LF206-15 Molecular Cell Biology

24/25

Department
Life Sciences
Level
Undergraduate Level 2
Module leader
Philip Young
Credit value
15
Module duration
10 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

The module aims to achieve a more in depth understanding of the basics of molecular biology. Students will understand the organisation and complexity of the sequence constitution of chromosomes in both Pro- and Eukaryotes. They will be able to understand how genes are controlled by building on the basics learnt in LF104 Molecules, Cells and Organisms on the nature of transcriptional control. They will be able to place this understanding into the context of chromatin remodelling, and will be introduced into the molecular biology of epigenetics. Students will gain an understanding of the mechanism of other layers of post-transcriptional/translational/post-translational control. They will be introduced into modern molecular methods and how they are used to study modern biological problems.

Understanding the biology of eukaryotic organisms requires knowledge of their organisation and operation at the cellular level. An appreciation of the means by which cells perform their many functions is a prerequisite for detailed study of the underlying biochemistry. This module does not cover the entire range of subjects that could be included under the heading of Cell Biology but concentrates on key areas to illustrate principles and to allow students access to the wider range of information available in modern texts.

Module aims

- To achieve a thorough understanding the structure and sequence content of both

Prokaryotes and Eukaryotes.
- To understand the control of gene expression at multiple layers - from chromosomal context, to expression, to modifications of the product.
- To understand the most recent methodology in the field and the context in which they are used.
  In the associated tutorials, which is largely based around original research papers, the students should gain an appreciation of how scientific discoveries are made, and the general principles of scientific research. It will also allow students to follow in detail an investigation of the activity of a particular gene product using recombinant DNA technology.

Students should gain a detailed understanding of the molecular biology which underlies the fundamental cellular processes of:

- The cytoskeleton in cellular structure, function and motility
- Mechanisms controlling cell proliferation and genome stability
- Protein processing in secretory pathway organelles
- Cell death programs in eukaryotic cells

Students are expected to gain a clear appreciation of the principles that underpin current understanding of these processes and also of the experimental approaches by which these have been elucidated.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Prokaryote Genomes
Eukaryote Genomes
Transcription and Post-transcriptional Gene Control
Advanced molecular techniques, microarrays, deep sequencing,
directed reverse genetic techniques.
Translation and translational control.
Post-translational modifications and events
Evolution of the eukaryotic cell
Microtubule cytoskeleton
Actin filaments
Actin motors
Cell cycle
Deregulation of the cell cycle in cancer
Mitosis
Cell death (necrosis and apoptosis)

Learning outcomes

By the end of the module, students should be able to:

- Students will understand the organisation and complexity of the sequence constitution of

chromosomes in both Prokaryotes and Eukaryotes.
- They will be able to understand how genes are controlled by building on the basics learnt in LF104 on the nature of transcriptional control
- They will be able to place this understanding into the context of chromatin remodelling, and will be introduced into the molecular biology of epigenetics
- Students will gain an understanding of the mechanism of other layers of post-transcriptional/translational/post-translational control
- They will be introduced into modern molecular methods and how they are used to study modern biological problems.
- Students will gain a detailed understanding of the biology that underlies the fundamental cellular processes of such as the control of cellular duplication by cyclin-dependent kinases, the major forms of the cytoskeleton and the process of cell death.
- The principles that underpin the current understanding of these processes and their impact on development and disease form the basis of this module.

Indicative reading list

Lodish Molecular Cell Biology 6th edition 2007
Alberts Molecular Biology of the Cell 5th edition 2007

Students are directed to the current literature for an up-to-date appreciation of developments in this area.

Research element

30% of the module marks will involve a laboratory class

Subject specific skills

Understand the structure and sequence content of both Prokaryotes and Eukaryotes

Understand the control of gene expression at multiple layers - from chromosomal context, to expression, to modifications of the product

Transferable skills

Self directly learning
Adult learning
critical appraisal of source material

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (13%)
Practical classes	3 sessions of 6 hours (12%)
Private study	112 hours (75%)
Total	150 hours

Private study description

112 hrs self-study and directed reading

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group D

	Weighting	Study time
Molecular Cell Biology Lab	30%	30 hours
Students will need to develop their own cloning strategy to amplify Actin cDNA from a total RNA library.		
Online Examination	70%	45 hours
The examination for LF206 will be a 1.5 hr paper in June.		

- Online examination: No Answerbook required

Assessment group R

	Weighting	Study time
In-person Examination - Resit	100%	
Re-assessment exam for LF206		

- Answerbook Green (8 page)
- Students may use a calculator

Feedback on assessment

Pastoral meetings with personal tutors

Past exam papers for LF206

Availability

Courses

This module is Core for:

- Year 2 of UBSA-C700 Undergraduate Biochemistry
- ULFA-C1A2 Undergraduate Biochemistry (MBio)
    - Year 2 of C1A2 Biochemistry
    - Year 2 of C700 Biochemistry
- Year 2 of ULFA-C702 Undergraduate Biochemistry (with Placement Year)
- Year 2 of ULFA-C1A6 Undergraduate Biochemistry with Industrial Placement (MBio)
- UBSA-3 Undergraduate Biological Sciences
    - Year 2 of C100 Biological Sciences
    - Year 2 of C100 Biological Sciences
- Year 2 of ULFA-C1A1 Undergraduate Biological Sciences (MBio)
- Year 2 of ULFA-C113 Undergraduate Biological Sciences (with Placement Year)
- Year 2 of ULFA-C1A5 Undergraduate Biological Sciences with Industrial Placement (MBio)
- UBSA-C1B9 Undergraduate Biomedical Science
    - Year 2 of C1B9 Biomedical Science
    - Year 2 of C1B9 Biomedical Science
    - Year 2 of C1B9 Biomedical Science
- ULFA-C1A3 Undergraduate Biomedical Science (MBio)
    - Year 2 of C1A3 Biomedical Science
    - Year 2 of C1B9 Biomedical Science
- Year 2 of ULFA-C1A7 Undergraduate Biomedical Science with Industrial Placement (MBio)
- ULFA-CB18 Undergraduate Biomedical Science with Placement Year
    - Year 2 of CB18 Biomedical Science with Placement Year
    - Year 2 of CB18 Biomedical Science with Placement Year
    - Year 2 of CB18 Biomedical Science with Placement Year
- Year 2 of UIPA-C1L8 Undergraduate Life Sciences and Global Sustainable Development
- Year 2 of ULFA-B140 Undergraduate Neuroscience (BSc)
- Year 2 of ULFA-B142 Undergraduate Neuroscience (MBio)
- Year 2 of ULFA-B143 Undergraduate Neuroscience (with Industrial Placement) (MBio)
- Year 2 of ULFA-B141 Undergraduate Neuroscience (with Placement Year) (BSc)

This module is Core optional for:

- Year 2 of UIPA-C1L8 Undergraduate Life Sciences and Global Sustainable Development