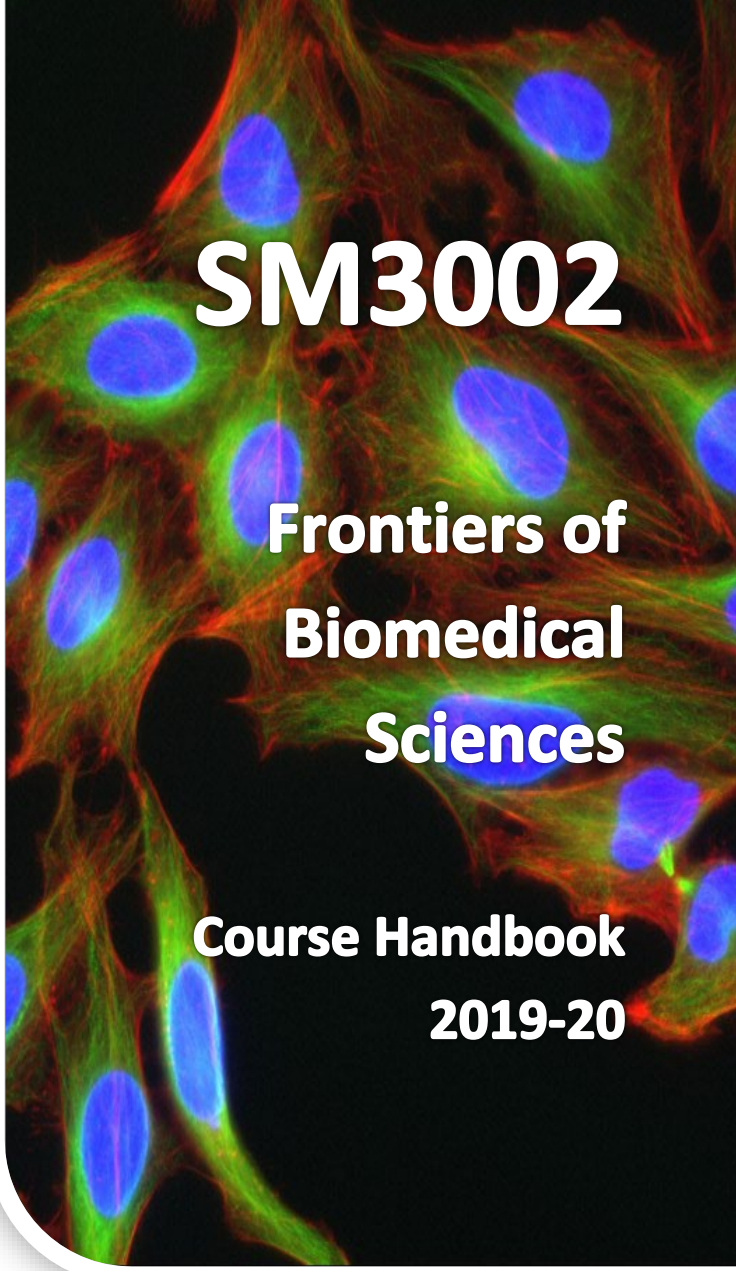
School of Medicine, Medical Sciences & Nutrition



SM3002

Frontiers of Biomedical Sciences

Course Handbook
2019-20

UNIVERSITY OF ABERDEEN

Contents

Cover image:

Confocal micrograph of fluorescently labelled HeLa cells.
Nuclei are labelled in blue, tubulin in green and actin fibres in red.

Courtesy of:

Kevin Mackenzie
Microscopy and Histology Core Facility
Institute of Medical Sciences
University of Aberdeen
http://www.abdn.ac.uk/ims/microscopy-histology

Course Summary

This course provides core material regarding the fundamental properties of molecules, membranes and cells that are essential for the understanding of physiology, pharmacology and neuroscience. It deals with some basic principles of membrane physiology, and pharmacology, and gives an overview of signalling processes, ion channels, transport mechanisms, synaptic transmission and central nervous system signalling.

