



**University of  
Nottingham**

UK | CHINA | MALAYSIA

# **Biotechnology**

## **Course Handbook**

**2017-2018**

Please note that all of the information given in this Student Course Handbook was correct at the time of going to press; Schools reserve the right to amend course structures or information and amend, substitute or withdraw modules detailed in this publication. Comments or feedback on the contents of this handbook are welcome, and will be used in the revised edition for 2018-2019. Any comments concerning this publication should be addressed to Kathy Wilson (Student Service Centre Manager) at the Sutton Bonington Campus or e-mail [Kathy.Wilson@Nottingham.ac.uk](mailto:Kathy.Wilson@Nottingham.ac.uk).

This handbook is available in alternative formats. Please contact the Programme Team by emailing [ss-programmes-sb@exmail.nottingham.ac.uk](mailto:ss-programmes-sb@exmail.nottingham.ac.uk) or the Student Services Centre at the Sutton Bonington Campus to request an alternative format.

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# 1 Dates for Your Diary

## **Term dates**

### *Autumn Term*

Monday 25 September 2017 – Friday 15 December 2017

### *Spring Term*

Monday 15 January 2018 – Friday 23 March 2018

### *Summer Term*

Monday 23 April 2018 – Friday 22 June 2018

## **Semester dates**

### *Autumn Semester*

Monday 25 September 2017 – Saturday 27 January 2018

### *Spring Semester*

Monday 29 January 2018 – Friday 22 June 2018

## **Exam dates**

### *Autumn Semester*

Monday 15 January 2018 to Saturday 27 January 2018 – including  
Saturday 20 January 2018

### *Spring Semester*

Monday 21 May 2018 to Saturday 9 June 2018 – including Saturday 26 May and  
Saturday 2 June 2018

### *Late summer resits*

Monday 20 August 2018 to Wednesday 29 August 2018 – excluding  
Saturday 25 August 2018

## **2 Course Handbook**

This Manual is designed to give you all the information you need to allow you to progress your studies at Nottingham. It describes the various procedures and practices that are in place which are designed to help you achieve your goals. From time to time these have to be changed to meet new requirements put upon us by the University and changes are also made based on student opinion. Therefore at any time if you have a positive suggestion, which can bring about some improvement in what we do, please bring these to the attention of the Student Guild who are represented on a number of School Committees.

### **3 The School of Biosciences**

The School of Biosciences is part of the Faculty of Science and is based mainly on the Sutton Bonington campus; the BSc/MSci Environmental Science and BSc Environmental Biology degrees are located at the University Park campus.

The School of Biosciences has over 80 academic members of staff, 895 undergraduate students and about 550 research and taught postgraduate students. Academic staff are allotted to one of 5 Divisions which reflect specific areas of teaching and research; Agricultural and Environmental Sciences, Animal Sciences, Food Sciences, Nutritional Sciences and Plant and Crop Sciences.

You can find full and detailed information about the School and its staff on our Website – [www.nottingham.ac.uk/Biosciences](http://www.nottingham.ac.uk/Biosciences)

## 4 Advice

One of the first people you will meet is your Personal Tutor. Your Personal Tutor will be a member of academic staff with whom you have regular meetings, sometimes as part of a group. Your Tutor is there to give you help and support in person as well as guidance in academic matters. You should make every effort to establish a good relationship. Your Tutor will provide you with advice and details of your exam performance so it is essential that you discuss your progress, in confidence, with him/her at regular intervals.

**Here are a few pieces of free advice; they come from fellow undergraduate students and from academic staff who helped us prepare this document.**

- Most lecturers teach at a faster pace than you may be used to from school or college.
- Develop good note taking skills early in your university career.
- Lectures are progressive, i.e. each one builds on the last. Missing lectures is therefore dangerous, as is ignoring things that you didn't fully understand at the time.
- Module Conveners may issue a book list. Check with academic staff and 2nd and 3rd year students which are the most valuable to buy. You may not be able to afford them all. Books on your reading lists can be borrowed from the Libraries.
- You should expect to work outside of class time. This may include reading, rewriting your notes, doing coursework, writing reports, etc.
- Don't be afraid of asking questions in lectures. Lecturers like to know that students are following what they are saying. The question you ask may be exactly what other students were wondering but were afraid to ask. Most lecturers will provide opportunities for questions. You can also ask for help outside of lecture time.
- Don't be afraid to approach staff for help. Their offices are accessible to you and they have telephones and email. They are busy people but a large part of their work involves dealing with students. Please see "office hours" section for further details of how to make appointments with academic staff.
- Make use of their time, advice, experience and expertise.
- Remember that activities continue after the exams and that you are required to remain at the University until the end of each semester.
- Never hesitate to see the lecturer if you are having difficulty with his / her module or don't understand why you were given a particular mark
- Handing in coursework late means losing marks. 5% will be lost for every working day late.
- The School has a Learning Community Forum with staff and student representatives from each year. Use this system to make constructive comments about your course.
- If you become ill and have to miss more than a couple of days, or a coursework deadline, or if your performance in an exam is affected, go to see your tutor and complete an Extenuating Circumstances Form and on the website:  
<http://www.nottingham.ac.uk/academicservices/qualitymanual/assessmentandawards/extenuating-circumstances-policy-and-procedures.aspx>
- Missing an exam for any reason is extremely serious and should be avoided if at all possible. Let your Tutor know IMMEDIATELY and complete an extenuating circumstances form available as above.
- Check your email daily and Moodle updates; otherwise you may miss vital information.

## 5 Student Commitment

Students are expected to access their e-mail accounts regularly as this is the main means of communication. Please do not use any other personal email account which you may have for communication within the University. If you do, you risk losing out on important information

You are required to:

- **Read** this handbook and other documents referred to so that you are clear about the structure of your degree course and what is expected of you.
- **Abide** by University Ordinances, Regulations and other codes of practice (e.g. Computing, Safety etc.).
- Read **notices** placed on official notice boards, these provide an important primary channel of general communication and may advertise such information as re-arrangements to the teaching timetable.

*It is wise to keep a diary in which to note appointments with tutors, module conveners, course diary, deadlines etc.*



## 6 Your School and Your Studies

**Teaching Staff** - Lecturers are responsible for teaching components of modules and for setting and marking assignments and examinations.

Each module has a **Convener** who is responsible for its organisation. At the start of the module, the Convener will issue to each student a document describing its aims, content, objectives, transferable skills, methods of assessment, dates for submission and return of coursework and penalties for late submission. Students will be given coursework turnaround details. S/he will also conduct a feedback exercise at the end of the module to gauge student opinion.

Each course has a **Course Director**, responsible for overseeing its structure and smooth running. The Course Director ensures balance between modules and liaises regularly with other staff to ensure that appropriate teaching and learning are provided. The **Course Directors** are directly responsible to the **Assistant Pro-Vice-Chancellor for Teaching and Learning** for ensuring that all levels of the teaching management structure operate efficiently. They should be notified of any significant problems. **Heads of Division** are ultimately responsible for the services provided by their staff.

The **Assistant Pro-Vice-Chancellor for Teaching and Learning** oversees the organisation and management of teaching across the School.

The **Semester 1 Tutor** is responsible for maintaining a balance of work between the core Semester 1 modules. S/he appoints student representatives and holds meetings at which any matters which students may wish to raise can be discussed. Don't be afraid to make your views known!

A list of the staff who hold these positions are included in this handbook (see Staff Roles section). Students should feel able to approach any of them with concerns they may have about aspects of their education. Your Personal Tutor can advise you and make the appropriate contacts.

## 7 Staff Roles

<b>Role In School</b>	<b>Staff Member</b>	<b>Location</b> <i>See key at end of table</i>	<b>Tel</b>	<b>Email</b> <b>@nottingham.a c.uk</b>
Head of School	Prof Simon Langley-Evans	MB	16139	Simon.Langley-Evans
Head of Operations	Dr Sarah Johnson	MB	16000	Sarah.Johnson
PA to Head of School and Head of Operations	Ms Susan Blencowe	MB	16010	Susan.Blencowe
Student Service Centre, Senior Manager	Ms Yvonne Allen	Barn	86500	Yvonne.Allen
Welfare Manager	TBC	MB	16003	SS-Welfare-SB
4-Year Degree Tutor (International Year)	Mrs Rachel Jessop	MB	16162	Rachel.Jessop
Marketing Officer	TBC	MB	16607	
Student Service Centre Programme Administrator	Student Services	Barn	86500	SS-Programmes-SB
IT Support Officer	Mr Gary Smith	JCG	16511	IT-Support-SB
U21 Co-ordinator	Mrs Rachel Jessop	BABS	16162	Rachel.Jessop
Student Service Centre Administrator	Mrs Elena Staves	Barn	18273	Elena.Staves
Student Service Centre Senior Administrator	Mrs Elisabeth Richmond	Barn	86500	SS-Assessments-SB

### Building Locations

MB = Gateway Building

MB = Main Building

SL = South Lab Building

SO = School Office, Main Building

JCG = James Cameron Gifford Library

Barn = Barn Building

<b>Heads of Division</b>	<b>Name</b>	<b>Building</b> <i>See key at end of table</i>	<b>Tel</b>	<b>Email</b> <b>@nottingham.ac.uk</b>
Animal Sciences	Prof Phil Garnsworthy	SL	16065	Phil.Garnsworthy
Agricultural and Environmental Sciences	Prof Sacha Mooney	GB	16257	Sacha.Mooney
Food Sciences	Prof Tim Foster	FS	16246	Tim.Foster
Nutritional Sciences	Prof Andy Salter	NL	16120	Andrew.Salter
Plant and Crop Sciences	Prof Mike Holdsworth	PCS	16323	Michael.Holdsworth

<b>Key Roles</b>	<b>Name</b>	<b>Building</b>	<b>Tel</b>	<b>Email</b> <b>@nottingham.ac.uk</b>
Warden Bonington Hall	Dr Ian Hardy	SL	16052	Ian.Hardy
Senior Tutors	Prof Martin Luck Dr Liz Bailey	SL	16309 16255	Martin.Luck Liz.Bailey
Semester 1 Tutor	Dr Kevin Pyke	PCS	13216	Kevin.Pyke
Exam Officer	Dr Matthew Elmes	NL	16183	Matthew.J.Elmes
Director of International Studies	Dr Marcos Alcocer	NL	16103	Marcos.Alcocer
Biosciences Director of Learning and Teaching	Dr Fiona McCullough	NL	16118	Fiona.Mccullough
Malaysia School Coordinator	Dr Marcos Alcocer	PCS	16103	Marcos.Alcocer
Study Abroad Co-ordinator (U21/University-wide, Erasmus+, Summer Schools abroad)	Mrs Rachel Jessop	MB	16162	Rachel.Jessop
Industrial Placement Officers & School Placement Officers	Dr Judith Wayte Mrs Rachel Jessop	MB	16171 16162	Judith.Wayte Rachel.Jessop

### **Building Locations**

FS = Food Sciences  
 GB = Gateway Building  
 NL = North Lab  
 PCS= Plant and Crop Sciences  
 SL = South Lab Building

<b>Course Directors</b>	<b>Name</b>	<b>Building</b> <i>See key at end of table</i>	<b>Tel</b>	<b>Email</b> <b>@nottingham. ac.uk</b>
Agriculture Agricultural and Crop Science Agricultural and Environmental Science Agricultural and Livestock International Agricultural Science	Dr C Siettou	SL	16306	Christina.siettou
Animal Science	Dr A Waterfall	SL	16307	Alan.Waterfall
Applied Biology & Biotechnology	Dr Nagamani Bora (Mani)	PCS	TBC	Nagamani.Bora
Environmental Biology	Dr Ruth Blunt	Gateway Building, SB, or B47, Life Sciences, UP	16288	Ruth.Blunt
Environmental Science	Dr Ruth Blunt	Gateway Building, SB, or B47, Life Sciences, UP	16288	Ruth.Blunt
Food Science & Nutrition and Food Science	Dr D Gray	FS	16147	David.Gray
Microbiology	Dr J Hobman	FS	16166	Jon.Hobman
Master of Nutrition and Dietetics	Dr Amanda Avery	NS	16118	Amanda.Avery
Nutrition	Dr P Jethwa	NL	16604	Preeti.Jethwa
Plant Science	Dr Kevin Pyke	PCS	13216	Kevin.Pyke

### **Building Locations**

FS= Food Sciences Building  
 GB = Gateway Building  
 NL = North Lab Building  
 PCS= Plant and Crop Sciences  
 SL = South Lab Building

## 8 Academic Staff and Locations

Name	Room	Telephone Number	Divisions*
Dr R Alberio	B223, South Laboratory Building	0115 951 6304	AS
Dr M Alcocer	C09, Bioenergy and Brewing Science Bldg	0115 951 6103	NS
Dr R Anand-Ivell	B216, South Laboratory Building	0115 951 6298	AS
Dr A Avery	49D, North Laboratory Building	0115 951 6238	NS
Dr E Bailey	C21, The Gateway Building	0115 951 6255	AES
Dr M Bell	B228, South Laboratory Building	0115 951 6056	AES
Ms M Benlloch Tinoco	A18, Food Sciences Building	0115 951 6146	FS
Prof M J Bennett	C06, Plant Sciences Building	0115 951 3255	PCS
Dr A Bishopp	C12, Plant Sciences Building	0115 951 6337	PCS
Dr R Blunt	B47, Life Sciences Building <b>or</b> C18 Gateway Building	0115 951 3238	AES
Dr N Bora	B06, Bioenergy and Brewing Science Bldg	0115 951 6011	PCS
Dr J Brameld	43, 1 <sup>st</sup> Floor, North Laboratory Bldg	0115 951 6133	NS
Prof M Broadley	A05, Plant Sciences Building	0115 951 6382	PCS
Dr K Brown	B20, Food Sciences Building	0115 951 6509	FS
Dr N Chapman	C34, Plant Sciences Building	0115 951 6032	PCS
Dr L Coneyworth	58, 2 <sup>nd</sup> Floor, North Laboratory Bldg	0115 951 6124	NS
Prof I F Connerton	B28, Food Sciences Building	0115 951 6119	FS
Dr D Cook	C04, Bioenergy and Brewing Science Bldg	0115 951 6245	FS
Prof N Crout	C19, The Gateway Building	0115 951 6253	AES
Prof C E R Dodd	B30, Food Sciences Building	0115 951 6163	FS
Dr S Egan	C21, School of Veterinary Medicine and Science	0115 951 6659	VS
Mrs S Ellis	40, 1 <sup>st</sup> Floor, North Laboratory Bldg	0115 951 6170	NS
Dr M Elmes	53, 2 <sup>nd</sup> Floor, North Laboratory Bldg	0115 951 6183	NS

Dr I Fisk	A28, Food Sciences Building	0115 951 6037	FS
Dr R Ford	C03, Bioenergy and Brewing Science Bldg	0115 951 6685	FS
Prof T Foster	B29, Food Sciences Building	0115 951 6246	FS
Dr M J Foulkes	312, South Laboratory Building	0115 951 6024	PCS
Dr R G Fray	C33, Plant Sciences Building	0115 951 6371	PCS
Dr A P French	C08a, Plant Sciences Building	0115 951 6374	PCS
Prof P C Garnsworthy	B203, South Laboratory Building	0115 951 6065	AS
Dr Z Gonzalez-Carranza	C11, Plant Sciences Building	0115 951 6335	PCS
Dr N Graham	C30, Plant Sciences Building	0115 951 6681	PCS
Dr D Gray	A29, Food Sciences Building	0115 951 6147	FS
Prof S E Harding	A15, NCMH, The Limes	0115 951 6148	FS
Dr I Hardy	C26, The Gateway Building	0115 951 6052	AES
Dr J Harris	C18, Vet School	0115 951 6316	AS
Dr K Harris-Adams	C311, South Laboratory Building	0115 951 6066	AES
Dr P J Hill	B21, Food Sciences Building	0115 951 6169	FS
Dr J L Hobman	B22, Food Sciences Building	0115 951 6166	FS
Prof M J Holdsworth	301B, South Laboratory Building	0115 951 6046	PCS
Mrs Rachel Jessop	C05, Bioenergy and Brewing Science Bldg	0115 951 6162	FS
Dr P Jethwa	55, North Laboratory Building	0115 951 6604	NS
Prof I P King	C21, Plant Sciences Building	0115 951 6372	PCS
Dr J King	C26, Plant Sciences Building	0115 951 6780	PCS
Dr B Lomax	C24, The Gateway Building	0115 951 6258	AES
Prof M R Luck	B207, South Laboratory Building	0115 951 6309	AS
Dr S Lydon	C08, Plant Sciences Building	0115 951 6289	PCS
Dr J Majewicz	37, 1 <sup>st</sup> Floor, North Laboratory Building	0115 951 6106	NS
Dr G Mann	B208, South Laboratory Building	0115 951 6326	AS

Dr J Margerison	B209 South Laboratory Building	0115 951 6301	AS
Dr K May	50, 2 <sup>nd</sup> Floor, North Laboratory Building	0115 951 8823	NS
Dr S Mayes	301C, South Laboratory Building	0115 951 6082	PCS
Dr F S W McCullough	26, 1 <sup>st</sup> Floor, North Laboratory Building	0115 951 6118	NS
Dr K Mellits	B26, Food Sciences Building	0115 951 6172	FS
Dr K M Millar	B67, Vet School	0115 951 6303	AS
Prof S Mooney	C31, The Gateway Building	0115 951 6257	AES
Dr E H Murchie	301C, South Laboratory Building	0115 951 6234	PCS
Mrs J Orr	40, 1 <sup>st</sup> Floor, North Laboratory Building	0115 951 6170	NS
Dr T Parr	53A, 2 <sup>nd</sup> Floor, North Laboratory Bldg	0115 951 6128	NS
Miss J Pearce	49G, 2 <sup>nd</sup> Floor, North Laboratory Bldg	0115 951 6105	NS
A/Prof K Porter	30, 1 <sup>st</sup> Floor, North Laboratory Bldg	0115 951 6756	NS
Dr C Powell	C02, Bioenergy and Brewing Science Bldg	0115 951 6191	FS
Dr S Price	CO8, Bioenergy and Brewing Science Bldg	0115 951 6742	FS
Dr K Pyke	C09, Plant Sciences Building	0115 951 3216	PCS
Dr D Quain	C08, Bioenergy and Brewing Science Bldg	0115 951 6160	FS
Dr C Raaff	26, North Laboratory Bldg	0115 951 6121	NS
Dr S Ramsden	308, South Laboratory Building	0115 951 6078	AES
Dr A Rasmussen	A15, Plant Sciences Building	0115 951 6504	PCS
Dr R Ray	303, South Laboratory Building	0115 951 6094	PCS
Dr C E D Rees	B23, Food Sciences Building	0115 951 6167	FS
Prof K Ritz	C22 Gateway Building	0115 951 6288	AES
Dr T P Robbins	C27, Plant Sciences Building	0115 951 6329	PCS
Dr A Rosenthal	A24, Food Sciences Building	0115 951 6038	FS
Prof A M Salter	32A, 1 <sup>st</sup> Floor, North Laboratory Bldg	0115 951 6120	NS
Prof D Salt	A06, Plant Sciences Building	0115 951 6339	PCS
Dr D Scott	B19, Food Sciences Building	0115 951 6221	FS

Prof G Shaw	C29, The Gateway Building	0115 951 3206	AES
Dr C Sietto	C304, South Laboratory Building	0115 951 6082	AES
Prof K D Sinclair	B210, South Laboratory Building	0115 951 6053	AS
Dr M S Sjogersten	C27, The Gateway Building	0115 951 6239	AES
Dr D L Sparkes	330, South Laboratory Building	0115 951 6074	PCS
Dr D Stekel	C20, The Gateway Building	0115 951 6294	AES
Dr C Stevenson	A57, Vet School	0115 951 6055	AS
Dr R Stoger	B232, South Laboratory Building	0115 951 6232	AS
Dr A Swali	A20, Food Sciences Building	0115 951 6578	FS
Dr R Swarup	C31, Plant Sciences Building	0115 951 6284	PCS
Dr D Sweetman	B234, South Laboratory Building	0115 951 6019	AS

Dr J A Swift	57a, 2 <sup>nd</sup> Floor, North Lab	0115 951 6178	NS
Dr R Tarlington	School of Veterinary Medicine and Science	0115 951 6273	VS
Dr M Taylor	52, 2 <sup>nd</sup> Floor, North Laboratory Bldg	0115 951 6104	NS
Prof G Tucker	C09, Bioenergy and Brewing Science Bldg	0115 951 6126	NS
A/Prof N Walker	49H, 2 <sup>nd</sup> Floor, North Laboratory Bldg	0115 951 6594	NS
Dr A Waterfall	B224, South Laboratory Building	0115 951 6307	AS
Dr S Welham	24, North Laboratory Building	0115 951 6129	NS
Dr D Wells	C07, Plant Sciences Building	0115 951 6373	PCS
Dr H West	C28, The Gateway Building	0115 951 6268	AES
Mrs E Weston	A22, Food Sciences Building	0115 951 6146	FS
Dr G White	B227, South Laboratory Building	0115 951 6068	AS
Dr K Whitehead	28A, 1 <sup>st</sup> Floor, North Laboratory Bldg	0115 951 6136	NS
Prof P Wilson	332, South Laboratory Building	0115 951 6075	AES
Prof Z A Wilson	A03, Plant Sciences Building	0115 951 3235	PCS
Prof J Wiseman	B205, South Laboratory Building	0115 951 6054	AS



Dr B Wolf	A27, Food Sciences Building	0115 951 6134	FS
Dr S Young	C25, The Gateway Building	0115 951 6256	AES

**\*Divisional codes**

AES Agricultural & Environmental Sciences  
 AS Animal Sciences  
 BABS Bioenergy and Brewing Science Bldg  
 FS Food Sciences  
 MB Main Building  
 NS Nutritional Science  
 PCS Plant and Crop Sciences  
 VS School of Veterinary Medicine and Science

## 9 Course Structure, Organisation and Choosing Your Modules

### The Academic Year

The academic year at Nottingham is based on 2 semesters (autumn and spring) spread over three terms.

