1495 UNIVERSITY OF ABERDEEN

SMB002- Frontiers of Biomedical Sciences

Course Handbook 2023-2024

School of Medicine, Medical Sciences & Nutrition

Undergraduate Medical Sciences

Contents

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-ordinators:

Dr Guy Bewick; g.s.bewick@abdn.ac.uk

Dr Wenlong Huang; w.huang@abdn.ac.uk **mailto:**

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 thorough grounding in scientific writing for practical reports, essays, review articles, abstracts and writing under examination conditions.
- Provide an understanding of the fundamental role of ion channels, metabotropic receptors, enzyme cascades and membrane potentials in communication within and between cells.
- Introduce the range of biochemical signalling mechanisms used within and between 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, including brain endocrine pathways related to energy balance and obesity.
- 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 formation, structure and function.

Course Teaching Staff

Course Co-ordinator(s):

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

Other Staff:

Ms Eleni Borompoka (EB), Library
Dr Tarek Abdelghani (TA)
Dr Catriona Cunningham (CC)
Dr Antonio Gonzales Sanchez (AGS)
Dr Victoria Gorberg (VG)
Prof Lora Heisler (LH)
Dr Pietro Marini (PM)
Dr Fiona Murray (FM)
Prof Graeme F Nixon (GFN)
Dr Iain Rowe (IR)
Dr Annesha Sil (AS)
Dr Lianne Strachan (LS)
Dr Sergiy Sylantyev (SS)
Prof Steve J Tucker (SJT)

Assessments & Examinations

This section describes the general requirements expected of students regarding assessments and examinations on this course. Further details of specific assessments may also be found in relevant sections later in the manual.

Students are expected to study lecture materials, including pre-recorded lecture recordings provided online in MyAberdeen, plus laboratory classes and other elements of the course, as well as 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 submitted online via MyAberdeen as instructed. Failure to submit work on time with no legitimate cause may result in deduction of marks or withdrawal from the course. It is imperative that any reasonable excuses for the late handing in of work are made **before** the deadline date to the course organisers (Dr Guy Bewick & Dr Wenlong Huang).

There will be no 'end of course' in person written examination. In common with other first semester level 3 modules, learning will be assessed entirely by continuous assessment, consisting of:

- a laboratory practical report,
- a problem-solving exercise,
- a review article (student-selected component; SSC) and
- a timed 'mock exam' essay.

The overall performance of the student will be expressed as an aggregate grade from these, awarded on the common grading scale (CGS).

Assessment Weighting Summary

The overall mark weighting for this course is made up as follows:

○ Laboratory report	33%
○ Problem solving exercise	25%
○ SSC review article	25%
○ Summative Mock exam essay	17%
TOTAL COURSE GRADE	**100%**

1) **Laboratory Practical report.** This is worth ***33% of the final course grade***. This must be submitted via MyAberdeen 2 weeks after completion of your group's final practical work session. Full details of the practicals are given in the 'Lab/Tutorial Work' section later, and on MyAberdeen. This develops scientific lab report writing style and skills
2) **Problem-Solving Exercise.** This data analysis exercise will develop your numerical, reasoning and critical analysis skills crucial for a scientist. It is also essential preparation for similar final year assessments. This will account for ***25% of the final mark***. Deadlines for completion are shown on the exercise and in the timetable (see later in manual). The data for the exercise will be issued at the start of term. ***It is strongly encouraged that you start working on this as soon as possible in the course.*** Completion of the assessment will be under exam conditions as an MCQ-style computer-based assessment later in the course. See exercise and timetable for details.

3) **Student Selected Component (SSC)**. Students will prepare a scientific review-style article on a subject chosen from wide-ranging list of topics relevant to research ongoing in the School (worth ***25% of final mark***). This exercise develops your ability to distil a range of information from primary sources into a single, logical report on the most important aspects of a chosen topic. ***You must meet with your assigned tutor early in your preparation for the SSC***
4) And, finally, the **Summative Mock Exam essay** under mock exam conditions (***17% of final mark***). This mock exam exercise is important training for writing essays under exam conditions. Exam essays are a major assessment method for the final 2 years of your studies here in Aberdeen. *Please note, this is preceded by training, via a formative 'practice' exam essay earlier in the course*. The exam topic area for each exercise is released before the exam, but the actual question is presented at the assessment session, just like a full examination in other courses you will do.

Assessment sessions are compulsory: The timed Formative and Summative Mock Exam essay, plus Problem-Solving Parts A & B are in person events completed on a computer in a University computer room. Attendance at these, like all assessment events, are **compulsory**.

IT and Data Handling Skills

A basic level of computer literacy is required to complete the coursework. Students will be required to use *Microsoft Word* and *Excel* programmes throughout the term for submitted work online, plus *Blackboard Collaborate*, by which much of the teaching is delivered.

Word: 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 IT centre who are able to offer support in such circumstances.

Excel: 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. **There is a short exercise in the first week** to show competence, or become familiar, with this software package (see Practical/Lab Work/Tutorials section).

Blackboard Collaborate: Students **should try** to become familiar with how to join *Blackboard Collaborate*. This may become essential for online synchronous delivery of teaching material and assessments, if the pandemic returns, or individual sickness at assessment times. Guidance on how to join and participate in a *Blackboard Collaborate* session is provided on the SM3002 MyAberdeen site.