Course Co-ordinator: Dr Guy Bewick (ext. 7398) g.s.bewick@abdn.ac.uk & Dr Wenlong Huang (ext. 7290) w.huang@abdn.ac.uk

Course Aims & Learning Outcomes

To provide students with core knowledge appropriate to study the fundamental mechanisms involved in cellular and membrane function, especially in complex cells such as neurones. Specifically to:

- Provide a basic understanding of the fundamental role of ion channels, metabotropic receptors and membrane potentials in communication within and between cells.
- Introduce the range of biochemical signalling mechanisms used by cells.
- Give an overview of the mechanisms by which substances are transported across cell membranes
- Have an understanding of the main neurochemical pathways in the central nervous system.
- Explain the action potential in terms of the properties of the ion channels underlying it. Be able to describe how and why action potentials may be modulated.
- Describe the processes governing synaptic structure and function.

Course Teaching Staff

Course Co-ordinator(s):

Dr Guy S Bewick (GSB) (Lead) &
Dr Wenlong Huang (WH) (Deputy)

Other Staff:

Dr Paul Armstrong (PA)
Dr John Barrow (JB)
Prof Stephen N Davies (SND)
Dr Nigel Hoggard (NH)
Dr Alison M Jack (AMJ)
Dr Pietro Marini (PM)
Ms Susan McCourt (SMcC), Library
Prof Gordon TA McEwan (GTAM)
Dr Fiona Murray (FM)
Prof Graeme F Nixon (GFN)
Prof Gernot Riedel (GR)
Dr Lianne Strachan (LS)
Dr Steve J Tucker (SJT)

Assessments & Examinations

Students are expected to attend all lectures, laboratory classes and other elements of the course, and to complete all class exercises by the stated deadlines. Marks will be deducted where deadlines fail to be met without a legitimate reason e.g. sickness accompanied by a medical certificate. Completed assignments must be handed in to the boxes in the basement of Zoology - it is imperative that any reasonable excuses for the late handing in of work are made to the course organiser (Drs Guy Bewick & Wenlong Huang), before the deadline date. Failure to submit work on time with no legitimate cause may result in deduction of marks or withdrawal from the course.

The course will be assessed by continual assessment of the practical laboratory report, the problem solving exercise, the SSC review article, the mock exam essay and by a three hour written examination held in January, in which 4 essays of equal weighting must be answered from a choice of 6 questions. The continuous assessment contributes 30% to the final mark and the written exam will contribute 70%. It is normally expected that students will pass both the continuous assessment and exam elements to achieve an overall pass on the course. The overall performance of the student will be expressed as a grade awarded on the common grading scale (CGS).

The resit examination is held in July/August. The continuous assessment mark will also be included at a student's second and any subsequent diets of examination. It is therefore imperative that students apply the same effort to their continuous assessment exercises as their exam preparation. Failure to submit this work without due cause can severely hamper the overall mark for the course.

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 and 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 be a class representative.

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** . 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**.

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(s) 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 Mrs Jenna Reynolds (**medsci@abdn.ac.uk**) in the Medical Sciences Office (based in the Polwarth Building, Foresterhill), or Mrs Sheila Jones (**s.jones@abdn.ac.uk**) in the Old Aberdeen office associated with the teaching laboratories, 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(s)
- Convenor of the Medical Sciences Staff/Student Liaison Committee (Prof Gordon McEwan)
- 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 semester during the summer vacation), coursework will be kept until the end of Freshers' Week, during the new academic year. After that point, unclaimed student work will be securely destroyed.

Course Reading List

There is no single recommended textbook that covers all the material in the course. The lecturers responsible for each section of the course will provide detailed guidance to enable students to follow up topics of particular interest. For general reading, much useful information can be found in the following texts that cover all levels: copies are available for study in the Sir Duncan Rice library (SDR).

- Levitan, I.B and Kaczmarek, L.K. The Neuron: Cell and Molecular Biology. 3rd Ed.Oxford University Press, 2002.
- Nicholls, J.G., Martin, R.A. & Wallace, B.G. From Neuron to Brain. 5th Ed. Sinauer, 2012.
- Kandel, E.R, Schwartz, J.H. & Jessel, T.M. Principles of Neural Science. McGraw-Hill, 2000.
- Hille, B. Ion Channels of Excitable Membranes. 3rd Ed. Sinauer, 2001
- Rang, H.P, Dale, M.M., Ritter, J.M., Flower R.J. & Henderson G. Pharmacology. 7th Ed. Churchill Livingstone, 2012.
- Boron, W.F., & Boulpaep, E.L. Medical Physiology. 2nd Edition. Elsevier Saunders, 2012

