

School of Medicine, Medical Sciences & Nutrition

BC3503

The Molecular Control of Cell Function

Course Handbook

2023-2024

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# Course Summary

Welcome to The Molecular Control of Cell Function. The course emphasises the diversity of roles played by protein molecules in the life of individual cells, tissues and organisms. We begin by looking at enzymes, how they act and how they are regulated. This leads on to a discussion of signalling molecules and how metabolic pathways are regulated, a topic that is further developed in one of the practicals. We will discuss metabolic disorders and cover some of the fundamental aspects of the structural and functional organisation of the cell, and consider how cells interact with and respond to signals they receive from their environment. We will also cover how cells interact with adjacent cells and with the extracellular matrix.

# Course Aims & Learning Outcomes

Aims

The overall general aims are to enable students:

* To become knowledgeable about the fundamental roles played by selected proteins or groups of proteins in the working life of cells, tissues and organisms;
* To experience some of the laboratory procedures that are used to acquire the information learned about in lectures. This will also serve the general function of increasing students’ level of experience in designing laboratory work and in data interpretation; and
* To gain experience in researching a topic and present the findings in written form.

Learning Outcomes

At the end of the course students should be able to:

* Describe how enzymes function using selected examples; to include the role played by metal ions and co-enzymes, enzyme kinetics, inhibition of enzyme activity
* Describe the actions of selected enzymes; focusing on cysteine, aspartyl proteases and serine proteases
* Describe how enzymes are regulated; to include allosteric regulation, and covalent modification
* Describe the mechanisms that regulate body mass and the resultant metabolic diseases that occur when these go awry
* Describe the current status of understanding of type 1 and type 2 diabetes mellitus
* Describe molecular mechanisms that regulate cell shape and movement; to include cellular cytoskeleton biochemistry
* Describe selected aspects of cell signalling including the operation of tyrosine kinase receptors, G-proteins, lipid-derivatives and calcium ions as second messengers, cell signalling in the immune system
* Define the nuclear receptor superfamily and describe the overall mechanism of action of steroid receptors and related non-steroid receptors (thyroid hormone, retinoic acid, vitamin D receptors)
* Explain the tissue specificity of hormone response as regards glucocorticoids and mineralocorticoids
* Discuss the concepts of chemiosmosis and intracellular homeostasis
* Describe the structural and functional features of selected membrane transport proteins
* Describe the molecules and mechanisms that govern cell-cell adhesion and cell-matrix interactions

Students will also develop practical skills in data interpretation and communication. These represent transferable skills that will benefit students across a range of disciplines.

The aims of the course will be achieved through a combination of lectures, tutorials, and practical classes.

# Course Teaching Staff

Course Co-ordinator(s):

Prof Berndt Müller b.mueller@abdn.ac.uk

Other Staff:

Dr Monika Gostic [monika.gostic@abdn.ac.uk](mailto:monika.gostic@abdn.ac.uk)

Professor Iain McEwan iain.mcewan@abdn.ac.uk

Dr Samantha Miller sam.miller@abdn.ac.uk

Dr Nimesh Mody n.mody@abdn.ac.uk

Prof Nicola Mutch n.j.mutch@abdn.ac.uk

Prof Justin Rochford j.rochford@abdn.ac.uk

Dr David Stead d.stead@abdn.ac.uk

Assessments & Examinations

The course is assessed in two ways:

CONTINUOUS ASSESSMENT (40% of total): This will be made up of marks from the written reports and oral presentations as follows:

* Enzyme Kinetics Test, 5 %.
* Protein Biochemistry Report, 15%.
* Essay, 15 %.
* Chemiosmosis Workshop Assessment, 5 %.

See the attached timetable for the timing/deadlines of these assignments.

WRITTEN EXAMINATIONS (60% of total): This three-hour exam and will be held at the end of the second half-session in May/June. You will be asked to answer four questions from a choice of eight.

The total assessment of the course, recorded as a single CGS mark, is based on continuous assessment marks contributing 40% of the total and the written examination contributing 60%. To achieve an overall pass for the course you must obtain a CGS score of D3.