Class Representatives

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

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

Students should be aware that their course attendance will be monitored. More guidance will be provided during the course introductory lecture.

If students have difficulties with any part of the course that they cannot cope with alone they should notify someone immediately so we can support you to get back on track. For routine and non-urgent matters, we strongly encourage initial contact by e-mail. For face-to-face meetings, most staff are based at Foresterhill (IMS) and you would waste valuable time traveling to Foresterhill only to find staff unavailable.

The Medical Science Office is **medsci@abdn.ac.uk**. Contact emails for other members of staff can be found via the 'Quick Links/Staff Directory' search function on the Medical Sciences web pages (**http://www.abdn.ac.uk/smmsn**).

Students with registered disabilities wishing to ensure that the appropriate facilities have been made available should contact either the Polwarth-based Medical Sciences Office (**medsci@abdn.ac.uk**) or the Old Aberdeen office associated with the teaching laboratories (Mrs Alison Davidson, **alison.davidson@abdn.ac.uk**). Otherwise, you are strongly encouraged to contact any of the following as appropriate:

Disabilities Co-ordinator (Dr Derryck Shewan) for discussing other additional learning support needs **d.shewan@abdn.ac.uk**

Member of staff teaching that part of the course if the problem relates to course-related subject matter.

Course co-ordinators (Drs Guy Bewick & Wenlong Huang).
The course organiser(s) may be contacted at **g.s.bewick@abdn.ac.uk** and **w.huang@abdn.ac.uk**. For urgent and personal matters, online or in-person meetings can be arranged by email in advance.

Personal Tutor. Contact details available on MyTimetable/MyCurriculum

Course student representatives. Contact details will be posted on MyAberdeen**.**

Convenor of the Medical Sciences Staff/Student Liaison Committee

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 specific guidance either within the lecture material or on MyAberdeen (or both) 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

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

*these are identified as essential readings supplied to the library, who are trying to make sure that reading lists are online as eBooks. This is an ongoing process and it may not possible to identify suitable online alternatives. However, the library will keep us informed.

Lectures & Study Periods

Teaching session delivery:

Unless COVID19 restrictions return, all teaching will be delivered face-to-face. These are lectures, some review/feedback/consolidation sessions, tutorials, and a laboratory practical. **Some assessments are** performed and submitted on classroom PCs. Thus, teaching will be delivered as follows:

1) **Lectures:** All lectures are currently planned to be delivered **face-to-face (F2F)**. Lectures will also be available as recordings using Panopto and recording links will be provided to students on MyAberdeen.
2) **Lecture recordings**: in addition, recordings of lectures on science-topics (i.e., most lectures, except the ***Course Introduction*** and ***Course Review*** lectures) will also be provided on MyAberdeen. These recordings are fully captioned from the same lectures recorded during the pandemic. These will be released for revision in synchrony with the course, after the F2F delivery, and at the pace you progress through the course. Some lecture pre-recordings are sub-divided into 15-20 min sections. For those not already sub-divided, you are advised to pause viewing at regular intervals. E.g. Break a 1h lecture session into three parts of ~20-minutes each, in order to rest and reflect on each section of material before moving onto next part.
3) **Review/feedback sessions:** These will review and consolidate some lecture topic areas, provide additional information on some assessments and provide feedback on performance in formative assessments. This is also an opportunity to ask questions. Students can also email queries in advance to the lecturer, to make sure that any burning question is addressed in the session.

4) **"Private study", "Self-study", "SSC preparation time"**, etc. In addition to formal teaching and assessment sessions, there are regular unstaffed sessions timetabled for self-study and assessment preparation. This time is set aside for ***independent*** work preparing for specific in-course assessments. Please be aware that **the course workload is significant**, and this time allocated for private study and preparation time is ***an essential component***. In these sessions you are free to work wherever you wish and are not required to be on campus or attending online. However***, we strongly advise taking full advantage of this time by using it for the allocated task.***

Lecture topics:

Introduction to the Course & SSC overview - Dr Guy Bewick/ Dr Wenlong Huang

Introduction and overview of the SM3002 course by the Course Co-ordinator(s). Attendance is essential, as this is a complex course. The session will also briefly introduce you to the ***Student Selected Component (SSC)***. The timings for the sign-up of the exercise will be explained. Further details and topic areas can be found in the Groups/SSC area of MyAberdeen.

Principles of Membrane Physiology – Dr Catriona Cunningham

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.

Health and Safety in Lab Classes – Dr Guy Bewick

4. Part 1: Principles of Health and Safety in Medical Sciences labs.
5. Part 2: Your personal responsibility for H & S in Medical Sciences labs

NB – *These lectures will be followed by a compulsory online H&S MCQ exam. You must pass this to take part in the lab practical later in the course. Resits will be arranged as necesary.*

Statistics for the Terrified - Prof Steve Tucker (lecture recording)

6. 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 (3 lectures) - Dr Sergiy Sylantyev

7 – 9. 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 three 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) will then be considered in terms of properties that determine speed and direction of action potential conductance.