- Lodish, H., Berk A., Kaiser C.A., Krieger M., Scott M.P., Bretscher A. and Ploeg H. Molecular Cell Biology. Freeman, 2008.
- Matthews G.G. Neurobiology. 2nd Edition. Blackwell Science 2001
- Purves D., Augustine G.J., Fitzpatrick D., Hall W.C., Lamantia A.S., McNamara J.O. and White L.E., Neuroscience, 4th Ed. Sinauer Associates, 2007, ISBN: 0878936971
- Carpenter R. Neurophysiology: A Conceptual Approach*, Fifth Edition*, Taylor and Francis, 2012, ISBN: 1444135171

Many older editions of the above books are also held at the SDR. These tend to be very similar to newer editions and are perfectly appropriate to consult if the newer edition is unavailable.

Lecture Synopsis

Please note, you will see a number of unstaffed sessions in the timetable entitled "Private study" or "Prioritised access to computers". This is time we have set aside for you to work on in-course assessment or revision. You are not required to be on campus for these sessions, you are free to work where ever you wish, but this is time, and in terms of the computer room, space, that has been allocated to you for private study and exercise preparation.

Introduction to the Course - Dr Guy Bewick

Introduction and overview of the SM3002 course by the Course Co-ordinator.

Principles of Membrane Physiology – Prof Stephen Davies

1. **Membrane potentials.** Overview of electrical communication between cells. Fluid mosaic model of membrane. Basis of resting membrane potential. Nernst equation. Usefulness of reversal potentials. IV-curves.
2. **Voltage-gated and Ligand-gated channels.** Voltage-gated channels, especially evidence for Na^+ and K^+ in action potential, and Ca^{2+} in transmitter release. Ligand-gated channels, classification according to ligand, mechanism (ionotropic vs metabotropic), or ion selectivity. Relation to EPSPs, IPSPs.
3. **Axonal conduction and synaptic transmission.** Concepts of resistance, conductance, capacitance. Graded (non-propagated) potentials vs action potentials. Electrical vs chemical synapses. Overview of chemical synaptic transmission.

Statistics for the Terrified - Dr Steve Tucker

An introduction to basic statistics relevant to the interpretation of biological data. This lecture will enhance student understanding of data handling and statistics ahead of the problem solving and laboratory exercises.

The Action Potential - Dr Alison Jack

The generation of the action potential represents an excellent example of how an understanding of the properties of specific ion channels can explain the "behaviour" of a

neuron. These lectures will cover the use of the voltage clamp technique by Hodgkin & Huxley in the 1950's to characterise the properties of the separate Na^+ and K^+ channels in the squid giant axon, and their relation to electrical events during the action potential. Propagation of the action potential (myelination, specialisation at the nodes of Ranvier) and signal modulation will then be considered in order to demonstrate how axons differentiate between the various stimuli that may impinge on neuronal systems.

Student Selected Component Introduction – Dr Steve Tucker

This class will introduce what is expected of you in the Student Selected Component that runs throughout this course and forms part of your continuous assessment. We will talk about how to tackle the exercise, hints and tips on reading and referencing scientific journal articles will be provided and the purpose and aim of the exercise explained. Further details can be found in the SSC area of MyAberdeen.

Signal Transduction - Dr Fiona Murray/Prof Graeme Nixon

Overview of the major signalling systems in mammalian cells and the concept of why signalling is necessary. Four types of receptor-effector coupling described: ion channels; G-protein linked ion channels and second messengers; tyrosine kinase linked receptors; steroid receptors. Examples of each type of coupling including receptor structure and interaction with ligand e.g. nicotinic acetylcholine receptor for ion channels. Structure and function of heteromeric G proteins. Description of small G proteins. Dual regulation of adenylyl cyclase. Second messenger systems e.g. cAMP, IP3, Ca^{2+}. Growth factor receptors and their regulation including guanylyl cyclase and cytokine receptors. Intracellular receptors e.g. steroid receptor DNA binding domain with zinc fingers. Mechanism of action of some pharmacological agents which modify signalling system is described.

Signalling systems based on nitric oxide are discussed. Nitric oxide is now known to be an important mediator of several physiological processes and is involved in some disease states. The last two lectures in this series will examine the regulation of nitric oxide production and metabolism and the intracellular signalling pathways controlled by this molecule. The various roles for different isoforms of nitric oxide synthase will be examined. In addition, the physiological roles of nitric oxide will be explored, including regulation of the cardiovascular system, immune system and nervous system.

