



Life Sciences

AT THE UNIVERSITY OF DUNDEE

Study Guide



Contents

SECTION 1: What is in this Study Guide?	3
1.1 Key Dates in Academic Year 2016-2017	3
SECTION 2: Your responsibilities as a student - learning, attendance and communication	4
2.1 Communication.....	4
2.2 Student attendance and participation	4
2.2.1 Attendance at compulsory classes and coursework submissions.....	4
2.2.2 Submitting your course work	5
2.2.3 Penalties for late submission of course work.....	5
2.3 Absence.....	6
2.3.1 What to do when absent from compulsory classes or examinations.....	6
2.3.2 Degree Examination Timetables	6
2.3.3 Absence from exams (including in-course tests and degree exams).....	7
2.4 Life Sciences Mitigating Circumstances procedure.....	7
2.4.1 How to report mitigating circumstances to the Mitigating Circumstances Committee	7
2.5 Discounting the semester or year	8
SECTION 3: Degrees in Life Sciences and the Modular Structure	9
3.1 School of Life Sciences Degree Programme Outline	9
3.1.1 Module Choices in Levels 3 and 4.....	9
3.1.2 Assessment at levels 3 and 4	10
3.1.3 Feedback.....	10
3.1.4 Core Textbooks	11
3.1.5 Biological Sciences module choices at levels 3 and 4	12
3.1.6 Biomedical Sciences module choices at levels 3 and 4.....	14
3.2 The core curriculum at Level 1	16
3.2.1 How will this be assessed?.....	17
3.2.2 Feedback.....	17
3.2.3 Life Sciences Modules at Level 1	18
3.2.4 Level 1 Module Descriptions.....	19
3.3 The core curriculum at Level 2.....	22
3.3.1 Life Sciences Level 2 Core Curriculum competencies.....	22
3.3.2 Feedback	25
3.3.3 Life Sciences Modules at Level 2	26
3.3.4 Level 2 Module Descriptions	26
3.4 Brief Module descriptors for Level 3 modules	30
3.5 Brief Module descriptors for Level 4 modules	35
SECTION 4 – Other important information	42
4.1 Advisers of Studies – choosing your programme of study	42
4.1.1 Changing modules and/or your programme of study	42

4.2 Studying abroad and eligibility criteria.....	42
4.2.1 Eligibility criteria.....	42
4.3 Prizes and Life Sciences award ceremony	43
4.4 Academic standards and student representation	43
4.4.1 The SCQF Credit Scheme and the student workload	43
4.4.2 Standards.....	43
4.4.3 Representation.....	43
4.4.4 Help with University regulations, teaching and learning	44
4.5 Athena SWAN.....	44
4.6. Campus services and facilities.....	45
4.7 Life Sciences Careers Officer Information.....	47
SECTION 5 - Assessment and Examinations.....	48
5.1 The new University Assessment Scale	48
5.2. MC (medical certificate) and/or CA (certified absence) grades	50
5.3 Use of English translation dictionaries in examinations.....	50
5.4 What can happen if you fail to pass modules?	50
5.5 Plagiarism and academic dishonesty	51
5.5.1 Examples of academic dishonesty include.....	51

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 Graham Christie

Phone: 01382 384330

Email: lsugcc@dundee.ac.uk

Programme Lead Biological Sciences: Dr David Booth

Phone: 01382 384278

Email: lsugbio@dundee.ac.uk

Programme Lead Biomedical Sciences: Dr Steve Land

Phone: 01382 3884760

Email: lsugbms@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.

Please note: between 5pm on Friday evening and 9am on Monday morning, please do not expect members of staff to reply instantly to your e-mails. Staff will usually respond as soon as possible after 9am on Monday morning.

Information for new students on Life Sciences programmes and modules – 2016-17

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 via any system 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 section, 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 the 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 on are available from the Course List under My Modules tab, or from My Current Modules on the right hand side of the *My Dundee* screen. **You will find a link on My Dundee within Life Sciences UG Useful Information Module OR your relative module folder announcement page to access your Module Handbook, Module Assessment Scheme and Module Timetable.**

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.

More about staff in LABSe

The key members of staff in Life and Biomedical Sciences Education (LABSe) 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

Director of Life and Biomedical Sciences

Education: Professor David Coates

Phone: 01382 385111

Email: d.coates@dundee.ac.uk

Associate Dean Learning & Teaching:

Dr Nick Brewer

Phone: 01382 384706

Email: n.j.brewer@dundee.ac.uk

Head of Administration for Learning and Teaching:

Ms Arlene Stewart

Phone: 01382 384570

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

Associate Dean Quality and Academic Standards:

Dr Jenny Woof

Phone: 01382 384269

Email: j.m.woof@dundee.ac.uk

Programme Lead Years 1 and 2 Core Curriculum:

Dr Graham Christie

Phone: 01382 384330

Email: lsugcc@dundee.ac.uk

Programme Lead Biological Sciences: Dr David Booth

Phone: 01382 384278

Email: lsugbio@dundee.ac.uk

Programme Lead Biomedical Sciences: Dr Steve Land

Phone: 01382 3884760

Email: lsugbms@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 learning@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)

SECTION 1: What is in this Study Guide?

