



Life Sciences

AT THE UNIVERSITY OF DUNDEE

Study Guide



Help and Support

So that you know what is expected of you, we are responsible for:

- producing a module handbook to explain the teaching aims and learning objectives of the Module;
- explaining the procedures by which you will be taught and examined;
- providing opportunities for you to judge your progress in the Module e.g. in the form of diagnostic or formative assessments;
- monitoring your attendance in classes, and we will ask you to explain any unauthorised absence or other failure to participate in the work of the Module. You will be reported to the relevant Programme Lead for any failure to attend and/or participate, or for poor academic performance.

For help with academic matters

Help from staff or Module Managers: If you have queries regarding module content or you wish one of the teaching staff or Module Managers to provide a reference or special letter, email the staff member specifying your query or requesting an appointment.

Help from your Adviser of Studies: It is imperative that you speak to your Adviser of Studies if you are intending to make changes to your programme of study whether it is changing modules or changing degree programme. Your Adviser of Studies can also provide references for you. In addition, if you are having problems that are affecting your ability to study, it is advisable to report these to your Adviser of Studies and the Programme Lead.

You can also seek help from your relevant Programme lead

Programme Lead Years 1 and 2, Core Curriculum Dr Nick Brewer

Phone: 01382 384706

Email: m1sugcc@dundee.ac.uk

Programme Lead Biological Sciences: Dr David Booth

Phone: 01382 384278

Email: 1sugbio@dundee.ac.uk

Programme Lead Biomedical Sciences: Dr Steve Land

Phone: 01382 3884760

Email: 1sugbms@dundee.ac.uk

For help with regulatory matters:

Occasionally health or personal problems have such a debilitating effect that you may have to consider withdrawing temporarily from your studies if you are continuously absent from your studies for 3 weeks or more. In this event you should discuss the matter with the Head of Administration for Learning and Teaching or your Programme Lead, who can advise or direct you to support on issues relating to Regulations and funding. Such discussions will be kept confidential, unless there are circumstances in which your interest would be best served by divulging the confidential information to other staff. Your permission would be sought in this event.

Information for new students on Life Sciences programmes and modules – 2015-16

The Life Sciences Undergraduate Teaching Office (UTO) Reception is in **Room C.G.14** of the Carnelley Building and is a “one-stop-shop”, manned from 9am – 4.30pm, Monday to Friday (closed 12.30-1.30pm) if you wish to drop by in person.

To make an appointment to see any key contacts or academics
Phone: 01382 384182 or
Email: SchoolOffice-LS@dundee.ac.uk

Contact details

Year 1 and 2 and Core Curriculum Teaching Support

Phone: 01382 388360

Email: LSUGCC@dundee.ac.uk

Biological Year 3 – 5 Teaching Support

Phone: 01382 384257

Email: LSUGBIO@dundee.ac.uk

Biomedical Year 3 – 5 Teaching Support

Phone: 01382 388178

Email: LSUGBMS@dundee.ac.uk

To find out about life in Life Sciences, programmes, regulations and modules, and what you need to be doing, you'll need to go to



My Dundee is the University of Dundee's web-based student portal (VLE), giving you access to your learning materials, your student clubs and societies and many other School and discipline specific resources. It can be reached from anything connected to the internet.

Logging into *My Dundee*

<http://my.dundee.ac.uk/>

The URL above takes you to the login page for *My Dundee* and uses the same username and password as your login to the University computer system. Alternatively, follow links to it from the University of Dundee Homepage, via Current Students > *My Dundee*. Your use of *My Dundee* is subject to University Regulations for the Use of Computer Facilities.

The My Dundee screen: The initial screen that appears once you log on provides access to your modules, announcements, calendar, tasks and additional areas. You can customise your *My Dundee* page by adding extra features, and changing the colours and layout. In the My Groups and Communities, you should see:

Life Sciences Undergraduate Students: Useful Information, which is where general useful information such as Degree Regulations and various important school documents such as Student Notification of Absence Form is stored for your information and use (including this document!)

More about My Dundee

My Modules: All modules you are enrolled in are available from the Course List under My Modules tab, or from My Modules on the right hand side of the *My Dundee* screen.

My Files: This tab gives access to a personal file store on *My Dundee* which you will need if your course or module is making use of electronic portfolios.

My Webmail: This tab gives access to your University e-mail account.

PC Requirements: You can access *My Dundee* using PCs in the University's IT suites. However, if you wish to logon from outside the University please follow the links below:

Browser and platform compatibility

checks: <http://kb.blackboard.com/pages/viewpage.action?pageId=71860304>

We also provide a link to a browser checker so that users can check their own setup: <http://www.dundee.ac.uk/elearning/browserchecker/>

More about staff in LaBSe

The key members of staff in Life and Biomedical Sciences Education (*LaBSe - the new name for the School of Life Sciences Learning and Teaching*) are listed to the right. In addition, each module has academic staff responsible for its academic content and for running the module. Module Managers have teams of academic, clerical and technical staff to help them run the various component parts of the modules for which they are responsible. For any questions about the modules, please contact the relevant Programme Lead, using the email addresses to the right:

Key Contacts in Life Sciences Learning and Teaching

Associate Dean and Head of Life and Biomedical Sciences Education: Professor David Coates

Phone: 01382 385111

Email: d.coates@dundee.ac.uk

Head of Administration for Learning and Teaching:

Ms Arlene Stewart

Phone: 01382 384570

Email: a.v.stewart@dundee.ac.uk

Programme Lead Years 1 and 2, Core Curriculum Dr

Nick Brewer

Phone: 01382 384706

Email: m1sugcc@dundee.ac.uk

Programme Lead Biological Sciences: Dr David Booth

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Programme Lead Biomedical Sciences: Dr Steve Land

Phone: 01382 3884760

Email: 1sugbms@dundee.ac.uk

Any questions, ask any of the staff you see in the Carnelley Building – that's the teaching base for the School of Life Sciences!

Further Help

If you have any problems using *My Dundee*, consult the *Help* tab, or try:

- ✓ Visiting the IT Service Desk in the Tower Basement IT Suite or Main Library.
- ✓ E-mailing a description of your problem to elearning@dundee.ac.uk.

Telephoning – use the 'Service Desk' button on a phone in an IT Suite or on other phones dial extension 88000 (or 01382 388000 externally)

1. What is in this Study Guide?

Students in Life Sciences will not receive printed module handbooks: only practical protocols and the initial Health and Safety documents will be printed. This study guide contains information on the content and assessment of these modules. This information is also available within each module on My Dundee. Module Timetables can be viewed at <https://timetable.dundee.ac.uk> which contains timetables for each of these modules but please note that sometimes times or venues have to be changed at short notice so always **check** My Dundee for latest information.

We hope that this Life Sciences Study Guide will:

Summarise important essential information, guidance and advice on issues of teaching, learning and student support

Help you achieve your maximum potential taking modules and/or degrees offered by the College of Life Sciences

1.1 Key Dates in Academic Year 2015-2016

Semester 1

Freshers' Week:	7-11 September 2015
Teaching Weeks 1-5 & 7-12:	14 September - 16 October 2015 26 October – 4 December 2015
Catch-up Week:	19-23 October 2015 (Level 3 only)
Semester 1 Exam Weeks 13 & 14:	7-18 December 2015 inclusive
4 weeks Christmas Vacation:	21 December 2015 – 15 January 2016

Semester 2

Teaching Weeks 15-25:	18 January – 01 April 2016
3 weeks Easter Vacation:	4 April – 24 April 2016
Semester 2 Exam Weeks 26-30:	25 April - 27 May 2016 inclusive
Graduation ceremonies:	20-24 June 2016 and 15-18 November 2016
Single resit diet for Semesters 1 & 2:	4-8 July 2016 inclusive

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SECTION 2: Your responsibilities as a student - learning, attendance and communication

2.1. Communication

It is your responsibility to keep yourself informed about the modules you are taking by reading and referring to the individual module handbooks available on-line via *My Dundee* and checking the following at least **once per day** for any urgent updates or rescheduling notices. You **must use your University e-mail address** for all communications with staff.

Check the following at least once per day for urgent updates or rescheduling notices

✓ **Your Dundee university Email account**

✓ ***My Dundee* 'Announcements'**

From week 4 on a regular basis check

✓ **eVision**

and report any discrepancies, by email to relevant Teaching Support, to address asap

2.2. Student attendance and participation

2.2.1 Attendance at compulsory classes and coursework submissions

You are encouraged to attend all lectures and scheduled classes in the timetables for all School of Life Science modules. However, for all modules,

attendance at workshop, tutorials and practical classes are **COMPULSORY** attendance registers are taken and it is your responsibility to ensure your attendance is noted each time.

At the end of the second week of teaching in both Semester 1 and 2 you will receive a general E-Mail reminding you of the importance of attending classes and submitting compulsory coursework. This is the only formal reminder you will receive about your attendance and submission of coursework.

Your attendance and course work submissions are strictly monitored and you should notify the School Office of any non-attendance or non-submissions using the appropriate procedure described in Section 2.2.3 below.

An accumulation of more than **one** unauthorised absence (AB) for either non-attendance and/or non-submission of coursework will mean that you will be invited to a meeting to explain why. You will receive a formal letter advising you of a time to meet with the Head of Administration for Learning and Teaching and your Programme Lead. The letter and notes of the meeting will be kept on file, and may be used by us when we are writing references for you later.

2.2.2 Submitting your course work

Submission of all course work assignments (paper-based or electronic) are **COMPULSORY** and should be submitted according to the instructions given in the Assessment and Submission Deadline sections in individual module handbooks. Unless otherwise informed, **ALL** paper based coursework should be submitted in the black boxes in the basement level of the Carnelley Building. You will have your marked paper-based assessments returned to you through the Undergraduate Teaching Office Reception in Carnelley room C.G.14. Students will be notified by email that coursework is ready for collection, normally within three weeks. Extensions to a submission deadline can only be given by a Module Manager and must be recorded by the Undergraduate Teaching Office.

2.2.3 Penalties for late submission of course work

Unauthorised late submission will incur a penalty of one numerical point on the marking scale per day for up to a maximum of 5 working days, **INCLUDING** weekends, following the published deadline. All submissions which are more than five days late will be marked for feedback purposes, but you will be awarded a BF grade towards the overall module mark for the associated coursework. Non-submission will be graded as AB. Requests for extensions to deadlines must be made to the module manager **BEFORE** the deadline.

2.3 Absence

2.3.1 What to do when absent from compulsory classes or examinations

If you are absent from classes, it is important that you complete a **Student Notification of Absence form**, available from the Undergraduate Teaching Office Reception in Carnelley room C.G.14, before or within **SEVEN DAYS** following the class and/or assessment. Depending upon the circumstances, as outlined below, you may also be required to provide a medical certificate or letter explaining your absence.

Absences of up to 5 days: **You can self-certify by completing a Student Notification of Absence form.** For minor illnesses, an MC grade will be entered into your assessment record. If your absence is due to a cause other than illness and the reason given on the Student Notification of Absence form is considered legitimate, then a certified absence (CA grade) will be granted.

Absences of more than 5 days: If an illness results in an absence of more than 5 days, then, **in addition to the Student Notification of Absence form, a medical certificate signed by a GP or hospital letter** will also be required. If the absence is for reasons other than illness, then you must submit a letter explaining the prolonged absence. In the latter case, you will be informed if your reason for absence is deemed to be certified.

Absence requests for extra curricula activities must be made in writing to the Undergraduate Teaching Office **no later than two weeks in advance of the event.** Failure to do this will result in an AB being recorded. You are unlikely to be retrospectively awarded a Certified Absence.

Self Certification: Please note that in the interest of ensuring you receive the optimum learning experience and reach your full potential on your modules, only two occasions of self-certified absences/non-submission of course work can be sustained. If your

attendance record shows more than two MC's (Medical related) or CA's (non-medical related) you will be invited to meet with the Head of Administration for Learning and Teaching and your Programme Lead, to review your position with regard to missed classes and/or course work.