Exam Tutorial – Dr Alison Jack

We will consider some of the best ways to approach essay-based exams and look at some past exam answers provided by previous students. Current students will be asked to role-play the position of an examiner, mark the essays in groups and a whole class discussion will then follow to highlight what an examiner is looking for in a good exam answer. Participation in these class discussions is highly encouraged and is often very entertaining but vocal participation is voluntary so don't be scared to come along! Also, the topic of the mock exam formative essay will be announced.

Neurochemistry 1-5 – Drs Tucker, Hoggard and Jack

1. & 2. Neuroendocrinology of Obesity – Dr Nigel Hoggard

These lectures will demonstrate how our understanding of the endocrine pathways, in particular, the pathways in the brain related to obesity, has developed in recent years.

Why has obesity become such a problem in our society and what factors are responsible for the development of obesity? The emergence of the leptin endocrine system linking peripheral fat with central pathways in the brain. The integration of the melanocortin system and other systems centrally with the leptin pathway. The role of monoamine neurotransmitters in obesity. The implications of these developments in our understanding of the mechanisms of energy balance in the treatment of obesity.

3. Fundamentals of Central Nervous System Neurotransmission – Dr Steve Tucker

Introduction to neurotransmitter signalling systems in the central nervous system with a particular focus on noradrenergic, dopaminergic and serotonergic pathways.

4. Neuroendocrine Signalling – Dr Steve Tucker

Introduction to neuroendocrine signalling systems in the central nervous system with a particular focus on hypothalamic control of pineal gland activity and the internal circadian clock.

5. Drug Addiction & Dependency – Dr Alison Jack

The physiological and pharmacological processes of drug addiction and dependency will be discussed as will the effects of alcohol on central nervous system function.

Mock Exam Essays (Formative & Summative) – Dr Guy Bewick or Dr Wenlong Huang

These two sessions are an essential preparation for your exam and 3rd and 4th year assessments in general, where examinations and a major component of continuous assessment consist of writing essays. Two sessions will be provided to practice these skills, under examination conditions. It is very important that you attend these sessions.

1. **Mock Exam Essay (Formative)** In this first session, you will write and submit an essay on a topic announced at the Exam Tutorial, which is submitted but does not contribute to the continuous assessment grade. Rather, you will get valuable feedback on areas to improve for the second (Summative) session. The topic of the Summative essay will also be announced.
2. **Mock Exam Essay (Summative)** In this session, you will write and submit an essay which will be graded and this will contribute your continuous assessment (5%). This essay will be on a different topic from the formative exercise, to provide the opportunity to learn how the principles of good essay writing can be applied to any topic.

Ion and non-Electrolyte Transport Pathways – Prof Gordon McEwan

1. **Transport of ions and nonelectrolytes across membranes.** Forces producing movement of substances across cell membranes. Fick's law of diffusion. Passive diffusion. Facilitated diffusion - transport proteins/carriers. Active transport linked to ATP hydrolysis. ATPases as pumps to create favourable electrochemical gradients. Cotransporters (symporters) and exchangers (antiporters).
2. **Cell volume regulation and intracellular pH regulation.** Reminder of osmotic effects on cell volume - swelling and shrinkage. Physiological factors affecting cell volume. Importance of volume regulation. Mechanisms involved in maintenance of cell volume - regulatory volume increase/decrease. Physiological factors affecting intracellular pH (pH_i). Mechanisms involved in pH_i regulation.
3. **Epithelial transport.** Barrier function of epithelia. Role in mediating vectorial transport. Concept of polarity - apical and basolateral membrane domains. Specific transport proteins in specific locations. Importance of tight junctions. Transcellular versus paracellular transport. Role of basolateral Na^+/K^+ ATPase in driving transepithelial electrolyte transport. Transepithelial water transport. Na/glucose cotransport.

