: **BMSM028**

Other information

Resourcefulness & Resilience: You will develop an understanding of clinical genomics platforms to conduct independent investigations to improve disease diagnosis and develop novel therapeutic strategies. Problem-solving-based learning (PBL) and self-directed flipped learning supported by in-class tutorials/skill development exercise further aids in their understanding of disease pathophysiology, their management, and most importantly the limitations in their diagnosis and treatment thus urging them to critical thinking to solve these pressing issues. Further independent research to complement in-class learning via student-led selection and completion of case studies. Provision of student feedback hours to discuss areas where improvements are needed.

Global and cultural capabilities: Lecture content to cover pathological aspects of a variety of human diseases (non-infectious), with particular emphasis on molecular and cellular pathological aspects of diseases which are prevalent among different groups of people (e.g., gender) in different parts of the world.

Sustainability: Through the analysis of case studies and the development of necessary skills to understand the cellular and molecular pathological basis of disease, you will develop the necessary skills to combat real-world sustainability issues. In line with OneHealth approach the module works towards relevant SDGs such as SDG4-good health and well-being. Disparities in access to healthcare with special reference to third world countries with high mortality to incident ratio will highlight the need to develop better diagnostic tools feasibly available for mass testing for the betterment of the human race.

Digital capabilities: Development of necessary skills to query subject-specific digital tools such as clinical gene expression profiling (e.g., ProteinAtlas, GEPIA) in healthy and diseased states. You will develop digital capabilities through learning the clinical genomics and histopathology web portal to conduct independent investigations which is vital for the completion of both elements of their summative assessment. The use of video communication tools such as Zoom/Teams to facilitate discussion and for online/hybrid communication. Creation of digital reports including posters, and use of Surreylearn as a further means of discussion.

Employability: The Biomed MSci programme has received accredited by the Institute of Biomedical Science (IBMS). This module as part of the wider programme meets the required standards of proficiency of scientists. Through gaining an in-depth understanding of cellular and molecular pathology via case studies/presentations, you will develop critical knowledge and problem-solving skills making you highly competitive with potential employers in national health services, and in pharma industry etc.

Programmes this module appears in

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

Please note that the information detailed within this record is accurate at the time of publishing and may be subject to change. This record contains information for the most up to date version of the programme / module for the 2024/5 academic year.