# Class Representatives

We value students’ opinions in regard to enhancing the quality of teaching and its delivery; therefore, in conjunction with the Students’ Association we support the Class Representative system.

In the School of Medicine, Medical Sciences & Nutrition we operate a system of course representatives, who are elected from within each course. Any student registered within a course that wishes to represent a given group of students can stand for election as a class representative. You will be informed when the elections for class representative will take place.

What will it involve?

It will involve speaking to your fellow students about the course you represent. This can include any comments that they may have. You will attend a Staff-Student Liaison Committee and you should represent the views and concerns of the students within this meeting. As a representative, you will also be able to contribute to the agenda. You will then feedback to the students after this meeting with any actions that are being taken.

Training

Training for class representatives will be run by the Students Association. Training will take place within each half-session. For more information about the Class representative system visit [www.ausa.org.uk](http://www.ausa.org.uk) or email the VP Education & Employability [vped@abdn.ac.uk](mailto:vped@abdn.ac.uk) . Class representatives are also eligible to undertake the STAR (Students Taking Active Roles) Award with further information about this co-curricular award being available at: [www.abdn.ac.uk/careers](http://www.abdn.ac.uk/careers).

Problems with Coursework

If students have difficulties with any part of the course that they cannot cope with, alone they should notify the course coordinator immediately. If the problem relates to the subject matter general, advice would be to contact the member of staff who is teaching that part of the course. Students with registered disabilities should contact the medical sciences office, ([medsci@abdn.ac.uk](mailto:medsci@abdn.ac.uk)) (based in the Polwarth Building, Foresterhill) to ensure that the appropriate facilities have been made available. Otherwise, you are strongly encouraged to contact any of the following as you see appropriate:

* Course student representatives
* Course co-ordinator
* Convenor of the Medical Sciences Staff/Student Liaison Committee
* Personal Tutor
* Medical Sciences Disabilities Co-ordinator (Dr Derryck Shewan)

All staff are based at Foresterhill and we strongly encourage the use of email or telephone the Medical Sciences Office. You may have a wasted journey travelling to Foresterhill only to find staff unavailable.

If a course has been completed and students are no longer on campus (i.e. work from second half session during the summer vacation), coursework will be kept until the end of Fresher’s Week, during the new academic year. After that point, unclaimed student work will be securely destroyed.

# Course Reading List

The recommended texts for this course are:

Biochemistry 9th edition (2019). Lubert Stryer; Jeremy Berg; John Tymoczko; Gregory Gatto; Lubert Stryer; Jeremy Berg; John Tymoczko; Gregory Gatto. Publisher: WH Freeman (MacMillan learning)

Molecular Cell Biology 8th Edition (2016) or 9th edition (2021). Harvey Lodish; Arnold Berk; Chris A. Kaiser; Monty Krieger; Anthony Bretscher; Hidde Ploegh; Angelika Amon; Kelsey C. Martin. Publisher: WH Freeman (MacMillan learning)

Other appropriate textbooks include:

Molecular Biology of the Cell, 7th edition (2022). Bruce Alberts, Rebecca Heald, Alexander Johnson, David Morgan, Martin Raff, Keith Roberts, Peter Walter, John Wilson, Tim Hunt Publisher: WW Norton & Company.

Lehninger Principles of Biochemistry 8th edition (2021). David L. Nelson; Michael M. Cox. Publisher: WH Freeman (MacMillan learning).

Biochemistry 6th edition (2016) Reginald H Garrett; Charles H Grisham Publisher: Cengage.

You will be expected to read around the subject matter presented in lecture and tutorials using the range of textbooks available through the University library.

Additional specific references may be provided by individual members of the teaching staff.