Signal Transduction (5 lectures) - Dr Fiona Murray/Prof Graeme Nixon

10 – 14. 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.

Neuroendocrinology – Prof Lora Heisler & Prof Steve Tucker

Neuroendocrinology of Obesity I & II – Prof Lora Heisler

15 & 20. 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.

Neuroendocrine Signalling – Prof Steve Tucker

16. 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.

CNS Neurochemistry - Prof Steve Tucker

Fundamentals of CNS Neurotransmission

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

Drug Addiction & Dependency

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

Formative Mock Exam Essay – Dr Guy Bewick/Dr Wenlong Huang (timed assessment in computer room)

In this *Formative* Essay, you will ***word-process*** a 45-minute essay (plus time dispensation if necessary for medical conditions) on a topic announced through MyAberdeen earlier in the course. Submit a PDF combining your essay and hand-drawn diagram(s) (highly recommended) immediately by the end of the session, via TurnitIn on MyAberdeen within 15 min of completing the session. This essay is for your training and guidance only. It receives a guide mark, and you will receive feedback but it does ***not*** contribute to your continuous assessment grade. This exercise, therefore, gives you essential practice in writing essays and working to a tight time schedule. The feedback and experience will give you valuable guidance on where to improve your skills. We strongly advise that this practice session is ***essential*** for maximising performance in future essay exercises. In the current course, this is practice for the Summative mock exam essay at the end of the course, which does contribute to your final grade.

Many 3rd and 4th year assessments consist of writing essays – whether within courses or during examinations. This session is designed to give general preparation for scientific essay writing under examination conditions. ***It is essential that you attend both this formative and the later final summative sessions.***

Ion and non-Electrolyte Transport Pathways – Dr Tareq Abdelghani

17. **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).
18. **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.
19. **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

23. **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 postsynaptic receptors at the NMJ and secondly the mechanisms underlying the developmental shift in subunit composition of the receptor/ion channel complex.
24. **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.
25. **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 may regulate all ion channel distributions.

Summative Mock Exam Essay – Dr Guy Bewick/Dr Wenlong Huang (timed assessment in computer room)

Like the previous formative essay, you will again complete an essay on a designated topic within the 45 min limit of a single standard examination question. It will again be **word-processed**, with embedded diagrams (photographs of hand-drawn figures), and submitted via Turnitin on MyAberdeen within 15 min of completing the essay. The topic of the *Summative* Essay will be announced on MyAberdeen approximately 2 weeks in advance. It will be a ***different*** topic from the Formative Essay. ***This will be graded***. This grade contributes ***17% of your continuous assessment***. Although a different topic, you will use the essay writing skills of structure (introduction, main body and conclusion), logical progression through linked ideas, and use of diagrams. It will therefore demonstrate how you have acquired the principles of good essay writing, and learned from the Formative Essay. These skills can be applied to any topic.

This second of two sessions continues your essential preparation for future 3rd and 4th year assessments, where writing essays predominates. These assessments test your development of these skills, under examination conditions. ***It is essential that you attend both formative and summative sessions***.

Course Review - Drs Guy Bewick & Wenlong Huang

Review of the course.

Lab/Tutorial Work

Literature Search Exercise – Staff from Sir Duncan Rice Library

These are ***essential skills*** and techniques to enable you to find and use academic information in support of assignments and course-related work. This goes beyond the library catalogue, to electronic journals, electronic books and databases. It 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). It addresses the importance of correct referencing, and refers to the Medical Sciences reference guide. Format: presentation and practical workshop.

Careers (w BT3006 course)

Timetabled alongside this course is BT3006, which runs sessions on employability and improving your chances of success in the job market. SM3002 students are encouraged to access these lecture ***recordings***.

Tutorials & Laboratory Work

1) Excel exercise (First week of course): To ensure that all students have adequate graph construction skills using *Excel*, there is a short exercise in the first week of the course where students are required to prepare two ***research-grade*** graphs using data provided to you and following precisely the instructions given. Many students are familiar with, and comfortable using, *Excel*. However, it is essential to recognise how to construct high-quality graphs. Students need to illustrate their ability to produce good quality graphs exactly according to instructions provided. Submit these graphs by ***5pm on the first Thursday of term*** via MyAberdeen. If you have problems producing the required graphs, please email the Course Coordinator(s) ASAP, to arrange a ***help session before the Thursday of submission***.

2) Tutorials: Two computer simulation sessions to reinforce more challenging topics of the course are delivered. They encourage in-depth exploration of ***membrane potentials*** and *neuronal* ***action potentials***. Both consist ofself-learning assessments, in small groups, guided by tutors.

3) Health and Safety: Before you start your laboratory work, you must study the lectures and pass an assessment on *Health and Safety*. ***This is a legal requirement,*** and you will have to ***pass a short online MCQ test*** to show that you have gained sufficient knowledge and competence to work in a research laboratory. ***You will not be allowed to do your laboratory work unless you have passed this test.*** Re-tests will occur until a pass is achieved.

Laboratory Work:

The **laboratory workshops** in this course **are assessed** and consist of:

A set of three linked exercises to provide comprehensive preparation, then a full lab experience. The resulting report is assessed and contributes to your course grade (***33% of the final mark***).