2.3.2 Degree Examination Timetables

Degree examination timetables

Please note that Registry publish degree exam timetables on the University web site in November for Semester 1, in March for Semester 2 and in June for the Resit Diet. The examinations only take place on Campus and only at the particular times published in the exam timetables. There are no exceptions so beware when

Degree examination results

Provisional Semester 1 degree examination results will be available via eVision from late January. The official results for both semester 1 and 2 will be available via eVision in June following the examination board meetings. The resit results will be available via eVision in August. Please note that examination

booking holidays or flights home within the semester dates given on the back cover of this booklet.

results will NOT be conveyed via the telephone. Therefore, please **do not** telephone the Undergraduate Office requesting this information,

2.3.3. Absence from exams (including in-course tests and degree exams)

Email SchoolOffice-LS@dundee.ac.uk or telephone 01382 384182 as soon as possible. In addition, if you miss the examination due to illness, you must send in a medical certificate within **SEVEN DAYS** following the examination. Self-certification is not allowed for absence from examinations. If you miss an examination, through no fault of your own, for reasons other than illness, then you must submit corroborative documentation within **SEVEN DAYS** following the examination.

2.4. Life Sciences Mitigating Circumstances procedure

If, during the course of your studies, you experience unforeseen and unavoidable circumstances that you believe have had a **significant negative impact** on your performance in coursework and/or examinations, you should submit your case (including supporting evidence where possible) in confidence for consideration by the School of Life Sciences Mitigating Circumstances Committee. The Committee meets following each Examination Diet, to consider submissions made which have affected your work and/or examination performance for the preceding semester, and makes recommendations to the relevant Board of Examiners on the level of support that should be given in each case. In accordance with the Data Protection Act, no significant details of any submission to the Mitigating Circumstances Committee are revealed to the Board of Examiners.

2.4.1 How to report mitigating circumstances to the Mitigating Circumstances committee

Fill in a Mitigating Circumstances Form, which you can download from the **Life Sciences Undergraduate Students: Useful Information** on *My Dundee* or obtain from the Undergraduate Teaching Office reception in Carnelley room C.G.14, giving brief details of how your work was affected - e.g. unable to concentrate for revision etc.

Provide documentary evidence of the problem giving some indication of the period of time involved e.g. doctor's note, a statement of support from a third party (e.g. Adviser of Studies, parents) to support your case.

The Mitigating Circumstances Form will have the submission deadline clearly identified and it is your responsibility to ensure that this form is submitted to the Undergraduate Teaching Office on or before the deadline provided. It may not be possible to consider late submissions. Receipt and consideration of your submission will be acknowledged, but there will be no specific feedback on the decision(s) made.

2.5. Discounting the semester or year

In the event that you are prevented from engaging with your study for legitimate reasons over a prolonged period, you may apply through the Life

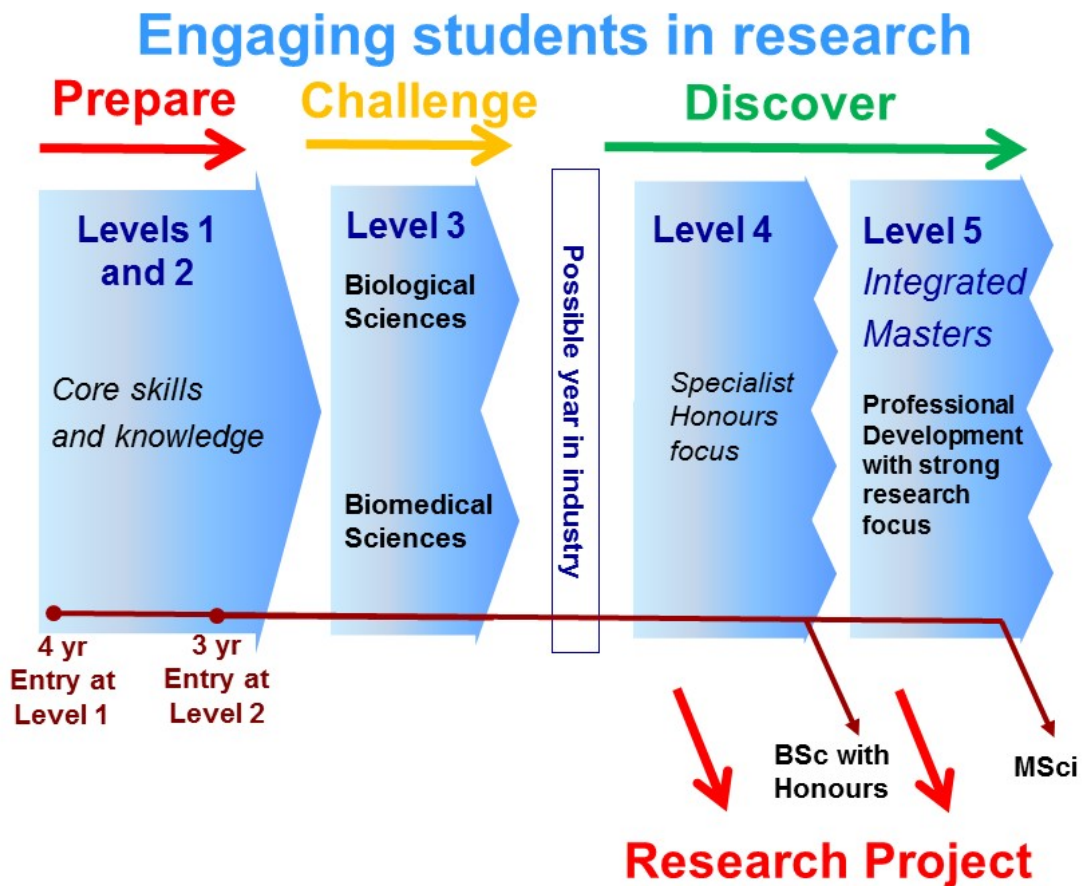
Sciences Undergraduate Teaching Office to have the semester or year discounted. An application for a discounted year should be submitted to the Undergraduate Teaching Office, addressed to the **Associate Dean, Learning and Teaching** (SchoolOffice-LS@dundee.ac.uk) as soon as possible and in any event not later than the beginning of the Easter break. It is possible to retain credits already accrued from modules completed in the discounted year.

SECTION 3: Degrees in Life Sciences and the Modular Structure

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3.1 School of Life Sciences Degree Programme Outline



All programmes in Life Sciences have a common core curriculum at levels 1 and 2: at level 3, a final choice is made as to whether to follow the Biological

Sciences route, and its specialisations; or the Biomedical Sciences route and its specialisations. Options exist to exchange semesters or years in levels 2 and 3, and for years out between levels 3 and 4. Translation to the MSci programme normally takes place in level 3.

The core curriculum for levels 1 and 2 is described in sections 3.2 and 3.3.

The module choices allowed at levels 3 and 4 for Biological Sciences and Biomedical Sciences routes are given on the following pages – brief module descriptors can be found in sections 3.4 and 3.5

3.1.1 Module Choices in Levels 3 and 4

By level 3 you will have now chosen whether you wish to specialise in the biological or biomedical stream. Students are automatically enrolled on modules essential for their chosen degree route but you may wish to check which modules these are by referring to the information below in 3.1.5

3.1.2. Assessment at levels 3 and 4

We use a variety of assessment types at Level 3 and 4 as listed below, you will be familiar with many of these from your previous studies:

Module type	Assessment type	Learning outcomes assessed
Theory and practical	On-line examination and tests (using QMP and EOL)	Core knowledge, numerical skills, problem solving and critical thinking.
Theory	Written exams – short answer, problems and essays	Core knowledge, numerical skills, problem solving and critical thinking.
Practical and theory	Presentations (oral and poster)	Communication skills and presentation of data.
Practical	Laboratory competence evaluation (experimental plans, risk assessments, lab books)	Practical skills, record keeping, organisational and planning skills.
Practical and theory	Scientific writing (reports, case studies, literature review, essays)	Written communication, presentation and analysis of data, critical thinking and problem solving
Theory and Practical	Data analysis	The ability to take raw data from a variety of sources, interpret and/or transform it and then present the results.

3.1.3. Feedback

You will receive feedback on all your coursework submissions which may be provided in a variety of forms e.g. hard copy feedback sheets, electronic feedback sheets, oral feedback (individual or group).

3.1.4. Core textbooks

The four semester one modules for Level 3 in Biological Sciences are the foundation for the specialist modules in semester two. To support your studies there are three recommended textbooks, many copies of which can be found in the library or can be bought either new or second-hand. In addition to these textbooks, lecturers will recommend other materials for your study.

Introduction to Genetic Analysis ,Griffiths et al ,10th Edition, Palgrave, (earlier editions are also suitable)

Molecular Biology of the Cell, Alberts, B. et al. 5th edition, Garland Science, (other editions are also suitable)

Genes IX, Lewin, B,Prentice Hall (other editions are also suitable)

3.1.5. Biological Sciences module choices at levels 3 and 4,

Level 3 - BIOLOGICAL STREAM MODULE CHOICES

		BLOCK	BCDD	BIOLSCI	MOLBIO	MOLGEN	MICBIO	BIOCHEM	CANCERBIOL	CDB	CELL SIGNAL	IMMUNOLOGY	PLANTSCI	BIOINFORM	PRE & CO REQUISITES
BS31003	Molecular Structure & Interactions	A	C	C	C	C	C	C	C	C	C	C	C	C	
BS31005	Genetics	A	C	C	C	C	C	C	C	C	C	C	C	C	
BS31004	Biochemistry & Cell Biology	B	C	C	C	C	C	C	C	C	C	C	C	C	
BS31006	Gene Regulation & Expression	B	C	C	C	C	C	C	C	C	C	C	C	C	
			No Options	No Options	No Options	No Options	No Options	No Options	No Options	No Options	No Options	No Options	No Options	No Options	
BS32004	Molecular Microbiology	C	O	O	C	O	C	-	O	O	O	O	O	O	
BS32006	Cell Signalling	C	O	O	O	O	O	C	C	C	C	C	O	O	
BS32007	Organic Synthesis	C	C	O	O	O	O	-	O	-	O	O	O	O	
BS32011	Practical Project A	C	O	C*	C*	C*	C*	C	C*	C*	C*	C*	C*	C	
BS32003	Drug Discovery & Development	D	C	O	O	O	O	O	O	-	O	-	O	O	Student must take this in association with BS32007
BS32005	Cell & Developmental Biology	D	-	O	O	O	O	O	O	C	O	O	O	O	
BS32008	Plant Science	D	-	O	O	O	O	O	O	O	O	O	C	O	
BS32009	Immunology	D	-	O	O	O	O	O	O	O	O	C	O	O	
BS32010	Applied Bioinformatics	D	-	O	O	O	O	O	O	O	O	O	O	C	Students MUST take this in association with BS32011
BS32012	Practical Project B	D	C	C*	C*	C*	C*	O	C*	C*	C*	C*	C*	O	
			1 Option	3 Options	3 Options	3 Options	2 Options	2 Options	2 Options	1 Option	2 Options	1 Options	2 Options	2 Options	

C = Core

O = Optional

C* = These are CORE Modules to Biological Stream however students have the option to select either practical Project 1 in block C OR practical Project 2 in block D

(specialism determined by Honours project and associated specialist modules in Year 4)

Level 3 Biomedical Stream Modules may be available as Elective Choices only under guidance and where scheduling permits