Lecture Synopsis

1. **How enzymes work – Prof Nicola Mutch**

The aim of this set of lectures is to develop an understanding of how enzymes function. We will consider how the catalytic efficiency of an enzyme relates to binding of a substrate to the active site and the chemistry of the reaction catalysed. The relationship between structure and function of an enzyme will be discussed in detail. We will also consider how enzymes use cofactors to enhance specificity or reaction rate, as well as more complex organisation into multi-enzyme complexes. Lectures will focus on:

* How enzymes are studied in the laboratory, including the measurement of single and linked reactions. Measuring activity to gain insight into more complex catalytic mechanisms.
* We will explore proteases with distinct but related mechanisms such as cysteine proteases, aspartyl proteases and serine proteases
* We will examine how cofactors modulate enzymatic activity. These include metal ions such as Ca2+, Mg2+ and Zn2+ or organic molecules such as NAD+, ATP and vitamin C.

1. **Regulation of enzyme activity –Prof Nicola Mutch**

Here we will consider the importance of how different regulatory mechanisms influence the activity and specificity of enzymes. Modulation of activity by allosteric regulation and reversible covalent modification will be discussed. Emphasis will be placed on defining the regulatory significance and complementary nature of these different mechanisms that modulate enzyme activity. Specifically, we will explore:

* How proteolysis can transition a protein from an inactive ’zymogen’ state to an active enzyme. Serine proteases, which are involved in digestion and blood coagulation, will be used as examples.
* The concept of allosteric regulation, in relation to thrombin, the terminal enzyme in the blood coagulation cascade, as a definitive example of a complex enzyme whose activity is modulated by ‘effector’ molecules. These effectors bind to allosteric sites distinct from the active site and alter the enzymes specificity toward substrates.
* How reversible covalent modification can transition an enzyme from an active to inactive state. One example is phosphorylation which is crucial in modulating the activity of many enzymes including the family of kinases.

1. **Receptors and Signalling Molecules – Prof Berndt Müller**

Cell signalling, the mechanism of communication between cells in multicellular organisms, is important for growth and development. The responses to signalling range from altered gene expression, changes in metabolism to cell death. The aim of these lectures is to give an overview about mechanisms and cascades involved in signalling, and to discuss selected aspects in more detail. Disorders caused by defective signalling will also be discussed. Lectures will focus on:

* G- protein coupled receptors and second messenger’s production
* Receptor tyrosine kinases, Ras protein activation and kinase cascades
* Cytokine receptors, JAKs and STATs
* TGFβ signalling
* Lipid-derived second messengers and control of protein kinase B and protein kinase C

1. **Metabolic Diseases – Dr Nimesh Mody/Prof Justin Rochford**

The aim of these lectures is to give an overview of cellular functions and cell signalling that influences metabolic health. Emphasis will be placed on understanding the mechanisms that regulate body weight and energy storage. In particular we will examine how altering these pathways can contribute to conditions such as type 1 and type 2 diabetes and the development of obesity and related metabolic disorders.

* An overview of the central and peripheral control of body weight and glucose homeostasis, the role of muscle, liver and adipose tissue and the endocrine and nervous system (JR).
* The pathways that control hunger and satiety and how they can alter body weight (JR).
* The development and function of adipose tissue, what different types of adipose tissue do and how they influence metabolic health (JR).
* Type 1 diabetes as an autoimmune disease of the pancreas, insulin deficiency (causes, consequences and treatments) (NM).
* Type 2 diabetes with emphasis on the association with obesity and the role of insulin resistance and β cell defects (NM).
* Intracellular signalling in metabolism, including insulin signalling cascade and hepatic transcription factors in the regulation of glucose homeostasis (NM).

1. **Receptors and Signalling Molecules: Steroid hormone receptors and related proteins – Prof Iain McEwan**

The aim of this series of lectures is to illustrate mechanisms by which small hydrophobic molecules are used as signals to control proliferation, differentiation and cellular metabolism in multicellular organisms. The lectures will discuss the ever-growing family of nuclear receptors by focussing on steroid hormone receptors (glucocorticoid receptor, oestrogen receptor) and key non-steroid receptors (including thyroid hormone, retinoic acid, and vitamin D3 receptors). Our increased understanding of nuclear receptor mechanisms of action through domain swapping experiments, transfection studies and reconstitution of receptor activity in the yeast Saccharomyces cerevisiae will be discussed. The differential response of tissues to circulating hormones through metabolism, together with the implications for human health of disrupting nuclear signalling will also be considered.