The following definitions might be helpful to you:

- **Credits** indicate a quantity of assessed learning. They contribute to a cumulative indication of modules which a student has completed. One credit equates to approximately 10 hours of study.
- A **Module** is a specified programme of study which is self-contained and attracts a specified number of credits. Examinations are held at the end of most modules. A ten credit module accounts for approximately 100 hours of your time, of which usually no more than 40 hours will be spent in the lecture room or laboratory
- A **Course of Study** is a set of modules satisfying the requirements for a particular degree and attracting 320 credits for an Ordinary Bachelor degree and 360 credits for an Honours degree.
- The levels in a course of study leading to an Honours degree are as follows
  - Year 1 (120 credits) Level 1
  - Year 2 (120 credits) Level 2
  - Year 3 (120 credits) Level 3

And for a Master of Nutrition and Dietetics or MSci degree

- Year 4 (120 credits) Level 4

Credits achieved in Year 1 are for progression purposes only and will not contribute to the final degree classification.

- A **semester** is a division of the academic year. It consists of twelve weeks of teaching, coursework and revision, plus two (Autumn Semester) or four (Spring Semester) weeks of assessment and consultation.  
Note: Although each academic year is divided for teaching purposes into two semesters, there is still a three-term pattern of attendance, with breaks at Christmas, Easter and during the summer.
- A **year** is period of study consisting of an Autumn Semester followed by a Spring Semester. **Assessment** may be by means of written examination papers, oral examinations or coursework. Progression and/or degree classification are based on the outcome of the assessment.
- A **mark** module a numerical indication of the quality of the assessed work completed by a student in each. Marks awarded are subject to the approval of the Board of Examiners and are ratified by an External Examiner.

## **Choosing Optional Modules**

### **Preliminary Module Choices for 2018/19 (for courses that have optional modules)**

In early May 2018 we will be inviting you to make preliminary module choices for the 2018/19 academic year. This year we will be using an online form which will be available from early May 2018.

We will contact you again in early May, before the online form opens, with a link and instructions and with more information about how to check which modules are available in 2018/19, and how to confirm the requirements of your programme of study. This communication will be by email (to your University account) and via Moodle. It is really important you keep an eye out for this message so that you are ready to make your choices. In the meantime if you have any questions about your module choices please contact us using the online enquiry form at [www.nottingham.ac.uk/studentservices/contact-us](http://www.nottingham.ac.uk/studentservices/contact-us) and choose 'module choice' from the list of things we can help you with.

# 10 Biotechnology J700

**Course Manager:** Dr Nagamani Bora

**Contact details:** e: nagamani.bora@nottingham.ac.uk or t: 0115 951 6011

## Qualifying Year (Year 1)

### **Compulsory**

Students must take all modules in this group

<b>Code</b>	<b>Title</b>	<b>Credits</b>	<b>Taught</b>
D211P1	Genes and Cells: 1	10	Autumn
D212P3	Applied Genetics	10	Spring
C112P1	Plant Science	10	Spring
D212Z5	Introductory Physiology	20	Spring
D21BN2	Biochemistry - The Building Blocks of Life	20	Full Year
D211F3	The Biosciences and Global Food Security	10	Autumn
D21BF7	The Physiology of Microbes	20	Full Year
D21BG1	Biosciences Tutorials (Academic Development) and Foundation Science	20	Full Year

## Part I (Year 2)

### **Compulsory**

Students must take all modules in this group

<b>Code</b>	<b>Title</b>	<b>Credits</b>	<b>Taught</b>
D223N6	Principles of Immunology	10	Autumn
D224G1	Professional Skills for Bioscientists	20	Spring
D223P0	Molecular Biology and the Dynamic Cell	20	Autumn
D224P8	Molecular Pharming and Biotechnology	20	Spring

### **Restricted**

Students must take 50 credits of optional modules from this group

<b>Code</b>	<b>Title</b>	<b>Credits</b>	<b>Taught</b>
C12461	Microbial Biotechnology	10	Spring
D223F6	Bacterial Biological Diversity	10	Autumn
D224F9	Analysis of Bacterial Gene Expression	10	Spring
D223F7	Virology	10	Autumn
D224E4	Computer Modelling in Science: Introduction (UP)	20	Spring
D224Z6	Principles of Animal Health and Disease 1	10	Spring
D224P7	Plant Pests and Diseases	20	Spring
D223P9	Applied plant physiology: from cell to crop	20	Autumn
D223A7	Applied Animal Science	20	Autumn
D223N8	Principles of Animal Nutrition	10	Spring

**Part II (Year 3)****Compulsory**

Students must take all modules in this group

<b>Code</b>	<b>Title</b>	<b>Credits</b>	<b>Taught</b>
D23PRO	Undergraduate Research Project	40	Full Year

**Restricted**

Students must take 80 credits of optional modules from this group

<b>Code</b>	<b>Title</b>	<b>Credits</b>	<b>Taught</b>
C135P2	Molecular Plant Pathology	10	Autumn
D236P4	Sex, Flowers and Biotechnology	10	Spring
D235Z1	Biotechnology in Animal Physiology	10	Autumn
D236A3	Current Issues in Crop Science	10	Spring
D236F5	Rapid Methods in Microbial analysis	10	Spring
D236F6	Microbial Fermentation	10	Spring
D236P3	Plant Disease Control	10	Spring
D235F1	The Microflora of Foods	20	Autumn
D235P2	Plant Cell Signalling	10	Spring
D235F5	Molecular Microbiology and Biotechnology	20	Autumn
D236M1	Virology and Cellular Microbiology	10	Spring
D235Z5	Applied Bioethics 1: Animals, Biotechnology and Society	10	Autumn
D236Z6	Applied Bioethics 2: Sustainable Food Production, Biotechnology and the Environment	10	Spring
C136E6	Environmental Biotechnology	10	Spring
D23BN3	Molecular Nutrition	20	Full Year
C13594	Gene Regulation	10	Autumn
D236Z8	Epigenetics and Development	10	Spring
F13CBE	Chemical Biology and Enzymes	10	Autumn
D23BA7	Genetic Improvement of Crop Plants	20	Full Year
C135E9	Computer Modelling in Science: Applications	20	Autumn
C135P3	Basic Introduction to Omic Technologies	10	Autumn
N13330	Technology Entrepreneurship in Practice	10	Spring

# 11 Table of Modules

Title	Saturn code	Campus code	Agric (Production)	Agric (Business)	iABM	Ag & C	Ag & LS	Ani Sci	Biotech	Dietetics	Env Biol	Env Sci	Food Sci	Microbio	Nutrition	Nutri and Food Sci	Plant Sci
Biosciences Tutorials (Academic Development) & Foundation Sciences																	
The Biosciences and Global Food Security	D21BG1	BIOS1028	10 of 20	10 of 20	10 of 20	10 of 20	10 of 20	10 of 20	10 of 20				10 of 20	10 of 20	10 of 20	10 of 20	10 of 20
Biochemistry – The Building Blocks of Life	D21BF3	BIOS1014	10	10	10	10	10	10	10	10				10	10		10
Genes and Cells 1	D21BN2	BIOS1009	10 of 20			10 of 20	10 of 20	10 of 20	10 of 20	10 of 20			10 of 20	10 of 20	10 of 20	10 of 20	10 of 20
Animal Biology	D211P1	BIOS1001	10			10	10	10	10	10				10	10		10
Introduction to Nutrition	D211A2	BIOS1015	10	10	10		10	10									
Agricultural Business in the Global Economy	D21BN1	BIOS1008				10 of 20	10 of 20	10 of 20		10 of 20			10 of 20	10 of 20	10 of 20		
Microbes and You	D211A3	BIOS1022		20	20												
The Physiology of Microbes	D21BF3	BIOS1020												10 of 20			
Dietetics Tutorial (academic Development)	D21BF7	BIOS1027							10 of 20					10 of 20			
Introduction to Dietetics	D21BN6	BIOS1029								5 of 10							
Food Commodities and Primary Processing	D21BN5	BIOS1021								5 of 10							
Food and Physiology	D211F4	BIOS1024											10			10	
Food Materials and Ingredients	D211F5												10			10	
Introduction to Health Behaviours	D21BF1	BIOS1010											10 of 20		10 of 20	10 of 20	
Global Environmental Processes (UP)	D21BN4	BIOS1019								10 of 20			10 of 20		10 of 20		
Environmental Geoscience (UP)	C11E1	BIOS1004									20	20			10 of 20		
Evolution, Ecology and Behaviour	C11E5	BIOS1013										20					
Tutorials in Environmental Science (UP)	C11EEB										10 of 20						
Environmental Science and Society	C11BE1	BIOS1011									10 of 20	10 of 20					
Life on Earth (UP)	D212E4	BIOS1026									10 of 20	10 of 20					
Plant Science Research Tutorials	C11LOE	LIFE1030															
	D212P5	BIOS1017				10											10

**NB Modules in semesters 2 - 6 may have pre-requisite modules. It is your responsibility to ensure you are taking the appropriate pre-requisites for later modules. Module choices are subject to timetabling constraints. It is therefore important to check the timetable and pre-requisites when making your module choices.**

Black sections: core    Grey Sections: recommended options    (UP) = Module based at University Park

Title	Saturn code	Campus code	Agric (Production)	Agric (Business)	iABM	Ag & C	Ag & LS	Ani Sci	Biotech	Dietetics	Env Biol	Env Sci	Food Sci	Microbiol	Nutrition	Nutri & Food Sci	Plant Sci
Biosciences Tutorials (Academic Development) and Foundation Sciences																	
Biochemistry – The Building Blocks of Life	D21BG1	BIOS1028	10 of 20	10 of 20	10 of 20	10 of 20	10 of 20	10 of 20	10 of 20	10 of 20			10 of 20	10 of 20	10 of 20	10 of 20	10 of 20
Applied Genetics	D21BN2	BIOS1009	10 of 20			10 of 20	10 of 20	10 of 20	10 of 20	10 of 20			10 of 20	10 of 20	10 of 20	10 of 20	10 of 20
Introduction to Nutrition	D212P3	BIOS1002					10	10	10					10			10
The Physiology of Microbes	D21BN1	BIOS1008					10 of 20	10 of 20	10 of 20	10 of 20			10 of 20	10 of 20	10 of 20	10 of 20	
Microbes and You	D21BF7	BIOS1027							10 of 20					10 of 20			
Food Materials and Ingredients	D21BF3	BIOS1020											10 of 20	10 of 20			
Contemporary Agricultural Systems	D21BF1	BIOS1010											10 of 20		10 of 20	10 of 20	
The Ecology of Natural and Managed Ecosystems	D21A2	BIOS1012	10	10	10	10	10					20	10			10	20
Introduction to Dietetics	D211E5	BIOS1016	20	20	20	20											
Dietetics Tutorials (academic development)	D21BN5	BIOS1021								5 of 10							
Introduction to Health Behaviours	D21BN6	BIOS1029								5 of 10							
Grassland Management	D21BN4	BIOS1019								10 of 20					10 of 20		
Bacterial Physiology	D21A1	BIOS1007	10	10	10	10	10				10						10
Introductory Physiology	D21F7	BIOS1005											10			10	
Tutorials in Environmental Science (UP)	C11BE1	BIOS1011						20	20	20		10 of 20			20		
Life on Earth	C11LOE	LIFE1030									10 of 20						
Evolution, Ecology and Behaviour	C11EEB	LIFE1031									10 of 20						
Integrated Agri-Food Markets and Marketing	D21A3	BIOS1023		20	20												
Managing Tourism & the Environment: Conflict or Consensus (UP)	N2122	BUS12014										10					
Environmental Science and Society	D21E4	BIOS1026									10 of 20	10 of 20					
The Anthropology of Human Ecology (UP)	AA1017	ARCY1001									10	10					
Microorganisms and Disease (UP)	C51201	LIFE1007									10	10		10			10 of 20
On Earth and Life	F81126	GEOG1014									10	10					
Earth and Environmental Dynamics (10cr) Spring	F81222	GEOG1012										10					
Environmental Archaeology	V61101	ARCY1009									10						
Plant Science (UP)	C112P1	BIOS1003	10			10			10			10					10

# 12 Timetable Information

## Academic Year 2017-2018 Week Pattern for the UK Campus.

Teaching starts Thursday 28 September 2017

Syllabus+ Week	Teaching Week	Week Commencing	Comments
1	1	25/09/2017	Registration & Induction Week. Teaching begins 28 September 2017
2	2	02/10/2017	Autumn Semester
3	3	09/10/2017	Autumn Semester
4	4	16/10/2017	Autumn Semester
5	5	23/10/2017	Autumn Semester
6	6	30/10/2017	Autumn Semester
7	7	06/11/2017	Autumn Semester
8	8	13/11/2017	Autumn Semester
9	9	20/11/2017	Autumn Semester
10	10	27/11/2017	Autumn Semester
11	11	04/12/2017	Autumn Semester
12	12	11/12/2017	Autumn Semester
13	Vacation	18/12/2017	Christmas Break
14	Vacation	25/12/2017	Christmas Break
15	Vacation	01/01/2018	Christmas Break
16	Vacation	08/01/2018	Christmas Break
17	Assessment	15/01/2018	Assessment
18	Assessment	22/01/2018	Assessment
19	1	29/01/2018	Spring Semester
20	2	05/02/2018	Spring Semester
21	3	12/02/2018	Spring Semester
22	4	19/02/2018	Spring Semester
23	5	26/02/2018	Spring Semester
24	6	05/03/2018	Spring Semester
25	7	12/03/2018	Spring Semester
26	8	19/03/2018	Spring Semester
27	Vacation	26/03/2018	Easter Break
28	Vacation	02/04/2018	Easter Break
29	Vacation	09/04/2018	Easter Break
30	Vacation	16/04/2018	Easter Break
31	9	23/04/2018	Spring Semester
32	10	30/04/2018	Spring Semester
33	11	07/05/2018	Spring Semester
34	12	14/05/2018	Spring Semester
35	Assessment	21/05/2018	Assessment
36	Assessment	28/05/2018	Assessment
37	Assessment	04/06/2018	Assessment
38	-	11/06/2018	-
39	-	18/06/2018	<i>Term finishes 22/06/18</i>
40		25/06/2018	
41		02/07/2018	
42		09/07/2018	
43		16/07/2018	
44		23/07/2018	
45		30/07/2018	
46		06/08/2018	
47		13/08/2018	
48	Assessment	20/08/2018	Re-sit Period

49	Assessment	27/08/2018	Re-sit Period
50		03/09/2018	
51		10/09/2018	
52		17/09/2018	



# 13 Teaching Methods

## Lectures

Throughout your university career, you will find that lectures are the most common method of teaching. It is most important for you to ensure that you have a set of good clear notes based on the lectures **and** your own reading. As you progress through the second and third years of your degree, you will be expected to do increasing amounts of reading; it is therefore useful to develop your reading skills during your first year. Teaching of some modules is complemented by the use of teaching software.

Hints and tips for making the most effective use of the teaching and learning opportunities available to you are provided in *Study Skills Guide* given to all students at the beginning of their first year).

**NB books which should be purchased will be identified at the start of teaching - you are advised not to buy any books prior to this unless otherwise indicated in the recommended reading lists at the end of each module synopses.**

## Practical Classes

Course requirements may require you to take practical classes. These may involve laboratory experiments or observations and analysis of data obtained during the sessions. Practical sessions provide an opportunity to learn and develop additional skills in techniques, observation and analysis. Practical classes also provide an opportunity to extend your knowledge of topics not covered in lectures. For each practical course you will receive a laboratory manual or collection of schedules which will expand on the learning experience of the course.

Some large first year classes are taught simultaneously in adjacent laboratories. Consult the class lists posted on the notice boards to identify the laboratory you will work in. For each practical class, at least one member of academic staff will always be in attendance. S/he will be accompanied by postgraduate students who work as demonstrators. In some cases, technicians may also be present to assist. The teaching team is present in the laboratory to aid your learning experience, so please seek their help as much as you need, and ensure you carry out your work safely, with no harm to yourself or other students. Practical classes provide a valuable opportunity for you to get to know the academic staff in a less formal way and for them to help you. These classes frequently provide an excellent opportunity for you to raise questions from the lecture course with the member of staff and deal with problems you may have.

For all practical classes, you **MUST WEAR** a suitable full-length laboratory coat, which must be buttoned at all times. You will be given a lab coat and safety glasses during Week 1 and advised about any other items you need to purchase. You **MUST** also **WEAR** safety glasses at all times unless advised to the contrary by an academic member of staff.

Safe working and good laboratory practices are essential in the laboratory environment and all laboratory exercises must be formally assessed under the regulations of COSHH. Details of these assessments are noted in the laboratory manual or schedule to draw your attention to specific hazards and the requirements of safe practice. During the introduction to a practical class, the member of staff in charge will give a verbal statement on safety issues.

Food and drink **MUST NOT** be taken into the laboratory.

### **Assessed Work**

Many modules have an element of student-centred learning, especially in Parts I (Year 2) and II (Year 3) of your course. The work involved in these is assessed and forms part of the overall mark for the module. The proportion of the mark allotted to coursework is identified in each module description. Penalties are applied for late submission of coursework (5% per working day), unless there are extenuating circumstances and appropriate documentation is provided. In general, modules in the School of Bioscience use electronic submission of coursework through Moodle as the means of submission.

### **IT Training**

IT is increasingly important as a basis of learning, communication and the preparation of your work e.g. dissertation, BSc project thesis and laboratory reports. It is important that you develop/improve your IT skills as you progress through your course.

### **Computer-aided Learning (CAL)**

Several modules include computer-based teaching material, quizzes, exercises, simulations. In order to use these, you must be registered on the School of Biosciences Network. You may be assessed on some of these packages while using them or in the form of a conventional write-up. You should be prepared to take notes as you work through material on computers.

# 14 Assessment, Progression, Compensation and Reassessment

The University Undergraduate Course Regulations apply to all the School's BSc, MSci and MNutr degrees.