Principles of Synaptic Transmission – Dr Guy Bewick

1. **Development of the synapse.** The neuromuscular junction (NMJ), the best understood synapse, will be the focus of these three lectures. However, the principles apply to all chemical synapses. After outlining the developmental timetable for nerve-target interactions during synaptogenesis, two topics will be explored in detail. Firstly, the molecular mechanisms controlling nerve-induced aggregation of acetylcholine receptors at the NMJ and secondly the mechanisms underlying the developmental shift in subunit composition of the acetylcholine receptor/ion channel complex.
2. **Structure/function relationships of presynaptic elements.** The involvement of synaptic vesicles in neurotransmission will be examined. The lecture will also deal with the proteins involved in the docking, fusion and recycling of synaptic vesicles and the experimental use of neurotoxins in the elucidation of these processes.
3. **Structure/function relationships of postsynaptic elements .** This lecture will examine the role of the postsynaptic folds in ensuring effective neuromuscular transmission. The segregation of different types of ion channels within the postsynaptic folds, the effect this ion channel distribution has on neurotransmission and how the segregation is maintained will also be discussed. Although these folds are unique to the NMJ synapse, contributing to its very high efficiency, the ion segregation mechanisms seem common to all synapses, and possibly regulate all ion channel distributions.

Course Review & Examination information - Drs Guy Bewick & Wenlong Huang

Review of the course, return of summative essays, examination information and advice.

Practical/Lab/Tutorial Work

Literature Search Exercise in Sir Duncan Rice Library

Essential skills and techniques to enable you to find and use academic information in support of assignments and course-related work. Goes beyond the library catalogue to electronic journals, electronic books and databases. Compares Google results with academic databases e.g. Scopus and Web of Science, and highlights a web-based tool to help produce correctly formatted bibliographies (RefWorks). Addresses importance of correct referencing, refers to the Medical Sciences reference guide.

Format: presentation and practical workshop.

Careers

Timetabled alongside this course is BT3006. SM3002 students are welcome to attend the BT3006 lectures which relate to employability and improving your chances of success in the job market.

Continuous Assessment

The continuous assessment mark for this course is made up as follows:-

○ Laboratory practical report	10%
○ Problem solving exercise	10%
○ SSC review article	5%
○ Mock exam essay (summative)	5%
Total Cont. Assessment	**30%**
Final exam mark	**70%**
TOTAL COURSE GRADE	**100%**

Laboratory Work

The laboratory/tutorial workshops in this course consist of computer simulations, a calculation tutorial, plus practical 'wet' work on biological tissue. The first two computer simulation sessions allow in-depth exploration of membrane potentials and neuronal action potentials and are accompanied by self-learning assessments. The second set of exercises begins with a drug dilution calculations tutorial, and a computer simulation of the final practical. The final full-day "wet" practical session occurs towards the end of the course. This wet practical will examine the effect of pharmacological manipulation on living tissue. It is essential that students attend the calculations tutorial and computer simulation exercise to be properly prepared to carry out practical, particularly the drug dilutions, in the final laboratory session. The results of this wet practical will be written up as a scientific report and assessed. The report must be submitted no later than 2 weeks after the practical session, in word-processed format, using Excel to produce graphs where appropriate. This laboratory report will account for 10% of your final mark.

The practical work required in this course may present difficulties to students with additional learning support needs. For such students, alternative arrangements will be made. Any student who requires additional support for learning should make the situation known to the course Co-ordinator(s) when registering for the class, and should then discuss their needs with the Medical Sciences Disabilities Co-ordinator, to ensure that they have the best possible outcome.

Health and Safety

Before you start your laboratory work, you must attend a short course on Health and Safety. This is a legal requirement and you will have to complete and pass a short test to show that you have attended and gained sufficient knowledge/competence to work in a research laboratory. You will not be allowed to continue with the rest of the course unless you have satisfactorily passed this test. Re-tests will occur until a pass is achieved.

Course Work

As well as the laboratory practical report (worth 10% of the final mark, see above), during the course, all students will complete three further elements of assessment. One is a problem-solving exercise (data analysis), which will develop your numerical and critical analysis skills in preparation for your final year assessments. This will account for 10% of the final mark. Deadlines for completion are shown on the exercise. The exercise will be issued at the start of term, but completion will be under exam conditions later in the course. See exercise and timetable for details.

Students will also prepare a scientific review type article based on a subject of their choice (Student Selected Component, or SSC, worth 5% of final mark) and, finally, complete an essay under mock exam conditions (5% of final mark). This mock exam exercise is important training for writing essays under exam conditions, as this is the major assessment method for the remainder of your studies here in Aberdeen.