* Introduction to nuclear receptor superfamily
* Overview of nuclear receptor structure and function
* Tissue specificity of the hormone response
* Glucocorticoids and mineralocorticoids exert different metabolic effects on target tissues (i.e. energy balance and salt balance respectively) but glucocorticoids can bind to both the glucocorticoid receptor and the mineralocorticoid receptor. The role of 11-beta-deydrogenase in regulating the specificity of mineralocorticoid hormones action.
* Defects in nuclear receptor signalling leading to genetic disease
* Resistance to androgens, thyroid hormones and vitamin D3
* Defects in metabolising enzymes

1. **Channels and Transporters – Dr Samantha Miller**

The aim of these lectures will be to describe classes of proteins that transport solutes across the plasma membrane and to relate where possible the molecular features of these molecules to their transport function.

* Bioenergetics associated with membrane transport processes. An overview illustrating ways in which cellular metabolism may be coupled to transport function. Chemiosmotic theory will be included.
* The distinction between carrier and channel transporters. The distinctive differences in the way these two classes of transporter function and how this relates to their molecular arrangement within the plasma membrane.
* We will explore the unique challenges and approaches to working with membrane proteins.
* The aquaporins with special reference to AQP1, AQP2, and AQP3 and their importance for water transport in kidney function.
* The amiloride sensitive sodium channel. The principle structural features of this epithelial transport protein and their relation to its transport function in particular ion selectivity.
* Sodium dependent and sodium independent glucose transporters with particular emphasis on SGLT1, and GLUTS 1, 2 and 4.
* The ABC (ATP-binding cassette) superfamily of proteins with special reference to the eukaryotic multidrug resistance (MDR) protein and the cystic fibrosis transmembrane regulator.

1. **Regulation of cell shape and movement – Dr Monika Gostic**

* Structure and function of intermediate filaments, microfilaments and microtubules.
* Function of components of cytoskeleton in cell structure, shape, motility and chromosome movement.
* Regulation of assembly, role of associated proteins including motor proteins (kinesin, dynein)
* Dynamic nature of these components.

1. **Multicellularity: cell-cell and cell-matrix interactions – Dr Monika Gostic**

The aim of these lectures is to discuss the processes of cell-cell adhesion, the structures and functions of cell-cell junctions, the biochemistry of the extracellular matrix, and the nature of cell-matrix interactions. Throughout, the emphasis is on how the matrix affects cell behaviour, and what happens when cell-matrix interactions malfunction.

* Cadherins and immunoglobulin superfamily proteins are major cell-surface glycoproteins concerned with cell-cell adhesion within tissues. Selectins are cell-surface glycoproteins concerned with the adhesion of circulating cells to blood-vessel walls.
* The three major types of cell-cell junctions are occluding (tight) junctions; anchoring junctions including cadherin-involving adherens junctions and desmosome junctions; and communicating (gap) junctions.
* Major components of the extracellular matrix are glycosaminoglycan-containing proteoglycans, collagen, elastin, fibronectin and laminin.
* Cell-surface integrin glycoproteins are key components in connecting the cytoskeleton with the extracellular matrix. They communicate information between matrix and the cytoskeleton and transmit information from the outside of the cell to the inside, through a series of recently-discovered pathways involving secondary messengers.

# In course assessment

You will have to write an in course assessment. The title and other information about the assessment will be given at the beginning of the course.

# Practical/Lab/Tutorial Work

The practical will be held in person. It focuses on protein engineering, purification and characterisation, and will be assessed by a brief report.

University Policies

Students are asked to make themselves familiar with the information on key education policies, available [here](https://www.abdn.ac.uk/staffnet/teaching/key-education-policies-for-students-11809.php). These policies are relevant to all students and will be useful to you throughout your studies.  They contain important information and address issues such as what to do if you are absent, how to raise an appeal or a complaint and how the University will calculate your degree outcome.