The regulations can be found at:

[www.nottingham.ac.uk/academicservices/qualitymanual/studyregulations/studyregulationsforundergraduatecourses.aspx](http://www.nottingham.ac.uk/academicservices/qualitymanual/studyregulations/studyregulationsforundergraduatecourses.aspx)

You should note that:

- The pass mark for a module is 40%.
- **Progression and Compensation (BSc):** You don't need to pass all modules in order to progress to the next stage of your course. Compensation of failed modules can be achieved in the following ways – if you have:
  - (a) passed modules worth at least 80 credits and have a weighted average for the stage of at least 40% with no module marks of less than 30%;
  - or
  - (b) passed modules worth at least 100 credits and have a weighted average for the stage of at least 50%.
  - or
  - (c) passed modules worth at least 90 credits, have marks of 30% or more in modules worth at least 110\* credits, and have a weighted average for the stage of at least 45%.

**Progression and Compensation (MNutr):** At the Part I, Part II and Part III stage, no core module can be compensated with the exception of optional modules for which university regulations apply. In addition, students must obtain at least 35% in both the examination and coursework components of these modules, although a mark between 35% and 39% in either the examination or coursework may be compensated by the other component of assessment.

**Progression (MSci):** At the end of Part I, students on the MSci degree must achieve an overall average of 55% at first sit in order to progress to Part II.

- **Reassessment:** If you do not reach the criteria for progression at the end of stage of study, you have a right to one re-assessment in each failed module (there are not resit opportunities in the final year). The form of reassessment is normally the same as for the first sit, with some exceptions (for example some MCQ papers are sometimes replaced with essay-style papers). For modules which are assessed by both coursework and exam, the School of Biosciences requires that, if the module has been failed overall, then you must be reassessed in the examination element of that module, even if that component of assessment has been passed.

In addition, if you have failed the coursework overall (of a module which is assessed by both coursework and examination) you may elect to resubmit remedial coursework. However, if you have passed your coursework overall, you are not entitled to resubmit either the whole coursework or any failed component within your coursework assessments. If you wish to take up the option of remedial coursework, you must make contact with the appropriate module convener (or his/her representative) **within 7 days** of the date of the letter notifying you that you have failed to progress. The module convener will give you a title and submission date for the coursework.

Any remedial coursework must be submitted before the start of the August examination period. However, individual module conveners have the right to set earlier deadlines at the time of setting the coursework.

**Please note: for modules which have both an examination and coursework component, it is not possible for you to be reassessed by resubmitting coursework alone; you are required to retake the examination, even if this element of the module has been passed.**

This policy allows students to maximise their chances of passing the module after reassessment. In Part I (and Part II [Master of Nutrition]), the ORIGINAL marks are carried forward for degree classification purposes. However, reassessment marks may be considered by the examining boards if the candidate is on the borderline between degree classes.

- **Progression after reassessment:** For progression purposes, the higher or highest of the marks obtained in each module (at first attempt or upon re-assessment) are considered and the progression and compensation regulations applied accordingly.
- **Marking Schemes:** see appendices 1-6.
- **Progression Charts:** see appendix 6 and can be viewed at <http://goo.gl/N492mp>
- **BSc Degree Candidates**

Award of an Honours degree is dependent on completion and submission of a final year project.

When the overall Part I / Part II mark has been computed, it is rounded to provide a single overall integer mark before any degree classification is assigned. Subject to the exception of borderline candidates and those with extenuating circumstances, who may be awarded a higher degree classification, students shall be awarded the class of degree with their overall mark. The classes of honours degree are as follows:-

- First Class - average of 70%+
- Second Class (Division 1) - average of 60-69%.
- Second Class (Division II) - average of 50-59%.
- Third Class - average of 40-49%.

The standardised weighting for the stages of a Bachelor degree will be 33/67 for Parts I and II respectively, and the standardised weighting for an Integrated Master's degree (undergraduate) will be 20/40/40 for Parts I, II and III respectively

### **Borderline Profiling**

Classification borderlines will be based on the overall rounded average mark (credit and stage weighted). Borderline overall averages will be as follows:

2:1-1st        68, 69

2:2-2:1        58, 59

3rd-2:2        48, 49

A student should be given the higher class if either of the following criteria are met:

- Half or more of the final stage credits are in the higher class;
- Half or more of the final and penultimate stage credits are in the higher class

### **Further Reading**

Full details of regulations can be viewed on the UoN Quality Manual page at <http://goo.gl/qoQP3>

# 15 Extenuating Circumstances

During your time with us you might experience significant personal difficulties that are outside of your control.

If these problems impact your ability to study or complete assessments, we recommend that you notify, for example, your Personal Tutor, PhD supervisor or a Welfare Officer, as soon as possible. These people will be able to provide advice and direct you to appropriate procedures or support services, if applicable.

If you've discussed your circumstances and you identify you need to make a claim under the Extenuating Circumstances policy, you will need to let us know by filling out an extenuating circumstances form.

Your case will then be looked at and you'll be informed of the outcome of your claim.

## What you need to know

If you miss an assessment or coursework deadline, or your performance was affected by extenuating circumstances, you will need to complete an extenuating circumstances form. Coursework extensions should also be requested using this form, (also see below guidance on Academic and Disability referral forms).

We've produced a leaflet to help you understand what you need to know regarding time limits within the EC policy.

The extenuating circumstances form must be submitted before your coursework deadline or within seven days of your assessment. Supporting documents can be attached to the form or sent to student-services-ec@nottingham.ac.uk within 14 days of the assessment.

## Students with Academic or Disability referral form

If you have an academic referral form (ARF) or disability referral form (DRF) that states on it that extensions to deadlines should be allowed on request wherever possible, you do not need to complete an extenuating circumstances form.

Instead you need to get the approval of the relevant module convenor/designated member of School staff on this form - Coursework Extension Request Form for students with an ARF/DRF, and submit it to a Service Centre. You do not need to include any supporting documentation. This form can only be used for one extension per assessment and must be submitted before the original deadline.

Submission can be in person or to studentservices@nottingham.ac.uk

# 16 Plagiarism and Paraphrasing

## Plagiarism and Paraphrasing

This section is also covered in the Study Skills book. It draws upon information available at the following University Web sources together with guidance from staff in the School of Biosciences. **As work is now submitted electronically through Turnitin, be aware that plagiarism is readily-detected.**

### USEFUL ADVICE FOR STUDENTS

One good method for avoiding plagiarism is to make notes from material you have read and construct your essay / report, in your own words, from these notes. It is tempting (and easy) to copy and paste, but this is unacceptable and constitutes an academic misconduct. It is also poor practice to construct a draft by copying and pasting material from multiple sources, with the intention of then paraphrasing the resulting document. Apart from the fact that the end-product may be disjointed, the paraphrasing is often incomplete and the work submitted may contain elements of plagiarised material. It is, however, acceptable to include relevant figures and tables from published work, as long as you acknowledge their source by citing the primary reference for them in the legend.

To make a specific point, there may be rare occasions when you have to quote an author verbatim; this is acceptable if you put the quotation in inverted commas and give the source, but you should have a good reason why you can't put the material in your own words. It is bad practice to use this as a way of avoiding paraphrasing.

### USEFUL WEBSITES

#### Academic integrity and plagiarism

<http://www.nottingham.ac.uk/studyingeffectively/writing/plagiarism/index.aspx>

#### Quality Manual

<http://www.nottingham.ac.uk/academic-services/qualitymanual/assessmentandawards/academic-misconduct.aspx>

#### Studying Effectively

<http://www.nottingham.ac.uk/studyingeffectively/home.aspx>

### DEFINITION OF AN ACADEMIC MISCONDUCT

Any activity or behaviour by a student which may give that student, or another student, an unpermitted academic advantage in a summative assessment is considered to be an act of academic misconduct and is unacceptable in a scholarly community. Such action(s) will be considered under the University's Regulations on Academic Misconduct and may lead to a penalty being imposed.

### DEFINITION OF PLAGIARISM

*The following definition of plagiarism appears in the University Quality Manual:*

Plagiarism: representing another person's work or ideas as one's own, for example by failing to follow convention in acknowledging sources, use of quotation marks etc. This includes the unauthorised use of one student's work by another student and the commissioning, purchase and submission of a piece of work, in part or whole, as the student's own.

Note: A proof-reader may be used to ensure that the meaning of the author is not misrepresented due to the quality and standard of English used, unless a School/Department policy specifically prohibits this. Where permitted, a proof-reader may identify spelling and basic grammatical errors. Inaccuracies in academic content should not be corrected nor should the structure of the piece of work be changed; doing so may result in a charge of plagiarism.

**Work in any year of study which is not undertaken in an Examination Room** under the supervision of an invigilator (such as dissertations, essays, project work, experiments, observations, specimen collecting and other similar work), but which is nevertheless required work forming part of the degree, diploma or certificate assessment, must be the student's own and must not contain plagiarised material.

The possible **penalties** for an academic misconduct including plagiarism are:

- a) No marks to be awarded in relation to the specific material which is the subject of the act constituting an academic misconduct (thus leading to a reduced overall mark for the piece of course work, dissertation, examination question or examination script in which the specific material appears)
- b) Award a mark of zero for the entire piece of course work, dissertation, examination question or examination script in which the academic misconduct has occurred
- c) Award a mark of zero for the entire module in which the academic misconduct has occurred
- d) Award a mark of zero for all the assessments in the semester (even where this will lead to a reduction in degree class). In the case of year-long modules, this penalty may affect both semesters
- e) Award a mark of zero for the whole year (even where this will lead to a reduction in degree class)
- f) Require the student to take reassessments (as a result of being awarded zero marks) in the following session before being allowed to progress or complete their course
- g) require the student to register with the University and enrol on modules in which they need to take reassessments (as a result of being awarded zero marks) in the following session before being allowed to progress or complete their course
- h) Terminate the student's course
- i) Withdraw the award of a degree or other qualification from, and issue an amended transcript to, a former student of the University

Full details of possible School and University penalties can be found at:  
[www.nottingham.ac.uk/academic-services/quality-manual/assessment/academic-misconduct.aspx](http://www.nottingham.ac.uk/academic-services/quality-manual/assessment/academic-misconduct.aspx)

## **ACADEMIC MISCONDUCT**

Any activity or behaviour by a student which may give that student, or another student, an unpermitted academic advantage in a summative assessment is considered to be an act of academic misconduct and unacceptable in a scholarly community. Such action(s) will be considered under the University's Regulations on Academic Misconduct and this may lead to a penalty being imposed.



Here is a range of cheating behaviours:

1. False citation (i.e. attributing work to the wrong source)
2. Plagiarism
3. Using unauthorised sources or notes in examinations or tests
4. Dishonestly obtaining material or information prior to examinations
5. Copying from other students
6. Permitting other students to copy your work
7. Soliciting work from others (e.g. individuals, 'editors' or essay banks etc)
8. Submitting your own previously assessed work without acknowledgement (auto plagiarism)

**Unauthorised Collaboration, or Collusion,** occurs where:

Collusion: cooperation in order to gain an unpermitted advantage. This may occur where students have consciously collaborated on a piece of work, in part or whole, and passed it off as their own individual efforts or where one student has authorised another to use their work, in part or whole, and to submit it as their own.

Note: Legitimate input from University tutors or approved readers or scribes is not considered to be collusion.

**Fabrication** may take various forms but is essentially concerned with manufacturing aspects of the work produced. For example, the insertion of made-up information, data, sources, quotes, anecdotes or analysis would all amount to fabrication

**Recycling or unauthorised, multiple submissions.**

The multiple submission by a student of their own material is not, in itself, considered as academic misconduct. Submission of material that has been submitted on a previous occasion for a different summative assessment is, however, unlikely to be academically appropriate. The merit of such material will therefore be a matter of academic judgement and it may attract fewer (or no) marks than would have been the case if it had not been assessed previously

**Note:**

**Plagiarism is regarded as a serious academic misconduct by the University and will be penalised accordingly. Plagiarism can be easily identified by entering suspect passages into search engines. Specialist search engines (e.g. Turnitin) are available to check all submitted work against previously published sources, including coursework submitted by students in the current or previous years. The School of Biosciences uses Turnitin to assist academic staff detect plagiarism; students are required to submit all coursework in electronic form to facilitate automatic on-line detection of plagiarism.**

**All BSc Research Projects must be submitted electronically to be checked by Turnitin along with the necessary hard copies (see Guidelines for BSc Research Projects).**

If a student is required to attend an Academic Misconduct interview within the School for any suspected academic misconduct his/her tutor will be informed of this, together with the Head of School (or nominee), module convenor (or nominee) and the School Manager for Academic Administration (or nominee).

**GUIDANCE TO HELP YOU AVOID COMMITTING PLAGIARISM**

1. You are allowed to use information from other people's work provided you acknowledge the source. This can apply to a statement, Table or Figure. The best way of doing this for Tables and Figures is to add: "After Smith (1988)" or "Modified from Smith (1988)", and include the reference in your reference list.
2. If you are discussing something somebody else has said, you can say, for example: "Smith (1987) claimed that coral reefs in the Pacific were damaged by high temperatures in 1975." Or: "It has been claimed that high temperatures in 1975 damaged coral reefs in the Pacific (Smith, 1975)."
3. It is rarely necessary to quote previous work directly and you should try to avoid doing this. If quotation is unavoidable, you should put the passage in quotation marks, e.g.: Smith (1980) described the outcome of unprecedented high temperatures on coral reefs as: "A disaster for the marine communities in the coastal regions of the Indo-Pacific", and then stated that: "The phenomenon appears to be due to unprecedented high temperatures".

**For information on paraphrasing see 8 and 9 below.**

4. Authors should be cited in text either as: Smith (1975), Smith and Allen (1978), Allen (1987, 1989), or as (Smith, 1975; Smith and Allen, 1978; Allen 1987, 1989). Note that these are in chronological, not alphabetic order. When more than two authors are quoted, this should be in the form Allen *et al.* (1993) in the text, but the reference given in your reference list should contain the names of all the authors. Do not use numerically cited or ordered references.
5. In your "References" or "Literature cited" section, the following style (authors, date, title, journal, volume number, page numbers; called the "Harvard" style) should be used and references should be listed alphabetically.

Provided you are consistent, you may also use any other accepted style - see journals in the library – unless instructed otherwise by the member of staff setting the coursework.

**Smith, A. J. and Allen, N. B. (1986). Temperatures and coral reefs. *Journal of the Marine Biological Association* 86: 101-123.**

**Smith, A. J., Jones, K. L. and Allen, N. B. (1988). Death of corals due to high temperatures. *Thermal Biology* 27: 19-34.**

If the source is only available electronically or is being published "ahead of print", give the DOI number in your reference.

Some electronic journals do not use page numbers.

6. For books, the following style (author, title underlined or in italics, publisher, place of publication) applies:

Allen, N. B. (1992). *Coral Reef Biology*. Blackwells, London.

7. For chapters in edited volumes, the following style (author, date, title of chapter, title of book underlined or in italics, editors, page numbers, publisher, place of publication) applies:  
Smith, A. J. (1987). Temperature and bleaching in corals. In: *Coral Reef Biology* (N. B. Allen and C. K. Hodges, eds.), pp. 65-90. Clumber Press, New York.

8. **Paraphrasing**, i.e. verbatim or almost verbatim restatement of a passage is a form of plagiarism. It is avoided by paraphrasing and including your own original thoughts, interpretations or evaluations. The following is paraphrased from C. H. Gordon, P. Simmons and G. Wynn (date unknown). *Plagiarism - What It Is And How To Avoid It*. University of British Columbia.

Students often ask "How much do I have to change a sentence to be sure I'm not plagiarising?" If you have to ask, you are probably about to commit plagiarism! There is no set number of words that you need to change or add to make a passage your own – the originality must come from the development and expression of your own ideas.

Original work demands original thought. You should try and separate your ideas from those of others. If you use another author's conclusions then acknowledge them. If you come to the same conclusions as another author you should still acknowledge them. Once a piece of work is complete, look at each part and ask yourself if the ideas expressed are entirely your own, and whether the general language or choice of words is your own. If the answer to either is "no" the work should be credited to the original author

9. Examples.

### **9.1 Original**

From Smith (1992):

The author has found that corals respond to high temperatures by expelling their zooxanthellae. This causes them to go white, a phenomenon known as "bleaching." Such corals soon become covered in algae, which makes it difficult for new coral planulae to settle and start a new colony (Davies, 1980). The phenomenon of bleaching is similar to the effect of a crown-of-thorns starfish (*Acanthaster planci*) attack where the polyps are digested by enzymes secreted onto the colony surface (Brown, 1990). As Jones (1972) found, *A. planci* poses a severe threat to corals in the Indo-Pacific. The recent occurrence of high numbers of these starfish on reefs has been correlated to run-off from land which contains high levels of plant nutrients (Jones, 1986). The subsequent increase in the number of algae apparently enhances the survival of the filter-feeding larvae of the starfish.

**To include this text verbatim in your own work (*without* placing the entire paragraph in quotation marks and acknowledging Smith (1992); see 3 above) would constitute plagiarism.**

### **9.2 Paraphrased version**

Paraphrased from Smith (1992):

Smith (1992) has found that corals respond to high temperatures by expelling their zooxanthellae. This phenomenon, known as "bleaching", causes them to go white. Such corals quickly become covered in algae and this makes it difficult for new coral planulae to settle and begin developing a new colony (Davies, 1980). Bleaching is similar to the effect of a crown-of-thorns starfish (*Acanthaster planci*) attack. Brown (1990) note that this is where the polyps are digested by enzymes secreted onto the colony surface. Jones (1972) found that *A. planci* may be a severe threat to corals in the Indo-Pacific. Recently high numbers of these starfish on reefs has been correlated to run-off from land with high levels of plant nutrients (Jones, 1986). The increase in the number of algae apparently enhances the survival of the filter-feeding larvae of the starfish.

**To include this text in your own work, even *with* the initial acknowledgment Smith (1992) would constitute plagiarism since it reads as if only the first sentence is taken from Smith, and the rest of the references (Davies, Brown and Jones) have been sourced and read by you and that the development and expression of the text is your own original work.**

### **9.3 Unacknowledged version (i.e. submitting this as if it were your own thoughts or work)**

The presence of high numbers of crown-of-thorns starfish (*Acanthaster planci*) on reefs has been connected to run-off from land containing high levels of plant nutrients. This causes an increase in the number of algae which results in better survival of the filter-feeding larvae of the starfish. The starfish kills corals by secreting digestive enzymes onto their surfaces. *A. planci* poses a severe threat to corals in the Indo-Pacific and their effect is similar to that caused by "bleaching", a phenomenon caused by high temperatures which results in zooxanthellae being expelled. Subsequently the dead corals become covered in algae which makes it difficult for a new colony to start.

**To include this text verbatim in your own work, would constitute plagiarism since there is no acknowledgment of Smith (1992).**

### **9.4 Acceptable version (based on information from Smith, reading the cited references yourself and drawing upon other work)**

Smith (1992) quoted Jones (1972, 1986) in suggesting that the crown-of-thorns starfish poses a threat to corals in the Indo-Pacific, and that their recent upsurge may be due to an increase in plant food levels caused by an input of nutrients from land. Brown (1990) found that these multi-armed starfish killed corals by everting their stomachs onto the coral colony surface and secreting an enzyme to digest the tissues externally. The resulting "bleaching" effect is similar to that which occurs when corals are exposed to high temperatures and the zooxanthellae are expelled (Smith, 1992). Davies (1980) found that the settlement of algae on the colony surface made it difficult for new coral larvae to settle and, although fish often grazed the algae continually, he found they could not keep these under control. Recent studies have shown that plagues of crown-of-thorns starfish may be a natural phenomenon, as the fossilised remains of previous outbreaks have been found in rocks millions of years old (Cromer, 1994).

**To present your work like this would not constitute plagiarism.**

Note that all the references and authors used in this document with the exception of Gordon *et al.* are fictitious.