IT and Data Handling Skills

A basic level of computer literacy is required to complete this course and students will be required to use Microsoft Word and Excel programmes throughout the term. Most students are familiar with Word and therefore tuition on the use of this software package will not be provided in this course. Students experiencing difficulty with this programme can however seek assistance from the computing centre who are able to offer help in such circumstances.

Students will also be required to use Excel throughout the course to prepare graphs and, since you will be assessed on the accuracy of these graphs, competence in using Excel is vital. To ensure that all students have adequate skill in graph construction using Excel, there is a short Excel based exercise in the first week of term where students are required to prepare two graphs using data provided. Many students are familiar with, and comfortable using, Excel and as such these students need only illustrate their ability by submitting the appropriate graphs by 1pm on the first Thursday of term to the boxes in the basement of Zoology. Any student struggling to produce the required graphs should email the Course Coordinator(s) in advance indicating that they wish to attend either of the Excel tutorial sessions on Thursday of the first week of term. The Co-ordinator(s) will then arrange to meet and provide assistance at that session.

Problems with Coursework

If students have difficulties with any part of the course that they cannot cope with alone they should notify someone immediately. If the problem relates to the subject matter, you may be best advised to contact the member of staff who is teaching that part of the course. Students with registered disabilities should contact either the Polwarth based Medical Sciences Office (tel. 01224 437471) (**medsci@abdn.ac.uk**) or the Old Aberdeen office associated with the teaching laboratories (Mrs Alison Davidson **alison.davidson@abdn.ac.uk**) 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-ordinators: Dr Guy Bewick & Wenlong Huang
Convenor of the Biomedical Sciences Staff/Student Liaison Committee: Prof Gordon McEwan
Personal Tutor
Disabilities Co-ordinator: Dr Derryck Shewan

Most staff are based at Foresterhill (IMS) and we strongly encourage the use of email or to telephone the Medical Science Office (01224 437471). You may be wasting your time traveling to Foresterhill only to find staff unavailable. Therefore, we particularly encourage initial contact by e-mail or phone. The course organiser(s) may be contacted by e-mail at **g.s.bewick@abdn.ac.uk** (telephone number: 01224 437398; or ext 7398 from Old Aberdeen) or **w.huang@abdn.ac.uk** (telephone number: 01224 437290; or ext 7290 from Old Aberdeen). Contact numbers for other members of staff can be found on the Medical Sciences web pages (**http://www.abdn.ac.uk/smmsn**).

Transition into level 3

As students' progress through their degree programme, they will notice a change in the style and approach of teaching and the expectations upon them as learners. This is particularly marked as students move into level 3 and beyond. To help with this transition into level 3, a number of activities will be planned to address any new challenges faced by students at level 3. The level 3 co-ordinator - Dr Steve Tucker (**s.j.tucker@abdn.ac.uk**; 01224 437491) will organise such events and should be a first point of contact for any level 3 Medical Science students facing any kind of difficulty. Regular activities and workshops will be designed around key issues faced by new level 3 students, (e.g. new exam format, time management), but specific guidance and support can also be provided on request for individuals or groups with any other problem relating to level 3. In addition, Dr Tucker will hold regular, advertised drop-in surgeries for students to raise any issues face-to-face and all level 3 Medical Science students will have access to a MyAberdeen site that will offer information, feedback, guidance and discussion forums designed to enable all students to achieve the most from level 3.

University Policies

Students are asked to make themselves familiar with the information on key institutional policies which been made available within MyAberdeen (**https://abdn.blackboard.com/bbcswebdav/institution/Policies**). 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 indicate how seriously the University takes your feedback.

These institutional policies should be read in conjunction with this programme and/or course handbook, in which School and College specific policies are detailed. Further information can be found on the **University[1]s Infohub webpage** or by visiting the Infohub.