Students in Life Sciences will not receive printed module handbooks: only practical protocols and the Health and Safety booklet 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, Handbooks and Module Assessment Schemes can viewed via the link in your My Dundee Module Folder. Timetables can also be viewed at <https://timetable.dundee.ac.uk>. Please note that occasionally times or venues have to be changed at short notice so always **check** My Dundee for the 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 when taking modules and/or degrees offered by the School of Life Sciences

1.1 Key Dates in Academic Year 2016-2017

Semester 1	
Freshers' Week:	5 – 9th Sept 2016
Teaching Weeks 1-12:	12 Sept 2016 - 2 Dec 2016
Catch Up Week 6 (Years 1 & 2 only)	17 – 21 Oct 2016
Semester 1 Exam Weeks 13 & 14:	5 – 16 Dec 2016
4 weeks Christmas Vacation:	19 Dec 2016 – 13 Jan 2017
Semester 2	
Teaching Weeks 15-25:	16 Jan 2017 – 31 March 2017
3 weeks Easter Vacation:	3 April 2017 – 21 April 2017
Semester 2 Exam Weeks 26-30:	24 April 2017 – 26 May 2017
Graduation ceremonies:	19 – 23 June 2017
Resit Exam Diet for Semesters 1&2:	3 – 7 July 2017

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 your University of Dundee email account and My Dundee Announcements 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, as soon as possible

2.2 Student attendance and participation

2.2.1 Attendance at compulsory classes and coursework submissions

All classes are COMPULSORY. You are encouraged to attend all scheduled classes in the timetables of all those School of Life Sciences modules you are enrolled on.

Attendance registers are taken and it is your responsibility to ensure your attendance is noted as required.

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 Undergraduate Teaching Office of any non-attendance or non-submissions using the appropriate procedure described in Section 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 prompted to meet with your Advisor of Studies to explain the reasons. If you fail to meet with your Advisor of Studies receive a formal email 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 referred to 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 these should be submitted according to the instructions given in the relevant 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 NC. 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-curricular 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 in 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-medically 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 be aware when

Degree examination results

Provisional Semester 1 degree examination results will be available via eVision from late January, **except for Level 4 students.** 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 July.

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 Teaching 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 submit 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 wherever 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.

Provide documentary evidence of the problem giving an 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.

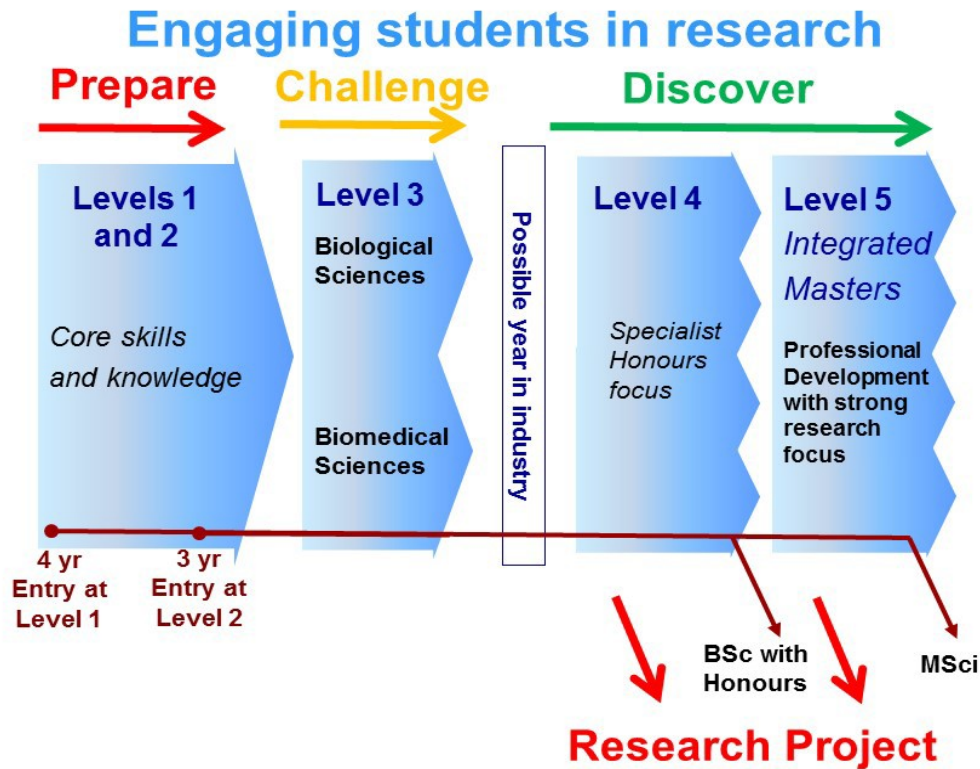
The Mitigating Circumstances Form will have the submission deadline clearly identified and it is your responsibility to ensure that this form is submitted to the Undergraduate Teaching Office on or before the deadline provided. It may not be possible to consider late submissions. Receipt and consideration 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

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. Transition 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 chosen whether you wish to specialise in the Biological Sciences or the Biomedical Sciences 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:

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

3.1.3 Feedback

You will receive feedback on 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, A.J.F. Griffiths *et al.*, 11th Edition, W.H. Freeman (earlier editions are also suitable)

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

Genes IX, B. Lewin, Jones and Bartlett (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	SEM 1	C	C	C	C	C	C	C	C	C	C	C	C	
BS31004	Biochemistry & Cell Biology	SEM 1	C	C	C	C	C	C	C	C	C	C	C	C	
BS31005	Genetics	SEM 1	C	C	C	C	C	C	C	C	C	C	C	C	
BS31006	Gene Regulation & Expression	SEM 1	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	
BS32022	Human Morphogenesis & Embryonic Development	C	O	O	O	O	O	-	O	O	O	O	O	O	
BS32029	Cell Proliferation and Survival Mechanisms Underlying Disease	C	O	O	O	O	O	-	C	O	O	O	O	O	
BS32030	Data and Statistical Analysis	C	O	O	O	O	O	-	O	O	O	O	O	O	
			1 Option	2 Options	1 Option	2 Options	1 Option	No Options	1 Option	1 Option	1 Options	1 Option	2 Options	1 Option	
BS32003	Drug Discovery & Development	D	C	O	O	O	O	O	O	-	O	-	O	O	Students 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	
			No Options	2 Options	1 Option	2 Options	2 Options	2 Options	2 Options	1 Option	2 Options	1 Option	1 Option	1 Option	