**PLEASE CONSULT YOUR TUTOR IF YOU ARE STILL IN DOUBT ABOUT PLAGIARISM**

# 17 Personal Academic Development

This table sets out the goals that you should strive for as you progress through your degree. If you can achieve these you will be well prepared for the diverse opportunities that lie ahead

	<b>Qualifying year Year 1</b>	<b>Part I Year 2</b>	<b>Part II Year 3</b>
Learning experience	<ul style="list-style-type: none"> <li>Establish a strong factual base</li> <li>Learn the basics of the scientific method and develop a questioning approach</li> </ul>	<ul style="list-style-type: none"> <li>Link knowledge from diverse sources and develop an ability to relate information</li> <li>Develop a critical and analytical approach to information</li> </ul>	<ul style="list-style-type: none"> <li>Develop the ability to handle complex information</li> <li>Evaluate information and synthesise ideas</li> <li>Develop a creative approach to problem solving</li> <li>Be able to accept emerging ideas</li> </ul>
Skills acquired	<ul style="list-style-type: none"> <li>Cope with varying lecture styles</li> <li>Make effective use of library and IT facilities</li> <li>Acquire basic laboratory skills</li> </ul>	<ul style="list-style-type: none"> <li>Consolidate information skills with extensive use of library and IT</li> <li>Enhance practical skills</li> <li>Enhance presentation skills</li> <li>Organise study and manage time to meet deadlines</li> <li>Appreciate the importance and value of team work</li> </ul>	<ul style="list-style-type: none"> <li>Develop a mature approach to study</li> <li>Exhibit strong self-discipline and commitment</li> <li>Clearly articulate knowledge and understanding</li> <li>Respect the views of others and engage in reasoned argument</li> <li>Be able to critically evaluate new ideas</li> </ul>
Developing independence	<ul style="list-style-type: none"> <li>Learn to combine teacher-driven study with work based on individual initiative</li> </ul>	<ul style="list-style-type: none"> <li>Make independent use of library and other information resources</li> <li>Acquire experience in a range of learning styles</li> </ul>	<ul style="list-style-type: none"> <li>Take responsibility for self-learning</li> <li>Demonstrate individual style and flair</li> <li>Exhibit professionalism and ownership of subject</li> </ul>

# 18 Academic Tutoring

Academic tutoring is the support which the school provides to students in addition to formal teaching. It is complementary to the University's central support services and pastoral care provision.

The objectives of Academic Tutoring are to:

- Help you acquire the necessary study skills to pursue your studies successfully.
- Address problems of lack of knowledge and understanding of a subject.
- Address any problems with aspects of a module or your studies in general.
- Provide you with an overview of your academic progress at module and programme level.
- Assist you in making academic choices e.g. module enrolments, programme pathways.
- Provide assessment feedback to help you improve your future performance.
- Contribute to the acquisition of key employability skills.
- Assist and encourage you to gain employment or continue your education after you graduate.

The School takes its responsibility for tutoring very seriously and provides the following to ensure that you are properly supported:

- One-to-one meetings with your personal tutor for personal development, pastoral support and guidance (e.g. on module choices).
- Meetings with course directors for module guidance.
- Tutorials/seminars within modules comprising your degree programme.
- Provision of specific credit-bearing academic tutoring and study skills modules and also through skills embedded in other academic modules including project and dissertation modules.
- Drop-in support sessions for mathematics and statistics.
- Written feedback on assessments including;
  - individual written or verbal feedback on coursework and mark allocation based on a transparent marking scheme
  - generic feedback one week after exam results are published,
  - constructive comments provided by markers through individual appointments with module convenors
  - module evaluation forms collated from student comments, available through Moodle.
- Student led-seminars.
- Peer support groups, including mentoring.
- 'Office hours' system for appointments with module coordinators/tutors.
- A flexible and comprehensive virtual learning environment (Moodle).
- Links to central support services e.g. Academic Support, the Counselling Service and the Student Services Centre.
- Assistance and guidance on academic administrative matters through the Student Service Centres.
- Encouragement to make use of central on-line study skills resources e.g. 'Study Skills' [www.nottingham.ac.uk/studyingeffectively](http://www.nottingham.ac.uk/studyingeffectively)
- Assistance with personal support or guidance from the School Senior Tutors.

## School of Biosciences Tutoring Statement

You are encouraged to read the full Biosciences tutoring statement in appendix 8 or at <http://goo.gl/dPpFjU>.

# 19 Attendance Monitoring

Students must attend all teaching activities necessary for the pursuit of their studies, undertake all associated assessments and attend meetings and other activities as required by their School or the University. Where students face difficulty in attending sessions or undertaking assessments and examinations, it is their responsibility to inform their School of this fact and to provide a satisfactory explanation. Please see <http://www.nottingham.ac.uk/academic-services/qualitymanual/registrationattendanceandstudy/regulations-governing-attendance-and-engagement.aspx> for further details on attendance regulations at the University.

Two weeks is considered a significant period of absence and students are encouraged to consider interrupting their studies if they will miss this length of time. See for further details on voluntary interruption of studies.

The School will consider all extenuating circumstances relevant to attendance and engagement with a student's studies. Students should make the School aware of any extenuating circumstances as soon as possible to ensure full support can be provided and any alternative arrangements such as coursework extensions can be applied within the approved timescales. See the Quality Manual <http://goo.gl/yX4aTC> or further details on extenuating circumstances.

Individual Schools and Departments have systems in place to monitor attendance during the academic year. Example includes taking registers in lectures, monitoring coursework submission and tutorial attendance, etc. Unauthorised absences are reported to Student Services and recorded as appropriate. Where students are absent without authorisation, to the point that it is not possible to continue with the course, Academic Services will write to the student stating that they will be deemed to have withdrawn from the University and their student record will be amended to show that they have withdrawn.

Students who are identified to be poorly engaging with their studies or poorly attending teaching activities will be asked to meet with the Student Experience and Support Officer or their Personal Tutor.

Where required the University will report non-attendance and poor attendance to appropriate authorities including the UK Border Agency and Student Finance.

## 20 Complaints and Appeals Procedures

Details of the University's Complaints and Appeals Procedure can be found at:  
<http://www.nottingham.ac.uk/academic-services/quality-manual/assessment-and-awards/academic-appeals-policy-and-procedure.aspx>

The procedure regarding a complaint concerning your course is that in the first instance you should contact the lecturer concerned. If the matter cannot be resolved, the next points of contact would be:

- Module Convener
- Course Director
- Teaching Manager
- Head of Division
- Head of School
- Student Year Representative (names are on the Learning Community Forum notice board together with the Module Convener)

Students are encouraged to involve their Personal Tutors at any stage, whether the matter of concern is of an academic or personal nature. Students also have the right to bring matters of concern before Learning Community Forum.



## 21 Industry Placements

As an undergraduate student in the School of Biosciences, the vast majority of you can undertake an optional industry placement, between years two and three of your degree, extending your degree to a four year programme.

The year-long placement is open to you if you are studying one of the following degree programmes:

- BSc Agriculture
- BSc Integrated Agricultural Business Management with Industrial Placement Award <sup>1</sup>
- BSc Agricultural and Crop Science
- BSc Agricultural and Livestock Science
- BSc International Agricultural Science <sup>2</sup>
- BSc Animal Science
- BSc Biotechnology
- BSc Environmental Science
- MSci Environmental Science <sup>3</sup>
- BSc International Environmental Science <sup>2</sup>
- MSci International Environmental Science <sup>2 3</sup>
- BSc Environmental Biology
- BSc Food Science
- BSc Microbiology
- BSc Nutrition
- BSc Nutrition and Food Science
- BSc Plant Science

You apply for placements during your second year. The School Placement Team help and support you by organising a range of employer presentations on campus, working with the Careers and Employability Service to provide training, sending weekly email alerts of placement opportunities, offering one-to-one appointments, and providing online resources.

All University of Nottingham students who undertake a year in industry as part of their degree pay a reduced tuition fee to The University of Nottingham, and continue to have access to student loans and the University's core bursary, as applicable. The vast majority of year in industry placements are paid.

Further information, profiles of student experiences and useful links can be found here:  
[www.nottingham.ac.uk/biosciences/placements](http://www.nottingham.ac.uk/biosciences/placements)

If you have any questions or want to find out more, contact the School of Biosciences Placement Team, Dr Judith Wayte and Mrs Rachel Jessop, on  
[biosciplacements@nottingham.ac.uk](mailto:biosciplacements@nottingham.ac.uk)

<sup>1</sup> If you are studying BSc Integrated Agricultural Business Management with Industrial Placement award, then a year-long industrial placement during year 3 is built into the 4 year degree programme.

<sup>2</sup> If you are studying a degree with an international pathway where you study abroad at the University of Sydney for your second year, you can still undertake an industrial placement. You will need to apply for your placement whilst studying in Sydney. You should be aware

that some companies will require you to attend an interview/assessment centre in person, whereas others will be more flexible and will be able to interview you remotely. You can work together with the School Placement Team by email from Sydney.

<sup>3</sup> If you are studying for an MSci degree course, adding a year in industry will mean that the total length of your degree course is 5 years. If you are an international student on an MSci degree course studying in the UK on a Tier 4 visa, and you wish to undertake a year in industry, you need to be aware of the following:

- Once you have secured an industrial placement, you will need to change degree course and apply for a visa extension.
- You may need to make your application for a visa extension from overseas.

The maximum length of time you can study in the UK on a Tier 4 visa at undergraduate level is 5 years. An MSci course with a year in industry is therefore at the maximum length, so if you were to fail one or more modules, you would not have the opportunity of resitting a year in the UK.

If you have any questions or want to find out more, contact the School of Biosciences Placement Team, Dr Judith Wayte and Mrs Rachel Jessop, on [biosciplacements@nottingham.ac.uk](mailto:biosciplacements@nottingham.ac.uk)

## 21.1 Study Abroad

Studying abroad takes you out of your comfort zone, helping you to develop valuable skills, such as independence and resilience, which are attractive to future employers. The School of Biosciences offers a range of study abroad opportunities.

### University-wide exchange programme

The University-wide exchange programme is open to all first year undergraduate students (except MNutr). It's a competitive programme that offers the opportunity to study abroad at one of our university-wide partner universities for the Autumn Semester of the second year, as part of their Nottingham degree programme. Many of our partner universities are part of Universitas 21, an international network of leading research-intensive universities, of which The University of Nottingham is a founding member.

In order to be considered for the programme, applicants are required to have attained a minimum of 60% average in first year January exams, to have a good academic reference and a good personal statement provided as part of the application process. The application deadline is in January for first year students.

### University of Nottingham Malaysia Campus

Students studying BSc Biotechnology, BSc Agricultural and Crop Science, BSc Nutrition, BSc/MSci Environmental Science, BSc Environmental Biology and BSc Plant Science have the opportunity to study abroad at the University of Nottingham Malaysia Campus during their second year, for one semester or the full academic year, as part of their three-year degree programme. All teaching at the Malaysia Campus is in English and the modules and exams are very similar to those in Nottingham. The application deadline is in February for first year students.

### International Year (Erasmus+)

All BSc students in the School of Biosciences are able to apply to undertake an optional International Year in Europe. The International Year takes place between years two and three of the degree programme, extending the degree to a four year programme and changing the degree title to "...with an International Year". The School of Biosciences has established Erasmus agreements of student exchange with a number of European institutions in France, Germany and Spain.

Students who wish to apply to the International Year must submit an application during the first year of study. Information regarding how to apply will be provided at a specific meeting during the Spring Term, to which all first year students will be invited. The application deadline will be in March of the first year.

Students taking the International Year must take and pass language modules during Year 2 of the degree by taking 10 credits of French, German or Spanish language (as applicable) alongside 50 credits of their degree programme in each semester (or as an evening class for Nutrition and Food Science students). Language classes are taught at the Language Centre, University Park. Students who do not have a GCSE in the relevant language can apply to the programme and may have the option of studying abroad in English, depending on destination.

During the third year abroad, students will study abroad at one of the School's Erasmus partner institutions in France, Germany or Spain, taking modules in the target language

alongside language classes. For some destinations, there is the option of studying abroad for the first semester and working abroad for the second semester.

## **Summer Schools**

Overseas Summer Schools offer students the fantastic opportunity to experience living and studying in another country over the summer vacation, through our range of international summer school programmes. These programmes range from one to six weeks so don't involve extended time away from your degree, family or friends. They are also a great way to study something you wouldn't normally have the chance to do, explore a new country and make new friends. As these programmes are offered during holiday periods, credits and grades are not transferred back to Nottingham and you can study whatever is of interest to you. The application deadline is in February each year for all students.

## **Study Abroad finance**

Studying abroad need not be any more expensive than studying at The University of Nottingham, if you budget your finances well and take advantage of available funding. There are a number of grants, bursaries and scholarships available, depending on where you will be studying abroad.

All University of Nottingham students who participate in one of the University's exchange programmes as part of their degree pay a reduced tuition fee to The University of Nottingham UK during the academic year when they study abroad. No tuition fees are paid to the host university abroad.

Financial support may also be available from Student Finance such as an overseas rate of loan or a travel grant.

## **Interested in study abroad?**

All first year Biosciences students will be invited to an information presentation about study abroad opportunities in November 2017 on the Sutton Bonington campus. 1:1 appointments for students interested in studying abroad will also be offered during the Autumn Term on campus.

Make sure you attend the Study Abroad Fair, organised by the Global Engagement Team, which will take place in November 2017. Here you will be able to find out about study abroad destinations open to you and meet with students who have already studied abroad. The Global Engagement Team also organise a range of information presentations throughout the year. Further information can be found here:

[www.nottingham.ac.uk/currentstudents/study-abroad/events](http://www.nottingham.ac.uk/currentstudents/study-abroad/events)

Further information about studying abroad can be found here:

Web: [www.nottingham.ac.uk/studyabroad](http://www.nottingham.ac.uk/studyabroad)

Facebook: [www.facebook.com/UoNStudyAbroad](https://www.facebook.com/UoNStudyAbroad)

Twitter: @UoNStudyAbroad

Study abroad contacts:

Rachel Jessop [rachel.jessop@nottingham.ac.uk](mailto:rachel.jessop@nottingham.ac.uk)

Elena Staves (Student Services Centre, The Barn)

## 22 Channels of Communication

Dissemination of information is an on-going process during the academic year; this will come from both the School Office and academic staff. We use several ways to give out information.

- **Email** – Email is the normal means of communication to individuals or class groups; your tutor and module conveners will email regularly and it is also a good way for you to contact academic staff. However, this and other media should not detract from personal meetings, which are necessary for the communication of several matters including the conveyance and discussion of examination.
- **Moodle** - Moodle is the online learning environment across the University. The resource allows you to access lecture notes, find links to external learning resources, access self-test exercises and assessments, participate in online learning activities, submit assignments and collaborate on group projects. You can log in using your University username and password the day after you have completed your registration online. w: moodle.nottingham.ac.uk
- **The Student Portal** - The Portal is a central part of the University's communication system for staff and students. Make sure you have access to it at: <https://goo.gl/dFwTwP>
- **Social Media** - The University of Nottingham uses the latest technology to bring Nottingham to life and to ensure that you can experience and interact with the University community at any time, see: [www.nottingham.ac.uk/connect/nottinghamconnect.aspx](http://www.nottingham.ac.uk/connect/nottinghamconnect.aspx)
- **Blue Castle website** - students can view their marks, progression status and final award information electronically at: <https://goo.gl/txm85c>

## 23 Students/Staff Consultation

The courses you are taking have evolved over a number of years and incorporate many features arising from student feedback and evaluation. Each department has its own procedures for allowing students to participate in the evaluation and future development of courses.

Broadly, two channels exist:

- Feedback evaluations which enable you to comment on the content, style and objectives of modules; we urge you to take the time and effort to complete these so you and future students can play a role in improving our teaching
- The Learning Community Forum (LCF) consists of course representatives of undergraduate students and teaching staff who discuss a wide range of academic and non-academic matters. Anyone who has comments, criticisms or suggestions that they wish to be discussed should contact one of the representatives, whose names will be notified to you during the first semester. Minutes of the Learning Community Forum will be made available electronically.
- The Student Guild also elects student representatives to the School Board and other School committees. If you want to influence academic procedures in the School and University on behalf of your fellow students, you must join the Guild first.

## **24 Students' Access to Academic Staff policy**

Appointments for meetings with staff should be requested by students by email or in person (by phone or office notice board). Requests by email can be made at any time. Staff should respond to such requests by email within two working days (both during term and outside term-time). Staff are not obliged to send their responses outside of normal working hours, nor during official University holidays, nor when on vacation. They should put out-of-office messages on their emails during vacations and respond within two working days upon return.

Following a request, appointments should be arranged with the student at a mutually convenient time, normally to be held within three working days of the request.

Once an appointment has been made, both the staff member and the student are expected to honour the appointment. Should either be unable to attend they should email to cancel prior to the meeting.

Staff have the option of restricting their availability to students to particular days or times of day (other than in emergencies). In this case, they will communicate their preferred availability to their tutees and to other students they see on a regular basis.

## 25 Quality Assurance

The primary aim of the University of Nottingham is to sustain and improve the high quality of its provision as one of the leading research-led universities in the United Kingdom. It is also committed to providing a learning environment of the highest quality for students, in which first class teaching is underpinned by excellent research. The School of Biosciences endeavours to maintain these goals in the Biosciences, where relevant in collaboration with other schools, in the following ways:-

- by recruiting motivated students with a proven record of high level of learning;
- by providing a broad education across the discipline;
- enabling the development of an analytical and critical appreciation of scientific ideas and problem solving;
- providing a learning experience enriched by an active research environment;
- enabling the development of independent learning and skills for a wide range of careers within and outside the biological sciences;
- to ensure that students receive appropriate support and guidance in their academic development and career planning;
- to identify and support the academic and pastoral needs of individual students;
- to provide a flexible, effective and adequately resourced learning environment, and
- to maintain and improve teaching and learning through effective management structures in line with the University Quality Manual.

As part of an ongoing process of improving quality, some of our teaching facilities have been recently refurbished and modernised. We look to our students to help us maintain these areas in good condition for the benefit of future generation.



## 26 Coursework and Examination Feedback

Feedback is provided in three main forms on i) assessed coursework, ii) examination performance and iii) general aspects of each module. In addition to individual marks given for assessed coursework in each module, you will receive an overall module mark and the end of each semester and a full set of module marks will be made available to you through Blue Castle (<https://bluecastle.nottingham.ac.uk>). Your module marks are confidential and not shown to other students. Individual mark components (e.g. coursework marks) are also confidential; the only exception to this is when you receive a mark for a piece of 'group work' in which all members of your group receive the same mark. The sections below provide further details about feedback.

### Coursework Feedback

Coursework feedback is normally provided through written comments on your work. For many pieces of coursework, a cover sheet will be returned with your work to explain the mark received and give advice on how your work could be improved. For other pieces of non-examination assessed work, it may not be feasible to provide written comments on your work, for example, a group oral presentation; in such cases, feedback may be provided verbally or by email. Feedback for other assessed work e.g. laboratory practicals, may be provided in other ways as appropriate to the assignment set. Whilst the manner by which you receive coursework may vary depending on the type of coursework set, the purpose of the feedback is to provide a mark for the work together with constructive comments to help improve your performance in future assignments. If you wish to discuss your performance in any assessed work, you should contact the module convenor.

Module convenors will set a deadline by which you must submit coursework and a date when you can expect to receive feedback on your work. This information will be provided when the module convenor sets the piece of work. In normal circumstances, marked coursework and associated feedback should be returned to students within 15 work days of the published submission deadline, i.e. students submitting work before the published deadline should not have an expectation that early submission will result in earlier return of work. See details

[www.nottingham.ac.uk/academicsservices/qualitymanual/assessmentandawards/feedback-to-students.aspx](http://www.nottingham.ac.uk/academicsservices/qualitymanual/assessmentandawards/feedback-to-students.aspx)

### Examination Feedback

After each examination period, general examination feedback from each module will be posted on Moodle. This will include: i) feedback on examination questions where students' performance could be improved, ii) suggested strategies for improving performance in those questions and iii) general comments about examination technique. Students wishing to discuss their examination performance should contact the relevant module convenor(s)

### General Feedback

A copy of the Module Report Form, which is a summary of the discussion/feedback with students at the end of each module, can be found within a folder for the module in Moodle. This feedback sheet is used by module convenors to identify which areas of the module students felt worked well, and others that could be improved; in the latter case, the module convenor will make appropriate academic adjustments to the module for the following academic session. The areas of feedback covered by the module report form follow the headings detailed in the Module Report Form.