These University wide education policies should be read in conjunction with this programme and/or course handbook, in which School specific policies are detailed. These policies are effective immediately, for the 2022/23 academic year. Further information can be found on the [University’s Infohub webpage](https://www.abdn.ac.uk/students/) or by visiting the Infohub.

The information included in the institutional area for 2022-23 includes the following:

* Assessment
* Feedback
* Academic Integrity
* Absence
* Student Monitoring/ Class Certificates
* Late Submission of Work
* Student Discipline
* The co-curriculum
* Student Learning Service (SLS)
* Professional and Academic Development
* Graduate Attributes
* Email Use
* MyAberdeen
* Appeals and Complaints

Where to Find the Following Information:

C6/C7- University of Aberdeen Homepage > Students > Academic Life > Monitoring and Progress > Student Monitoriung (C6 & C7)

https://www.abdn.ac.uk/students/academic-life/student-monitoring.php#panel5179

Absences- To report absences you should use the absence reporting system tool on Student Hub. Once you have successfully completed and sent the absence form you will get an email that your absence request has been accepted. The link below can be used to log onto the Student Hub Website and from there you can record any absences you may have.

Log In - Student Hub (https://www.abdn.ac.uk/studenthub/loginbdn.ac.uk)

Submitting an Appeal- University of Aberdeen Homepage > Students > Academic Life > Appeals and Complaints

https://www.abdn.ac.uk/students/academic-life/appeals-complaints-3380.php#panel2109

Academic Language & Skills support

For students whose first language is not English, the Language Centre offers support with Academic Writing and Communication Skills.

Academic Writing

* Responding to a writing task: Focusing on the question
* Organising your writing: within & between paragraphs
* Using sources to support your writing (including writing in your own words, and

citing & referencing conventions)

* Using academic language
* Critical Thinking
* Proofreading & Editing

Academic Communication Skills

* Developing skills for effective communication in an academic context
* Promoting critical thinking and evaluation
* Giving opportunities to develop confidence in communicating in English
* Developing interactive competence: contributing and responding to seminar discussions
* Useful vocabulary and expressions for taking part in discussions

More information and how to book a place can be found [here](https://www.abdn.ac.uk/students/academic-life/study-resources-3379.php).

Medical Sciences Common Grading Scale

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Grade | Grade Point | % Mark | Category | Honours Class | Description |
| A1 | 22 | 90-100 | Excellent | First | • Outstanding ability and critical thought • Evidence of extensive reading • Superior understanding •The best performance that can be expected from a student at this level |
|  |
| A2 | 21 | 85-89 |  |
|  |
| A3 | 20 | 80-84 |  |
|  |
| A4 | 19 | 75-79 |  |
|  |
| A5 | 18 | 70-74 |  |
|  |
| B1 | 17 | 67-69 | Very Good | Upper Second | • Able to argue logically and organise answers well  • Shows a thorough grasp of concepts  • Good use of examples to illustrate points and justify arguments  • Evidence of reading and wide appreciation of subject |  |
|  |
| B2 | 16 | 64-66 |  |
|  |
| B3 | 15 | 60-63 |  |
|  |
| C1 | 14 | 57-59 | Good | Lower Second | • Repetition of lecture notes without evidence of further appreciation of subject • Lacking illustrative examples and originality • Basic level of understanding |  |
|  |
| C2 | 13 | 54-56 |  |
|  |
| C3 | 12 | 50-53 |  |
|  |
| D1 | 11 | 47-49 | Pass | Third | • Limited ability to argue logically and organise answers • Failure to develop or illustrate points • The minimum level of performance required for a student to be awarded a pass |  |
|  |
| D2 | 10 | 44-46 |  |
|  |
| D3 | 9 | 40-43 |  |
|  |
| E1 | 8 | 37-39 | Fail | Fail | • Weak presentation • Tendency to irrelevance • Some attempt at an answer but seriously lacking in content and/or ability to organise thoughts |  |
|  |
| E2 | 7 | 34-36 |  |
|  |
| E3 | 6 | 30-33 |  |
|  |
| F1 | 5 | 26-29 | Clear Fail |  | • Contains major errors or misconceptions • Poor presentation |  |
|  |
| F2 | 4 | 21-25 |  |
|  |
| F3 | 3 | 16-20 |  |
|  |
| G1 | 2 | 11-15 | Clear Fail/Abysmal |  | • Token or no submission |  |
|  |
| G2 | 1 | 1-10 |  |
|  |
| G3 | 0 | 0 |  |
|  |