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
STUDENTS PLEASE NOTE ONLY TWO MODULES ARE TAKEN FROM BLOCK C AND FROM BLOCK D

Life Sciences Study Guide 2016/17

Level 4 -BIOLOGICAL STREAM MODULE CHOICES

		BLOCK	BCDD	BIOLSCI	MOLBI	MOLGEN	MICBIO	BIOCHEM	CANCERBIOL	CDB	CELL SIGNAL	IMMUNOLOGY	PLANTSCI	BIOINFORM	PRE & CO REQUISITES
BS41004	Research Project: Biological Sciences	SEM 1	C	C	C	C	C	C	C	C	C	C	C	C	
BS41005	Research Skills in Biological Sciences	SEM 1	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	
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 Science	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	Stem Cells in Development and Disease	C	-	O	-	O	O	O	O	C	O	O	-	O	Students must have studied BS32005, BS32026
			1 Option	2 Options	2 Options	2 Options	2 Options	2 Options	1 Option	1 Option	2 Options	1 Option	1 Option	1 Option	
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
BS42027	Cancer Pharmacology and Treatment	D	O	O	-	O	-	O	C	O	O	O	O	O	
			1 Option	2 Options	No Options	1 Option	1 Option	1 Options	1 Option	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 scheduling permits

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

STUDENTS PLEASE NOTE ONLY TWO MODULES ARE TAKEN IN BLOCK C AND IN BLOCK D

3.1.6 Biomedical Sciences module choices at levels 3 and 4

Level 3 -BIOMEDICAL STREAM MODULE CHOICES

		BLOCK	NEUR	PHAR	PHSC	BIMS	Pre & Co Requisites
BS31004	Biochemistry & Cell Biology	SEM 1	O	O	O	O	Students MUST have taken BS31004 if they intend to take BS32006 AND/OR BS32005 in SEM 2
BS31006	Gene Regulation & Expression	SEM 1	O	O	O	O	
BS31013	Biomembranes	SEM 1	C	C	C	C	
BS31016	Practical Techniques in Biomedical Sciences	SEM 1	C	C	C	C	
BS31019	Regulatory Physiology and Pharmacology	SEM 1	C	C	C	C	
BS31020	Experimental Cell Culture	SEM 1	O	O	O	O	
			1 Option	1 Option	1 Option	1 Option	
BS32006	Cell Signalling	C	O	O	O	O	MUST have taken either BS31020 OR BS31004 in SEM 1
BS32022	Human Morphogenesis & Embryonic Development	C	O	O	C	O	
BS32026	Sensory and Motor Neuroscience	C	C	O	O	O	
BS32028	Molecular Pharmacology	C	O	C	O	O	
BS32029	Cell Proliferation and Survival Mechanisms Underlying Disease	C	O	O	O	O	
BS32030	Data and Statistical Analysis	C	O	O	O	O	
			1 Option	1 Option	1 Option	2 Options	
BS32005	Cell & Developmental Biology	D	O	O	O	O	MUST have taken either BS31020 OR BS31004 in SEM 1
BS32009	Immunology	D	O	O	O	O	
BS32020	Human Epithelial Biology	D	O	O	C	O	
BS32021	Quantitative Pharmacology	D	O	C	O	O	
BS32024	Neuropsychopharmacology	D	C	O	O	O	
			1 Option	1 Option	1 Option	2 Options	

C = Core

O= Optional

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

STUDENTS PLEASE NOTE ONLY TWO MODULES ARE TAKEN IN BLOCK C AND IN BLOCK D

Level 4 -BIOMEDICAL STREAM MODULE CHOICES

		BLOCK	*BIMS	SPBI	PHSC	PHAR	NEUR	Pre & Co Requisites
BS41006	Research Skills in Biomedical Sciences	SEM 1	C	C	C	C	C	
BS41007	Research Project: Biomedical Sciences	SEM 1	C	C	C	C	C	
			NO OPTIONS	NO OPTIONS	NO OPTIONS	NO OPTIONS	NO OPTIONS	
BS42006	Advanced Immunology	C	O*	-	-	-	-	
BS42007	Cancer Biology	C	O	-	O	O	-	
BS42015	Regulation of Oxygen and Fuel Utilisation	C	O	C	*C	-	-	* - Must Select both *C Modules OR *C plus one other option
BS42016	Advanced Clinical Exercise Science	C	-	C	-	-	-	
BS42018	Synaptic Plasticity and Cognition	C	O	-	-	O	O	
BS42019	Cardiovascular Pharmacology	C	O	-	O	C	-	
BS42024	Sensory Systems	C	O	-	*C	-	C	* - Must Select both *C Modules OR *C plus one other option. Also there is a Prerequisite of BS31013
BS42025	Analgesic and Anaesthetic Pharmacology	C	O	-	-	O	O	
BS32006	Cell Signalling	C	O*	-	O	O	O	Prerequisite BS31004 OR BS31020 at Level 3
BS32021	Quantitative Pharmacology		-		O			
BS32022	Human Morphogenesis and Embryonic Development	C	O	-	O	O	O	
			2 OPTIONS	NO OPTIONS	1 OPTION	1 OPTION	1 OPTION	
BS42014	Diabetes, Obesity and Metabolic Dysfunction	D	O	-	*C	-	-	* - Must Select both *C Modules OR *C plus one other option
BS42009	Advanced Molecular Microbiology	D	O*	-	-	-	-	
BS42012	Parasitology	D	O*	-	-	-	-	
BS42013	Advanced Cell Signalling	D	O*	-	-	-	-	
BS42017	Psychiatric Disorders	D	O	-	-	O	O	
BS42021	Heart and Circulation	D	O	C	*C	O	-	* - Must Select both *C Modules OR *C plus one other option
BS42022	Advanced Training Methods	D	-	C	-	-	-	
BS42023	Applied Neuroanatomy and Neurodegenerative Disorders	D	O	-	-	O	C	
BS42027	Cancer Pharmacology and Treatment	D	O		O	C	O	
BS32005	Cell & Developmental Biology	D	O*	-	O	-	-	Prerequisite BS31004 OR BS31020 at Level 3
BS32009	Immunology	D	O*	-	O	O	O	
BS32024	Neuropsychopharmacology	D	-		O			
			2 OPTIONS	NO OPTIONS	1 OPTION	1 OPTION	1 OPTION	