Level 4 -BIOLOGICAL STREAM MODULE CHOICES

		BLOCK	BCDD	BIOLSCI	MOLBI	MOLGEN	MICBIO	BIOCHEM	CANCERBIOL	CDB	CELL SIGNAL	IMMUNOLOGY	PLANTSCI	BIOINFORM	PRE & CO REQUISITES
BS41004	Biological Sciences Honours Project	1	C	C	C	C	C	C	C	C	C	C	C	C	
BS41005	Research Skills	1	C	C	C	C	C	C	C	C	C	C	C	C	
			NO OPTIONS												
BS42003	Advanced Bioinformatics	C	O	O	O	O	O	O	-	O	-	-	O	C	
BS42004	Advanced Modern Drug Discovery	C	C	O	O	O	O	-	-	-	-	-	-	-	Students must have studied BS32003, BS32007
BS42005	Advanced Plant Sciences	C	O	O	O	O	O	O	O	O	O	O	C	O	
BS42006	Advanced Immunology	C	-	O	O	O	O	O	O	O	O	C	-	O	Students must have studied BS32006, BS32009
BS42007	Cancer Biology	C	O	O	O	O	O	O	C	O	O	O	O	O	
BS42008	Advanced Cell and Developmental Biology	C	-	O	-	O	O	O	O	C	O	O	-	O	Students must have studied BS32005
			1 Option	2 Options	2 Options	2 Options	2 Options	2 Options	1 Option	2 Options	2 Options	1 Option	1 Option	1 Option	
		BLOCK	BCDD	BIOLSCI	MOLBI	MOLGEN	MICBIO	BIOCHEM	CANCERBIOL	CDB	CELL SIGNAL	IMMUNOLOG	PLANTSCI	BIOINFORM	
BS42009	Advanced Molecular Microbiology	D	O	O	C	O	C	O	O	O	O	O	O	O	
BS42010	Advanced Gene Regulation and Expression	D	O	O	C	C	O	C	O	-	O	O	-	O	
BS42011	Advanced Organic Chemistry	D	C	O	-	O	O	-	-	-	-	-	-	-	Students must have studied BS32007
BS42012	Parasitology	D	O	O	-	O	O	O	O	O	O	O	O	O	
BS42013	Advanced Cell Signalling	D	O	O	-	O	-	O	O	O	C	O	O	O	Students must have studied BS32006
			1 Option	2 Options	No Options	1 Option	1 Option	1 Options	2 Options	2 Options	1 Option	2 Options	2 Options	2 Options	

C = Core

O= Optional

"-" These Modules are neither C or O but may be taken as electives where

Level 3 and/or Level 4 Biological and/or Biomedical Stream Modules may be available as Elective Choices only under guidance where scheduling permits

3.1.6. Biomedical Sciences module choices at levels 3 and 4,

Level 3 -BIOMEDICAL STREAM MODULE CHOICES

		BLOCK	SPRBI	NEUR	PHARM	PHYSICI	BIMS	Pre & Co Requisites
	BS31013	Biomembranes	A	C	C	C	C	
	BS31019	Regulatory Physiology and Pharmacology	A	C	C	C	C	
	BS31015	Sports & Exercise Science 1	B	C	-	-	-	
	BS31016	Practical Techniques in Biomedical Sci	B	C	C	C	C	
	BS31020	Practical Techniques in Cell Biology	B	-	O	O	O	
BIOLOGICAL OPTIONS	BS31004	Biochemistry & Cell Biology	B	-	O	O	O	Students must have taken BS31004 if they intend to take BS32006 AND/OR BS32005 in Sem 2
			NO OPTIONS	One Option	One Option	One Option	One Option	
	BS32022	Human Morphogenesis & Embryo Dev	C	C	O	O	C	O
	BS32026	Sensory & Motorneuroscience	C	C	C	O	O	O
	BS32028	Molecular Pharmacology	C	-	O	C	O	O
BIOLOGICAL OPTIONS	BS32006	Cell Signalling	C	-	O	O	O	O
								MUST have taken either BS31020 OR BS31004 in SEM 1
	BS32020	Human Epithelial Biology	D	C	O	O	C	O
	BS32021	Quantitative Pharmacology	D	-	O	C	O	O
	BS32024	Neuropsychopharmacology	D	-	C	O	O	O
	BS32027	Sports & Exercise Science 2	D	C	-	-	-	-
BIOLOGICAL OPTIONS	BS32005	Cell and Dev Biology	D	-	O	O	O	O
	BS32009	Immunology	D	-	O	O	O	O
			NO OPTIONS	Two Options	Two Options	Two Options	Four Options	

C = Core

O= Optional

STUDENTS PLEASE NOTE ONLY TWO MODULES MUST BE TAKEN IN EACH OF THE FOUR BLOCKS

Biological Modules are only available if Timetabling Allows

Level 4 -BIOMEDICAL STREAM MODULE CHOICES

		BLOCK	BIMS	SPRBI	PHYSICI	PHARM	NEUR	Pre & Co Requisites
BS41006	Biomedical Research Topics	1	C	C	C	C	C	
BS41007	Biomedical Research Project	1	C	C	C	C	C	
			NO OPTIONS	NO OPTIONS	NO OPTIONS	NO OPTIONS	NO OPTIONS	
BS42015	Oxygen Uptake and Utilization (OUU)	C	O	C	*C	-	-	* - Must Select both *C Modules OR *C plus Biol Option
BS42016	Advanced Clinical Exercise Science	C	-	C	-	-	-	
BS42018	Synaptic Plasticity and cognition	C	O	-	-	O	O	Prerequisite BS31013
BS42019	Cardiovascular pharmacology	C	O	-	-	C	-	
BS42024	Sensory Systems	C	O	-	*C	-	C	* - Must Select both *C Modules OR *C plus Biol Option, Also there is a Prerequisite of BS31013.
BS42025	Analgesic and anaesthetic pharmacology	C	O	-	-	O	O	Prerequisite BS31013
BS32021	Quantitative Pharmacology		-	-	O	-	-	

Biological	BS42006	Advanced Immunology	C	O	-	-	-	-	
Level 3 Options	BS32006	Cell Signalling	C	O	-	O	O	O	Prerequisite BS31004 OR BS31020 at Lev 3
	BS32022	Human Morphogenesis and Embryonic Development	C	O	-	O	O	O	

	BS42014	Nutrient Sensing, Signalling and Acquisition	D	O	-	*C	-	-	* - Must Select both *C Modules OR *C plus Biol Option
	BS42017	Psychiatric Disorders	D	O	-	-	O	O	Prerequisite BS31013
	BS42020	Cancer, Chemical Stress & Treatment Options	D	O	-	-	C	-	
	BS42021	Heart and Circulation (HC)	D	O	C	*C	-	-	* - Must Select both *C Modules OR *C plus Biol Option
	BS42022	Advanced Training Methods	D	-	C	-	-	-	
	BS42023	Applied Neuroanatomy	D	O	-	-	O	C	Prerequisite BS31013
	BS32024	Neuropsychopharmacology	D	-	-	O	-	-	
Biological	BS42009	Advanced Molecular Microbiology	D	O	-	-	-	-	
	BS42012	Parasitology	D	O	-	-	-	-	
	BS42013	Advanced Cell Signalling	D	O	-	-	-	-	
Level 3 Options	BS32005	Cell & Developmental Biology	D	-	-	O	-	-	Prerequisite BS31004 OR BS31020 at Lev 3
	BS32009	Immunology	D	-	-	O	O	O	
				4 OPTIONS	NO OPTIONS	2 OPTIONS	2 OPTIONS	2 OPTIONS	

C = Core

O= Optional

STUDENTS PLEASE NOTE ONLY TWO MODULES FROM EACH BLOCKS

Biological Modules are only available if Timetabling Allows

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3.2 – The core curriculum at Level 1

After study of all the core theory modules in Level 1 students will acquire and/or demonstrate the following competencies via assessed coursework and examinations from lectures and attendance at associated workshops:

- Be able to describe the events which prepared the earth for the emergence of life.
- Summarise the key concepts of evolution, the increasing complexity of organisms and physiological developments associated with the move from water to land.
- Explain how variation allows for selection at all levels.
- Summarise the differences between, and pathways leading to, prokaryotic and eukaryotic cells.
- Interpret Mendel's genetic rules in terms of the underlying physical processes.
- Summarize the benefits of multicellularity.
- Classify approaches to intercellular signalling.
- Classify the stages of cell division in relation to the need to maintain information from generation to generation.
- Summarise the nature of covalent and non-covalent forces.
- Summarise the roles and mechanisms of enzymes as catalysts.
- Summarise the thermodynamic mechanisms for energy flow and transfer in cells.
- Assess the relationship between structure and function for biological molecules.
- Be able to critically evaluate evidence based analysis (classic papers).
- Be able to make and to defend judgement on work in the biological and biomedical sciences.
- Understand the evolutionary and physiological processes that shape life between the Cambrian era and to the KT mass extinction.

After study of all the core practical modules in Level 1 students will acquire and/or demonstrate the following competencies via assessed coursework from practical sessions and attendance at associated workshops:

- Calibrate and operate standard laboratory equipment and perform analyses on a variety of sample types.
- Competent field trips skills (correct use of GPS and observation skills).
- Design and perform experiments.
- Design and make buffers, and prepare standard solutions.
- Problem solve.
- Use molecular graphics and statistics programmes as appropriate.
- Work in groups.
- Keep an up to date lab book.
- Become proficient in written communication skills (report and poster writing) including citation/referencing and bibliographic skills.
- Self-assess skills and learning.

3.2.1 How will this be assessed?

We use a variety of assessment types as listed below:

Module type	Assessment type	Learning outcomes assessed
Theory and practical	On-line examination and tests (using QMP and EOL)	Core knowledge, numerical skills, problem solving and critical thinking.
Practical and theory	Presentations (oral and poster)	Communication skills and presentation of data.
Practical	Laboratory competence evaluation (lab tests, poster, experimental plans, risk assessments, lab books)	Practical skills, record keeping, organisational and planning skills.
Practical and theory	Scientific writing (reports, case studies, literature review, essays)	Written communication, presentation and analysis of data, critical thinking and problem solving.
Practical	PDP (skills checklist, reflective writing)	Self-reflection and self-assessment.

3.2.2 Feedback

You will receive feedback on all your coursework submissions which may be provided in a variety of forms e.g. hard copy feedback sheets, electronic feedback sheets, oral feedback (individual or group).

3.2.3 Life Sciences Modules at Level 1

LEVEL 1 MODULES	
SEMESTER 1	SEMESTER 2
BS11001 Introduction to the Life Sciences: the early years (10 Credits)	BS12001 Life: building the organism (10 credits)
BS11002 Introduction to Life Sciences: Why go multicellular? (10 credits)	BS12002 Life: the underlying structures (10 credits)
BS11003 Laboratory and Research Skills 1A (10 credits)	BS12003 Laboratory and Research Skills 1C (10 credits)
BS11004 Laboratory and Research Skills 1B (10 credits) ▲	BS12004 Laboratory and Research Skills 1D (10 credits) ▲
BS11005 Introduction to Maths, Chemistry and Physics (20 credits) *	BS12005 Science and Society (20 credits) **
BS11006 The Poison Pen ** (20 credits)	

* recommended for students who need to strengthen their skill and understanding within these subjects

** Optional module

▲ Modules not available to non-Life Science students except forensic anthropology/anatomical sciences students

3.2.4 Level 1 Module Descriptions

Semester 1 modules

BS10001 Dundee College Co-Curriculum (20 credits)

Brief description of module: This is a module for life sciences students to study chemistry and biology at Dundee College but partake in classes at Dundee University in preparation for entry to level 2 as a full time Dundee University. Students on the module have a personal tutor at Dundee University whom they can see to discuss any issues with chemistry/biology topics

Teaching: to take place at Dundee College, assessments to take place at Dundee College

BS11001 Introduction to the Life Sciences: the early years (10 credits)

Brief description of module: This is a module that introduces aspects of two major concepts: The Basics of heredity and Evolution. For Basics of heredity, an introduction to genetics, inheritance of traits, and the fidelity of genetic information over generations will be given. The concept of Evolution will consider Darwin's theory of evolution through natural selection, the nature of variation, the ways in which selection acts upon variation and descent from a single common ancestor. Finally the concept of molecular evolution explores how genes and genomes evolve to produce the diversity of life systems observed today.

Teaching: 2 lectures/week (22 in total) with 5 workshops. You will receive teacher-directed study exercises.

BS11002 Introduction to the Life Sciences: why go multicellular? (10 credits)

Brief Description of module: This is a module that introduces aspects of major concepts: For Life as Chemistry, major topics covered will include the origin & age of the Earth, the climate of the early Earth and how it has changed, the origins of oceans and continents and the inorganic origins of life. The concept of Evolution introduces the topics of multicellularity and the benefits of being multicellular or clonal. The concept of Biological Organisation introduces the topic of chemical transmission and how characteristics are retained from simple animals such as the coelenterates to more complex animals such as the chordates. The need for a nervous system and the early development of nervous systems including simple nerve nets are explored from an evolutionary perspective.