The University's Quality Manual provides information on good practice for feedback on assessed work and what you can expect to receive as a student at the University of Nottingham – see [www.nottingham.ac.uk/academicservices/qualitymanual/assessmentandawards/feedback-to-students.aspx](http://www.nottingham.ac.uk/academicservices/qualitymanual/assessmentandawards/feedback-to-students.aspx)

## 27 Student Services/departments

### 27.1 Student Services Centre

The Student Services Centre can provide you with information and support throughout your student life. They are approachable, knowledgeable and most of all they are there to help. Student Services Centres are based at Sutton Bonington, University Park, QMC and Jubilee Campuses. Further details of support services to be given to you on arrival.

### 27.2 Libraries

The James Cameron-Gifford Library on Sutton Bonington (SB) Campus, together with Hallward Library (at UP), George Green Library (UP) and the Medical School Library (QMC and Derby) provide information on all subject areas covered by the School, plus study areas and computing facilities. The on-line catalogue ([NUsearch](#)) enables you to search for material held at all branches of The University of Nottingham library. Material from the other campuses can be obtained swiftly for you through the intersite delivery service. During Semester 1 you should attend an introductory lecture provided by the library's Teaching and Learning Support Team. This will be followed up by a tutorial providing an introduction to key resources and discussion on the critical interpretation of published materials as part of the Academic Development and Employability module.

Learning these basic information retrieval and evaluation skills is essential - you will need them for essays and projects throughout your course. As you progress, more specialised studies are undertaken and you must become familiar with the experimental data published in various journals. Acquaintance with published research provides the foundation for most final year research projects. You should not forget to read the more popular scientific press such as *New Scientist* or *Scientific American*, as well as those appropriate to your discipline.

The James Cameron-Gifford Library at Sutton Bonington has over 100 study spaces, including quiet areas, bookable/non-bookable study rooms and a number of PCs (see below); it links with several of the Computer Rooms. The Library stock has been developed to support teaching and research in the Schools of Biosciences and Veterinary Medicine, and the library service also provides access to a wide range of databases, electronic journals, and e-books.

Your University Card is also used as a Library borrower's card, and is required for entry to the libraries at University Park campus.

The James Cameron-Gifford Library is open Monday to  
Friday 8.00 am - 9.45 pm  
Saturday 9.00 am - 4.45 pm Sunday  
9.30 am - 4.45 pm

The library is open 24/7 during exam periods. More information can be found on our website at: [www.nottingham.ac.uk/library](http://www.nottingham.ac.uk/library)  
You can also stay up to date with library news and announcements via the Library Twitter account: @UoNLibraries

## 27.3 IT Facilities

### Help and advice

Comprehensive advice and information for new users of the IT facilities is available on the Student Services web pages

(<http://www.nottingham.ac.uk/student-services/services/it.aspx>) and on the IT Services web site (<http://www.nottingham.ac.uk/it-services/>).

Several hard-copy guides and booklets are also available in the libraries.

### Getting online

Your username and password will get you access to most of the services you will need during your time at the University. Make sure you set a strong password and *never* share your password with someone else. The University will *never* ask you to reveal your password, and you should be suspicious of any request to tell someone your password. Be sure to check your University email regularly, or you may miss important information.

### Computer rooms

There are a number of IT Services computer rooms on the Sutton Bonington campus which students can use, but some are also used for teaching classes. Please look out for notices stating times when the rooms are unavailable due to teaching bookings

There is a large (120 seat) computer room in the Gateway building (room A07); and smaller rooms in the Main Building (rooms B05, B08, B09, and B10). Further computers are available in the James Cameron Gifford Library, including some with large screens for collaborative or group work.

All IS Computer Room computers are set up in an identical manner, with the same selection of software installed or available (Windows, Microsoft Office, EndNote, PDF Creator; and a range of statistical, graphical and course-related software applications).

### Computer loans

The JCG library counter offers a short-term laptop and tablet loan service, with loans restricted to use within the Library and Learning Hub areas only.

Students may also make use of the IT Services Laptop Loan and Repair service, where longer-term loan periods are possible. This service operates from the Pope Building on University Park.

### The Portal; and Virtual Learning Environment

The **Portal** (linked from the University's home page) is the main point of access for students, through which you can access most of the services you will need. From the Portal you can connect to your email service, module information, Library services, timetables, and other essential information. You can also connect to **Moodle**, which is the University's Virtual Learning Environment (VLE), and is where you will find course information, module documents, lecture notes, reading lists, assignments, etc.

### Saving your files and backing up your data

It is the responsibility of all students to save their work safely and securely! Each student has 1TB of personal file storage available through the University's Microsoft Office 365

'OneDrive' service. This storage is available through a web browser on any networked computer.

Never save your work onto the hard drive of Computer Room computers: your work will be lost when you log off! Save files to your OneDrive or to an external storage device.

Work created on your own computer also needs to be backed up. Use either OneDrive; an external storage device; or one of a number of cloud storage options available widely.

## Printing

Students can print from any IS computer to the University Print Service. Printing is held in a queue and can be printed off and collected at Print Service printers which are situated close to all IS computer rooms and in the libraries.

You can also print from your home computer, laptop or mobile device using the Mobile Print Service. Simply email your document to [mobileprint@nottingham.ac.uk](mailto:mobileprint@nottingham.ac.uk)

## Wireless

Good wireless coverage on the **eduroam** service should be available in all of the main teaching and social areas of the campus, and in some outdoor areas. Eduroam is also available in the CLV Ltd halls of residence at Sutton Bonington, although CLV also provide their own wireless service.

## 27.4 Accessibility

Teams supporting students with study support, disabilities, specific learning difficulties and long term health conditions are located in the Student Services Centre (SSC), in The Barn on Sutton Bonington Campus, in the Portland Building on University Park, and will be available on all of our other teaching sites.

We can assist with queries regarding:

- Support in making the transition to University, admissions and registration
- Liaison with your School or department about any impact your condition may have on the study elements of your course OR: assessments in relation to disability and dyslexia and recommendations to academic staff about reasonable adjustments in the learning, teaching and assessment environments
- access to alternative formats such as Braille and large print
- residential accommodation – adapted study bedrooms
- accessible transport around and between our Nottingham campuses
- applying for Disabled Students' Allowances
- access to alternative formats such as Braille and large print
- access to specialist technology in libraries
- liaison with libraries for enhanced services such as extended loans
- timetabling arrangements

The Accessibility Team also provides support for students who wish to develop their strategies for academic writing and time management.

The Accessibility Team have online study resources which relate to almost all of the areas you cover in the guide, see <http://www.nottingham.ac.uk/studentsservices/supportforyourstudies/academicsupport/studyresources/index.aspx>

If you would like to contact us please phone the Student Services Centre on (0115) 951 3710

e: [disability-support@nottingham.ac.uk](mailto:disability-support@nottingham.ac.uk)  
[dyslexia-support@nottingham.ac.uk](mailto:dyslexia-support@nottingham.ac.uk)

The University of Nottingham ACCESS Centre (UNAC), in the Student Services Centre, provides assessments for students who have applied for Disabled Students' Allowances.

The School also has a dedicated Student Welfare Manager, who provides a point of reference, advice and guidance for members of staff and students in the School about student support. The Welfare Manager is part of a large cross campus team of Student Welfare support managers and officers that meets regularly to share good practice. The Welfare Manager in Biosciences is located in the Main Building and works closely with the Accessibility Team in working to ensure that all students are supported and advised appropriately and that there is equality of opportunity for all.

If you have any requirements or concerns talk in the first instance to your Welfare Manager – or contact your personal tutor.

## 27.5 Careers and Employability Service

Many first year students think it is too early for them to start thinking about their future career, but in our experience it is never too early. By making the most of your time at university you can develop skills and build experiences that will be of interest to your future employers.

You could:

- join a **society** or **sports team**
- complete an **Advantage Award** module
- find a **part-time job** through Unitemps.

For more information about the Advantage Award, Unitemps or other ways to make the most of university life you can visit our webpages [www.nottingham.ac.uk/careers](http://www.nottingham.ac.uk/careers) or speak to a member of the careers team.

Whether you have one or several career ideas or none at all, it is a good idea to start researching possible career options. There are a number of ways the Careers and Employability Service can help you to do this:

- **Speak to a Careers Adviser.** You can book a one-to-one appointment to discuss your career ideas or questions at Sutton Bonington Campus or at University Park.
- **Meet employers on campus.** Throughout term time there will be a range of different employers visiting Sutton Bonington Campus and University Park. While you're in your first year you can attend these events to find out about different industries and companies, which will help you with your career planning.
- **CV Reviews.** Whether applying for work experience, a summer internship or a part-time job you can have your own CV reviewed at Sutton Bonington Campus or University Park.

To book an appointment or CV review, or to book a place at an employer event or workshop visit: [www.nottingham.ac.uk/careers/login](http://www.nottingham.ac.uk/careers/login)

To find out about the workshops and events, check your university email to find your weekly Biosciences Careers bulletin. You can also follow @UoNCareers and @UoNBioscicareers on twitter.

If you have any questions or if you would like to find out more about The Careers and Employability Service, please do visit one of the careers offices:

- **Sutton Bonington Campus** – A10, Main Building, Sutton Bonington Campus
- **Science Faculty team** – B08, Pope Building, University Park

## 28 Health, Safety & Security

- The research buildings are open to students from 08:30am until 18:00pm, Monday to Friday, except public holidays and University holidays. If for any reason you have to be in the building outside of these times, you must be supervised by an academic member of staff.
- There are lifts available in all teaching buildings for use by disabled students. The other use of the lifts is for movement of goods, and should not be used for other purposes.
- The School has its own Safety Handbook which is available on the web at <http://goo.gl/UASVap>

### Fire

- Fire alarms in the teaching buildings are tested at a regular time (eg Wednesday at 10 am in the Main Building). In the event of fire in the building the alarm will sound continuously. In the event of this the lecturer in charge of your class will organise evacuation of the building to the relevant assembly point. Fire exits are clearly sign-posted. Re-entry into the building after a fire alarm is given by the Fire Monitor.

### Safety

- Safety in the building, especially in the Laboratories is paramount. See further reference to this matter under 'Practical Classes'
- Practical classes are continuously supervised by an academic member of staff with the support of demonstrators and occasionally technicians. You should not enter a laboratory until a member of staff arrives.
- Suitable protective clothing must be worn for laboratory classes (see 'Practical Work').
- Defined procedures must be followed for the disposal of certain types of laboratory waste, such as syringes and syringe needles, broken glass, organic solvents and microbial cultures. Instruction on the correct disposal of these and other items will be given in practical classes.
- Safety in Fieldwork. Field Course safety information and the Code of Practice for students can be found at: <http://goo.gl/IBS6EF>

### Accidents & First Aid

- For minor injuries, first aid boxes are available in all laboratories and certain offices. In such situations it is likely you can deal with such injury yourself.
- Where an injury is more serious a qualified 'First Aider' should be called. Names of First Aiders are listed on the School's web pages.
- If a 'First Aider' is not available or if further treatment is required, you will be taken to the Cripps Health Centre or A&E at Queens Medical Centre in extreme situations.
- All accidents, whatever their severity, must be reported on an accident report form available from the member of staff taking the class at the time of the accident and will supervise completion of the form.

### Food & Drinks

- On no account should food and/or drink be taken into a laboratory, lecture theatre or computing rooms.



# 29 Module Information

## 29.1 Qualifying (Year 1) Modules

### D211P1 Genes and Cells: 1

**Module Convenor:** Dr A Parmar

**Module Assessment Period:** Autumn (Default) Assessed by end of Autumn Semester

**Target Students:** all year 1 students enrolled on a School of Biosciences degree.

**Total credits:** 10

**Level:** 1

**Pre-requisite(s):** None

**Number of Places:** 300

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** The module will start will examining the ultrastructure of the main cell types; eukaryotic (animal and plant) and prokaryotic; and viruses, along with the structure and function of the main organelles within cell type. An overview of cell growth and development will be outlined including the control of the cell cycle, mitosis and meiosis and cell differentiation. The module will then move into more molecular biology and genetic investigations, examining Mendelian laws of inheritance and gene expression.

**Lecture Programme:** Lecture programmes will be given to Students at the beginning of module.

#### **Practical Class Programme:**

Lecture 1 2hrs 0min Centrally

Practical 1 2hrs 0min Centrally

#### **Coursework:**

Coursework 1 25% Online portfolio of practical work

#### **Assessment:**

Exam 1	75%	1.5 hour Rogo based multiple choice exam	1 Hour 30 Mins
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Coursework 1	25%	Online portfolio of practical work
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#### **Aims and Objectives:**

This module is designed to give students a broad foundation in the basic functional units of life: cells. The first half of the module will cover the general cell ultrastructure of animal, plant and bacteria cells and also viruses as well as the major organelles essential for their function. A solid foundation in the growth and development of cells will be delivered focusing on mitosis, meiosis, cell division and differentiation. Basic genetic principles will be examined in the second half of the module looking at the Mendelian laws of inheritance and gene expression processes. Application of the basic theories will also be enhanced using practical sessions and workshops.

**Learning outcomes:**

1. Describe the ultrastructure of eukaryotic (animal and plant), prokaryotic cells and viruses outlining the structure and function of the main organelles.
2. Explain the growth and development of cells in relation to the cell cycle and cell differentiation.
3. Explain the regulation of gene expression in eukaryotic and prokaryotic cells highlighting the processes from DNA to protein and the sub-cellular units involved that each stage of the process.
4. Online Mendelian Law of Inheritance (using the correct terminology) and the factors that result in changes in populations
5. Report on several key molecular cell biology techniques examining the principles and functions of cell biology.

# D212P3 Applied Genetics

**Module Convenor:** Dr Zinnia Gonzalez-Carranza [Zinnia.Gonzalez-](mailto:Zinnia.Gonzalez-Carranza@nottingham.ac.uk)

[Carranza@nottingham.ac.uk](mailto:Carranza@nottingham.ac.uk) **Module Details:** Level 1, Spring Semester, 10 Credits

**Pre-requisite(s):** D211P1 Genes and Cells: 1

**Co-requisite(s):** None

**Expected Number of Students taking module - 150**

**Target Students** – D420 Agricultural and Livestock Science, D320 Animal Science, J700 Biotechnology, C501 Microbiology, C200 Plant Science

## Summary of Content:

This module builds upon the basics of fundamental genetic processes delivered in semester 1 and examine areas of nucleic acid structure; control of gene expression; genetic variation; mutation and repair; restriction endonucleases. It will then apply the knowledge and explain how this is exploited in recombinant DNA technology; gene cloning, DNA sequencing and genetic engineering. Specialist options within animal, plant and microbial spheres will allow for subject specific applications of genetic techniques and theories which form an underpinning knowledge base for subsequent modules.

**Timetable:** A mix of three one-hour timetabled sessions per week; alternated with one hour lecture and a practical session of 2 hours: eleven core lectures, and 8 specialist options, regular tutorials/examples classes, forty hours student led studies and revision. Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Core Lecture Programme:** Lecture programme is provisional and more detailed information will be given to you in the first session and in each of the specialist options.

- 1 Module introduction, Gene structure (ZHGC)
- 2 Introns (ZHGC)
- 3 Regulatory regions (ZHGC)
- 4 Genetic Variation (ZHGC)
- 5 Mutations (ZHGC)
- 6 DNA and Genome Sequencing (ZHGC)
- 7 Restriction Endonucleases (ZHGC)
- 8 Cloning of DNA (ZHGC)
- 9 Modern Vectors (ZHGC)
- 10 PCR (ZHGC)
- 11 in vitro mutagenesis (ZHGC)

**Assessment:**

One summative assessment:

One Exam	100	1.5hr hour Rogo exam
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Two pieces of Coursework (Formative assessment): Core practical sessions and Specialist option exercise

**Aims:**

This module aims to build upon the basics of fundamental genetic processes and examine areas of nucleic acid structure; control of gene expression; genetic variation; mutation and repair; restriction endonucleases. It will then apply the knowledge and explain how this is exploited in recombinant DNA technology; gene cloning, DNA sequencing and genetic engineering. Specialist options within animal and microbial spheres will allow for subject specific applications of genetic techniques and theories which will form an underpinning knowledge base for subsequent modules.

**Learning Outcomes:**

1. Describe the structure and functions of DNA.
2. Describe the ways genetic variation occurs.
3. Describe different ways mutations can occur and their effect on populations.
4. Describe the basic methods of gene cloning and recombinant DNA technology.
5. Explain the polymerase chain reaction and DNA sequencing.
6. Understand how the genetic principles can be used in modern genetics, including forensics, biotechnology, and animal and crop improvements.

**Recommended background reading:**

- [1] Beebe, Trevor J. C. and Burke, Julian 1992. Gene structure and transcription. IRL Press.
- [2] Cassimeris, Lynne et al. 2011. Lewin's Cells. Jones and Bartlett Publishers.
- [3] Hartl, Daniel L. 2014. *Essential genetics: a genomics perspective*. Jones & Bartlett Learning.
- [4] Hartl, Daniel L. et al. 2012. *Genetics: analysis of genes and genomes*. Jones & Bartlett.
- [5] Watson, James D. 2007. Recombinant DNA: genes and genomes: a short course. Cold Spring Harbor Laboratory Press.

# C112P1 Plant Science

**Module Convener:** Dr Kevin Pyke [Kevin.Pyke@nottingham.ac.uk](mailto:Kevin.Pyke@nottingham.ac.uk)

**Module Details:** Level 1 Spring Semester 10 credits.

**Expected Number of Students Taking Module:** 80

**Target Students:** Primarily available for students taking a degree in an degree in Biosciences.

**Pre-requisite modules or other requirements:** A level in Biology and Chemistry preferred

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Lecture Programme:** Lectures will cover a variety of topics on modern plant science including plant evolution, plant morphology, photosynthesis and water movement, flowering and seed development biology, plant pathology, plant genetic transformation and the central role of the model organism *Arabidopsis thaliana* in plant science research. The module also has three practical sessions relating to the lecture material.

## Example:

Week	SUBJECT	LECTURER
1	Plant Evolution and Plant Structure	SL/KP
2	Photosynthesis	KP/RF
3	Flowering	ZW
4	Seed Development and Fruit ripening	KP
5	Water relations of plants	KP
6	Plants and Nutrients	MB
7	Plant Pathology	Matt D
8	Arabidopsis and Plant Tissue culture	RS/MD
9	Practical 1	AR/KP/NG/DW
10	Practical 2	AR/KP/NG/DW
11	Practical 3	AR/KP/NG/DW

**Staff:** KP – Kevin Pyke; RF – Rupert Fray; ZW – Zoe Wilson; MB – Martin Broadley; Matt D – Matt Dickinson; RS – Ranjan Swarup, SL –Susie Lydon; MD – Mike Davey; AR – Mandy Rasmussen; NG – Neil Graham; DW – Darren Wells

## Assessment:

Exam 1            75%            1 hour 30 mins examination  
Coursework 1 25%            Coursework essay - 1000 words

**Module Amendments introduced this session:** Some changes to teaching personnel.

**Module Aims:** To provide an introduction to the biology and importance of plants. Lectures will focus on plant form and function, highlighting the ways that genetics and studies on the model plant, *Arabidopsis*, have added to our understanding. Emphasis will also be placed on the ways plants adapt to their surroundings and the potential for use of biotechnology in plant improvement.

**Learning outcomes:** On successful completion of the module, students will be able to:

1. Describe the process of plant evolution and place the Angiosperms in the context of different types of plants.
2. Discuss the cellular structure of plants, in particular seeds, leaves, flowers and roots and demonstrate an understanding of how these multicellular tissues are constructed.
3. Appreciate the importance of model plants such as Arabidopsis in the development of modern plant biology and demonstrate knowledge of how this plant's attributes have been exploited.
4. Recognise the importance of plant nutrition and the interaction with pathogens are crucial to plant growth and production
5. Develop professional skills in scientific information retrieval and to work safely in a laboratory situation.

**Recommended reading:**

**Main Text:**

Campbell NA, Reece JB and Mitchell LG (2011) Biology 9th International Edition

**Secondary texts:**

Raven Biology of Plants, Evert RF and Eichorn SE (2012)

All course material including PowerPoint lectures will be available on Moodle.