The information included in the institutional area for 2019/20 includes the following:

- Absence
- Appeals & Complaints
- Student Discipline
- Class Certificates
- MyAberdeen
- Originality Checking
- Feedback
- Communication
- Graduate Attributes
- The Co-Curriculum

Medical Sciences Common Grading Scale

Grade	Grade Point	Category	Honours Class	Description
A1	22	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			
A3	20			
A4	19			
A5	18			
B1	17	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			
B3	15			
C1	14	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			
C3	12			
D1	11	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			
D3	9			
E1	8	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			
E3	6			
F1	5	Clear Fail	Not used for Honours	• Contains major errors or misconceptions • Poor presentation
F2	4			
F3	3			
G1	2	Clear Fail/ Abysmal	-	• Token or no submission
G2	1			
G3	0			

Course Timetable SM3002: 2019-2020

Date	Time	Place	Subject	Session	Staff
Week 7					
Mon 9 Sep	09:00-10:00	A21	Introduction to SM3002	Lecture	GSB
Tue 10 Sep					
Wed 11 Sep	11:00-12:00	McR051	Membrane Potentials 1	Lecture	SND
Thu 14 Sep	10:00-13:00	EWF81	Graph preparation time (Excel and spreadsheet) – **Self study**	Study	
	or 10:00-13:00	ULF2 PC3	Library Search Exercise: **Group 1**	Tutorial	SMcC
	14:00-17:00	EWF81	Graph preparation time (Excel and spreadsheet) – **Self study**	Study	
Fri 13 Sep	09:00-10:00	FN3	Membrane Potentials 2	Lecture	SND
	10:00-11:00	ZB6/11	Membrane Potentials Tutorial: **Groups 1 & 2**	Tutorial	SND/PA/ SJT/PM
	11:00-12:00	ZB6/11	Membrane Potentials Tutorial: **Groups 3 & 4**	Tutorial	SND/PA/ SJT/PM
Week 8					
Mon 16 Sep	09:00-10:00	StM105	Membrane Potentials 3	Lecture	SND
	10:00-11:00	StM105	Safety course – part 1	Lecture	GSB
Tue 17 Sep					
Wed 18 Sep	11:00-12:00	McR051	Safety course – part 2 (+Safety MCQ Exam)	Lecture	GSB
	12:00-13:00	McR051	Statistics for the terrified!	Lecture	SJT
Thu 19 Sep	10:00-13:00	ZB06	Drug dilutions intro & calculations tutorial: **Groups 3 & 4**	Tutorial	SJT/LS AMJ/JB
	or 10:00-13:00	ULF2 PC3	Library Search Exercise **Group 2**	Tutorial	SMcC
	14:00-17:00	ZB18/19	Drug dilutions intro & calculations tutorial: **Groups 1 & 2**	Tutorial	SJT/LS/ AMJ/JB
	or 14:00-17:00	ULF2 PC3	Library Search Exercise: **Group 3**	Tutorial	SMcC
Fri 20 Sep	09:00-10:00	FN3	The Action Potential 1	Lecture	AMJ
	10:00-13:00	ULF2 PC3	Library Search Exercise: **Group 4**	Tutorial	SMcC
	10:00-13:00	EWF81	Prioritised access to computers for SM3002	Study	
Week 9					
Mon 23 Sep	09:00-10:00	StM105	The Action Potential 2	Lecture	AMJ
	10:00-11:00	StM105	The Action Potential 3	Lecture	AMJ
Tue 24 Sep					
Wed 25 Sep	11:00-12:00	McR051	Student Selected Component (SSC) Introduction	Lecture	SJT
Thu 26 Sep	10:00-13:00	ZG9	Labs: Drug dilutions; practical simulation **Groups 3 & 4**	Tutorial	SJT/LS/ AMJ/PM
	14:00-17:00	ZB11/ ZG21	Labs: Drug dilutions; practical simulation **Groups 1 & 2**	Tutorial	SJT/LS/ AMJ/PM
Fri 27 Sep	09:00-10:00	FN3	Signal Transduction 1	Lecture	FM
	10:00-13:00	EWS81/ EWF95	Action potential exercise: **Groups 1 & 2**	Tutorial	SJT/PA AMJ/PM
Week 10					
Mon 30 Sep	09:00-10:00	A21	Signal Transduction 2	Lecture	FM
Tue 1 Oct					
Wed 2 Oct	11:00-12:00	McR051	Signal Transduction 3	Lecture	GFN
Thu 3 Oct	10:00-17:00	ZB11	Lab Practical: **Group 1**	Practical	SJT
Fri 4 Oct	09:00-10:00	FN3	Exam Tutorial	Lecture	AMJ