Teaching: 2 lectures/week (22 in total) with 5 workshops. You will receive teacher-directed study exercises.

BS11003 Laboratory and Research Skills 1A (10 credits)

Brief description of module: This module will start with a mandatory introduction to health and safety and basic lab skills. There will be two field excursions (sandy shore and rocky shore) and a series of practical classes that will cover techniques of isolation and culture of microorganisms and gram staining. Other set practical classes include: arthropod diversity and insect dissection, forensic entomology and the analysis of DNA

Teaching: 1 practical session and workshop/week plus teacher-directed study exercises.

BS11004 Laboratory and Research Skills 1B (10 credits)

Brief description of module: This module will extend and develop the generic skills introduced in BS11003 with specific emphasis on basic laboratory practice, statistics, experimental techniques (including TLC and IR) and experimental design. The ability to work effectively as part of a group on two separate 3-week projects ('Brine shrimps as model species' and 'Terpenes') will form a significant part of this module. Students will extend their information literacy skills by locating and accessing scientific resources to support their learning. Protocols associated with scientific observations, record keeping and writing will be introduced as a means of effectively communicating the outcome of each research project. Finally, students will also be required to reflect on and evaluate their own learning throughout the semester, through the Personal Development Portfolio, identifying areas for development and consolidation.

Teaching: 1 practical session and workshop/week plus teacher-directed study exercises.

BS11005 Introduction to Maths, Physics & Chemistry (20 credits)

Brief description of module: This module introduces the application of the physical sciences and mathematics to the Life Sciences. The module covers aspects of basic physics, chemistry and mathematics including numeracy and mathematical application; biophysics; organic; and physical chemistry and the introduction to and use of numeric and scientific literacy. The use of technology to support and enhance application within the Life Sciences will form a significant part of this module, which will be both theoretical and practical in delivery.

Teaching: 2 lectures/week plus workshops or practicals each week. You will receive teacher-directed study exercises.

BS11006 The Poison Pen (Optional module - 20 credits)

Brief description of module: This module offers a science based optional module which may be of particular interest to those students who intend to specialise in later years in either pharmacology or drug discovery. The module will look at several classical English texts in which poisonings play a

pivotal role in the plot. After examination of the text, the symptoms will then be unpicked and possible poison molecules identified along with their source. Students will be able to explore the darker side of pharmacology and look at the importance of dosage and how molecules used to cure can also kill.

Teaching: Lectures and a mixture of tutorials and workshops with additional on-line exercises and self-directed study supported by VLE-delivered material.

Semester 2 modules

BS12001 Life: building the organism (10 credits)

Brief description of module: This module develops aspects of four major concepts: The Cell, the Gene, Evolution and Biological Organisation. The concept of the Cell covers major topics such as cell division, chromosome structure, sexual reproduction, germ cells, meiosis and fertilisation. The concept of the Gene covers the major topic of genetics, introducing genes and alleles and gives a functional explanation of Mendel's Laws. The concept of Evolution introduces topics such as the Mesozoic ecosystem structure and the transition of life to land, including the dominance of insects, amphibians and reptiles. Consideration will be given to the physiological problems of life on land (reproductive freedom from water, breathing air [especially during the mid-Devonian drop in global oxygen levels], water conservation and the emergence of the mammal-like reptiles). The concept of Biological Organisation covers topics such as changes in posture, heart anatomy, respiratory capacity, temperature regulation and endothermy in terrestrial vertebrates. Fluid balance, homeostasis and the basic principles of endocrinology are introduced, together with the basic concepts of neurophysiology, muscles and movement.

Teaching: 2 lectures/week (22 in total) with 5 workshops. You will receive teacher-directed study exercises.

BS12002 Life: the underlying structures (10 credits)

Brief description of module: This module develops aspects of three major concepts: Life as Chemistry, The Cell and the Gene. The concept of Life as Chemistry introduces the major topics of chemical and biological thermodynamics covering enzymes (as biological catalysts, their structure and basic mechanisms), enzyme kinetics; aromatic and alkene chemistry; and the basic principles of metabolism in autotrophic and heterotrophic organisms. The concept of the Cell develops the topic of cell structure, covering compartmentalisation and trafficking; lipids and membranes, with specific emphasis on the biochemical and biophysical properties of membranes. The concept of the Gene covers the major topics of DNA replication, RNA/DNA structure, transcription, translation, and genetic manipulation.

Teaching: 2 lectures/week (22 in total) with 5 workshops. You will receive teacher-directed study exercises.

BS12003 Laboratory and Research Skills 1C (10 credits)

Brief description of module: This module will extend and develop laboratory and research skills introduced in semester 1 of Level 1. In this module there are a series of set practical classes that will cover optical techniques, protein expression and purification, polymerase chain reaction (PCR) and enzyme kinetics. These lab-based practical classes are supplemented and supported by a programme of associated workshops, which also include sessions covering preparation of a published figure, the use of online literature databases and the reference management tool EndNote. At the end of the module there is a summatively assessed lab skills test, and finally a field trip to the Botanic Gardens, Dundee..

Teaching: 1 practical session and workshop/week plus teacher-directed study exercises.

BS12004 Laboratory and Research Skills 1D (10 credits)

Brief description of module: This module will extend and develop the generic skills introduced in BS12003 with specific emphasis on data presentation, interpretation and analysis. The ability to work effectively as part of a group and the application of peer support and peer-assessment will form a significant part of this module. Students will extend their information literacy and scientific writing skills by researching and presenting an area of current research in poster format, giving due attention to scientific writing protocols. Students will be encouraged to reflect on and evaluate their own learning throughout the semester, identifying areas for development and consolidation and setting appropriate targets.

Teaching: 1 practical session and workshop/week plus teacher-directed study exercises.

BS12005 Science in Society (Optional module - 20 credits)

Brief description of module: This module outlines the historic development of the Life Sciences from alchemy with its origins in ancient Egypt to the present day. It covers key milestone events such as identifying the structure of DNA and cloning of Dolly the sheep and includes pivotal figures such as da Vinci, Darwin and Watson and Crick. The module explores the relationship between art and science through botany, anatomy and forensic art and reviews modern popular science writers such as Stephen Jay Gould, Richard Dawkins and Nick Lane. The module goes on to examine the significance of the philosophical framework within which science is developed and how this has impacted upon the direction of scientific thought. The moral and ethical implications of scientific research and development are analysed within traditional and contemporary contexts such as body snatchers, stem cell research, use of animals and humans in research and the nature/nurture debate. The role of the media in shaping society's opinion and interpretation of science is discussed in relation to the public understanding of science.

Teaching: 3 hour workshop/week.

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3.3. The core curriculum at Level 2

3.3.1 Life Sciences Level 2 Core Curriculum competencies

After study of all the core theory modules in Level 2 students will acquire and/or demonstrate the following competencies via assessed coursework and examinations from lectures and attendance at associated workshops:

- Students will develop knowledge and understanding of the patterns and themes of the diversification of modern life on Earth; should be able to summarise the key events and physical components that resulted in the contemporary world; and should be able to apply fundamental theories and knowledge of evolution, genetics, physiology and population biology.
- Students will have a knowledge and understanding of molecular biology through the context of 'the gene through to the cell' with prokaryotes and eukaryotes as example pathways and should understand post modification and the principles of regulation of metabolism.
- Describe the health benefits of physical activity and the health risks associated with physical inactivity, and how to monitor and evaluate levels of physical activity.
- Should be able to explain the physical and biochemical principles that underlie: electrical signals and neuromuscular communication; the biochemistry and physiology of skeletal muscle contraction; heart structure and function; cardiovascular responses to exercise; action of drugs on neuromuscular and heart function.
- Should develop a knowledge and understanding of the main metabolic pathways, how they interlink in the cell and the mechanisms of their molecular processes; and will be introduced to microbiology and immunology to gain preparatory knowledge for later years.

- To assess and use a range of defined and self-selected learning materials, and evaluate their own learning, identifying strengths and weakness within the context of modules and the wider degree programme.
- Be able to effectively participate in oral presentations, written work, planning and time management and problem solving; reflecting on, and self-assessment of their skills and employability; discuss ethical and controversial issues; researching and understanding scientific literature.

After study of all the core practical modules in Level 2 students will acquire and/or demonstrate the following competencies via assessed coursework from practical sessions and attendance at associated workshops:

- Be able to effectively participate in oral presentations, written work, planning and time management and problem solving; reflecting on, and self-assessment of their skills and employability; discuss ethical and controversial issues; researching and understanding scientific literature.
- Students will acquire and/or demonstrate via assessed coursework from practicals and attendance at associated workshops.
- Demonstrate in the lab how kinetic or thermodynamic control during a biochemical reaction can determine how a protein unfolds; demonstrate which conditions (pH, temperature, concentration) affect the pathway in which a protein will unfold.
- Perform basic aseptic laboratory techniques, explain the different steps involved in a bacterial mating experiment and analyse quantitative data on plasmid transfer by conjugation.
- Explain how antibodies are used to measure the amount and location of specific proteins and other antigens in biological samples; demonstrate how red blood cells can be used to investigate osmolarity and tonicity.
- Use basic descriptive statistical analyses and graphical representation to interpret experimental data; perform basic sequence analyses on DNA and protein sequence data retrieved from databases.
- Students will apply and extend the lab skills and techniques from level 1, extend their knowledge of health and safety procedures and be able to apply these in preparing risk assessments for their own and others' practical work.
- Have a knowledge and understanding of analytical and synthetic techniques in life sciences, and gain lab skills relating in particular to Biomedical sciences.
- Students will be able to critically assess both their own written work and that of others; Prepare and deliver oral and written presentation; plan experiments and practise time management; Careers and employability workshop.

3.3.2. How will this be assessed?

We use a variety of assessment types as listed below:

Module type	Assessment type	Learning outcomes assessed
Theory and practical	On-line examination and tests (using QMP and EOL)	Core knowledge, numerical skills, problem solving and critical thinking.
Practical and theory	Presentations (oral and poster)	Communication skills and presentation of data.
Practical	Laboratory competence evaluation (lab tests, experimental plans, risk assessments, lab books)	Practical skills, record keeping, organisational and planning skills.
Practical and theory	Scientific writing (reports, case studies, literature review, essays)	Written communication, presentation and analysis of data, critical thinking and problem solving.
Practical	PDP (skills checklist, reflective writing)	Self-reflection and self-assessment.

3.3.3. Feedback

You will receive feedback on all your coursework submissions which may be provided in a variety of forms e.g. hard copy feedback sheets, electronic feedback sheets, oral feedback (individual or group).

3.3.4. Life Sciences Modules at Level 2

LEVEL 2 MODULES	
SEMESTER 1	SEMESTER 2
BS21001 The Evolution of Modern Life (10 credits)	BS22001 Biomedical Sciences (20 credits)
BS21002 The Gene and the Cell (10 credits)	BS22002 Biological Sciences (20 credits)
BS21003 Laboratory and Research Skills 2A (10 credits)	BS22003 Laboratory and Research Skills 2C (20 credits) ▲
BS21004 Laboratory and Research Skills 2B (10 credits) ▲	

* *Optional module*

▲ *Modules not available to non-Life Science students except forensic anthropology and anatomical science students*

3.3.5. Level 2 Module Descriptions

Semester 1 modules

BS21001: The Evolution of Modern Life (10 credits)

Brief description of module: The module will be covering the evolution of life in the Cenozoic era. The first half of which will be a general to specific introduction to statistics for the biosciences, bringing students up to speed on the structure of datasets and how one infers differences. This will also include an introduction to the design of experiments, concepts of randomisation and blocking; regression, anova and principle tests of signal versus noise. The second half of the module will address the geological, climatic and biological changes that have led to the modern disposition of the continents. This will cover major climatic themes that have shaped modern life including sea level change and glaciation; evolutionary development of birds and mammals; the evolution of endothermy; the biogeographic distributions of biota; and the adaptive radiation/evolution of the mammals. This will also include a comprehensive introduction to human origins and the impact this species has on nature. Topics including the evolution of the hominid lineage; predation/parasitism, and disease/population dynamics. Students will be expected to complete a substantial piece of coursework related to a component of the indicative content.

