2005/06 Taught Postgraduate Module Catalogue

BIOL5235M

Molecular Cell Biology 2
10 credits

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Taught Semester 1 View Timetable

Year running 2005/06

Pre-requisite qualifications
BSc or equivalent

This module is not approved as an Elective

Objectives
On completion of this module, students should be able to:

1. Provide a brief overview of the exocytic and endocytic pathways in eukaryote organisms:
This includes a brief overview of regulatory molecules that programme the translocation and movement of proteins through the secretory pathway; protein motifs recognised by such regulators; receptor internalisation of nutrients and growth factors.

2. Provide a brief overview of components of protein translocation and secretion machinery in prokaryotes:
Such mechanisms are of potential importance in antibiotic therapeutics and resemble eukaryote pathways. Different model systems are considered for both gram positive and gram negative bacteria.

3. Understand the control of the eukaryote cell cycle and cell death:
The eukaryote (yeast to man) cell cycle is considered with emphasis on regulators via protein phosphorylation-dephosphorylation as well as proteolysis. Cyclins, cyclin-dependent kinases, phosphatases, inhibitors of such components, growth factor and cytokine activation, relation of the cell cycle to cancer are considered. Programmed cell death (apoptosis) is also considered in relation to oncogenesis and regulatory factors such as Bcl-2, Bax and caspases are highlighted.

4. Describe the cellular cytoskeleton and cell adhesion:
Cellular movement in complex organisms is regulated by components which interact with the substratum. The molecular basis for cellular movement and adhesion by the actin, microtubule, and intermediate filament networks,

regulatory molecules and transmission of extracellular signals to these networks are highlighted. How these are modulated by adhesion receptors that bind to specific extracellular substances are considered as well.

5. Describe the cellular basis for immunity:
The humoral immune system will consider antibody and complement systems plus the genetic evolution of such defence systems. The cellular immune system will focus on the T-cell mediated immune recognition system with relevance to MHC Class I and MHC Class II recognition and responses.

6. Advanced topics in molecular cell biology:
A choice of 1 advanced topics (from 6 offered) in different areas of molecular cell biology covering areas such as intracellular signalling, angiogenesis, exo- and endocytosis and other areas will be taken.

7. Evaluate experimental findings and data:
The students will carry out tutorials where papers are summarised and evaluated to help their progress in evaluating experimental findings. Concise abstracts must be written beforehand for each paper and evaluated by the tutor. Assessed coursework on linked problems in molecular cell biology where the students are required to apply quantitative and qualitative analyses.

Syllabus
This module is aimed at providing MRes/MSc students from a variety of backgrounds with lectures on molecular cell biology and a choice of 1 specialised topic in linked areas. Lectures are linked to tutorial analysis of experimental papers where the students are asked to evaluate the experiments, conclusions and provide critical analysis. Assessed coursework on problems in molecular cell biology using qualitative and quantitative approaches will highlight the nature of hypothesis-driven research to answer key questions in molecular cell biology. Performance in the module will be based on tutorial work and assessed coursework

Paper Analysis
3 key papers in molecular cell biology from EMBO J., PNAS, J. Cell Biol., J. Cell Sci., or Mol. Biol. Cell.
Areas covered include cell cycle, membrane traffic, cytoskeleton, signalling, human disease and areas linked to lectures and modules
Students are asked to read the papers and prepare a brief definitive summary/abstract before each tutorial
Each tutorial will involve a discussion of the data and conclusions of each paper: strengths and weaknesses of the work will be explored

Assessed Coursework (3 compulsory pieces of work)
Quantitative Analysis
Qualitative and Morphological Analysis
Biochemical Analysis

Teaching methods
Lectures: 22 x 1 hour;
Tutorials: 3 x 1 hour.

Private study
Reading for lectures: 45 hours;
Paper analysis for tutorials: 15 hours;
5 hours study per assessed work: 15 hours.

Progress monitoring
Students will be closely monitored and performance marked in small group tutorials and paper analyses. Assessed coursework on molecular cell biology problems will be evaluated in parallel.

Methods of assessment
Paper analysis and performance in tutorials: 20%;
Problem solving x 2: 30%;
Literature review essay: 50%.

Reading list
The reading list is available from the Library website