1) Drug dilution calculations ***tutorial***.
2) A ***computer simulation*** of the final practical.
3) *The final "wet" ***practical session***. This wet practical will examine the effect of pharmacological manipulation on living tissue. It will be delivered in the Science Teaching Hub labs.

It is ***essential*** that students attend all sessions. The initial calculations tutorial and the computer simulation exercise ensure you will be properly prepared to carry out the final practical skills required, 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***.

Submit via MyAberdeen ***within 2 weeks of the practical session***, in word-processed format, using *Excel* to produce graphs where appropriate. This laboratory report will account for ***33% of your final mark***.

Additional learning support needs & shielding provision**: The practical work required in this course may present difficulties to students with additional learning support needs or shielding requirements due to medical conditions. For such students, alternative arrangements will be made. Any student who requires additional support for learning should make their situations known to the Course Co-ordinator(s) ***when registering for the class, and should then discuss their needs with the School Disabilities Co-ordinator (contact details given under, '**Problems with Coursework**' above), to ensure that they have the best possible outcome.

NB:- Other Assessed Course Work

You are reminded that as well as the laboratory report above (***worth 33%***) students **must also** complete the following three further elements of assessment:

- **Problem-Solving Exercise.** (***25% of the final mark***).
- **Student Selected Component (SSC)**. (***25% of the final mark***).
- **Summative essay** under mock exam conditions (***17% of final mark***).

See 'Assessment' section for details.

Transition into level 3

As students progress through their degree programme, they will notice a steady progression 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 - Prof Steve Tucker (**s.j.tucker@abdn.ac.uk**) 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, Prof Tucker will hold regular, advertised "drop-in" online surgeries for students to raise any issues 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 education policies, available here. 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 2023/24 academic year. Further information can be found on the University's Infohub webpage or by visiting the Infohub.

The information included in the institutional area for 2023-24 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

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	Not used for Honours	• 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 SM3002: 2023-24

Date	Time	Place	Subject	Session	Staff
Week 8					
Mon 18 Sep	09:00-10:00	A21	Introduction to SM3002	Lecture	GSB/WH
Tue 19 Sep					
Wed 20 Sep	11:00-12:00	A21	Membrane Potentials 1	Lecture	CC
Thu 21 Sep	10:00-13:00		Graph preparation time (Excel and spreadsheet) – **Self study**	Self-Study	
	or 10:00-13:00	EWF81 (Comp)	Library Search Exercise: **Group 1**	Tutorial	EB
	14:00-17:00		Graph preparation time (Excel and spreadsheet) – **Self study**	Self-Study	
	17:00	MyAb	Excel graph submission deadline	Formative Assessment	
Fri 22 Sep	09:00-10:00	A21	Membrane Potentials 2	Lecture	CC
	10:00-11:00	ZB16/18	Membrane Potentials Tutorial: **Group 1/ Group 2**	Tutorial	CC/AGS SJT/IR/PM
	11:00-12:00	ZB16/18	Membrane Potentials Tutorial: **Group 3/Group 4**	Tutorial	CC/AGS/AS/IR/SJT
Week 9					
Mon 25 Sep	09:00-10:00	A21	Membrane Potentials 3	Lecture	CC
	10:00-11:00	NK6	Safety course – part 1	Lecture	GSB
	12:00-13:00	A21	Student Selected Component (SSC) Introduction, &	Lecture	GSB/WH

			Excel graphs & course content Q&A		
Tue 26 Sep					
Wed 27 Sep	11:00-12:00	ZG18	Safety course – part 2	Lecture	GSB
		MyAb	Statistics for the terrified!	Online	
Thu 28 Sep	10:00-13:00	STH 2.001	Lab Prep: Drug dilutions intro & calculations tutorial **Groups 3 & 4**	Tutorial	SJT/IR/LS /AS/JB
	or 10:00-13:00	FN112 (Comp)	Library Search Exercise **Group 2**	Tutorial	EB
	14:00-17:00	STH 0.004	Lab Prep: Drug dilutions intro & calculations tutorial **Groups 1 & 2**	Tutorial	SJT/LS/A S/VG/DR
	or 14:00-17:00	ZG21 (Comp)	Library Search Exercise: **Group 3**	Tutorial	EB
Fri 29 Sep	09:00-10:00	A21	The Action Potential 1	Lecture	SS
	10:00-13:00	EWS84 (Comp)	Library Search Exercise: **Group 4**	Tutorial	EB
	17:00	MyAb	Safety MCQ Exam (all day) – online exam deadline	Formative Assessment	
Week 10					
Mon 2 Oct	09:00-10:00	A21	The Action Potential 2	Lecture	SS
	10:00-11:00	NK6	The Action Potential 3	Lecture	SS
Tue 3 Oct					
Wed 4 Oct	11:00-12:00	A21	Signal Transduction 1	Lecture	FM
Thu 5 Oct	10:00-13:00	STH 0.001	Lab Prep: Drug dilutions & practical simulation **Groups 3 & 4**	Tutorial	SJT/IR/LS /PM/VG
	14:00-17:00	STH 0.001	Lab Prep: Drug dilutions & practical simulation **Groups 1 & 2**	Tutorial	SJT/IR/LS /PM/VG
Fri 6 Oct	09:00-10:00	A21	Student Selected Component (SSC) Q&A	Lecture	WH
	10:00-13:00	EWS81/ EWF86	Action potential exercise: **Group 1/Group 2**	Tutorial	AGS/SS/Z F/JB/VG
Week 11					
Mon 9 Oct	09:00-10:00	A21	Signal Transduction 2	Lecture	FM
Tue 10 Oct					
Wed 11 Oct	11:00-12:00	A21	Signal Transduction 3	Lecture	GFN
Thu 12 Oct	10:00-17:00	STH 1.007	Lab Practical: **Group 1** **(Report submission MyAb 2 weeks later)**	Practical	SJT/IR
Fri 13 Oct	09:00-10:00		Private study – Lab Report/Prob Solving/SSC Prep		
	10:00-13:00	EWS81/ EWF86	Action potential exercise: **Group 3/Group 4**	Tutorial	IR/AGS/J B/SS/VG
Week 12					
Mon 16 Oct	09:00-10:00	A21	Signal Transduction 4	Lecture	GFN
	10:00-11:00	NK6	Mid-Course Review/Safety MCQ feedback	Lecture	GSB/WH
Tue 17 Oct					
Wed 18 Oct	11:00-12:00	A21	Signal Transduction 5	Lecture	FM
Thu 19 Oct	10:00-17:00	STH 1.001	Lab Practical: **Group 2** **(Report submission MyAb 2 weeks later)**	Practical	SJT/IR
Fri 20 Oct	09:00-13:00		Private study – Mock Exam (Formative) Prep	Self-Study	