BS21002: The Gene and the Cell (10 credits)

Brief description of module: This module builds the foundations for our understanding of genetics and molecular biology. DNA is at the core of explaining who we are and how we are different and this module explores the role of DNA in transmitting information from generation to generation, how that information is copied and used, and how that use is regulated. With that foundation the module explores how we can manipulate the genetic code of

an organism to take on new functions and respond to stimuli, and what happens when the regulation of the cell goes wrong.

BS21003: Laboratory and Research Skills 2A (10 credits)

Brief description of module: This module will extend and develop laboratory and research skills introduced in Level 1 (direct Level 2 entrant students will have an opportunity to learn skills and techniques at the start of semester 1). There is specific emphasis on the following subject areas: comparison of kinetic and thermodynamic control in protein folding, use of aseptic techniques through the use of bacteria, the broad use and application of antibodies in Life Sciences, introduction of the concepts of osmolarity and tonicity and retrieval and analysis of sequence information (genetic, cDNA and amino acid) from online databases. A significant component of the taught element of this module is devoted to the study and application of statistics, data analysis and representation, using the R-Studio software tool. A summatively assessed lab skills test is set at the end of the module.

BS21004: Laboratory and Research Skills 2B (10 credits)

Brief description of module: Students will carry out two laboratory projects which will allow them to gain experience in the use of laboratory equipment and techniques. The projects will cover basic organic synthesis of biological molecules and also a forensic chemistry investigation. These projects will allow them to improve their experimental planning, risk assessment, report writing and data analysis skills. Group work will involve oral and written presentation skills and provide team building experience.

Semester 2 modules

BS22001 – Biomedical Sciences (20 credits)

Brief description of module: The aim of this module is to introduce students to specific topics within the Biomedical Sciences. Topics will include: Nerve and muscle: the neuromuscular junction (NMJ), muscle contraction and body movements; Cardiovascular system: heart function and integrated control of blood pressure; Pharmacology of NMJ and heart muscle; Effects of exercise on cardiovascular system. Skills - Students will develop and apply skills in problem solving, teamwork and IT and be encouraged to develop self-reliance and independent study skills.

BS22002 – Biological Sciences (20 credits)

Brief description of module: The aim of this module is to give students a sound foundation in biomolecular mechanisms and processes. This module will study the main mammalian metabolic pathways and their control including the molecular processes involved. The module will also look at current topics in microbiology including disease and resistance and introduce immunology and virology.

BS22003 – Laboratory and Research Skills 2C (20 credits)

Brief description of module: The aim of this module is to broaden and strengthen both the practical and generic skills of students by building on experience gained at level 1 and semester 1 of level 2.

The module will expand on techniques and skills introduced in earlier practical modules. Practicals will be accompanied by data handling and manipulation workshops. Basic concepts in ethics in the Biosciences will be introduced in a workshop. Careers and employability exercises will help students to decide on their future career paths. Generic skills will be reinforced by updating students' PDP.

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3.4 Brief Module descriptors for Level 3 modules

Below are outline descriptions of the modules and an overview of how each will be assessed. Lecture outlines will be available on My Dundee plus detailed criteria for each assessment. There are no printed handbooks for these modules.

BS31003: Molecular Structure & Interactions (15 Credits)

The aim of this Module is to introduce specific topics within the area of molecular structure and interactions analysis that will underpin the more specialised areas which students will encounter in Semester 2 of Level 3 and in Level 4. The module also aims to introduce students to the study of interactions that underpin biological events or early stage drug discovery and strengthen students' skills in scientific writing, critical analysis of scientific literature and in self-directed learning.

Topics covered in the module are High-throughput DNA sequencing and genome annotation, Secondary structure, disorder, post-translational modification, cloning, single crystal X-ray diffraction methods, Use of bioinformatics resources and databases, Scientific paper analysis.

BS31004: Biochemistry & Cell Biology (15 Credits)

The aim of this Module is to introduce specific topics within the area of Biochemistry and Cell Biology that will underpin the more specialised areas that students will encounter in Semester 2 of Level 3 and in Level 4. The Module also aims to strengthen students' skills in scientific writing, critical analysis of scientific literature and in self-directed learning.

Topics covered in the module are how proteins function at the molecular level, protein folding, targeting, posttranslational modification and turnover, the cytoskeleton, molecular motors, cell division and how cells form tissues, cell signalling and regulation of metabolism, bioenergy and photosynthesis, systems biology approaches.

BS31005: Genetics (15 Credits)

This module will study model genetic systems, genome structure and evolution, genetic polymorphism, genetic markers and mapping, population genetics, genetic networks, and reverse genetics.

Topics covered in the module are the important main threads of modern genetics, how DNA becomes damaged, genetic mapping, dissecting genetic networks, model Genetic systems, Genome analysis, genetics and genomics of populations.

BS31006: Gene Regulation & Expression (15 Credits)

The aim of this module is to introduce specific topics within the area of Gene Regulation and Expression including examples of how defects at the molecular level result in disease. Topics will include transcription, translation, mRNA processing, RNAi and miRNA function and utilisation, DNA recombination and Epigenetics and genetic disease,

Students will understand the fundamental processes in molecular biology that are critical for gene expression in relation to cellular function

To be able to apply this knowledge and other information to explain the mechanism by which at least one disease state is manifest by perturbation and mutation of the apparatus to allow normal function.

BS31013: Biomembranes (15 Credits)

This module will provide the student with an understanding of the regulation of normal membrane function and the physiological principles underlying this, show how our current understanding of membrane function has been arrived at using examples from current literature, provide an understanding of some basic cellular and molecular physiological and pharmacological techniques and their application to investigate membrane function and enable the acquisition of skills, attitudes and techniques useful in the pursuit of modern biology.

BS31015: Sport & Exercise Science 1 (15 Credits)

The aim of this module is to develop understanding and practice of the applied sports and exercise science support process, physiological testing and monitoring of health and athletic performance.

After successful completion of this module, students should be able to (i) describe the applied sports science support process and illustrate how an integrated approach is an important part of this process, (ii) classify the parameters of fitness and relate how they can be tested and monitored for athletic, recreational and clinical populations and (iii) based on scientific knowledge gained, design a physiological testing and monitoring programme for athletic, recreational or clinical populations.

BS31016: Practical Techniques in Biomedical Sciences (15 Credits)

This module will broaden and strengthen the practical, laboratory research and generic skills of students by building on their level 1 and 2 or other previous experience and preparing them for more advanced study at level 4.

After successful completion of this module, students should be able to demonstrate knowledge and understanding of changes in biological membranes, pre-clinical methods used in drug screening and development, techniques available for evaluating human psychological and/or physiological responses and different types of study design in clinical trials.

BS31019: Regulatory Physiology & Pharmacology (15 Credits)

This module will provide a good understanding of the physiological and pharmacological regulation of body systems for maintaining homeostasis. After successful completion of this module, students should be able to demonstrate knowledge and understanding of how key body systems are

regulated by physiological and pharmacological agents in the maintenance of processes such as blood sugar, calcium balance, obesity/appetite/satiety and reproduction.

BS31020: Experimental Cell Culture (15 Credits)

To introduce practical tissue culture laboratory skills, and strengthen research and generic skills of students by building on their level 1 and 2 or other previous experience and preparing them for more advanced study at level 4

After successful completion of this module students should be able to demonstrate their knowledge and understanding of the effects of signaling mechanisms on cells and molecules; of the techniques available for evaluating physiological responses in tissue culture cells; and of the principles underlying advanced instrumentation commonly used to assess experiments involving cultured cells e.g. fluorescent microscopes, luminometers.

BS32003: Drug Discovery and Development (15 Credits)

This module will give an understanding of the process involved in identifying drug targets and developing drugs against that target including assay development. The main topics discussed include target identification, assay development, pharmacokinetics, and structure activity relationships (SAR).

Students will gain a knowledge and understanding of the drug development process from target identification to assay development and pre-clinical trials.

BS32004: Molecular Microbiology (15 Credits)

The aim of this Module is to introduce students to specialist topics within the areas of bacterial and fungal microbiology. This module will underpin more specialised areas of molecular microbiology that the students will encounter in their Level 4 laboratory projects and in Semester 2 of Level 4. The module aims to strengthen students' skills in problem solving, critical analysis of scientific literature, and in self-directed learning.

Students will be able to explain broad aspects of microbiology and relate this to protein structure / function and molecular genetics. Students will understand the principles that underlie the processes of how bacteria sense, respond and move to environmental stimuli, nutrient sensing and uptake by bacteria, how, why and when antibiotics are produced by bacteria, the bacterial cytoskeleton, molecular motors, and the process of cell division in prokaryotes, multicellular and community behaviour in bacteria and fungi, geomicrobiology and its applications, fungal cell wall biosynthesis and the molecular basis of pathogenicity and virulence in bacteria.

BS32005: Cell & Developmental Biology (15 Credits)

This module is to introduce students to the specialist area of study of developmental biology building on their core curriculum in levels 1&2 and Semester 1 of Level 3. To give the student an understanding of the stages and processes involved in the development of organisms. Topics include: Morphogenesis, patterning embryos, patterning tissues, morphogenetic movements, development and diseases stem cells.

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Students will be able to explain broad aspects of the development of vertebrates and invertebrates and what happens when these processes go wrong and will develop their literature review skills, and group working and ways of presenting information in an informative manner.

BS32006: Cell Signalling (15 Credits)

This module will cover methods of cell-to-cell communication, signal transduction pathways, key proteins in signal transduction and downstream effects.

BS32007: Organic Synthesis (15 Credits)

This module should give an in-depth understanding of the main organic reactions used in modern synthetic laboratories with particular respect to the design of molecules for drug discovery.

Students will gain a knowledge and understanding of the main organic reactions and mechanisms. They will be able to predict products of reactions and represent the mechanisms of the reactions using curly arrow notation and be able to design a synthetic strategy to produce a desired product.

BS32008: Plant Science (15 Credits)

This module will study the structures and diversities of plant genomes, plant sexual strategies, plant responses to the environment, hormonal signalling, developmental programming, seasonal change, symbionts and pathogens. Learning Outcomes include plant genomes, plants and the environment, plants and human welfare, plant development, plants and their biotic environment and plant improvement.

BS32009: Immunology (15 Credits)

This module will provide students with a broad understanding of key topics in immunology. This module will underpin more specialised areas of immunology that the students will encounter in their Level 4 laboratory projects and in Semester 2 of Level 4. The module aims to strengthen students' skills in problem solving, critical analysis of scientific literature and will be able to explain central concepts in the field of immunology and relate this to protection against infectious disease.

Students will be able to explain central concepts in the field of immunology and relate this to protection against infectious disease, innate immune mechanisms that sense and eliminate pathogens, processing and presentation of antigenic material to drive immune responses, antibody-mediated protection, development and activation of B and T lymphocytes, lymphocyte function, mucosal immune defences, immunological memory and vaccination, immunity to viruses, immunodeficiency diseases, autoimmune diseases and immune hyper reactivity.

BS32010: Applied Bioinformatics (15 Credits)

This module build on the basic bioinformatics introduced in Years 1 and 2, and give students a broad understanding of modern bioinformatics using Python programming and bioinformatics toolkits to study algorithms used for phylogeny, data mining, interpretation of high throughput data

including next generation sequencing analysis and statistical evaluation of the relevance of results.

BS32011: Practical Project [15 Credits]

This module will build on practical experience in Years 1 & 2 and provide training for the final year research project. This module will offer a range of projects related to specialist modules in semester 2.

Project Titles include:-

- Applied Bioinformatics
- Microbial Cell Biology
- Molecular Biochemistry

BS32012: Practical Project B (15 Credits)

This module will build on practical experience in Years 1 & 2 and provide training for the final year research project. This module will offer a range of projects related to specialist modules in semester 2.