	10:00-13:00	EWS81/ EWF95	Action potential exercise: **Groups 3 & 4**	Tutorial	SJT/PA/ AMJ/PM
Week 11					
Mon 7 Oct	09:00-10:00	A21	Signal Transduction 4	Lecture	GFN
Tue 8 Oct					
Wed 9 Oct	11:00-12:00	McR051	Signal Transduction 5	Lecture	FM
Thu 10 Oct	10:00-17:00	ZB11	Lab Practical: **Group 2**	Practical	SJT
Fri 11 Oct	09:00-10:00	FN3	Neurochemistry 1	Lecture	NH
	10:00-13:00	EWF81	Prioritised access to computers for SM3002	Study	
Week 12					
Mon 14 Oct	09:00-10:00	A21	Neurochemistry 2	Lecture	NH
Tue 15 Oct					
Wed 16 Oct	11:00-12:00	McR051	Ion & Non-Electrolyte Transport 1	Lecture	GTAM
Thu 17 Oct	10:00-11:00	ZG9	Mock exam essay (formative): **Groups 1 & 2**	Assessment	GSB/WH
	11:00-12:00	ZG9	Mock exam essay (formative): **Groups 3 & 4**	Assessment	GSB/WH
Fri 18 Oct	09:00-10:00	FN3	Ion & Non-Electrolyte Transport 2	Lecture	GTAM
	10:00-13:00	EWF81	Prioritised access to computers for SM3002	Study	
Week 13					
Mon 21 Oct	09:00-10:00	A21	Ion & Non-Electrolyte Transport 3	Lecture	GTAM
Tue 22 Oct					
Wed 23 Oct	11:00-12:00	McR051	Private study - Problem solving/SSC prep	Study	
Thu 24 Oct	10:00-17:00	ZB11	Lab Practical: **Group 3**	Practical	SJT
Fri 25 Oct	09:00-10:00	FN3	Private study - Problem solving/SSC prep	Study	
	10:00-13:00	EWF81	Prioritised access to computers for SM3002	Study	
Week 14					
Mon 28 Oct	09:00-10:00	A21	Neurochemistry 3	Lecture	SJT
Tue 29 Oct					
Wed 30 Oct	11:00-12:00	McR051	Private study - Problem solving/SSC prep	Study	
Thu 31 Oct	10:00-17:00	ZB11	Lab Practical: **Group 4**	Practical	SJT
Fri 1 Nov	09:00-10:00	FN3	Neurochemistry 4	Lecture	SJT
	10:00-13:00	EWS81	Prioritised access to computers for SM3002	Study	
Week 15					
Mon 4 Nov	09:00-10:00	A21	Neurochemistry 5	Lecture	AMJ
Tue 5 Nov					
Wed 6 Nov	11:00-12:00	McR051	Private study - Problem solving/SSC prep	Study	
Thu 7 Nov	10:00-11:30	ZG9	Problem solving (Parts A&B): **Groups 1 & 2**	Assessment	GSB
	11:30-13:00	ZG11	Problem solving (Parts A&B): **Groups 3 & 4**	Assessment	GSB
	14:00-15:00	A21	Principles of Synaptic Transmission 1	Lecture	GSB
Fri 8 Nov	09:00-10:00	FN3	Principles of Synaptic Transmission 2	Lecture	GSB
	10:00-13:00	EWS81	Prioritised access to computers for SM3002	Study	
Week 16					
Mon 11 Nov	09:00-10:00	A21	Private study - SSC prep	Study	
	Midday	Midday	Deadline for Problem Solving (part C) submission	Deadline	
Tue 12 Nov					
Wed 13 Nov	11:00-12:00	McR051	Private study - SSC prep	Study	
Thu 14 Nov	14:00-15:00	ZB13/14	Mock exam essay (summative): **Groups 1&2**	Assessment	GSB/WH
	15:00-16:00	ZB13/14	Mock exam essay (summative): **Groups 3&4**	Assessment	GSB/WH

Fri 15 Nov	09:00-10:00	FN3	Principles of Synaptic Transmission 3	Lecture	GSB
Week 17					
Mon 18 Nov	09:00-10:00	A21	Private study - SSC prep	Study	
Tue 19 Nov					
Wed 20 Nov	11:00-12:00	McR051	Review, Exam information, SSC Deadline	Lecture	GSB/WH
Thu 21 Nov					
Fri 22 Nov					

Staff

Dr Guy S Bewick (GSB) - (Course Co-ordinator, Lead)
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