Week 13					
Mon 23 Oct	11:00-12:00	A21	Ion & Non-Electrolyte Transport 1	Lecture	TA
Tue 24 Oct					
Wed 25 Oct	11:00-12:00	A21	Ion & Non-Electrolyte Transport 2	Lecture	TA
Thu 26 Oct	10:00-11:00	MR117 (Comp)	Mock exam essay (formative): **Groups 1 & 2**	Formative Assessment	GSB/WH
	11:00-12:00	MR117 (Comp)	Mock exam essay (formative): **Groups 3 & 4**	Formative Assessment	GSB/WH
Fri 27 Oct	09:00-10:00	A21	Ion & Non-Electrolyte Transport 3	Lecture	TA
	10:00-13:00		Private study – Lab Report/Prob Solving/SSC Prep	Self-Study	
Week 14					
Mon 30 Oct	09:00-10:00	A21	Neuroendocrine Signalling	Lecture	SJT
	10:00-11:00	NK6	Membrane Potentials Revision	Tutorial	CC
Tue 31 Oct					
Wed 1 Nov	11:00-12:00		Private Study – Lab Report/Prob Solving/SSC Prep	Self-Study	
Thu 2 Nov	10:00-17:00	STH 1.007	Lab Practical: **Group 3** **(Report submission MyAb 2 weeks later)**	Practical	SJT
Fri 3 Nov	09:00-10:00	A21	Neuroendocrinology of Obesity - I	Lecture	LH
	10:00-13:00		Private study – SSC Prep	Self-Study	
	17:00	MyAb	Student Selected Component (SSC) Submission Deadline	Summative Assessment	
Week 15					
Mon 6 Nov	09:00-10:00	A21	Neuroendocrinology of Obesity - II	Lecture	LH
Tue 7 Nov					
Wed 8 Nov	11:00-12:00		Private Study - Lab Report/Prob Solving Prep	Self-Study	
Thu 9 Nov	10:00-17:00	STH 1.007	Lab Practical: **Group 4** **(Report submission MyAb 2 weeks later)**	Practical	SJT
Fri 10 Nov	09:00-10:00	A21	CNS Neurotransmission	Lecture	SJT
	10:00-13:00		Private Study - Lab Report/Prob Solving Prep	Self-Study	
Week 16					
Mon 13 Nov	09:00-10:00	A21	CNS – Drug addiction and dependency	Lecture	SJT
Tue 14 Nov					
Wed 15 Nov	11:00-12:00		Private Study – Prob Solving Prep	Self-Study	
Thu 16 Nov	10:00-11:30	EWF81 (Comp)	Problem solving (Parts A&B): **Groups 1 & 2**	Summative Assessment	GSB/WH
	11:30-13:00	EWF81 (Comp)	Problem solving (Parts A&B): **Groups 3 & 4**	Summative Assessment	GSB/WH
	14:00-15:00	NK1	Principles of Synaptic Transmission 1	Lecture	GSB
Fri 17 Nov	09:00-10:00	A21	Principles of Synaptic Transmission 2	Lecture	GSB
	10:00-11:00	A21	Principles of Synaptic Transmission 3	Lecture	GSB
Week 17					
Mon 20 Nov	09:00-13:00		Private study – PS PtC/Mock exam (summative) Prep	Self-Study	
	17:00	MyAb	Deadline for Problem Solving (part C) submission	Deadline	
Tue 21 Nov					