C = Core

O= Optional

STUDENTS PLEASE NOTE ONLY TWO MODULES ARE TAKEN IN BLOCK C AND IN BLOCK D

*BIMS Must select one of the modules labelled with a * in EITHER block C OR block D (timetable permitting)

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

3.2 The core curriculum at Level 1

After study of all the core theory modules in Level 1 students should acquire and/or demonstrate the following competencies via assessed coursework and examinations:

- 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 should acquire and/or demonstrate the following competencies via assessed coursework:

- Calibrate and operate standard laboratory equipment and perform analyses on a variety of sample types.
- Field trip skills (correct use of GPS and observation skills).
- Design and perform experiments.
- Design and make buffers, and prepare standard solutions.
- Solve problems.
- Use molecular graphics and statistics programmes as appropriate.
- Work in groups.
- Keep an up to date lab book.
- Written communication skills (report and poster writing) including citation/referencing and bibliographic skills.
- Self-assessment skills and learning.

3.2.1 How will this be assessed?

We use a variety of assessment types as listed below:

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

3.2.2 Feedback

You will receive feedback on 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)	BS12006 Chemistry for the Life Sciences Workshops <u>Core for HE Foundation Year</u> (10 credits)
BS11007 Physics for the Life Sciences Workshops <u>Core for HE Foundation Year</u> (10 credits)	BS12008 Introduction to Scientific Enterprise (20 credits) **

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

** Optional module

▲ Modules not available to non-Life Science students except 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 student. 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.

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: The Gene, Evolution and Biological Organisation. The concept of the Gene covers major topics such as DNA, genes, genomes, reproduction and heredity. The concept of Evolution introduces the topics of multicellularity and the benefits of being multicellular. 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.

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 one field excursion 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.

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 health and safety and basic laboratory practice. The ability to work effectively as part of a group 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.

To support the group lab project, students will receive guidance on lab-book/record keeping, experimental design and project planning, in addition to interpretation of data and presentation of project results. Students will also be encouraged to reflect on and evaluate their own learning throughout the semester, identifying areas for development and consolidation.

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.

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.

BS11007 Physics for the Life Sciences Workshops Core for HE Foundation Year (10 credits)

Brief description of module: This module will consist of one tutorial session every week covering:

Energy, waves, statics, motion, biomaterials, radioactive decay and nuclear medicine.

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.

BS12002 Life: the underlying structures (10 credits)

Brief description of module: This module develops aspects of three topics: i) Energy and Metabolism, ii) The Cell and its Environment, and iii) Animals: Form and Function.

Energy and metabolism introduces the major topics of chemical and biological thermodynamics covering enzymes (as biological catalysts, their structure and basic mechanisms), enzyme kinetics, energy flow and transfer and the basic principles of metabolism in autotrophic and heterotrophic organisms.

The Cell and its Environment develops the topic of cell structure, covering intracellular compartmentalisation and trafficking; lipids and membranes, with specific emphasis on the biochemical and biophysical properties of membranes.

The Animals: Form and Function topic starts with the basic concept that specialised cells form tissues and organs which in turn interact at the level of the whole-organism. Physiological systems (endocrine, nervous, circulatory, gas exchange and excretory) in animals of increasing complexity are used as examples, highlighting links between form and function and to illustrate the importance of homeostasis.

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

- Optical techniques – Students will use a spectrophotometer to produce a standard absorbance spectrum, apply the Beer-Lambert Law to derive unknown concentrations from known values of absorbance and perform a Bradford Assay
- Protein purification – Students will experience two techniques that are commonly used to separate mixtures of proteins: size exclusion chromatography (SEC) and SDS polyacrylamide gel electrophoresis (SDS PAGE)
- PCR - In conjunction with its associated workshop, this laboratory exercise aims to give students a basic understanding of the practical application of the polymerase chain reaction (PCR) and the use of agarose gel electrophoresis for the analysis of DNA samples.
- Enzyme kinetics – Students will gain practical experience of a typical enzyme assay procedure.
- Digital skills – online scientific literature searches
- Protein expression – Students will learn how to purify and analyse a recombinant protein.

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.

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 bodysnatchers, 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.

BS12006 Chemistry for the Life Sciences Workshops (Core for HE Foundation Year (10 credits))

Brief description of module: This module will consist of one tutorial session every week covering:

- Inorganic chemistry with particular reference to metals in biology such as iron, copper and zinc and chelation therapy.
- Trends in the periodic table will be looked at in depth.
- Organic chemistry content will focus on fundamental mechanisms, stereochemistry and aromatic and carbonyl chemistry.