Course Timetable BC3503 – 2023-2024

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| --- |
| Blue = Live classes delivered in person |
| Yellow = Assessment |
| Grey = No scheduled classes on these days |

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| --- | --- | --- | --- | --- | --- |
| Date: | Time: | Place: | Subject: | Type: | Staff: |
| Week 26 | | | | | |
| Mon 22 Jan | 09:00-10:00 | BMP LT | Introduction to the Course | Workshop | BM |
| Mon 22 Jan | 10:00-12:00 | BMP LT | Enzymology (1) | Lectures | NJM |
| Tue 23 Jan |  |  |  |  |  |
| Wed 24 Jan |  |  |  |  |  |
| Thu 25 Jan |  |  |  |  |  |
| Fri 26 Jan |  |  |  |  |  |
| Week 27 | | | | | |
| Mon 29 Jan | 10:00-12:00 | BMP LT | Enzymology (2) | Lectures | NJM |
| Tue 30 Jan | 13:00-15:00 | Medical Physics D2 | Enzymology (1) | Lectures/Workshop | NJM |
| Wed 31 Jan | 12:00-13:00 | BMP LT | Protein Biochemistry Practical Introduction | Workshop | BM/MG |
| Thu 1 Feb | 09:00-13:00 | STH 1.007 | Protein Biochemistry Practical Class 1 | Practical | BM/MG |
| Thu 1 Feb | 14:00-18:00 | STH 1.007 | Protein Biochemistry Practical Class 2 | Practical | BM/MG |
| Fri 2 Feb | 10:00-12:00 | 2.054 | Enzymology (2) | Lectures/Workshop | NJM |
| Week 28 | | | | | |
| Mon 5 Feb | 10:00-12:00 | BMP LT | Receptors and Signalling Molecules | Lectures | BM |
| Tue 6 Feb |  |  |  |  |  |
| Wed 7 Feb |  |  | Enzyme Kinetics Test (to be completed between 08:00 and 20:00) |  |  |
| Thu 8 Feb | 09:00-13:00 | STH 1.001 | Protein Biochemistry Practical Class 3 | Practical | BM/MG |
| Thu 8 Feb | 14:00-17:00 | Edward Wright Comp F81 | Protein Biochemistry Practical Class 4 (GFP Bioinformatics) | workshop | BM/MG |
| Fri 9 Feb | 10:00-12:00 | 2.054 | Receptors and Signalling Molecules | Lectures/Workshop | BM |