Project Titles include:-

- Plant Science
- Synthetic Biology
- Drug Discovery and fragment synthesis

BS32020: Human Epithelial Biology (15 Credits)

This module will provide a good understanding of the physiology and pharmacology of the human respiratory, renal and gastrointestinal systems.

After successful completion of this module, students should be able to demonstrate knowledge and understanding of the functions and related pharmacology of respiratory, renal and gastrointestinal systems in human physiology.

BS32021: Quantitative Pharmacology (15 Credits)

This module will provide students with a good understanding of the quantitative aspects of pharmacology including mathematical descriptions of drug/receptor interactions and the handling of drugs by the body (pharmacokinetics).

After successful completion of this module, students should be able to demonstrate receptor theory, including basic mathematical descriptions of receptor occupancy and the nature and

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diversity of allosteric interactions within receptor complexes, the area of pharmacokinetics and drug disposition within the body and the drug development process.

BS32022 : Human Morphogenesis and embryonic development [15 Credits]

This module will provide the anatomical background to the human systems studied in the Biomedical Stream at level 3.

After study of this module, students will be able to; recognise the gross anatomy and histology of the systems covered, describe the pathology of these systems and explain the development of systems during the first trimester.

BS32024: Neuropsychopharmacology (15 Credits)

This module will provide students with a good knowledge and understanding of chemical transmission within the central nervous system and how this may be modulated to achieve therapeutic benefit in several disorders of nervous system function.

After successful completion of this module, students should be able to demonstrate chemical transmission within the central nervous system, pathological mechanisms involved in disorders of the central nervous system and the modulation of chemical transmission to achieve therapeutic benefit.

BS32026: Sensory & Motorneuroscience (15 Credits)

This module will provide an opportunity to acquire a good understanding of the physiology and anatomy of systems that govern the sensory perception and motor function.

After successful completion of this module, students should be able to demonstrate knowledge and understanding of how nervous systems, in particular the motor and sensory systems, are built and function, using examples from all stages of neural organization (at the molecular, cellular, circuits and systems levels).

BS32027: Sports & Exercise Science 2 (15 Credits)

The aim of this module is to lead on from SES 1 (Physiological Testing and Monitoring) by using the knowledge gained to develop training programmes based on scientific theory and application.

After successful completion of this module, students should be able to (i) describe the principles of training, (ii) investigate the parameters of fitness and relate how they can be developed and/or trained for athletic, recreational and clinical populations, (iii) explain how rest and recovery impact on training and performance, (iv) develop an awareness of different sporting groups, specialist populations and additional considerations (such as the environment) and how these may impact on programme design and progression.

BS32028: Molecular Pharmacology (15 Credits)

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This module will provide an understanding of the fundamental principles of molecular pharmacology, from drug receptor interactions to activation of intracellular signaling cascades.

After successful completion of this module, students should be able to demonstrate and explain the basic principles of receptor pharmacology, with a focus on G protein coupled receptor structure, signalling and function.

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3.5 Brief Module descriptors for Level 4 modules

Semester 1 (for both *Biological Sciences* and *Biomedical Sciences* students)

BS41004/07: Research Project (40 Credits)

Building on their project experience at Level 3, students will expand their research experience by participating in a semester long research project based around one chosen area of the current world-class research in Life Sciences. Depending on the type of project chosen, students will learn advanced practical techniques and/or enhance their data interpretation skills, analysis of current literature, scientific writing and communication skills. All students will enhance their skills in planning and time management. Four main types of projects are available to students:

A) Individual lab based research- students will carry out research into a current topic allied to and within a research group in School of Research, James Hutton Institute or Medical Research Institute at Ninewells.

B) Group lab based research- in groups of no more than four, students will plan and carry out investigations into a current area of research. They will work cooperatively to carry out investigations and produce data but write individual reports.

C) Science communication- in conjunction with Dundee Science Centre, students will prepare materials to communicate current research topics and techniques to a public audience

BS41005/06 Research Skills (20 Credits)

The aim of this module is to use the vibrant research environment of the College of Life Sciences, James Hutton Institute and Medical Research Institute at Ninewells, to expand the student's experience of current research and give them the opportunity to be part of the wider research culture. Students will gain knowledge of the current leading areas of research in Life Sciences. They will enhance their scientific communication skills through writing and gain experience of grant proposal writing. Following attendance at seminars, students will be able to produce abstracts summarising the subject of at least three of these seminars. Following tutorials on grant proposal writing, students will prepare a grant proposal in relation to their own research project which will then be presented to and assessed by a panel of current researchers. Students will collectively organise a research symposium to take place in the final week of the semester.

SEMESTER 2

BS42003: Advanced Bioinformatics* (15 Credits)

The aim of this module is to provide specialist knowledge and understanding of frontier topics in bioinformatics. Students will gain an understanding of key technologies and applications in modern biological research and familiarity with state of the art processes

This module will consist of four blocks delivered by specialists in specific fields. Indicative content are Genome Assembly, Proteomics, Structural analysis and systems modelling though these may change with research areas and staff availability.

BS42004: Advanced Modern Drug Discovery (15 Credits)

The aim of this module is to build upon the students' understanding from Level 3 of the process involved in identifying drug targets and developing drugs against those targets. This will include key aspects of drug development beyond lead optimisation. Students will gain an understanding of the drug discovery and development process, from target identification through to assay development and lead optimisation.

Topics covered in this module include detailed receptor pharmacology, special considerations for specific drug discovery programmes, including Central Nervous System targets and biologicals, detailed understanding of what makes a good drug target and a potential drug molecule, an introduction to nonclinical development with specific emphasis on safety pharmacology, safety assessment and more detailed Drug Metabolism Pharmacokinetics study requirements and finishing with a case study assessment.

BS42005: Advanced Plant Sciences (15 Credits)

The aim of this module is to provide students with an in depth view of cutting edge plant science research. Students will gain an understanding Plant environment interactions (covering pathogen, symbiotic and abiotic interactions), Genomics and crop improvement and development and gene

Expression. Topics covered in this module include Plant-environment interactions (perception and response to bacterial oomycete; fungal and insect pathogens; plantsymbiote interactions; plant detection of and responses to abiotic stress). Use of genome sequencing and association genetics for plant breeding and biotechnology. Regulation of gene expression and plant development in changing environments.

BS42006: Advanced Immunology (15 Credits)

The aim of this Module is to provide students with an in- depth understanding of a variety of major topics in immunology and to strengthen students' skills in problem solving, critical analysis of scientific literature, and in self-directed learning. Topics covered in this module include Innate immune mechanisms, Toll-like receptors and signalling, Inhibitory/activatory receptors, Immunoglobulin biology, Antibody engineering for therapy and research, Antigen processing and presentation, Lymphocyte activation and signalling, T cell mediated immunity, Immune hyper reactivity and immunodeficiency and Immunity to viruses.

BS42007: Cancer Biology (15 Credits)

The aim of this Module is to provide students with a broad understanding of key topics in cancer biology. This module will build on more specialised areas of biochemistry, molecular cell biology and genetics that the students will have encountered in their Level 4 laboratory projects and will complement additional courses in Semester 2 of Level 4. Topics covered in this module are Introduction to cancer pathology, Introduction to the molecular biology of cancer, Cancer treatment – chemotherapy and radiotherapy: mechanisms of action, Oncogenes, Tumour suppressor genes, Growth factors, Cell signalling pathways, Cancer viruses, Environmental carcinogenesis, DNA damage and repair, Invasion and metastasis and Cancer stem cells.

BS42008: Advanced Cell & Developmental Biology ** (15 credits)

The aim of this module is to provide a specialised insight into advanced cell and developmental biology. This module will extend and build on the students' knowledge gained in Level 1 -3 and will provide plenty of opportunities for the students to engage in, as well as critically appraise and evaluate, cutting edge research in highly topical cell and developmental biology subjects in normal and disease physiologies. Students will gain understanding and be able to explain detailed aspects of the molecular regulation and cell biology of either vertebrate development, invertebrate development or Stem cell biology subjects in both normal and disease states.

Specialist topics offered are Stem Cells in Development, Advanced Invertebrate Development and Systems.

BS42009: Advanced Molecular Microbiology (15 Credits)**

The aim of this module is to provide a specialised insight into advanced molecular microbiology. This module will extend and build on the students' knowledge gained in Level 1 -3 and will provide plenty of opportunities for the students to engage in cutting edge research in highly topical microbiology subjects. On completion of the module students should be able to explain the molecular principles that underpin (some of) the following processes in microorganisms i.e. Bacterial quorum sensing, Cyclic nucleotides second messengers in bacteria, Antibiotic resistance in bacteria, Bacterial protein secretion and export systems, Bacterial ion channels, Bacterial transport metabolons

Topics covered in the module are Bacterial quorum sensing, Cyclic nucleotides second messengers in bacteria, Antibiotic resistance in bacteria, Bacterial protein secretion and export systems, Bacterial ion channels and Bacterial transport metabolons.

BS42010: Advanced Gene Regulation & Expression (15 Credits)

The aim of this module is to provide an opportunity for students to carry out an in-depth study of specific topics within the area of Gene Regulation and Expression and of the advanced technologies and experimental design that underpin them. Students will gain an understanding of selected topics in cell and molecular biology at the level of contemporary, cutting-edge research in these areas. The selected areas will reflect the expertise and research interests of the Centre for Gene Regulation & Expression in Dundee but will be placed within the wider context of current research. Specialist topics offered as part of this module may vary from year to year but will typically include five topics drawn from the following areas: transcriptional regulation, chromosome biology, nuclear structure and gene expression, chromatin structure and gene regulation, DNA damage response, control of DNA replication, advanced topics in cell division, advanced proteomics, quantitative and high-resolution microscopy.

BS42011: Advanced Organic Chemistry & Chemical Biology (15 Credits)**

The aim of this module is to build on levels 1-3 chemistry teaching and to provide students with the core skills required to design synthetic routes towards novel compounds. During this module students will work through examples of how organic chemistry can be used to answer biological questions using chemical biology methods.

On completion of this module students will gain an understanding of several advanced methods for organic synthesis and organic synthesis design theory. This module will look at designing novel synthetic pathways to drug molecules using combinations of known synthetic procedures including Parallel synthesis, Fragment synthesis, Convergent synthesis, Functional group transformations, Protection groups and Radical chemistry.

BS42012: Parasitology (15 Credits)**

The aim of this module is to introduce students to molecular, cellular and biochemical studies on selected parasitic protozoa. Students will gain an understanding of selected parasites, common approaches to their study and development of chemotherapies against them.

Topics covered in this module will include Genetic approaches, Immune evasion, Drug-delivery, Drug targets and Drug mode-of-action.

BS42013: Advanced Cell Signalling (15 Credits)

The aim of this module builds on the Level 3 module Cell Signalling (BS32006) and will take students close to the forefront in selected areas of cell signalling research currently being pursued in the School of Research within the College of Life Sciences.

On completion of this module, students should have the ability to acquire, organize, present and discuss information about Cell Signalling obtained from the primary scientific literature and other sources.

Topics covered in this module are protein kinase families; recognition of substrates by protein kinases; regulation of protein kinases; protein phosphatase families; targeting of phosphatases via regulatory subunits; sensing of energy by AMPK; organization of protein phosphorylation networks by 14:3:3 proteins; signalling in the innate immune system; analysis of T cell signalling by phosphoproteomics.

BS42014 – Nutrient Sensing, Signalling and Acquisition

The aim of this module is to ensure students have a detailed understanding of how the human body and its component cells sense nutrient availability and signal this to mechanisms regulating body functions (including appetite and endocrine control systems). They should also be familiar with the mechanisms by which macronutrients are digested, absorbed and assimilated by the body from dietary sources. They should also be aware of diseases and genetic disorders which affect the normal functioning of the above processes.

Students will gain an understanding of nutrient sensing, signalling and acquisition by the human body in health and states of metabolic disease.

Topics covered are Dietary requirements for macronutrients, Control of appetite, Digestion and absorption of carbohydrate, protein, lipids, Sensing of dietary and extracellular nutrients, Signalling of nutrient availability to effector processes (e.g. synthesis of protein and nutrient storage materials), Interactions between nutrient-signalling and endocrine (e.g. growth factor) signalling pathways, disorders of macronutrient absorption and metabolism, including monogenic disorders (e.g. cystinuria) and polygenic diseases (e.g. Type II diabetes).