BS12008 Introduction to Scientific Enterprise (20 credits)

Brief description of module: The purpose of this module is to inspire students to think beyond their programme of studies and plan their own business/research idea. This module will consist of:

Inspire Dundee - Lectures from inspirational members of staff who run their own companies.

Intellectual Property - discovering what people want to think about when protecting their own ideas, an overview of patent law.

CV Writing skills

The Money Pot - where to obtain funding and how to write a successful proposal.

The Plan - writing business plans and discovering how much money is needed to set up a business/run a lab.

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 should acquire and/or demonstrate the following competencies via assessed coursework and examinations:

A knowledge and understanding of the patterns and themes of the diversification of modern life on Earth. They should be able to summarise the key events and physical components that resulted in the contemporary world, and apply fundamental theories and knowledge of evolution, genetics, and physiology and population biology.

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.

Be able to 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.

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.

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.

Be able 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; to reflect on and self-assess their skills and employability; to discuss ethical and controversial issues; and to research and understand 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:

Be able to effectively participate in oral presentations, written work, planning and time management and problem solving; to reflect on and self-assess their skills and employability; to discuss ethical and controversial issues; and to research and understand scientific literature.

Be able to demonstrate in the lab how kinetic or thermodynamic control during a biochemical reaction can determine how a protein unfolds, and demonstrate which conditions (pH, temperature, concentration) affect the pathway in which a protein will unfold.

Be able to perform basic aseptic laboratory techniques, explain the different steps involved in a bacterial mating experiment, and analyse quantitative data on plasmid transfer by conjugation.

Be able to explain how antibodies are used to measure the amount and location of specific proteins and other antigens in biological samples, and demonstrate how red blood cells can be used to investigate osmolarity and tonicity.

Be able to use basic descriptive statistical analyses and graphical representation to interpret experimental data, and perform basic sequence analyses on DNA and protein sequence data retrieved from databases.

Be able to apply and extend the lab skills and techniques from level 1, extend knowledge of health and safety procedures, and 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.

Be able to critically assess written work, prepare and deliver oral and written presentations, plan experiments and practice time management, and demonstrate knowledge of careers and employability.

How will this be assessed?

We use a variety of assessment types as listed below:

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

3.3.2 Feedback

You will receive feedback on 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).

3.3.3 Life Sciences Modules at Level 2

LEVEL 2 MODULES	
SEMESTER 1	SEMESTER 2
BS21001 Statistics and Experimental Design (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) ▲	
BS21008 Bioinorganic, Biophysical and Organic Chemistry for the Life Sciences Workshops (20 credits)*	
BS21009 Data Analysis for the Life Sciences (20 credits)*	
BS21010 Introductory Programming for Life Sciences (20 credits)*	
BS21011 Developing Scientific Enterprise (20 credits)*	

* Optional module

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

3.3.4 Level 2 Module Descriptions

Semester 1 modules

BS21001: Statistics and Experimental Design (10 credits)

Brief description of module: 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 include an introduction to the design of experiments, concepts of randomisation and blocking. Regression and Multiple regression; ANOVA (including posthoc testing); principle tests of signal versus noise. Students will also be introduced to appropriate graphing and representation of data. 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 to create proteins, and how those proteins can be regulated. With that foundation the module explores how gene regulation can control cell growth and development, 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 broaden and strengthen both the practical, laboratory research and generic skills of students by building on their level 1 or other previous experience (direct Level 2 entrant students will have an opportunity to learn skills and techniques at the start of semester 1).

- An introduction to basic lab techniques and the use of commonly-used lab equipment.
- Interpretation of experimental data through use of basic descriptive statistical analyses and graphical representation (using R).
- Introduction of the concepts of osmolarity and tonicity.
- Retrieval of sequence information (genetic, cDNA and amino acid) from internet databases and to use this information to perform basic sequence alignments.
- Comparison of kinetic and thermodynamic control in protein folding and application of the concept to a series of problems during a work shop session.
- The broad use of antibodies in Biological Sciences.
- Use of aseptic techniques through handling of bacteria.

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.

BS21008: Bioinorganic, Biophysical and Organic Chemistry for the Life Sciences Workshops (20 Credits)

Brief description of module: This module will consist of one tutorial session every week covering:

- A recap on the fundamentals of molecular orbital theory, acids and bases and physical chemistry as applied to Biology
- Inorganic chemistry with particular reference to metals in biology such as iron, copper and zinc and chelation therapy.
- Trends in the periodic table will be looked at in-depth.
- Organic chemistry content will focus on fundamental mechanisms, molecular structure, stereochemistry, and functional groups with a focus in carboxylic acids.

BS21009: Data analysis for the Life Sciences (20 Credits)

Brief description of module: This module will provide a general introduction to statistics with specific examples for the biosciences, bringing students up to speed on the structure of datasets and how one infers differences. This will include an introduction to the design of experiments, concepts of randomisation and blocking; Regression and Multiple regression; ANOVA (including posthoc testing); principle tests of signal versus noise. Students will also be introduced to appropriate graphing and representation of data. Students will be expected to complete a substantial piece of coursework related to a component of the indicative content.

BS21010: Introductory Programming for Life Sciences (20 Credits)

Brief description of module: This module focuses on the development of basic programming skills using Python 3 for use in Life Sciences applications. The intention is to provide a basic understanding of programming. This will be achieved by a comprehensive hands-on experience of the use of these languages.

The course is intended to provide a hands-on introduction to programming in Python 3. The expectation is that the skills acquired will provide a basic competency that will enable the development of Python scripts that may be embraced in problem solving and data analysis beyond this module.