Wed 22 Nov	11:00-12:00		Private study – Mock exam (Summative) Prep	Self-Study	
Thu 23 Nov	14:00-15:00	MR117 (Comp)	Mock exam essay (summative): **Group 1/Group 2**	Summative Assessment	GSB/WH
	15:00-16:00	MR117 (Comp)	Mock exam essay (summative): **Group 3/Group 4**	Summative Assessment	GSB/WH
Fri 24 Nov	09:00-10:00	A21	Course Review	Lecture	GSB/WH

Staff

Dr Guy S Bewick (GSB) - (Course Co-ordinator, Joint)
Dr Wenlong Huang (WH) - (Course Co-ordinator, Joint)
Dr Tarek Abdelghani (TA)
Ms Eleni Borompoka (EB), Library
Dr Catriona Cunningham (CC)
Dr Antonio Gonzales Sanchez (AGS)
Prof Lora Heisler (LH)
Dr Pietro Marini (PM)
Dr Fiona Murray (FM)
Prof Graeme F Nixon (GFN)
Dr Iain Rowe (IR)
Dr Annesha Sil (AS)
Dr Lianne Strachan (LS)
Dr Sergiy Sylantyev (SS)
Prof Steve J Tucker (SJT)

Campus Maps – Foresterhill

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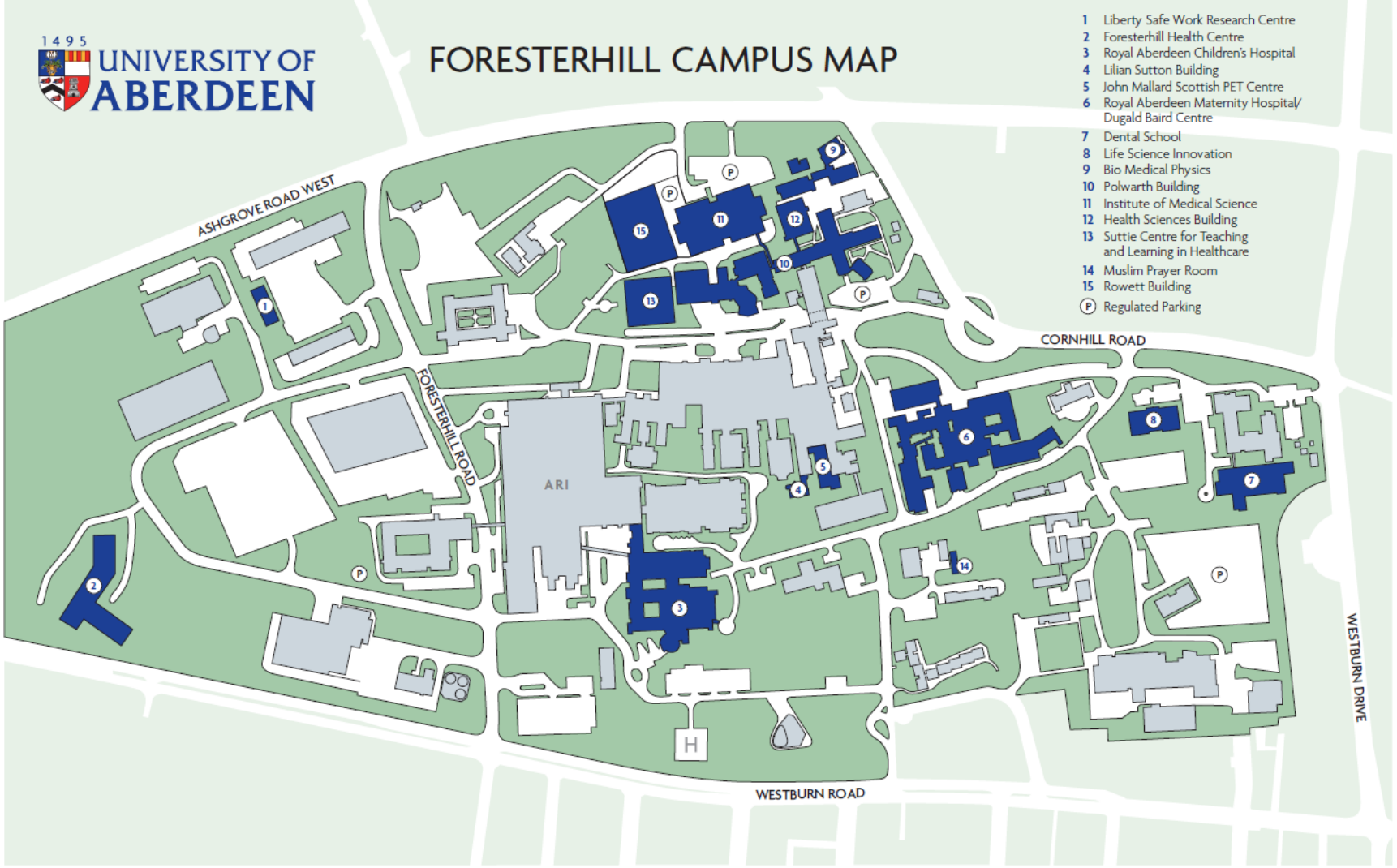
FORESTERHILL CAMPUS MAP