BS42015 – Oxygen Uptake and Utilization

The aim of this module is to ensure students have a detailed understanding of how the human body and its component cells regulate oxygen uptake and the role of this gas in converting nutrients into energy. Familiarity with the mechanisms by which systems and cells detect variation in oxygen availability and how they respond at metabolic, molecular and genetic levels to maintain aerobic homeostasis. An awareness of (i) how cells respond to energetic stress caused by restriction or

excess of nutrient and oxygen availability and (ii) diseases and genetic disorders which affect the normal functioning of the above processes.

Topics covered in the module are Ventilation: Perfusion matching in the lung during exercise and in low oxygen environments, Meeting oxygen demands during exercise at high altitude, Molecular mechanisms of peripheral chemoreception at high altitude, Molecular mechanisms of genetic oxygen sensing and hypoxic adaptation, Uncoupling proteins and the regulation of basal metabolism, Achieving metabolic dormancy by suppressing metabolism below basal rates, the discovery of the AMP-activated protein kinase (AMPK) pathway, Regulation of AMPK during muscle contraction, Metabolic responses to AMPK activation, Effects of AMPK activation on gene expression and cell growth.

BS42016 – Advanced Clinical Exercise Science

The aim of this module is to ensure students have a detailed understanding of the effects of exercise on specific medical conditions - from prevention to survivorship. To gain familiarity with the epidemiological studies on physical activity and disease incidence; exercise intervention studies on disease symptom management and the physiological and biological mechanisms by which physical activity is linked to the development of specific medical conditions.

An awareness of the current evidence based guidelines for patients and survivors.

BS42017 – Psychiatric Disorders

The aim of this module is to introduce students to the psychopathology and treatment of a range of common psychiatric conditions including drug addiction. The module will specifically promote an appreciation of the role of experimental studies of behaviour and neuroimaging of the brain in understanding psychiatric disorders, knowledge of drug treatments available for psychiatric disorder and the rationale to their use, an understanding of the neurobiology and mood disorder schizophrenia, obsessive compulsive disorder (OCD) and addictions, awareness of current research upon drugs of abuse with emphasis upon cannabinoids and the debate regarding the use of such drugs for medicinal purposes

BS42018 – Synaptic Plasticity and Cognition

It is intended that students should acquire a detailed understanding of the molecular and cellular mechanisms that underlie various forms of synaptic plasticity. This module will promote familiarity with (i) the experimental techniques (including neuroanatomical, neurochemical, and neurophysiological) that have been used to study synaptic plasticity, (ii) how this phenomenon relates to higher order functions (including behaviour, cognition), (iii) an appreciation of the strengths and weaknesses of molecular genetic and behavioural genetic approaches in linking cellular and circuit phenomena to cognition, (iv) an ability to frame at a theoretical level how

changes in synaptic plasticity may underpin changes at higher levels of analysis and neuronal basis of episodic memory.

BS42019 – Cardiovascular Pharmacology

Students will be exposed to advanced aspects of cardiovascular pharmacology. The module will specifically promote knowledge of the role of the endothelium in the control of vascular smooth muscle tone, detailed understanding of neurohumoral mediators of vascular smooth muscle tone, a comprehensive understanding of the cardiac action potential and the membrane conductances that underlie it, understanding of cardiac ischaemic and the phenomenon of ischaemic preconditioning as a protective mechanism and a knowledge of common cardiac dysrhythmias and their treatment by drugs.

BS42020 – Cancer, Chemical Stress and Treatment Options

This module has two distinct, though complementary, themes: firstly recent developments in the treatment of cancers previously considered intractable and secondly defence mechanisms of the body against toxic xenobiotics. Students will be exposed to the most recent developments in the treatment of cancer at the cutting edge of cancer biology and drug discovery. They will also gain specialised knowledge of drug metabolism by the brain and environmental toxicity to the adult and developing brain.

BS42021 – Heart and Circulation

This module will provide the student with an understanding of the physiological control mechanisms in the heart and peripheral circulation as an integrated system, as well as the cellular pathways (i.e. risk factor pathways) involved in the development of cardiovascular disease and how this can lead to a variety of acute and chronic clinical complications. This will also give students a knowledge base in state-of-the-art techniques for research in cardiovascular medicine.

Students are expected to develop an in depth, integrated and critical understanding of the physiology and pathophysiology of cardiac muscle and the cellular basis of new and evolving therapies, central and hormonal control of cardiac output in health and disease, physiology and pathophysiology of microvascular and macrovascular function and regulation and advantages and disadvantages of current biomarker techniques for evaluation of endothelial function and arterial stiffness.

BS42022 – Advanced Training Methods

The unit is designed to give students a clear understanding of the role of specific advanced training methods in developing performance for different athletic populations, including power athletes, endurance athletes and children. The topics of recovery and dietary supplements will also be explored.

Topics covered will include:

- Introduction to advanced training methods
- Power (Peak force, rate of peak force development and the force-velocity relationship; The power exercises; Manipulation of training variables; Programme considerations)
- Endurance (Focussing on the role of strength training – benefits, risks, efficacy; Physiological relationship between strength and endurance; Concurrent training; Economy; Injury prevention; Programme considerations; Ultra-Endurance Events)
- Training children (focussing on the role of strength training – benefits, risks, efficacy; Programme considerations; Position standpoints)
- Recovery methods (Efficacy of topical methods e.g. ice baths, compression garments, periodised training, sleep, nutrition; implementing a recovery strategy).
- Dietary supplementation (Legality of supplements; Drug testing in sport; Risks, efficacy and protocols for commonly used supplements e.g. creatine, caffeine, bicarbonate and protein; Position standpoints).

BS42023 – Applied Neuroanatomy & Neurodegenerative Disorders

Students will be introduced to the clinical morphology and pathology of nervous system function, neural disease and neurodegenerative disorders. The module will specifically promote knowledge of imaging techniques used to investigate the central nervous system, an appreciation of the relationship between abnormal structure of nervous system disease, knowledge of the mechanisms that underlie Alzheimer, Creutzfeldt Jacob, Parkinson and Huntington disease, an appreciation that abnormal protein aggregates are a common feature in neurodegenerative disorders and an awareness of current therapeutic strategies available for the treatment of neurodegenerative disorders and the potential for the development of novel treatment strategies.

BS42024 – Sensory Systems

It is intended that students should acquire a detailed understanding of the anatomy and physiology of select mammalian sensory systems including the somatosensory, visual and olfactory systems. This module will promote familiarity with the experimental techniques used to probe the physiology of cells, circuits and systems and the principles of sensory physiology that have emerged from such studies. Students will develop (i) an understanding of the somatosensory system and particularly of the molecular and cellular mechanisms involved in thermosensation, (ii) a knowledge of the visual pathway from retina to visual cortex, (iii) a knowledge of odorant receptors and the processing of afferent signals by the olfactory bulb, (iv) awareness of the commonalities and differences that exist between the functioning of the systems presented and (v) a knowledge of the basis of select sensory dysfunctions and the approaches that have been utilized to correct them.

BS42025 – Analgesic and Anaesthetic Pharmacology

This module aims to promote an understanding of the mode of action of analgesic and general anesthetic drugs at a modern and advanced level, specifically (i) to relate the complex state of general anaesthesia to the modulation of the function of specific transmitter-gated ion channels within the CNS, (ii) to describe the actions of endogenous neurosteroids as anxiolytic and sedative molecules, (iii) to illustrate the complexity of modern anaesthesia and the management of the patient in the peri-operative period by multiple drugs and (iv) to describe emerging targets for new analgesic agents

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SECTION 4 – Other important stuff

4.1. Advisers of Studies – choosing your programme of study

You will meet your Adviser of Studies when you first matriculate. They will help you to select your optional modules. Your Adviser of Studies can also act as a Personal Tutor. This means that you are welcome to meet with your Adviser to discuss any matter giving rise for concern.

4.1.1. Changing modules and/or your programme of study

You must seek the permission of your Adviser of Studies if you wish to make any changes to your optional modules. Your Adviser is the only person authorised to agree changes.

You must make any changes to your module selection within 2 weeks of the start of Semester 1 or Semester 2.

4.2. Studying abroad and eligibility criteria

You may wish to spend a period of study overseas (a semester or year) as part of a University of Dundee degree and so should check out the information on one or other of the following at

http://www.dundee.ac.uk/undergraduate/studying_abroad/

ERASMUS - study and work placement in Europe 2nd or 3rd year for one or two semesters.

Transatlantic student exchange - spend your 2nd year of study in either the USA or Canada.

Australasia student exchange - spend one or two semesters of your 3rd year of study in Australia, New Zealand or Hong Kong.

4.2.1. Eligibility criteria

You must ensure that the programme of study you intend to take, at the host institution, is appropriate grounding for continuing with your chosen degree when you return to Dundee. Please note that to have your application authorised by the Associate Dean of the School of Life Sciences Learning & Teaching, you **MUST** satisfy the following criteria:

- ✓ You must have passes in all modules and a minimum of a **B3** grade average for the year of study prior to that during which you wish to go on the exchange.
- ✓ You must also have a good record of attendance and submission of in-course work for all years of study to date.

4.3. Prizes and Life Sciences award ceremony

Core Curriculum Prizes for Level 1 and 2 – This prize goes to the top student(s) with the highest academic achievement and sustained attendance to all level 1 modules.

Other Prizes – There are various other prizes and bursaries awarded by the School and College each year.

Awards Ceremony – Students who have won module, School and College prizes are presented with certificates and prizes at a special Awards Ceremony which normally takes place in Semester 1 of the new session.

4.4. Academic standards and student representation

4.4.1. The SCQF Credit Scheme and the student workload

The SCQF scheme envisages 1200 hours of work by you each year, based upon 40 hours a week for 30 weeks, successful completion of which will give you a total of 120 credits. The module credit rating indicates the total number of hours of effort that is required of you in that module e.g. a 20 credit module requires 200 hours of effort. Such a module could contain 30 hours of lectures, 25 hours of laboratory practicals and 5 hours of tutorials. The balance of the 200 hours (in this example 140 hours) must be spent by you on independent learning including background reading, getting your notes into shape, completing coursework, revision etc. If you obtain an overall pass

grade for that module, you will be awarded 20 credits. If you fail, no credits will be awarded.

If you are a full-time student, you are expected to pass modules totalling 120 credits each year. Failure to do so may impact on the type of degree you achieve and the number of years it will take you to gain a degree.

4.4.2 Standards

The University has a responsibility to assure the standards of its academic awards and the quality of teaching. All students are given an opportunity to give us their individual views of the modules by completing electronic module evaluation questionnaires via *my Dundee*. Any constructive comments you make about modules are fed back and used in course monitoring and contribute to the future development of modules. This is a feature of the University Academic Standards procedure and is fully supported by DUSA. The results of the questionnaires will also be available to you via the *My Dundee* module.

4.4.3 Representation

- **School President and student representation** – For information on student representation within the university, check out the URL below: http://www.dusa.co.uk/content/431393/about_us/
- The elected School President for Life Sciences for session 2015-16 will be confirmed in September 2015. It is the job of the School President to work with class representatives and other students to ensure issues and comments are picked up and brought to the attention of the appropriate committees such as the School Board of Life Sciences Learning & Teaching or the DUSA Student Representative Council meetings.
- **Class representatives and staff student liaison** – At the beginning of the academic year we will ask for volunteers to act as class reps.

4.4.4 Help with University regulations, teaching and learning

Undergraduate Teaching office staff can help with

- Absence forms and medical certificates
- Authorise official documents (Please note that a minimum of 48 HOURS notice is required in order to produce or authorise official documents so, please allow for this delay when you request such services)

Teaching support by Undergraduate office staff includes

- Processing submitted coursework and the return of marked paper-based coursework
- Recording your attendance and academic grades for module assessments

The Head of Administration for Learning and Teaching/Programme Leads can help with

- Applications for a discounted year, temporary withdrawal from studies or deferred year of study
- Applying to graduate with Cert HE, Dip HE, Ordinary and Honours degrees
- Permanent withdrawal from study and/or transfers to other Colleges and institutions
- Helping make appointments with teaching staff
- For all other enquiries please contact the module manager or Head of Year.