BS21011: Developing Scientific Enterprise (20 Credits)

Brief description of module: This module will consist of:

Theoretical concept of an entrepreneur – introduction to the current theory of what makes an entrepreneur.

Research techniques – how to complete market research in order to evaluate the feasibility of a business proposal and market the business proposal once developed, and how to conduct interviews in order to evaluate the entrepreneurial characteristics of an individual.

Developing the business idea – Taking a basic business idea and adding flesh in the form of determining the market, refining the processes, and understanding the key components of the business model.

Numbers count – an introduction to key accounting models such as costing and break-even analysis to allow students to financially evaluate their proposals.

Business Risk – how to evaluate and mitigate the business risks relating to individual business proposals.

Semester 2 modules

BS22001 – Biomedical Sciences (20 credits)

Brief description of module: The aim of this Module is to introduce students to the physiology, pharmacology and anatomy of specific topics within the Biomedical Sciences, including:

- 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 cardiovascular system
- Respiratory system: mechanics of ventilation and factors influencing gas exchange

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.

Practical work 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.

3.4 Brief Module descriptors for Level 3 modules

Below are outline descriptions of the modules. Lecture outlines will be available on My Dundee along with other relevant information. 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, and 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, and systems biology approaches.

BS31005: Genetics (15 Credits)

This module will study the important main threads of modern genetics, covering model genetic systems, genome structure and evolution, genetic polymorphism, genetic markers and mapping, population genetics, genetic networks, and reverse genetics.

BS31006: Gene Regulation & Expression (15 Credits)

The aim of this module is to introduce students to specific topics within the area of Gene Regulation and Expression that will underpin the more specialised areas which the students will encounter in Semester 2 of level 3 and in level 4. It will focus on the principles underlying the following fundamental processes, including examples of how defects at the molecular level result in disease:

Transcription; RNA splicing; RNA modification; Translation; Chromatin and epigenetics; RNA-mediated regulation of gene expression (RNAi and miRNAs); DNA replication; Chromosome segregation; DNA recombination; DNA repair; and molecular biology of cancer.

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.

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. This module will offer a range of practical classes and associated workshops related to core techniques that are important for the biomedical sciences. These will include:

- Whole body physiological measurements
- In vitro laboratory preparations
- Experimental simulations
- Data analysis and presentation using software packages

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. Topics covered will include:

- the role of hypothalamic/pituitary and HPA axis
- thyroid hormone and regulation of metabolic rate
- hormonal control of growth and calcium homeostasis
- insulin and its impact on fuel metabolism
- obesity, appetite control and diabetes
- the function of nuclear hormone receptors
- hormonal control of reproduction

BS31020: Experimental Cell Culture (15 Credits)

This module aims 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.

This module will offer a range of practical classes and associated workshops and lectures related to core techniques that are important for the biomedical and biological sciences. These will include:

- Experience in the handling and passage of cells in culture
- Experimental methods for the visualization and quantification of changes in gene expression and protein levels
- Microscopic approaches to visualize cellular proteins and compartments
- Data analysis and presentation using software packages

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.

The module will explore broad aspects of microbiology and relate this to protein structure / function and molecular genetics. It will address 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; 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, and stem cells. The module will address broad aspects of the development of vertebrates and invertebrates and what happens when these processes go wrong.

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.

It will explore the main organic reactions and mechanisms, showing how to predict products of reactions and represent the mechanisms of the reactions using curly arrow notation, as well as design of synthetic strategies 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. Topics covered will include plant genomes, plants and the environment, and plants and human welfare.

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 at Level 4. The module aims to strengthen students' skills in problem solving, critical analysis of scientific literature. It will explore central concepts in the field of immunology and relate this to protection against infectious disease. Topics covered will include 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 hyperreactivity.

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 interpretation of high throughput sequencing data, including statistical evaluation of the relevance of results.

BS32011: Practical Project A [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 Design

BS32020: Human Epithelial Biology (15 Credits)

As the front line between internal and external body environments, epithelial cells perform a variety of key functions ranging from nutrient and electrolyte transport, monitoring of change in the external environment to defense against pathogen attack. This module examines the anatomy, physiology and pharmacology of epithelial cells through the prism of the human skin, renal and gastrointestinal systems. For each of these body systems, we explore the organization of epithelial cell structures, their physiological function and consider the pharmacological approaches that may be used to treat diseases such as cancer, hypertension and secretory diarrhoea.

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).

It will explore receptor theory, including basic mathematical descriptions of receptor occupancy and the nature and 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 focus on the theme of human developmental anatomy and will explore the major anatomical features of human embryos and fetuses, the development of specific organs and structures within the human embryo and foetus, and the effects that perturbation of major pathways has on tissue development.

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.

It will explore 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. It will address 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).

BS32028: Molecular Pharmacology (15 Credits)

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

It will explore the basic principles of receptor pharmacology, with a focus on G protein coupled receptor structure, signalling and function.

BS32029: Cell proliferation and Survival Mechanisms Underlying Disease (15 Credits)

This module will provide a firm grounding in key molecular mechanisms and pathways underpinning proliferation and survival relevant to the development of cancer and other disease-related themes at levels 3 and 4. Additionally, it will provide an insight into the experimental approaches that have advanced the field of cancer biology. Topics covered will include reversible post-translational modification of proteins and the nature/function of the enzymes that mediate these processes, with emphasis on their dysregulation in cancer; major pathways controlling proliferation and survival including cell cycle regulation and programmed cell death; key principles by which transcriptional regulation underpinning the control of gene expression is perturbed during cancer

development; pathological mechanisms (with emphasis on post-translational modification) by which stimulatory and inhibitory signals regulate cell cycle control through selective gene expression in cancer; and general therapeutic strategies in cancer based on the understanding of these pathways.