Polwarth Floor Plans

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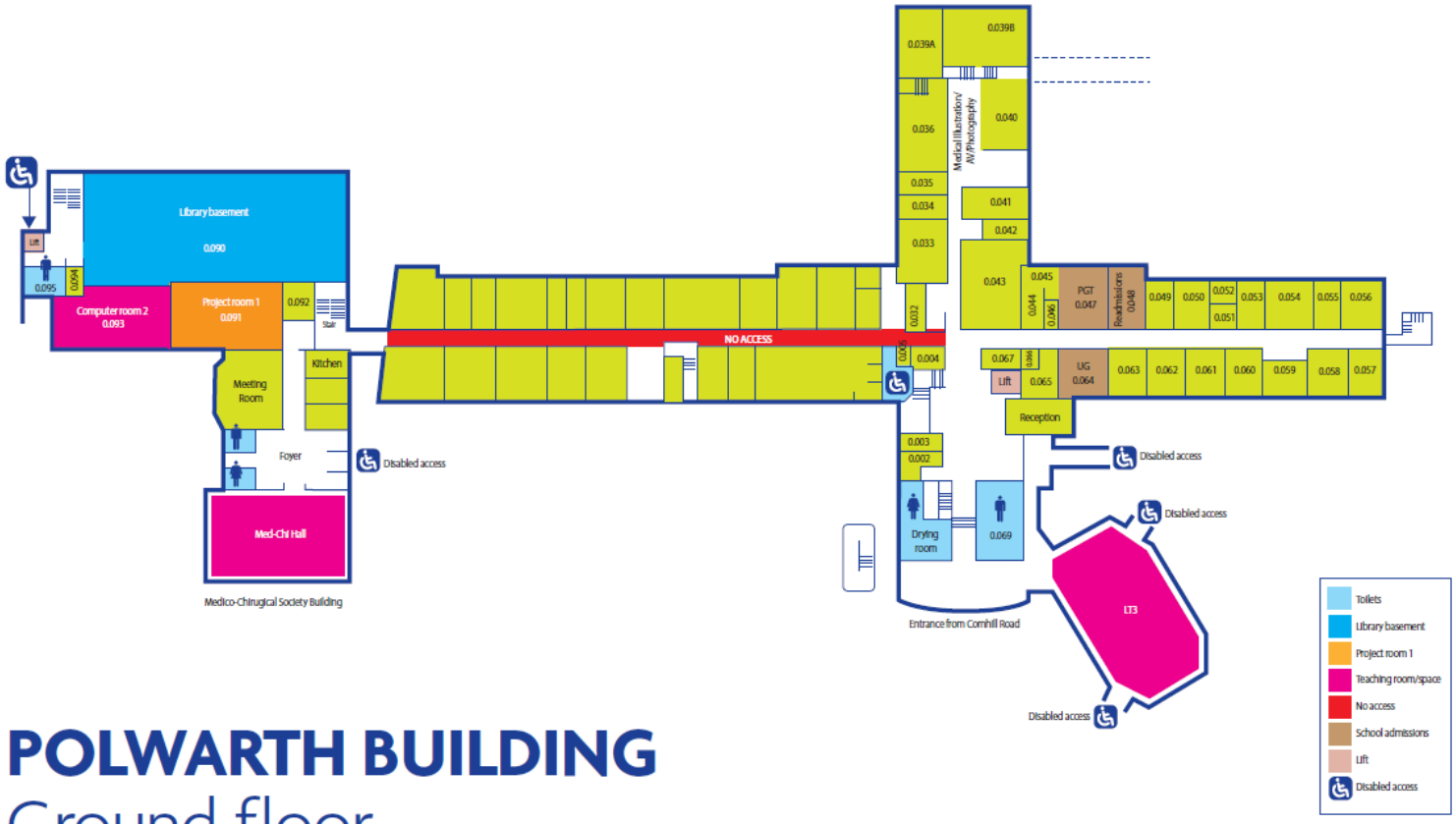