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| --- | --- | --- | --- | --- | --- |
| Week 29 | | | | | |
| Mon 12 Feb | 10:00-12:00 | BMP LT | Steroid Hormone receptors and related proteins | Lectures | IJM |
| Tue 13 Feb |  |  |  |  |  |
| Wed 14Feb |  |  |  |  |  |
| Thu 15 Feb | 10:00-12:00 | 2.054 | Protein Biochemistry Practical Class 5 | Workshop | BM/MG/DS |
| Thu 15 Feb | 14:00-16:00 | Comp room 2 | In course assessment |  | BM/MG |
| Fri 16 Feb | 10:00-12:00 | 2.054 | Steroid Hormone receptors and related proteins | Lectures/Workshop | IJM |
| Week 30 | | | | | |
| Mon 19 Feb | 10:00-12:00 | BMP LT | Metabolic Disease (1) | Lectures | NM |
| Tue 20 Feb |  |  |  |  |  |
| Wed 21 Feb |  |  |  |  |  |
| Thu 22Feb |  |  |  |  |  |
| Fri 23 Feb | 10:00-12:00 | 2.054 | Metabolic Disease (1) | Lectures/Workshop | NM |
| Week 31 | | | | | |
| Mon 26 Feb | 10:00-12:00 | BMP LT | Metabolic Disease (2) | Lectures | JR |
| Tue 27 Feb |  |  |  |  |  |
| Wed 28 Feb |  |  |  |  |  |
| Thu 29 Feb |  |  |  |  |  |
| Fri 1 Mar | 10:00-12:00 | 2.054 | Metabolic Disease (2) | Lectures/Workshop | JR |
| Week 32 | | | | | |
| Mon 4 Mar |  |  |  |  |  |
| Tue 5 Mar |  |  |  |  |  |
| Wed 6 Mar | end of day |  | Protein Biochemistry practical report hand-in deadline (submission deadline 23:59) |  |  |
| Thu 7 Mar | 10:00-13:00 | 2.054 | Molecular Control of Cell Function | Workshop | SM |
| Fri 8 Mar |  |  |  |  |  |
| Week 33 | | | | | |
| Mon 11 Mar | 10:00-12:00 | BMP LT | Channels and Transporters | Lectures | SM |
| Tue 12 Mar |  |  |  |  |  |
| Wed 13 Mar |  |  |  |  |  |
| Thu 14 Mar | 10:00-18:00 | STH 1.007 | Chemiosmosis Practical | Practical | SM |
| Fri 15 Mar | 10:00-12:00 | 2.054 | Channels and Transporters | Lectures/Workshop | SM |

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| --- | --- | --- | --- | --- | --- |
| Week 34 | | | | | |
| Mon 18 Mar | 10:00-12:00 | BMP LT | Regulation of cell shape and movement | Lectures | MG |
| Tue 19 Mar | 13:00-15:00 | Medical Physics D2 | Chemiosmosis Practical Data analysis | Workshop | SM |
| Wed 20 Mar |  |  |  |  |  |
| Thu 21 Mar |  |  |  |  |  |
| Fri 22 Mar | 10:00-12:00 | 2.054 | Regulation of cell shape and movement | Lectures/Workshop | MG |
| Week 35 | | | | | |
| Mon 25 Mar | 10:00-12:00 | BMP LT | Multicellularity: cell-cell and cell-matrix interactions | Lectures | MG |
| Mon 25 Mar |  |  | Chemiosmosis Practical Assessment deadline (submission deadline 23:59) |  |  |
| Tue 26 Mar |  |  |  |  |  |
| Wed 27 Mar |  |  |  |  |  |
| Thu 28 Mar | 10:00-12:00 | 2.054 | Multicellularity: cell-cell and cell-matrix interactions. | Lectures/Workshop | MG |
| Fri 29 Mar | 10:00-12:00 | 2.054 | Course Closing Session | Workshop | BM |

STH: Science Teaching Hub, Old Aberdeen; Comp F81: Computer room F81 Edward Wright Building, Old Aberdeen; Comp room 2: Computer room 2, Medical School library Polwarth Building; BMP LT; Biomedical Physics Lecture Theatre, Medical Physics Building; Medical Physics D2: Medical Physics D2 workshop; 2.054, 1M:003: Polwarth Building.

Staff

|  |  |
| --- | --- |
| MG | Dr Monika Gostic |
| IJM | Prof Iain McEwan |
| SM | Dr Samantha Miller |
| NM | Dr Nimesh Mody |
| NJM | Prof Nicola Mutch |
| BM | Prof Berndt Müller |
| JR | Prof Justin Rochford |
| DS | Dr David Stead |

Campus Maps - Foresterhill



Polwarth Floor Plans

Diagram, schematic

Description automatically generated

Diagram

Description automatically generated

Diagram

Description automatically generated