BS32030: Data and Statistical Analysis (15 Credits)

This module will provide a broad knowledge base in data analysis for students of life sciences. Aspects of generalized linear modelling using datasets will be revisited and extended. Topics explored will include generalised linear modelling using error structures that aren't normally distributed; analysis of data with fixed, random and mixed effects; principal component analysis and other clustering techniques; and analysis of experimental designs that involve nested, split plot or non-orthogonal data.

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 prior knowledge and skills, students will expand their research experience by participating in a semester long research project based around one chosen area of 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 the Schools of Life Sciences or Medicine
- B) Group lab based research - 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 and/or education - students will prepare materials to communicate current research topics and techniques to a public audience. The project must include a data analysis component.
- D) Data analysis project which must include analysis of published and/or unpublished scientific data and will contribute towards the body of knowledge in a specific field.

BS41005/06: Research Skills (20 Credits)

The aim of this module is to use the vibrant research environment of the School of Life Sciences, James Hutton Institute, and the School of Medicine, to expand student experience of current research and provide an opportunity to be part of the wider research culture. After instruction in proposal writing, students will prepare a grant or outreach proposal based on their research project. Students will attend seminars given by internal and external researchers on a wide range of bioscience topics. A summarized account of one selected seminar will be submitted for assessment. Students will have the opportunity to demonstrate their knowledge of current research by applying this to current "big questions" in Life and Biomedical Sciences in a general examination paper held during semester 1. A final synopsis of their Honours year project will be displayed as a poster during the Honours Year Symposium at the end of the project research period.

SEMESTER 2 Modules

BS42003: Advanced Bioinformatics* (15 Credits)

The aim of this module is to provide specialist knowledge and understanding of frontier topics in bioinformatics. It will explore key technologies and applications in modern biological research and build familiarity with state of the art processes. This module will be delivered by specialists in specific fields, addressing areas such as Genome Assembly, Proteomics, Structural analysis and Systems modelling.

BS42004: Advanced Modern Drug Discovery (15 Credits)

The aim of this module is to build upon prior understanding of the process involved in identifying drug targets and developing drugs against those targets. The module will address key aspects of drug development beyond lead optimization, providing 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. Topics covered in this module include plant-environment interactions (perception and response to bacterial oomycete; fungal and insect pathogens; plant symbiote interactions; plant detection of and responses to abiotic stress), use of genome sequencing and association genetics for plant breeding and biotechnology, and 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, lymphocyte activation and signalling, T cell mediated immunity, immune hyper reactivity and immunodeficiency, cross-talk between autophagy and immunity pathways, and cytokine receptor signalling.

BS42007: Cancer Biology (15 Credits)

The aim of this Module is to provide students with a broad understanding of key topics in cancer biology. Topics covered will include an introduction to cancer pathology, an 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, and DNA damage and repair.

BS42008: Stem Cells in Development and Disease (15 credits)

The aim of this module is to provide a specialised insight into advanced cell and developmental biology, through the prism of stem cell 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. The module will explore the basics of what stem cells are, and the molecular mechanisms required to maintain them or allow them to differentiate into different lineages, covering embryonic and adult stem cells in both endogenous and disease states. Topics will reflect the following areas: Introduction to stem cells, Embryonic stem cells, Epigenetic regulation in stem cells, Reprogramming/iPS cells, Asymmetric cell division, Tissue stem cells, Stem cells during development.

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. It will explore the molecular principles that underpin (some of) the following processes in microorganisms:

- Bacterial quorum sensing
- Cyclic nucleotides as second messengers in bacteria
- Antibiotic resistance in bacteria
- Strategies for infection of topical bacterial pathogens
- Bacterial protein secretion and export systems
- Bacterial ABC transporters and their role in understanding human disease
- Microbial solutions to bioenergy research

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. Specialist topics offered as part of this module will typically be 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 (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. The module will provide an understanding of several advanced methods for organic synthesis and organic synthesis design theory, and 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 will reflect key areas such as genetic approaches, immune evasion, drug delivery, drug targets and drug mode-of-action.

BS42013: Advanced Cell Signalling (15 Credits)

The aim of this module is to build on Level 3 studies of Cell Signalling, and take students close to the forefront in selected areas of cell signalling research. The module will cover 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; and analysis of T cell signalling by phosphoproteomics.

BS42014: Diabetes, Obesity and Metabolic Dysfunction (15 Credits)

This module will provide a physiological perspective on the ways in which macro and micronutrients (glucose, fatty acids, amino acids and iron) modulate both cellular responses and endocrine/neuropeptide function in mammalian cells with particular emphasis on how such modulation is essential for normal physiological homeostasis and how its dysregulation contributes to the development of conditions such as obesity and diabetes. Topics covered include nutrient transporters and their regulation, control of appetite via leptin and central mechanisms, 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 (mTORC1) and endocrine (e.g. insulin/growth factor) signalling pathways, and pathogenesis of obesity and diabetes.

BS42015: Regulation of Oxygen and Fuel Utilisation (15 Credits)

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; a 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 include:

- 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.
- Mechanisms of fuel selection in muscle.
- The discovery of the AMP-activated protein kinase (AMPK) pathway
- Regulation of AMPK during muscle contraction
- Metabolic responses to AMPK activation.
- Activation of glucose uptake & chronic adaptations of muscle to exercise.
- Effects of AMPK activation on gene expression and cell growth
- Health benefits of exercise with respect to obesity and type 2 diabetes

BS42016: Advanced Clinical Exercise Science

This module aims to provide a detailed understanding of the effects of exercise on specific medical conditions - from prevention to survivorship; a familiarity with the epidemiological studies on physical activity and disease incidence, with exercise intervention studies on disease symptom management, and with the physiological and biological mechanisms by which physical activity is linked to the development of specific medical conditions; and 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, and knowledge of opioid dependence, its mechanisms, epidemiology, consequences for the individual and society and the evolution of treatment strategies in the U.K.