# D212Z5 Introductory Physiology

**Module Convenor:** Dr Alan Waterfall [Alan.Waterfall@nottingham.ac.uk](mailto:Alan.Waterfall@nottingham.ac.uk)

**Module Details:** Level 1 Spring Semester, 20 credits

**Note:** This module is a pre-requisite for Year 2 module **Physiology of Excitable Tissues**.

**Expected Number of Students Taking Module:** 200

**Target Students:** Biosciences

**Summary of Content:** This module will introduce the major physiological systems including the central nervous system, the respiratory system, the cardiovascular system, the renal system and the digestive system. In each case the gross structures and functions of the major organs will be outlined, and the functions of individual cell types will be described in the context of each system as a whole. Regulatory pathways, which integrate internal physiological responses with external influences will be investigated; basic principles of cell communication will be discussed in the context of cell-specific responses to environmental signals and stresses. The topics covered will refer to genes, proteins and membranes, transport of molecules across membranes, nerve signalling and biorhythms. Examples from across the animal kingdom will be presented.

**Timetable (provisional):** This will consist of 2 lectures per week (5hrs) and 4(2 repeats) practical class (8hrs). Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

## Teaching Programme (provisional):

Homeostasis	1 lecture (Dr Carl Stevenson)
Endocrine system	1 lecture (Dr Carl Stevenson, Prof Martin Luck)
Cellular communication	1 lecture (Dr Reinhard Stoger)
Cellular response	1 lectures Dr Reinhard Stoger)
Nervous system	3 lectures (Dr John Harris, Dr Alan Waterfall)
Autonomic nervous system	1 practical repeated once (Dr John Harris, Dr Alan Waterfall)
Cardiovascular system	2 lectures (Dr Alan Waterfall)
Respiratory system	2 lectures (Dr Reinhard Stoger)
Renal system	2 lectures (Dr Simon Welham)
Digestive system	2 lectures (Dr Simon Welham)
Pharmacology	1 Lecture (Dr Carl Stevenson)
Reproductive system	1 lecture (Dr Ravinder Anand-Ivell)
Stem cell physiology	1 lecture (Dr Ramiro Alberio)

**Teaching Staff:** Dr Reinhard Stoger, Dr John Harris, Dr Carl Stevenson, Dr Alan Waterfall, Dr Simon Welham, Dr Ravinder Anand-Ivell, Dr Ramiro Alberio.

## Assessment:

Exam	75% 2 hour examination
Coursework 1	25% short answers & MCQ questionnaire (60 questions) based on the lab practicals.

**Aims:** This module deals with the major physiological systems which are essential for life. The aim is provide students with basic information on form and function within the central nervous system, respiratory system, cardiovascular system, renal system and digestive

system. In each case the gross structures and functions of the major organs will be outlined, and the functions of individual cell types will be described in the context of each system as a whole. This module will deal with animals from a functional standpoint including their reactions to the internal and external environments, reproduction and development. The aim of the course is to investigate how multilevel physiological processes ranging from environmental down to molecular, mediate organism function.

**Learning outcomes:** On successful completion of this module, students will be able to:

- Name the major anatomical structures of the major organs systems
- Identify the function of the major organ systems at the cellular, organ and organism levels
- Identify the basic rules of pharmacology and drug receptor interactions
- Recognise the interdependence of major physiological systems
- Identify the basic principles of cell communication
- Recognise cell-specific responses to signals and environmental stresses.



# D21BN2 Biochemistry The Building Blocks of Life

**Module Convenor:** Dr Matt Elmes [Matthew.Elmes@nottingham.ac.uk](mailto:Matthew.Elmes@nottingham.ac.uk)

**Lecturers:** Dr Matt Elmes (ME); Dr Marcos Alcocer (MA ; Prof Andy Salter (AS); Dr Simon Welham (SM); Dr Ranjan Swarup (RS); Dr Kevin Pyke (KP).

**Module Details:** Level 1 Autumn and Spring Semesters, 20 credits

**Expected Number of Students Taking Module:** 250

**Target Students:** All School of Biosciences students in year 1

**Availability to Exchange Students** Yes - if relevant in the first year

**Note:** This module is a pre-requisite for D224N0 Nutrition, Metabolism and Disease, D223F0 Manufacture of Food (40 credit), D223N8 Principles of Animal Nutrition, D224A6 Endocrine Control Systems D224G1 Professional Skills for Bioscientists & D23BN3 Molecular Nutrition.

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/student-services](http://www.nottingham.ac.uk/student-services)

**Summary of Content:** This module introduces - proteins, carbohydrates, lipids and nucleic acids. The structure and properties of these will be examined in relation to their function. Topics covered include proteins as structural elements and enzymes, lipids as components of cell membranes, carbohydrates as energy stores and nucleic acids as genetic information and genetic engineering. The process of protein synthesis in prokaryotes will be outlined. The nutritional roles of amino acids, carbohydrates and fats will also be considered briefly. The major metabolic pathways in the cell responsible for energy production (respiration) and biosynthesis of cellular components, including the major pathways of carbohydrate and lipid metabolism along with some aspects of thermodynamics will be covered. Photosynthesis and pathways responsible for the assimilation of nitrogen in plants and eventually animals, will be covered along with general nucleic acid metabolism. In addition general mechanisms for the control of cellular metabolism will also be discussed. The practical sessions are designed to introduce students to several key biochemical techniques. In the first semester this will introduce students to the use of spectroscopy and demonstrate two major separation techniques - chromatography and electrophoresis. The practical sessions in the second semester are designed to introduce the concept of sub-cellular fractionation, enzyme assays and metabolite quantification.

## Lecture Programme (provisional):

Week	Subject	Lecturers
2	Nucleic acids - structure	ME
3	Nucleic acids – Properties and Applications	TBC
4	Amino acids and protein structure	MA
5	Practical	ME,
6	Practical	ME
7	Practical	MA,
8	Protein synthesis	SW
9	Amino acid metabolism	MA
10	Nucleotide synthesis and metabolism	MA
11	Nucleotide synthesis and metabolism	MA
12	Enzymes	SW

19	Bioenergetics and Respiration	ME, RS
20	Bioenergetics and photosynthesis	ME, KP
21	Bioenergetics	ME
22	Practical	MA,
23	Practical	ME
24	Practical	MA,
25	Carbohydrates and lipids-structure	ME, AS,
26	Carbohydrates and lipids-structure	ME, AS
31	Carbohydrates and lipids -functions	ME, AS
32	Metabolic control	ME

**Teaching Staff:** Dr Matt Elmes (ME); Dr Marcos Alcocer (MA); Prof Andy Salter (AS); Dr Andy Murton (AM); Dr Simon Welham (SM); Dr Ranjan Swarup (RS); Dr Kevin Pyke (KP).

**Coursework:** Laboratory practical report.

**Formative Assessment:** MCQ moodle quiz

### **Summative Assessments:**

Exam 1                      60%              1.5 hour MCQ exam

Coursework 1              40%              Practical Write up in Spring (equivalent to 1000 words)

**Aims:** The aim of this module is to introduce students to the basic structure, properties and functions of the four key biological macromolecules namely- nucleic acids, proteins, carbohydrates and lipids. It also aims to introduce the basic metabolic pathways occurring in cells, such as respiration, photosynthesis and the biosynthetic pathways for the key macromolecules. In particular:

1. To provide a basis for the understanding of biochemical processes in living organisms.
2. To provide students with a basic understanding of the structure and key properties of all four major macromolecules.
3. To demonstrate to students how these properties are essential for the biological functions of the macromolecules.
4. To provide students with a basic understanding of the major biochemical pathways in cells and their control.
5. To demonstrate to students how these pathways are essential for the cell.
6. To demonstrate several key biochemical techniques for the separation and analysis of macromolecules and measurement of metabolic processes.

### **Learning Outcomes:**

**Knowledge and Understanding to learn of:** The structure, properties and functions of proteins, nucleic acids, lipids and carbohydrates.

Handle kinetic data and understand molarity.

Understand the basic principles of key techniques such as electrophoresis and spectrophotometry.

The major metabolic pathways such as respiration, photosynthesis, lipid and protein biosynthesis.

Bioenergetics and the role of energy in metabolism.

Understand the basic principles of key techniques used to study metabolism such as enzyme assays.

**Intellectual Skills -the ability to:**

Analyse simple experimental data

Handle simple mathematical concepts relevant to the biological sciences, such as molarity, calibration curves and kinetics.

**Practical Skills -the ability to:**

Accurately operate simple laboratory equipment, such as pipettes Collect and record data

Work safely in the laboratory.

**Transferable/key skills -the ability to:**

Communicate experimental results clearly and concisely in a written form Work productively as an individual and as part of a team

Manage time efficiently.

# D211F3 The Biosciences and Global Food Security

**Module Convenor:** Dr Kevin Pyke [Kevin.Pyke@nottingham.ac.uk](mailto:Kevin.Pyke@nottingham.ac.uk)

**Module Details:** Level 1, Autumn Semester, 10 Credits

**Expected Number of Students Taking Module:** 250

**Target Students** Any student taking a degree in the School of Biosciences

**Availability to Exchange Students** Yes - if relevant in the first year

**Pre-requisite(s):** Normal entry requirements for School of Biosciences.

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content** – The module will define global food security as a concept and then examine various aspects thereof, including plant growth, evolution of crop crops, agriculture and crop production, agricultural systems and animal production, the food industry and sustainable nutrition.

**Assessment details** There will be three pieces of assessment  
Practical questionnaire (3 pages) – 500 words 15%  
An online assessment for a self-study session (30 minutes) – 15  
Written exam - one hour - 10 short answer question (70%)

**Aims:** To provide first year students with an overview of the issues of global food security and show them the level of complexity that exist in different parts of the food generation system, from plant and crop growth, agricultural systems, generating food stuffs and the environmental effects this process entails and sustainable nutrition

**Learning outcomes:** On successful completion of the module, students will be able to:

Appreciate the roles of crop plants and farm animals in the provision of world food supply

- Review new technologies used to combat global food security.
- Describe the impact agriculture and food production has on the environment.
- Describe the challenges being faced in global food production in relation to your subject area.
- Develop professional skills to work safely in a laboratory situation

# D21BF7 The Physiology of Microbes

**Module Convenor:** Dr CED Rees

**Module Assessment Period:** Full Year (Default) Assessed by end of Spring Semester

**Target Students:** BSc Microbiology, BSc Biotechnology and other related biological sciences and Availability to Exchange Students.

**Total credits: 20**

**Level: 1**

**Pre-requisite(s): None**

**Co-requisite(s):**

D211P1

Genes and Cells: 1

D212P3

Applied Genetics

**Number of Places: 60**

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** The module will introduce students to the principles of bacterial and yeast cell structure and nutrition, covering the diverse ways by which these microbes obtain energy. The module will cover both practical and theoretical elements of microbial growth and survival, including the processes of adaption and strategies that they have evolved to allow them to occupy selected environmental niches. Special emphasis is placed on the growth and identification of microbes and analysis data from microbiological experiments. Twenty x one-hour lectures at approximately two per week throughout the semester; five 3-hour practicals and five 1-hour practicals (results and subculture sessions) held in alternate weeks.

This module cannot be used as a pre-requisite unless students achieve a pass mark in the practical element of the course (50% of the module mark based on 4 short laboratory reports).

**Lecture Programme:** Lecture programmes will be given to Students at the beginning of module.

**Practical Class Programme:**

Lecture 1 2hrs 0min Centrally

Lecture 1 2hrs 0min Centrally

Practical 1 3hrs 0min Centrally

Further Activity Detail: Other activities 5 x 3 hour plus 5 x 1 hour practical session run in alternate weeks; open book test 1 hour.

### Coursework:

Coursework 1 10% Plotting growth curves and determination of growth rate

Coursework 2 50% Laboratory reports - 900 words plus graphs

### Assessment:

Exam 1	40%	1.5 hour MCQ questions and short answer maths questions.	1 Hour 30 Mins
Coursework 1	10%	Plotting growth curves and determination of growth rate	
Coursework 2	50%	Laboratory reports - 900 words plus graphs	

**Aims and Objectives:** To provide students with knowledge of yeast and bacterial cell structures and growth which will form a foundation upon which much of the higher level microbiology courses are based. In addition students will be introduced to the concepts of homeostasis in single cells and the adaptations required to achieve this when the external environment changes. This underpin this students will be introduced to the adaptations that single cells can undertake, such as motility and chemotaxis, sporulation and other responses to environments through changes in patterns of gene expression. Students will be taught how culture and identify microbes and how to process data commonly used in microbiological experimentation. Students will be trained in the basic practical methods required for all microbiological laboratory work.

**Learning outcomes:** On successful completion of this module, students will have knowledge of: • Principles of microbial nutrition covering the diverse processes by which yeast and bacteria obtain energy. • Practical and theoretical elements of microbial growth and knowledge of yeast and bacterial cells structures. • Strategies microorganisms have evolved to allow them to occupy selected environmental niches, including motility, sporulation and adaptive gene regulation. In addition students will gain experience of: • Experimental approaches to investigating microbial populations. • Processing and presenting data from microbiological experiments • Basic sterile technique, cell culture and methods used to identify microbes.

**Recommended Reading/Resources:** The lectures and practicals in the Spring semester will be co-timetabled with students taking D212F7 (Bacterial Physiology) and therefore lecture rooms and labs must be large enough to accommodate both groups of students.

# D21BG1 Biosciences Tutorials (Academic Development) and Foundation Science

**Module Convenor:** Dr A French

**Module Assessment Period:** Full Year (Default) Assessed in both Autumn and Spring Semesters

**Target Students:** Biosciences Tutorials (Academic Development) and Foundation Science.

**Total credits:** 20

**Level:** 1

**Pre-requisite(s):** None

**Number of Places:** 260

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** The content is as follows: The tutorials component is intended to enhance the transition into university and guide students through the academic expectations of their degrees. This part of the module is spread throughout the year and will include three generic sessions on 'study skills and plagiarism', 'study opportunities' and 'career and personal development', and a series of small group tutorials with the academic tutor to develop generic skills such as finding crucial information, oral presentation, data handling and presentation of results, preparation for examinations, and essay writing skills relevant to the Biosciences. The Foundation Science content has three elements: Chemistry, Maths & statistics and Physics. The Chemistry element will include: elements and periodic table; atomic structure and bonding; intermolecular attractions, chemical equilibrium; acids and bases, oxidation and reduction; rates of reaction; basic organic chemistry, isomerism, and rings. The Maths and Stats element will include: calculations, algebra, functions and relationships, powers, logarithms, descriptive statistics, significance, regression and presenting data. The Physics element will include: - units and dimensions; power, energy and heat; light and the electromagnetic spectrum; attenuation/absorption; and radioactivity. There is also an IT element, which interfaces with generic IT training for undergraduates provided within the University.

**Lecture Programme:** Lecture programmes will be given to Students at the beginning of module.

## **Practical Class Programme:**

Computing 1 4hrs 0min Centrally

Computing 1 2hrs 0min Centrally

Lecture 1 1hr 0min Centrally

Lecture 1 2hrs 0min Centrally

Placement 1 3hrs 0min Centrally

Tutorial 1 1hr 0min Locally

Further Activity Detail: Tutorials: 3 x 1 h lectures spec times in year; Tutorials 9 wks 1 per wk 45 mins. Foundation science: large lecture rm in Vet School every wk, with exception of wks 3,8,12,23,24,34. Specific requirements other wks: 3, 24,34: booking of all computer rooms on SB campus for 4 hrs(9-1); Weeks 8,12, 23: book B01/02 Gateway for 4 hrs(9-1). If not available, book seminar rms in Lecture Block B04, 5, 6, 7, 8

### **Coursework:**

Coursework 1 50% 2000 word essay completed in the Autumn semester

### **Assessment:**

Exam 1 25% Chemistry and Physics test (Rogo, 45 minutes)

Coursework 1 50% 2000 word essay completed in the Autumn semester

Exam 2 25% Mathematics and statistics tests (Rogo, 45 minutes)

**Aims and Objectives:** The aims of this module are twofold: The Tutorial elements are to enhance the academic and professional development of students via small group work within tutor groups. Working in small groups will encourage active participation and knowledge transfer. This part of the module should equip students with essay-writing, presentational skills (oral and written), critical interpretation of published materials, and other generic skills that should benefit them in modules throughout their degree. It will also provide an opportunity to learn and reflect on opportunities available to enhance their transition from University into the workplace. The Foundation Science element will complement this by providing foundation level knowledge of mathematics, physics and chemistry for undergraduate students entering the School of Biosciences. The module aims to compensate for gaps in knowledge caused by differences in individual prior education and to ensure that all students have the basic knowledge of these key disciplines required to underpin their future studies in the School of Biosciences. The syllabus has been developed in conjunction with degree programme leaders across the School.

**Learning outcomes:**

- Recognise the significance of the core topics in foundation level physics, chemistry and mathematics to their future degree study in the Biosciences.
- Understand a range of fundamental concepts in physics, maths and chemistry which form core knowledge for scientists of all disciplines.
- Understand the importance of using the correct scientific units and be able to convert between different units of measurement (e.g. SI and non-SI units).
- Manipulate mathematical equations and perform calculations designed to improve confidence in dealing with logarithms, exponentials, powers, scientific



notation.....etc. • Recognise the basis of fundamental scientific equations, their interpretation and meaning. • Use Microsoft Excel at a basic level to analyse scientific data, enter formulae and plot graphs • Summarise key relevant information succinctly in an abstract. • Give examples of appropriate referencing styles for scientific reporting. • Identify an appropriate approach for solving a quantitative problem through background and collaborative research. • Review a given scientific topic in a written report.

## 29.2 Part I (Year 2) Modules

### D223N6 Principles of Immunology

**Module Convenor:** Dr Marcos Alcocer [Marcos.alcocer@nottingham.ac.uk](mailto:Marcos.alcocer@nottingham.ac.uk)

**Lecturers:** Prof M Luck, Prof D Hannant (Special Professor) and invited external lecturers

**Module Details:** Level 2, autumn semester, 10 credits

**Pre-requisite:** D21BN2 Biochemistry–The Building Blocks of Life

**Availability to Exchange Students** Yes

**Expected Number of Students Taking Module:** 180

**Target Students:** All home and international students with an interest in animal and human biology.

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** The module will concentrate on: The innate immune system; the adaptive immune system; MHC and antigen presentation; antibodies and antibody responses; immune-techniques; regulation of the immune responses; effector mechanisms of immune responses; immunity to infection; immunology of reproduction; and immune-deficiencies.

**Lecture Programme:** The lecture timetable is provisional. Details will be provided at the beginning of the module. Topics to be covered will include:

- 1 The innate immune system
- 2 The adaptive immune system
- 3 The response to injury
- 4 MHC and antigen presentation
- 5 Antibodies and Antibody responses
- 6 Immunological techniques
- 7 Regulation of the immune responses
- 8 Effector mechanisms of immune responses
- 9 Vaccination and immunity to infection
- 10 Immunology of reproduction

**Coursework:** Coursework 1: a MCQ on-line exam.

**Assessment:** Exam, 70%, 1.5hour. Coursework 1, 30%

**Aims:** The module aims at introducing the students to: basic concepts of cellular and molecular immunology; current immune-techniques; modern concepts of immune-deficiency and hypersensitivities.

**Learning Outcomes:** On successful completion of the module students will be able to: Describe the main characteristics and features of the innate and adaptive immune system, their functions and how they relate to each other.

- Discuss the main events of the immune response when the body is infected by intra and extracellular parasites, essential components of many diseases.
- Analyse results from classical immune techniques that will help the reading and comprehension of scientific publications.
- Integrate the immune mechanisms and discuss current topics of animal and human diseases

**Recommended background reading:** Reading lists are provided by each staff member teaching in the module.

# D224G1 Professional Skills for Bioscientists

**Module Convenors:** E [Weston emma.weston@nottingham.ac.uk](mailto:emma.weston@nottingham.ac.uk) and D [Scott david.scott@nottingham.ac.uk](mailto:david.scott@nottingham.ac.uk)

**Module Details:** Level 2, Spring Semester and Summative Assessment all at the end of Semester 4, 20 credits

**Session availability** – All Biosciences Undergraduates with the exception of students studying the following programmes: Food Sciences, Nutrition and Food Sciences, Environmental Science.

## **Pre-requisites:**

1. Successful progression from Qualifying Year of studies of a Biosciences Degree (or equivalent)
2. Submission of draft CV as part of Module D21BP1

**Expected Number of Students taking module** - est 200

**Target Students** - Biosciences Undergraduate Students and available to Exchange Students from other UoN Campuses only.