4.5 Athena SWAN

The Equality Challenge Unit (ECU) Athena SWAN Charter recognises commitment to advancing gender equality: representation, progression and success for all.

ECU's Athena SWAN Charter covers women (and men where appropriate) in:

- academic roles in science, technology, engineering, maths and medicine (STEMM) and arts, humanities, social sciences, business and law (AHSSBL)
- professional and support staff
- trans staff and students

In relation to their:

- representation
- progression of students into academia
- journey through career milestones
- working environment for all staff

For further information on the Charter please visit:

<http://www.ecu.ac.uk/equality-charters/athena-swan/>

The College of Life Sciences (now School of Life Sciences) obtained a Bronze Athena SWAN award in April 2015.

In line with the School's commitment to Athena SWAN, if there are occasions where students have issues that pertain specifically to gender they may request a meeting with an Advisor of their preferred gender. Students should contact the School Learning and Teaching Office to make such a request.

The School of Life Sciences Athena SWAN undergraduate representative for 2015/16 is Aleksandra Tsoleva (a.o.tsoleva@dundee.ac.uk). Aleksandra is a member of the School Athena SWAN assessment team so please contact

Aleksandra directly should you have any issues relating to the remit of Athena SWAN.

For further information and updates on Athena SWAN at the University of Dundee:

www.dundee.ac.uk/hr/athenaswan

Follow University updates on Twitter: @UoD_AthenaSWAN



4.6. Campus services and facilities

<http://www.dundee.ac.uk/main/currstud.htm>

There are a variety of Services and Facilities which provide information, support and advice for students including how to use the services and facilities on offer as well as providing self-help and/or information leaflets. These are listed in the 'Student Handbook' and also available on the web. Some of the most useful web links are listed below.

- **Student Services:** <http://www.dundee.ac.uk/student-services/>
- **Student Advisory Service:** <http://www.dundee.ac.uk/adviceguidance/ourservice.html>
- **Counselling Service:** <http://www.dundee.ac.uk/counselling/students.htm>
- **Health Service:** <http://www.dundee.ac.uk/healthservice>
- **The Registry:** <http://www.somis.dundee.ac.uk/registry/>. The Registry is responsible for matriculation, examinations and graduation and maintains the Student Record. In addition, the Registry produces student ID cards and provides certification of student status for Council Tax purposes, funding bodies, etc.
- **University Chaplaincy:** <http://www.dundee.ac.uk/chaplaincy/>. Fiona Douglas (University Chaplain) has appointed David Robertson (Honorary Chaplain to the University and to Dundee FC) to work alongside her within the College of Life Sciences. Fiona and David have indicated that they wish to be considered as an additional resource for the College. They will not be coming around knocking on doors, but they will be available for any student or member of staff (of any faith or none) who wishes to discuss any ethical or moral dilemmas, the relationship between science and religion or indeed any issue that you may wish to raise with them. Please feel free to contact Fiona f.c.douglas@dundee.ac.uk or David darobertson@blueyonder.co.uk.
- **Life Sciences Disability Officers:** <http://www.dundee.ac.uk/disabilityservices>

Disability Services is based in the Ewing Annexe on the main University campus and offers a range of confidential services

Disability Officers for Life Sciences

dedicated to the support and empowerment of disabled students. All disabled students are advised to register with Disability Services as soon as possible in order for recommendations to be made for day to day teaching and examination support.

Mrs Monica Lacey:
Phone: 01382 384790
Email: m.lacey@dundee.ac.uk

- **Life Sciences Careers Officer Information**

<http://www.dundee.ac.uk/careers>

The Careers Service is located at 166 Nethergate and you can just drop in to use the Information room which contains a wealth of literature regarding employment, further study, gap year, volunteering, funding and much more.

What is Offered? Help includes:

Work experience:

Vacation/Semester Employment;
Career Choice, Finding a Job;
Application Form; CV;s; Graduate Selection Tests; Further Study;
Changing Course; Funding;
Interview Preparation; Mock Interviews

Careers Officers for Life Sciences

Lynsay Pickering:

Email: l.pickering@dundee.ac.uk

Opening Times

Monday – Friday
(0900 to 1700 hrs)

- **Library Services** <http://www.dundee.ac.uk/library/>

Provides a wide variety of services including how to find books, journals and electronic resources and life sciences students can request the help of the specific Librarians

Library Liaison Manager for Life Sciences

Andy Jackson:

Phone: 01382 383159

Email: ljc@dundee.ac.uk

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5. Assessment and Examinations

5.1 The new University Assessment Scale

As from 2015/16, there is a new assessment system being used - We will continue to use an alphanumeric marking scale but the overall range of that scale has been slightly extended. The major changes from the current scale are that the range of A band awards has been extended and the 'Fail' range has been clarified:

Marking Scale	Associated Aggregation Scale	Descriptor	Honours Class (where appropriate)
A1	23	Excellent	1 st
A2	22		
A3	21		
A4	20		
A5	19		
B1	18	Very Good	2(i)
B2	17		
B3	16		
C1	15	Good	2(ii)
C2	14		
C3	13		
D1	12	Sufficient	3 rd
D2	11		
D3	10		
MF1	9	Marginal Fail	
MF2	8		
MF3	7		
CF	5	Clear Fail	
BF	2	Bad Fail	

Your marks will, almost always, be returned as an alphanumeric (A1 to D3) grade, but where scores are numeric (i.e. the assessment has given a percentage mark) there is a conversion system which is used to convert the numerical percentage mark to a grade, which is shown on the next page:

Grade conversion tables used in summative assessment

% to Grade conversion

%	GRADE	%	GRADE	%	GRADE
0	AB	34	MF2	68	B1
1	BF	35	MF2	69	B1
2	BF	36	MF2	70	A5
3	BF	37	MF1	71	A5
4	BF	38	MF1	72	A5
5	BF	39	MF1	73	A5
6	BF	40	D3	74	A5
7	BF	41	D3	75	A5
8	BF	42	D3	76	A4
9	BF	43	D3	77	A4
10	BF	44	D2	78	A4
11	BF	45	D2	79	A4
12	BF	46	D2	80	A4
13	BF	47	D1	81	A4
14	BF	48	D1	82	A4
15	BF	49	D1	83	A3
16	BF	50	C3	84	A3
17	BF	51	C3	85	A3
18	BF	52	C3	86	A3
19	BF	53	C3	87	A3
20	CF	54	C2	88	A3
21	CF	55	C2	89	A2
22	CF	56	C2	90	A2
23	CF	57	C1	91	A2
24	CF	58	C1	92	A2
25	CF	59	C1	93	A2
26	CF	60	B3	94	A2
27	CF	61	B3	95	A1
28	CF	62	B3	96	A1
29	CF	63	B3	97	A1
30	MF3	64	B2	98	A1
31	MF3	65	B2	99	A1
32	MF3	66	B2	100	A1
33	MF3	67	B1		

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5.2. MC (medical certificate) and/or CA (certified absence) grades

Where there are good grounds for missing assessments, adjustments can be made to make sure you are not disadvantaged by entering either MC or CA grades in the marks sheet, depending upon the element of assessment as follows:

For assessed certified absence or non-submission of coursework, suitable adjustment will be made to the overall module grade to take these into account. Where this adjustment results in an upgrading, your overall module grade will be duly amended following the examiners meeting for the module.

For certified absence from Degree examinations, your overall module grade will be amended to reflect 0 MC such that your coursework marks will go forward to the next diet of examinations, for which your result will be recorded as a first attempt and not a resit on your official transcript.

5.3 Use of English translation dictionaries in examinations

If you are a student, whose first language is not English and you wish to use an English translation dictionary during exams, then you must apply, through the SLSL&T School Office, for a letter giving you permission to use a paper-based dictionary. You must take the letter to ALL examinations for checking, along with the dictionary, by the senior invigilator. **Electronic dictionaries are not allowed in exams.**

5.4. What can happen if you fail to pass modules?

Under normal circumstances you will have the opportunity to remediate a failed status within a module after a first sitting of the assessment, either by a second attempt at the examination in the resit diet, or submission of appropriate work or task if your module is continually assessed. Failure to pass a resit examination or reassessment task always has consequences for your Degree Programme. In the extreme event that you did not gain the prescribed minimum number of credits (80 credits per academic session for fulltime students), you would be subject to the Termination of Studies Regulations, in which case you will be informed of the procedures to be followed by letter, following publication of the results of the resit examinations.

Requirements for avoiding termination of studies: if you are a full time student, you are required to acquire a minimum 80 credits for each academic year of attendance. If, by the end of the re-sit diet of exams, you have failed to acquire 80 credits for the year, you would be invited to submit an appeal, and your case would be considered by the Sollege termination of studies committee, which would decide, following inspection of your academic record and consideration of any mitigating circumstances you present, whether to allow you to return or whether to require you to discontinue your studies. If

the college requires you to discontinue your studies, you have the right to appeal to the equivalent senate committee.

Failing even one module, although not necessarily leading to Termination of Studies, has an impact on your future because you have to gain enough credits for a Degree. A failed Module may have to be taken again the following year, possibly on an “extended DP”, which allows you to sit the examinations without attending classes. However, for students entering in 2006 and later, EDPs will be permitted to enable progression from Levels 1 to 2 ONLY. If you fail a level 2 or 3 module, you may be required to repeat the module in attendance.

If you fail more than 2 modules, you may have to remain at the same level of study for another year and not be allowed to progress to the next level until you have gained the necessary credits

If you are carrying a failed module(s) at the start of the new academic session you will have an appointment made to meet with the School Secretary and Head of Year to discuss the terms of your progression.

To summarise, failure to pass modules inevitably leads either to additional pressure at the next Level of Study, delayed progression to the next Level of Study (with consequent lengthening of the time and expense to achieve your degree) or even exclusion from your chosen programme of study. You should note also that fail grades appear on University Academic Transcripts which may be requested to support job applications.

It should be noted that in fourth year, students must pass their modules on first sitting except in cases of extenuating circumstances.

5.5. Plagiarism and academic dishonesty

The University of Dundee’s Code of Practice on Plagiarism and Academic Dishonesty may be viewed in full at <http://www.dundee.ac.uk/academic/plagiarism.htm>.

Plagiarism and other forms of academic dishonesty are particularly unpleasant forms of intellectual deceit. There are greater temptations for students to engage in these activities in assessed coursework, whether that be essays, computer programmes, laboratory or practical work or undergraduate and postgraduate dissertations and theses. Therefore prevention is particularly important and, where possible, plagiarism detection software is used. Also, teaching staff are experienced in identifying possible cases of academic dishonesty. The University regards academic dishonesty as an extremely serious offence of equal import to cheating in written examinations, and it is dealt with accordingly.

5.5.1. Examples of academic dishonesty include

Collusion - the representation of a piece of unauthorised group work as the work of a single candidate.

Commissioning - submitting an assignment done by another person as the student’s own work.

Duplication - the inclusion in coursework of material identical or substantially similar to material which has already been submitted for any other assessment within the University.

False declaration - making a false declaration in order to receive special consideration by an Examination Board or to obtain extensions to deadlines or exemption from work.

Falsification of data - presentation of data in laboratory reports, projects, etc. based on work purported to have been carried out by the student, which have been invented, altered or copied by the student.

Plagiarism - the unacknowledged use of another's work as if it were one's own. Examples are:

- inclusion of more than a single phrase from another's work without the use of quotation marks and acknowledgement of source;
- summarising another's work by changing a few words or altering the order of presentation without acknowledgement;
- copying another's work;
- use of another's ideas without acknowledgement or the presentation of work as if it were one's own which is substantially the ideas of another.

Further explanation and guidance on how to avoid infringing them can be found on the Advance@Dundee

at: <http://www.dundee.ac.uk/advancedundee/D/d018p.htm>.

Particularly useful information on how (and how not) to paraphrase the work of others can be viewed

at: http://www.wisc.edu/writing/Handbook/QPA_paraphrase.html.

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