POLWARTH BUILDING
Ground floor

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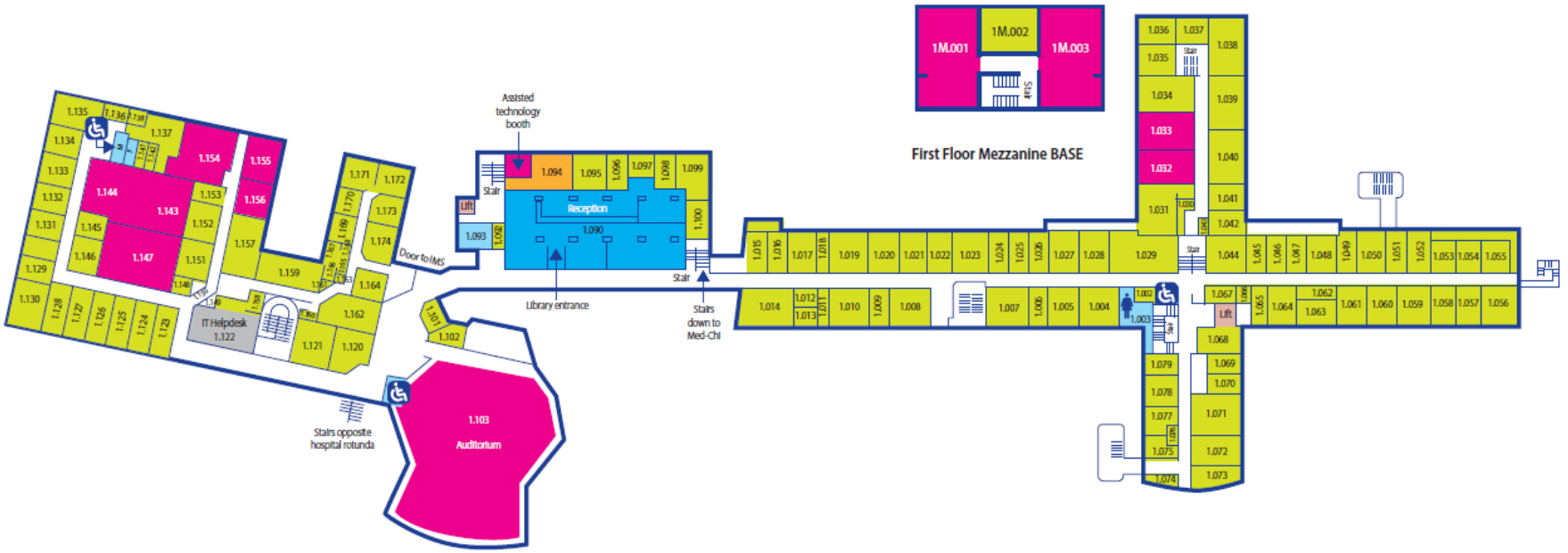

POLWARTH BUILDING
First floor

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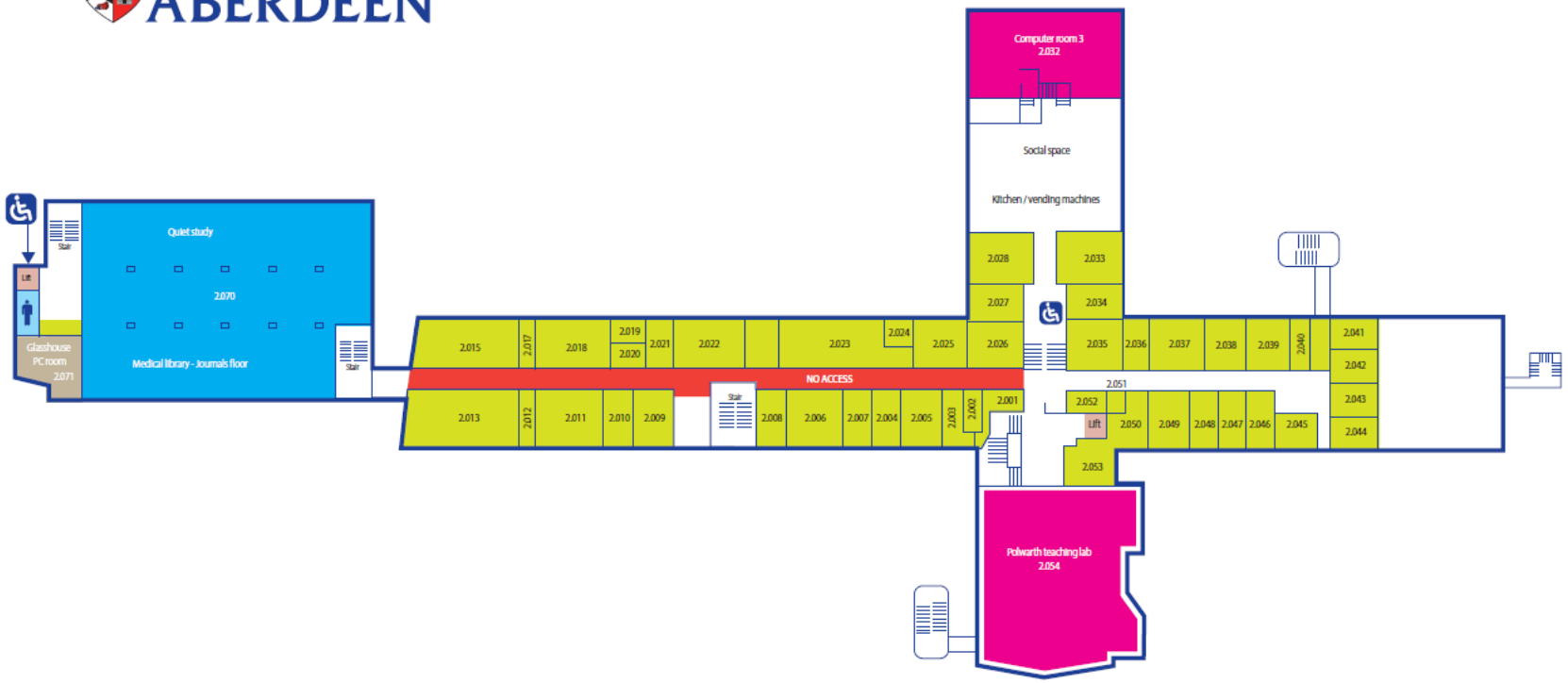

POLWARTH BUILDING
Second floor