**Summary of Content** The module is divided in to 2 sections. One half (Section B) will be focused on the provision of specific material deemed appropriate for each course programme to prepare their students for their Final Year (in most cases this will be the research project).

The other section (A) is centered on delivery of key core professional skills through timetabled lectures and group activities and self-directed learning.

**Module Web Links** – Moodle

**Module Activities** – Including Lectures, Group Activity Sessions, Self-Directed Learning, Workshops, Group Presentation Session.

## **Assessment details**

Coursework: 100% - 3 summative coursework outputs and one formative

Professional Skills Section (A)

10% Submission of a Mahara Portfolio with prescribed items

40% Problem based learning assessment (output varies by course)

Final Year Preparation Section (B)

50% 2000 word essay or equivalent output appropriate to the specific degree programme -

Formative

Newspaper article piece – communications development

**Aims:** The aim of the module is to develop and consolidate students' professional competencies and abilities as a Bioscientist.

**Learning Outcomes:**

LO1 Demonstrate an understanding of the research process within your discipline

LO2 Identify possible future career pathways reflecting on learnings and wider experiences

LO3 Demonstrate a range of professional behaviours and competencies associated with your discipline

# D223P0 Molecular Biology and the Dynamic Cell

**Joint Module Convenors:** Kevin Pyke (KP) [kevin.pyke@nottingham.ac.uk](mailto:kevin.pyke@nottingham.ac.uk) and Ranjan Swarup (RS) [ranjan.swarup@nottingham.ac.uk](mailto:ranjan.swarup@nottingham.ac.uk)

**Module Details:** Level 2 Autumn semester, 20 Credit

**Expected Number of Students Taking Module:** 70

**Target Students:** Biosciences and Life Sciences students.

**Availability to Exchange Students:** Yes

**Summary of Content:** A detailed study of the core molecular processes that enable cells to function such as DNA biochemistry, gene expression, protein synthesis and degradation. These sessions will complement lectures on basic eukaryotic cell biology covering a range of organelles and cell structures including the nucleus, plastids, mitochondria, endoplasmic reticulum, Golgi bodies and secretion together with a consideration of cell differentiation.

## (Provisional timetable)

Week		SUBJECT
1	Session 1	An overview of the Cell and its nucleus (Nucleus) (KP)
	Session 2	Chromosome packaging, DNA replication and molecular basis of evolution (RS)
2	Session 3	RNA Synthesis, processing and export (RS) Protein synthesis, antibiotics, abnormal protein folding and human diseases (RS)
	Session 4	Regulation of Gene Expression I: Molecular switches, motifs, transcriptional activators, repressors, enhancers and insulators (ZW)
3	Session 5	Regulation of Gene Expression II: Targeted Protein Degradation (ZW) Regulation of Gene Expression III: micro RNA, snRNA, siRNA and artificial microRNA (RF)
	Session 6	Methods of investigating Gene Expression including an overview of gene chips and new generation sequencing (RS/ZW)
4	Session 7	Practical: Immuno detection (RS)
	Session 8	Practical: in situ Immunolocalisation and Confocal demo (RS+KP)
5	Session 9	Regulation of Gene Expression IV: Long non protein coding RNA (RS) Epigenetics: DNA methylation, imprinting and chromatin remodelling (DS)
	Session 10	Mitochondrion, plastids (KP) Extra nuclear genomes: the plastid and mitochondria (KP)
6	Session 11	The cytoskeleton I: IFs and MTs (KP) The cytoskeleton II: MFs and motors (KP)
	Session 12	The endo membrane system I: ER and import (KP) The endo membrane system II: Golgi and export (KP)

7	Session 13	Mitosis and Chromosome movement (KP) The Cell cycle - CDK's, cyclins and checkpoints (KP)
	Session 14	Cell Differentiation (KP/RS) Programmed
8	Session 15	The endomembrane system-Secretion and uptake (KP+RS)
	Session 16	Practical (Vesicle trafficking and cell differentiation) (KP)
9	Session 15	Coursework poster session (ALL)
	Session 16	Coursework poster session (ALL)
10	Session 19	20. Cell in a multicellular context covering cell to cell interactions and mechanisms of long and short distance signalling-Part I (animals) (DS)
	Session 20	21. Cell in a multicellular context covering cell to cell interactions and mechanisms of long and short distance signalling-Part II (plants) (RS)
11	Session 21	Poster Feedback, Examination Guidance and tutorial (KP+RS)
	Session 22	Tutorial (KP+RS)

KP-Kevin Pyke; RS-Ranjan Swarup; ZW-Zoe Wilson; RF-Rupert Fray; DS-Dylan Sweetman

**Coursework:** Two pieces of coursework: one poster and one Lab report and questionnaire.

**Assessment:** Exam 1 (60%) 2 hour examination  
Coursework 1 (15%) Poster  
Coursework 2 (25%) Practical report and questionnaire (2000 words)

**Aims:** This module aims to teach students about the basic molecular processes that underpin the function of eukaryotic cells and to describe how different organelles within the cell function, with an emphasis on the dynamic nature of cell biology.

**Learning Outcomes:** On successful completion of the module, students will be able to: 1. Explain the mechanisms of key molecular processes taking place within cells associated with DNA, RNA and protein synthesis 2. Distinguish different molecular mechanisms regulating gene expression within cells, 3. Demonstrate knowledge and understanding of the molecular and cellular components of Eukaryotic cells and their function and how cellular components are integrated into cellular function. 4. Appreciate the use of modern imaging technology and marker molecules in elucidating cellular function and recognise the highly dynamic nature of rapidity of cellular function. 5. Demonstrate intellectual skills to evaluate critically molecular and cell biology research papers 6. Develop professional skills in scientific information retrieval and to work safely in a laboratory situation.

# D224P8 Molecular Pharming and Biotechnology

**Module Convenor:** Dr Rupert Fray [Rupert.Fray@nottingham.ac.uk](mailto:Rupert.Fray@nottingham.ac.uk)

**Module Details:** Level 2, Spring Semester, 20 credits

**Pre-requisites:** A suitable range of genetics /molecular biology and/or plant sciences modules

**Co-requisites:** None

**Target Students:** Students in the Schools of Biosciences and Exchange Students

**Expected Number of Students taking module:** 50

**Summary of Content:** Transgenic research and “Synthetic Biology” approaches have the potential to enable plants to be used as “green factories” for the production of novel products. In addition, the creation of genetically modified organisms (GMOs) are having a major impact on modern agriculture. The course will provide theoretical and practical knowledge as to how transgenic organisms are engineered. We will assess the technologies used to generate transgenic plants then describe examples currently being developed for commercial uses. Following this comprehensive briefing on the 'nuts and bolts' of generating GMOs, commercial and environmental concerns and approaches will be debated with invited experts. Alongside genetic modification approaches, production of traditional plant products and their uses in biotechnological industries will also be discussed as will the use of other genomics tools.

**Timetable:** Typically thirteen double lectures , four four hour practicals, one full day site visit, tutorials/examples classes, forty hours student led studies and revision. Personal timetables will be available to all students via [www.nottingham.ac.uk/student-services](http://www.nottingham.ac.uk/student-services)

**Lecture Programme:** Lecture programme is provisional and more detailed information will be given to you in the first session.

- 1 Module introduction (RGF); Plant genetic transformation and global GM crops(RGF)
- 2 Metabolic engineering of plant lipids (FB)
- 3 Chloroplast engineering (RGF)
- 4 Genome sequencing and genomic technologies (GS):
- 5 RNAi, switching genes off (RGF)
- 6 Gene disruption technologies (RGF)
- 7 Plants as cell factories for vaccines and antibodies (RGF)
- 8 Metabolic engineering; Coursework guidance tutorial (FB, RGF)
- 9 Engineering plant viruses (External)
- 10 Biofuels, feedstock and biopolymers (GWL)
- 11 GM for nutritional improvement (RGF)
- 12 ROGO (RGF)
- 13 The future? GM plants in the age of synthetic biology (RGF)

## Assessment:

Exam 1	60%	Two long answer questions in a 1.5 hour exam
Coursework 1	40%	Short answer open book questions on a selected primary research article related to the practical class. Short answer questions related to the practical sessions.



**Aims:** This module provides a detailed analysis of the applications of technologies for the production of genetically modified organisms (GMOs). It describes how transgenic plants are generated; provides practical examples of commercial products created using GM technologies; and addresses the regulatory and societal issues raised by GMOs. In addition, various non-GM approaches for crop improvement are also discussed. The course benefits from the input of a range of experts based at Nottingham and other leading UK research organisations.

**Learning outcomes:** On Successful completion of the module, students will be able to:

- Explain the key technologies and approaches used for generating transgenic.
- Critically analyse and summarise information drawn from a variety of sources, including original published research papers.
- Discuss examples of GM-plant derived novel products
- Compare different methods for regulating the expression of endogenous plant genes.

**Recommended background reading:**

**Plant Biotechnology**, The genetic manipulation of plants; Second Edition. **Adrian Slater, Nigel Scott, and Mark Fowler. Oxford University Press.** ISBN: 9780199282616

Recent research papers that will be indicated and made available via Moodle.

# C12461 Microbial Biotechnology

**Module Convenor:** Professor SV Avery

**Module Assessment Period:** Spring (Default) Assessed by end of Spring Semester

**Target Students:** The course is designed for BSc/MSci Biology and Microbiology students but not restricted to them.

**Total credits:** 10

**Level:** 2

**Pre-requisite(s):** C41105 Microbiology, First year module(s) with basic microbiology content; for example, Genes Molecules and Cells (LIFE1029) and Life on Earth (LIFE1030)

**Number of Places:** 100

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** The course will cover the key groups of eukaryotic and prokaryotic microorganisms relevant to microbial biotechnology, principles of GM and strain improvement in pro- and eukaryotes. Microbial biotechnology in the food industry, including dairy and alcohol products, organic acids. Relevance to agriculture, including biological control. The pharmaceutical industry, e.g. microbiological production of therapeutic entities. Microbial production of industrial ethanol and other biofuels. The impact of "omics", systems biology, synthetic biology and effects of stress on industrial microorganisms.

**Lecture Programme:** Lecture programmes will be given to Students at the beginning of module.

## **Practical Class Programme:**

Lecture 1 - 3hrs

Further Activity Detail: The module is based on 10 morning sessions, one per week, amounting to 30h contact time. The coursework, revision and assessment comprises a total of 45h.

## **Coursework:**

Coursework 1 - 30% - Coursework 30% comprising submission of a power-point presentation and accompanying notes.

## **Assessment:**

Exam 1 -70% - one 1.5 hr multiple choice exam

**Aims and Objectives:** The aim of the course is to describe the use of yeasts, filamentous fungi and bacteria in biotechnology as it relates to the food, agriculture, medicine and other industries. The course will demonstrate how an understanding of the biology and genetics of microorganisms allows their use as cell factories for the production, and models for the

discovery, of enzymes and metabolites. The course will also explore how microbial activities themselves can be exploited in processes ranging from food production to biocontrol of disease-causing organisms. The course will cover the key types of product, metabolic pathways, their regulation at the gene level, and methods for strain improvement including the use of recombinant DNA technology for ameliorating product yield and the synthesis of new products. The impact of genomics and systems biology on microbial biotechnology will be presented.

**Learning outcomes:** Knowledge and understanding of

A2 (current trends and developments between Biology and other disciplines)

A3. (the importance of Biology in human health and disease and its relevance to biotechnology)

A4. (appropriate terminology, nomenclature and classification) and A5 (genetics). Other aspects are also relevant, e.g.A6,A7 and A10.

Intellectual Skills -

the ability to critically analyse and interpret published information and data (B1) and think independently while giving due weight to the arguments of others (B2).

Also, the course will help students to understand complex ideas and relate them to specific problems or questions (B3) and acquire substantial quantities of information systematically, process it effectively, and draw appropriate conclusions (B4).

Transferable Skills

the ability to communicate effectively in writing (D1), organise and manage your working time, schedule tasks, and meet deadlines (D3) and work productively with others (D7).

**Recommended Reading/Resources:** Adequate consultation has taken place with the library

# D223F6 Bacterial Biological Diversity

**Module Convenor:** [Dr Kristelle Brown kristelle.brown@nottingham.ac.uk](mailto:kristelle.brown@nottingham.ac.uk)

**Lecturer:** Prof C. Dodd, Dr N. Bora, Dr K. Brown.

**Module Details:** Level 2, Autumn Semester, 10 credits

**Pre-requisites:** D211P1 Genes and Cells I

**Expected Number of Students Taking Module:** 40

**Target Students:** Compulsory for students taking Honours degree in Microbiology.  
Optional for students taking Honours degree in Biotechnology.

**Timetable:** Personal timetables will be available to all students via  
[www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** This module is designed to provide an understanding of the extent of prokaryote biological diversity. Following introductory lectures on microbial taxonomy and classification, students will undertake two student-centred exercises. The first will be a group exercise to construct a website on a chosen group of organisms covering their taxonomy, biology and ecology. This will be presented to class members in a short group presentation. The web pages will be accessible by other students to aid student centred learning of other topics, which will be an essential element for the essay coursework. The second will be an individual exercise to produce an essay including features of a range of organisms represented in the websites.

## Indicative Timetable for module

**Lecture Programme:** Approximately 7h of lectures within the first 3 weeks of the Semester.

**Non-Lecture Programme:** Four hours of tutorials throughout the Semester.

## Indicative Timetable for module

### Week 2

Introduction to the module & website group sign-up	KB
Classical bacterial taxonomy	CERD
Effect of plasmids on bacterial taxonomy	CERD

### Week 3

Numerical taxonomy	NB
Chemosystematics: cell walls and membranes	NB
Group website tutorials	CERD NB & KB

### Week 4

Chemosystematics: proteins and metabolites	CERD
Chemosystematics: nucleic acids	CERD

Student centred website preparation

### **Week 5**

Student centred website preparation  
(Dr Brown available)

KB

### **Week 6**

Web-site workshop

KB

### **Week 7**

Group website meeting  
Web sites submission

### **Week 8**

Web site presentations  
Release of essay title

CERD NB & KB

### **Weeks 9-11**

Student-centred essay preparation aided by web-sites

### **Week 11**

Essay submission

**Practical assessment:** There is no laboratory element to this module

**Course assignment:** The first exercise will be a group exercise to design a web site on a chosen groups of organisms, covering their taxonomy, biology and ecology. These will be presented to other students in a short group presentation. The web pages will be accessible by other students to aid student centred learning of other topics, which will be an essential element for the second exercise. The second exercise will be the production of an essay covering features of a range of organisms.

**Assessment:** Coursework 1 60% Essay - 2000 words; the web sites are a source material for this. Coursework 2 40% Group web site -group exercise of up to 5 people. No set length.

**Aims:** There are three main aims: to give students a broader knowledge of bacterial biology; to provide training in literature searches on a defined topic and production of written synopses; to provide web design skills.

**Learning outcomes:** On successful completion of this module students will be able to:

- 1) Comprehend the terminology and nomenclature used in microbial systematics and its underlying basis.
- 2) Critically analyse microbiological information derived from a variety of sources associated with specialist disciplines including physiology, interaction with the environment, genetics, molecular biology and biotechnology.

- 3) Synthesise and summarise information drawn from various sources to address a specific question and present this in a new format.
- 4) Work productively as an individual or as part of a team.

**Recommended background reading:**

Brock, Biology of Microorganisms, 14<sup>th</sup> Edition

# D224F9 Analysis of Bacterial Gene Expression

**Module Convenor:** Dr P Hill (module convenor)

[phil.hill@nottingham.ac.uk](mailto:phil.hill@nottingham.ac.uk) **Lecturer:** Dr CED Rees

**Capped module at 30 – You will need permission from the module convenor to take this module unless it is compulsory for your course**

**Module Details:** Level 2, Spring semester, 10 credits

**Pre-requisites:** Genetics with Specialist Options (D212P3) or equivalent, D211P1 Genetics and Cell Biology, Microbial Physiology (D212F7; STUDENT MUST HAVE A PASS MARK IN THE PRACTICAL ELEMENT OF THE MODULE) or equivalent

**Note: This module is a pre-requisite for D236M1 Virology and Cellular Microbiology module in Part 2 (Final Year)**

**Target Students:** Microbiology, Biotechnology

**Availability to Exchange Students** Yes

**Summary of Content:** The course will cover the major techniques required for analysis of gene expression including methods for gene sequence and transcriptional analysis. An in depth study of vectors and gene constructs will provide an understanding of the different strategies used in creating mutants and identifying gene function in bacteria. The coursework exercises are designed to illustrate the topics covered in the lecture course and will give students experience of experimental design and critical analysis of research data and an introduction to bioinformatics for the analysis of DNA and protein sequences.

**Lecture Programme:** More detailed information will be issued in the first teaching session.

Topic	
1	Introduction to module; review of DNA structure & Gene
2	Enzymes in molecular biology: PCR; DNA sequencing; Restriction enzymes and mapping
3	Proteomics & reverse genetics
4	Transposons and reporter genes
5	Screening libraries and preparation of genomic DNA
6	Plasmid vectors and conjugation
7	Hybridisation techniques
8	Use of computers for DNA sequence analysis and
9	Phage vectors and transduction
10	mRNA techniques

## **Non-Lecture Programme:**

There is one practical and one computer session usually around weeks 8 & 9 of the module respectively.

**Further Activity Detail:** Half a day per week throughout the semester, to include formal lectures and tutorials (44 hours) and practicals distributed evenly throughout the

semester. Also, For D224F9 there is one practical and one computer session usually around weeks 8 & 9 of the module respectively

**Assessment:**

Exam 1            60%    2 hour examination

Coursework 1 30%    Data analysis exercise

Coursework 2 10%    Oral Presentation

**Aims:** To introduce students to the principles molecular methods of analysis of bacterial gene expression and give experience of the interpretation of data used to map genetic constructs. These provide a platform to allow further study of bacterial molecular genetics and their application in biotechnology in later courses. Student-led short seminars give experience of data analysis and presentation of data.

**Learning outcomes:** On successful completion of this module, students will be able to:

- Explain the mechanism of bacterial gene expression and the methods used to identify control points at the DNA, RNA and Protein levels.
- Compare the differences between alternative methods for analysing specific macromolecules (e.g. DNA) and assess their appropriateness for particular applications.
- Analyse raw data generated by a number of techniques used for gene analysis and interpret their meaning in context with given background information
- Apply practical experimental procedures to prepare and analyse DNA from bacterial cultures.

**Recommended background reading:**

Genes (Lewin) or similar texts

Instant Notes in Molecular biology (Turner, McLennab, Bates & White)

Additional research papers and reviews provided on Moodle



# D223F7 Virology

**Module Convenor:** Dr Ken Mellits [ken.mellits@nottingham.ac.uk](mailto:ken.mellits@nottingham.ac.uk)

**Capped Module at 45 - You will need permission from the module convenor to take this module unless it is compulsory for your course.**

**Module Details:** The module will provide an introduction to viruses and their interactions with their hosts (bacteria, plants and animals including humans). The structure of viruses, their significance including pathogenesis and molecular biology will be discussed. 10 credits

**Pre-requisite module or other requirements:** D211P1 Genetics and Cell biology, D21BF7 The Physiology of Microbes

**Note: This module is a pre-requisite for D236M1 Virology & Cellular Microbiology for module in Part 2 (Final Year).**

**Target Students:** Compulsory for students reading degrees in Food Microbiology and Microbiology. Optional for students reading Animal Sciences, Biotechnology, Food Science and Plant Sciences.

**Availability to Exchange Students** Yes

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** The module will provide an introduction to viruses and their interactions with their hosts (bacteria, plants and animals including humans). The structure of viruses, their significance including pathogenesis and molecular biology will be discussed.

## Lecturers:

Kristelle Brown	Brian Thomson
Ken Mellits	Matt Dickinson
Will Irving	Jon Ball
Cath Rees	

**Coursework:** 30% of the module mark will be awarded for coursework, which is a laboratory report which amounts to a 300 word essay.