BS42018: Synaptic Plasticity and Cognition

This module will address the molecular and cellular mechanisms that underlie various forms of synaptic plasticity. It will promote:

- Familiarity with the experimental techniques including neuroanatomical, neurochemical, and neurophysiological that have been used to study synaptic plasticity and how this phenomenon relates to higher order functions including behaviour and cognition
- An appreciation of the strengths and weaknesses of molecular genetic and behavioural genetic approaches in linking cellular and circuit phenomena to cognition
- An ability to frame at a theoretical level how changes in synaptic plasticity may underpin changes at higher levels of analysis.

BS42019: Cardiovascular Pharmacology

This module will present advanced aspects of cardiovascular pharmacology. It 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.

BS42021: Heart and Circulation

This module will provide 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.

Topics will include 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 module 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; power exercises; manipulation of training variables; programme considerations), Endurance (role of strength training; physiological relationship between strength and endurance; concurrent training; economy; injury prevention; programme considerations; ultra-endurance events), Training children (role of strength training; programme considerations; position standpoints), Recovery methods (efficacy of topical methods e.g. ice baths, compression garments, periodised training, sleep, nutrition; implementing a recovery strategy), and Dietary supplementation (legality of supplements; drug testing in sport; risks, efficacy and protocols for commonly used supplements; 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 Alzheimers,

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

This module will explore the anatomy and physiology of selected mammalian sensory systems including the auditory, visual and olfactory systems. It 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; awareness of the commonalities and differences that exist between the functioning of the systems presented; knowledge of the visual pathway from the retina to the visual cortex, and the plasticity exhibited by neurons innervating the visual cortex; knowledge of odorant receptors, the processing of afferent signals by the olfactory bulb, and ideas concerning odor perception; and 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.

BS42027: Cancer Pharmacology and Treatment

The aim of this module is to provide students with advanced research-led teaching of key topics in cancer pharmacology and treatment. This module will build on previously encountered specialised areas of pharmacology, biochemistry, molecular cell biology and genetics. Topics will include cancer pathology and the molecular biology of cancer, cancer treatment – chemotherapy and radiotherapy: mechanisms of action, pharmacogenetics – inherited differences in drug response, mutational signatures in common cancers – identification and prioritisation of novel drug targets, cancer stem cells, drug resistance mechanisms, individuality in treatment response, and the role of tissue banks and the research ethics service.

SECTION 4 – Other important information

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 for Level 1 and 2 modules, or within 1 week of the start of either semester for Level 3 and 4 modules.

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 Prize 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 each year.

Awards Ceremony – Students who have won module or School 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 typically 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 totaling 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:

<https://www.dusa.co.uk/about-us/>

The elected School President for Life Sciences for session 2016-17 will be advised in September 2016. 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 Committee of 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 Schools and institutions

- Helping make appointments with teaching staff
- For all other enquiries please contact the module manager or Programme Lead.

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.

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

<http://www.dundee.ac.uk/about/athenaswan/>

Follow University updates on Twitter: @UoD_AthenaSWAN



4.6. Campus services and facilities

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

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/studentsservices/>

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.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 School of Life Sciences.

Fiona and David have indicated that they wish to be considered as an additional resource for the School. 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 Officer for Life Sciences

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

Disability Services is based in the Old Technical Institute (UTI) on the main University campus and offers a range of confidential services 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.

4.7 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; CVs; Graduate
Selection Tests; Further Study;
Changing Course; Funding;
Interview Preparation; Mock
Interviews

Careers Officer 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

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SECTION 5 - Assessment and Examinations

5.1 The new University Assessment Scale

In 2015/16, a new assessment system came into use based on an alphanumeric marking scale in which the scale has been slightly extended. The major changes from the previous 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		
M1	9	Marginal Fail	
M2	8		
M3	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	M2	68	B1
1	BF	35	M2	69	B1
2	BF	36	M2	70	A5
3	BF	37	M1	71	A5
4	BF	38	M1	72	A5
5	BF	39	M1	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	M3	64	B2	98	A1
31	M3	65	B2	99	A1
32	M3	66	B2	100	A1
33	M3	67	B1		

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 English is not your first language and you wish to use an English translation dictionary during exams, then you must apply through the School Undergraduate Teaching 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, if the module is continually assessed, by submission of an appropriate piece of work or task normally in the resit diet unless otherwise stated in your module handbook. 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 of 80 credits for each academic year of attendance. If, by the end of the resit diet of exams, you have failed to acquire 80 credits for the year, you will be invited to submit an appeal, and your case would be considered by the School Termination of Studies Committee, which will decide, following inspection of your academic record and consideration of any mitigating circumstances you present, whether to allow you to return or to require you to discontinue your studies. If the School 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 Duly Performed (EDP)” status, 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 the following academic year.

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 or modules at the start of the new academic session you will have an appointment to meet with the Head of Administration and your Programme Lead 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 Level 4, 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 is available in full at <http://www.dundee.ac.uk/governance/policies/#!p>

Plagiarism and other forms of academic dishonesty are particularly unpleasant forms of intellectual deceit. Arguably there are greater temptations for students to engage in these activities in assessed coursework, including 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://writing.wisc.edu/Handbook/>