**Assessment:** Rest of assessment is: 70% for a 1.5 hour examination.

**Formative assessment:** Short group presentation

**Aims:** To provide a basic understanding of viruses, their diversity, interaction with their hosts and pathogenesis.

**Learning outcomes:** On successful completion of the module students will be able to:

- Describe viruses and their diversity, and the mechanism by which they invade cells and cause disease.
- Acquire, practical techniques associated with studying viruses, including but not limited to the ability to acquire, interpret, plot and critically analyse virological data and information

- Acquire basic Presentation skills including the ability to ask and respond to questions, in a group context.

**Recommended reading:**

Fields Virology Sixth addition pt 1 and 2.

**Module Ownership** (*This information is important as it will be used for the appropriate distribution of income through the University Budgeting System*)

# D224E4 Computer Modelling in Science:

## Introduction (UP)

**Module Convenor:** Dr Dov Stekel [Dov.Stekel@nottingham.ac.uk](mailto:Dov.Stekel@nottingham.ac.uk)

**Module Details:** Level 2 Spring Semester, 20 credits

**Prerequisites:** Level 3 students who have already taken C135E9 will not be admitted to this module.

**Co-requisites:** None

**Location:** University Park Campus

**Expected Number of Students Taking Module:** 70

**Target Students:** All School of Biosciences students, Natural Sciences students and Ningbo 2+2 Environmental Sciences students (based in Geography).

**Summary of Content:** Modern biological and environmental science includes the study of complex systems and large data sets, including imaging data. This necessitates the use of computer models and analyses in order to understand these systems. This module contains an introduction to computer programming and modelling techniques that are used in the biological and environmental sciences. Specifically, it contains: (i) An introduction to computer programming and algorithms, using the Python programming language. (ii) An introduction to the construction of mathematical models for biological and environmental systems using difference and differential equations, with a particular emphasis on population dynamics, and the use of computing to simulate, analyze these models and fit these models to data. Throughout the module, the focus will be on relevant examples and applications, e.g. environmental pollution, growth of microbial populations, disease epidemics, or computer manipulation of images of plants, animals or the natural environment. The module will be assessed by a patchwork assessment consisting of write-ups of assignments from during the semester.

**Timetable:** The first week of term is a two hour session, followed by 9 four hour sessions. Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Lecture Programme:** All teaching will be mixed mode (lecture/computer practical) in computer rooms. Lecture programme is provisional and more detailed information will be given to you in the first session.

1. Module introduction (Stekel)
2. Introduction to Python (French)
3. Programming in Python (French)
4. Python modules: NumPy and Matplotlib (French)
5. Modelling: difference equations (Band)
6. Modelling: simple differential equations (Stekel)
7. Modelling: differential equations and SciPy (Stekel)

8. Modelling: multi-dimensional systems (Stekel)
9. Modelling: steady state analysis (Stekel)
10. Model building and workshop (Band)

**Teaching Staff:** Dr Leah Band (LB), Dr Dov Stekel (DJS), Dr Andrew French (APF)

**On-line material:** Supporting background material on computing and mathematical concepts (e.g. algorithms, calculus) will be posted on-line with on-line exercises to complete.

### **Assessment:**

Patchwork Assessment consisting of write-up of related assignments from the whole module and a reflective piece.

Practical	36%	Patchwork Assessment (Parts 1 and 2)
Practical	59%	Patchwork Assessment (Parts 3, 4 and 5 and reflective piece)
Practical	5%	Model building workshop

**Aims:** The aim of this module is to introduce the use of computing programming and modelling in the biological and environmental sciences for model simulation and image processing.

**Learning outcomes:** A student who successfully completes this module should be able to: (i) Transform a series of instructions specified mathematically or textually into a pseudocode algorithm. (ii) Create or modify simple computer program code in order to carry out a set algorithmic task. (iii) Critically evaluate the use and results of suitable computer algorithms or programs in the context of relevant challenges in the biological or environmental sciences. (iv) Construct a simple mathematical model from a set of biological or environmental processes. (v) Simulate and analyse mathematical models using a computer and appropriate software and/or algorithms. (vii) Critically evaluate a mathematical model and its simulation results in the context of relevant challenges in the biological or environmental sciences.

**Recommended Reading:** A full reading list will be provided at the outset of the module.

# D224Z6 Principles of Animal Health and Disease

**Module Convenors:** Dr Rachael Tarlinton [Rachael.Tarlington@nottingham.ac.uk](mailto:Rachael.Tarlington@nottingham.ac.uk) and Dr Sharon Egan [Sharon.Eagan@nottingham.ac.uk](mailto:Sharon.Eagan@nottingham.ac.uk)

**School:** Veterinary Medicine & Science

**Module Details:** Level 2, Spring Semester, 10 credits

**Capped module at 80 – You will need permission from the module convenor to take this module unless it is compulsory for your course**

**Target Students:** D320 Animal Science, available to Exchange Students – subject to appropriate background.

**Pre-requisite(s):** D212Z5 Introductory Physiology

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** The module will introduce physical assessment and laboratory based measurements of animal health and assessment of the major effects of diseases on the body's physiological and immunological systems. The main types of disease will then be systematically discussed in a number of species including poultry, equine, canine, bovine and ovine species.

**Assessment Details:**

Formative Exam	0%	MCQ style online Rogo examination	1 hour
Summative Exam	100%	MCQ style online Rogo examination	1 Hour and 30 minutes

**Learning Outcomes:** Knowledge and Understanding - To learn (1) The major effects of disease on the body (2) To develop a more detailed understanding the effects of diseases on specific body systems in a range of example species Intellectual Skills - The ability to (1) Be able integrate knowledge of the various body systems into an understanding of the effects of diseases (2) Develop an understanding of how to assess the health status of an animal (3) Be capable of retrieving information from a variety of sources. Practical/Professional Transferable/key skills - The ability to (1) Work effectively as an individual or member of a small team (2) Manage, and organise time effectively and work to deadlines (3) Perform a range of techniques commonly used in laboratory diagnosis, (4) Obtain experience in animal handling techniques.

**Aims:** To develop an understanding of the basic effects of disease in domesticated and food production animals

# D224P7 Plant Pests and Diseases (UP)

**Module Convenors:** Dr Ian Hardy [Ian.Hardy@nottingham.ac.uk](mailto:Ian.Hardy@nottingham.ac.uk); Dr Ruth Blunt [Ruth.Blunt@nottingham.ac.uk](mailto:Ruth.Blunt@nottingham.ac.uk)

**Module Details:** Level 2, Spring Semester, 20 credits

**Pre-requisites:** None **Co-requisites:** None

**Expected Number of Students Taking Module:** 35

**Target Students:** Biosciences students studying Agriculture, Agriculture and Crop Science, Environmental Biology, Biotechnology, Plant Science and students in Life Sciences studying Biology

**Summary of Content:** This module is core for agriculture and crop science students and for non-molecular plant science students and is a recommended option for other agriculture and plant science students, biotechnologists, environmental biologists and biologists. It will introduce students to the importance of interactions between plants, microbes and insects. It will explain the importance and the nature of the organisms that are pests and diseases of plants, including population dynamics and epidemiology. It will also explore the main approaches for control and management of pests and diseases, including chemical interventions, resistance breeding in plants and biological control. Lecture material will be complemented by practical sessions, videos, demonstrations and self-study.

**Timetable:** Typically one three-hour timetabled session per week (four hours in those weeks that include practical sessions): twenty-five lectures, 12 hours practicals/demonstrations. Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Lecture Programme:** Lecture programme is provisional and more detailed information will be given to you in the first session.

Week	Subject	Format	Staff
19	The concept of plant disease Invertebrates as pests	Lectures	MD RB
20	The causes of disease – fungi, bacteria, viruses, nematodes	Lectures	MD
21	The concepts of biotrophy and necrotrophy Plant pathogen diagnostics	Lectures	MD
22	Basic insect morphology, life cycles, identification Insect reproduction	Lectures	RB
23	Insect feeding Practical week 1	Lecture and Practical	RB IH & MD
24	Insects as vectors Practical week 2	Lecture and Practical	RB IH & MD
25	Insect senses & nervous systems Practical week 3	Lecture and Practical	RB

			IH & MD
26	Insecticides Practical Demonstrations	Lectures	RB
31	Biocontrol Insect monitoring/IPM	Lectures	IH
32	Disease resistance mechanisms, fungicides and biological control	Lectures	NC
33	Termites and bees Module review & revision topics	Lectures	IH IH & MD

N.B (if any): MD = Matt Dickinson; RB = Ruth Blunt; IH = Ian Hardy; NC = Natalie Chapman

### Assessment details

Exam 1	70%	Rogo style exam – 1.5 hours
Coursework 1	30%	Self-study exercise - 1000 word advisory leaflet on a specific pest or disease

**Aims:** This module will explore the nature and importance of plant pests and diseases, the organisms involved, and the approaches used to control them

**Learning outcomes:** On successful completion of this module, students will be able to:

- Discuss the importance of plant pests and diseases in World agriculture.
- Explain how microbes and insects cause disease of plants.
- Discuss the methods used to control plant pests and diseases.
- Relate practical skills to plant pest and pathogen identification.

# D223P9 Applied Plant Physiology: from cell to crop

**Module Convenors:** Drs Erik Murchie (EM) [Erik.murchie@nottingham.ac.uk](mailto:Erik.murchie@nottingham.ac.uk). Debbie Sparkes (DS) [Debbie.sparkes@nottingham.ac.uk](mailto:Debbie.sparkes@nottingham.ac.uk)  
Other teaching staff: Dr Kevin Pyke (KP), Dr Rupert Fray (RF), Dr Neil Graham (NG)

**Module Details:** Level 2 Autumn semester, 20 Credit

**Pre-requisites:** D211F3: The Biosciences and Global Food security, C112P1: Plant Science or equivalent.

**Expected Number of Students Taking Module:** 70

**Target Students:** Students in the Schools of Biosciences and Life Sciences. Availability to Exchange Students

**Summary of Content:** This module provides a comprehensive understanding of plant physiology with an applied context from the molecular level to the field. There is an emphasis on the mechanisms that plants use to capture and utilise physical resources i.e. solar energy, water and nutrients. The module examines the physiological basis of resource capture and utilisation in growth and development, physical aspects of the plant environment incorporating key processes (photosynthesis, respiration, uptake and transpiration of water, the uptake and role of mineral nutrients). This physiological understanding will be applied in an agricultural context to consider major crop species in the UK and worldwide, and how cropping is affected by soil type. Limitations to resource capture by crops, and how growers overcome these, will be considered in relation to integrated crop management. The module also considers contemporary issues and future developments in agronomy and the role of the agronomist in successful crop management.

**(Provisional timetable).** All lectures unless stated otherwise

Week	Subject	Lecturer
1	Photosynthesis: organelle structure and function. Major crop species	KP
2	Photosynthesis: how chloroplasts work. Practical: Major Crop Species	KP, RF, DS
3	Photosynthesis: diversity and ecology. Soils and Cropping Systems	KP, EM, DS
4	How crops capture and 'convert' solar energy to yield. Weed biology	EM
5	Weed management Practical: weed competition and nutrients	DS DS/NG
6	Environmental physiology of plants and crops: temperature, photosynthesis, respiration and stress. Practical: photosynthesis	EM/RF
7	How does water move through plants? Practical: water and photosynthesis	EM
8	Stomata: structure and function of a small but globally significant plant organ. Root traits for water and nutrient uptake	EM DS/TBC
9	Water use efficiency of crops. Group work on conservation agriculture	EM DS
10	Plant nutrients, uptake and functions Mixed species cropping	NG TBC
11	Nutrient, transport, assimilation and use in crops. Integrated Crop Management	NG DS/EM



**Coursework:** 40 %. A written report (1500 words) related to the practical sessions.

**Assessment:** Exam 1 60 %. Short questions and answers on module material using computers running Rogo software. This is timetabled and will take place in an IT lab.

**Aims:** The module is designed to introduce the key processes by which individual plants and plant communities capture and use physical resources i.e. light, water and nutrients, and provides an understanding of the physical and chemical processes and key biological processes involved. This is placed into an applied setting by considering agricultural examples and crop management strategies. By the end of the module, the student should understand not only the individual mechanisms, but also appreciate the importance of their integration into crop processes and the relevance of this to contemporary environmental and agricultural issues.

**Learning outcomes:** On successful completion of this module, students will be able to:

- Describe the physical resources available for plant growth and development
- Explain how soil type and climate affect crop choice
- Explain the physiological mechanisms by which plants capture physical resources and convert them to growth
- Discuss the abiotic and biotic limitations to plant and crop productivity by resource availability and use
- Analyse data accurately and critically and write a referenced scientific report
- Devise integrated crop management strategies

# D223A7 Applied Animal Science

**Module Convenor:** Prof Kevin Sinclair [Kevin.Sinclair@nottingham.ac.uk](mailto:Kevin.Sinclair@nottingham.ac.uk)

**Lecturers:** Prof Phil Garnsworthy, Dr Steve Ramsden, Dr Gavin White

**Module Details:** Level 2 Autumn; 20 credits

**Pre-requisites:** None

**Co-requisites:** None

**Note: This module is a pre-requisite for D235A8 Companion Animal Science, D23BA1 Livestock Production Science for module in Part 2 (Final Year)**

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Aims:** The module will consider a wide range of subjects. The autumn semester will concentrate on Feed Evaluation: determining and expressing the energy-yielding and nutrient contents; energy and protein evaluation systems for ruminants and non-ruminants; micronutrients, essential fatty acids; principles of diet formulation; variability and processing of raw materials; feeding systems; feedstuff recognition; legislation. Growth of Farm Animals: relative growth rate, allometry, differential maturity of individual carcass components; application of principles to selection of genotype and nutrition. Farm Animal Welfare: concept of the 5 freedoms; applicability to commercial practice; diversity of systems intended to improve welfare. There will be one livestock visit, (one of pig, dairy, beef or sheep), which will be integrated into the teaching and learning assessments for this module. The module will cover Livestock Systems: Comparisons of systems of production for all major species of farm livestock; farm visit, integration of these different systems with each other and other enterprises on farms; fundamentals of grass growth and development, grass-animal interactions and forage conservation; general aspects of health and diseases in farm animals, livestock breeding, organic livestock systems, financial management, systems analysis and meat quality.

**Activities:** This module includes one visit to a local livestock farm which is a core element of the module. If you are a student with a disability, or have any mobility issues, you should discuss any specific needs you may have with the module convener at the point of registering for this module. The University will take all reasonable steps to ensure that any student with a disability can take this module. Students will be provided with essential PPE when required but should bring their own Wellingtons on such visits.

**Learning Outcomes:** On successful completion of the module, students will be able to:

- Describe the underlying principles of the processes and mechanisms of animal growth, development, production and utilisation.
- Acquire, interpret and critically analyse biological and/or management data and information derived from a variety of sources.
- Demonstrate a range of practical techniques and methodologies, together with appropriate procedures for data analysis and presentation.
- Collect and integrate several lines of evidence and apply them in a balanced manner to support an argument, taking ethical considerations into account where appropriate.
- Critically analyse, synthesise and summarise information drawn from various sources, including published research papers and reports.
- Analyse financial and other management information and use it in decision making.

- Process, analyse and present data using a variety of methods, including appropriate qualitative and quantitative techniques and packages.

<b>Week</b>	<b>SUBJECT</b>	<b>LECTURER</b>
2	Introduction, basic principles	KS
	Ruminant systems – Beef Cattle	KS
3	Non-ruminants – Pig/Poultry	GW
	Ruminant systems – Dairy Cattle	PG
4	Nutrition evaluation	PG
	Ruminant Systems – Sheep	LS
5	Special features of ruminants	PG
	Organic Livestock Systems	JM
6	Systems analysis (Visit)	KS
	Systems analysis (Visit)	KS
7	Diet formulation	PG
	Gross Margins (GM)	KS
8	Private study time	-
	Pig systems	GW
9	Computer Class	PG
	Grazing Management & Fodder	JM
10	Raw materials	GW
	Respiratory and Enteric Diseases	KS
11	Animal growth	PG
	Animal Breeding	KS
12	Animal Welfare	JM
	Meat quality + <b>Module Review</b>	KS
13-16	Vacation	
17-18	January Assessment	

**Teaching Staff:** Prof Kevin Sinclair (KS; Module convenor), Prof Phil Garnsworthy (PG), Dr Gavin White (GW), Dr Jean Margerison

#### **Assessment Details:**

Exam 1                      70% One 3-hour paper  
 Coursework 1            10% Computer class write-up (500 words).  
 Coursework 2            20% Systems Analysis Project write-up (1000 words).

# D223N8 Principles of Animal Nutrition

**Module Convenor:** Dr Jean Margerison [Jean.Margerison@nottingham.ac.uk](mailto:Jean.Margerison@nottingham.ac.uk)

**Lecturers:** Dr John Brameld, Dr Matt Elmes, Dr Preeti Jethwa

**Module Details:** Level 2, Spring Semester, 10 credits

**Pre-requisites:** D21BN1 Introduction to Nutrition (advisable, but not essential)  
D21BN2 Introductory Biochemistry

**Note: This module is a pre-requisite for D23BN2 Animal Nutrition and D23BN3 Molecular Nutrition modules in Part 2 (Final Year)**

**Expected Number of Students Taking Module:** 50

**Target Students:** All students with an interest in animal nutrition and Exchange students.

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** Dietary feed intake, energy, protein, water, macro and micro-nutrient requirements. Application of feed analysis and databases. Nutritional energetics and protein metabolism. Energy, protein and amino acid nutrition. Regulation of appetite and energy expenditure. Future nutrition based challenges.

**Lecture Programme:** The lecture timetable is provisional. Details will be provided at the beginning of the module. Topics to be covered will include:

- 1 Measuring nutrient content and energy in food (lectures)
- 2 Amino acid and Protein nutrition (lectures)
- 3 Regulation of Energy balance (lectures)
- 4 Energy models and calculations (lectures/ workshop)
- 5 Determining future nutritional challenges of the world (lectures and seminar)

**Assessment:** Exam 1 70% 1.5hour. Coursework 1 30%

**Aims:** To explain and illustrate the knowledge required to understand nutrition at an advanced level with 1) specific reference to Diet formulation and analysis, including Nutritional Energetics and Protein Nutrition. 2) To consider energy requirements of animals in different physiological/pathological states. 3) To consider protein and amino acid requirements of animals. 4) To understand the factors involved in regulating appetite and energy expenditure. 5) To understand the future nutritional challenges of the world.

**Learning Outcomes:** On successful completion of this module, students will be able to: • Describe principles underlying animal nutrition, energy and protein metabolism, and relate this knowledge to feed intake, energy, protein, water and mineral requirements of animals • Explain the regulation of energy balance and appetite • Evaluate the influence of dietary protein quality for ruminant and non-ruminant species • Discuss the principles of diet formulation and application of feed analysis and databases.

**Recommended background reading:** Reading lists are provided by each staff member teaching in the module

## 29.3 Part II (Year 3) Modules

### D23PRO Undergraduate Research Project

**Module Convenor:** Dr S Lydon [susannah.lydon@nottingham.ac.uk](mailto:susannah.lydon@nottingham.ac.uk)

**Total Credits:** 40

**Level:** Level 3, Year-long module

**Summary of Content:** The project is a year-long level 3 module. The topic of the project will be chosen from a list of suggestions, and will be finalised after consultation with the student's Course Manager and a member of academic staff who will act as the supervisor. It involves detailed research on the topic chosen after discussion with the supervisor. Each project will involve collection of data by means such as experiment, questionnaire, observation and/or literature search as well as the analysis and interpretation of the data in the context of previous work. Reading and summarising previous research by other scientists working in the area, and writing a clear concise final report are essential components of the project.

**Module details:** This module consists of an extended programme of research under the direction of an individual member of staff. Students are expected to undertake a challenging piece of work, in which emphasis is placed on self-motivation and self-learning. Detailed guidelines will be provided by the Division.

**Expected Number of Students Taking Module:** 250

**Target Students:** All Biosciences students registered for Honours Degrees in the School of Biosciences apart from those studying Microbiology, and Environmental Sciences degrees.

**Non-lecture programme:** Private study using library, Internet, laboratory, or field facilities supported by regular tutorials with the project supervisor.

**Target Students:** All Biosciences students registered for Honours Degrees in the School of Biosciences apart from those studying Microbiology, and Environmental Sciences degrees.

**Assessment:** The module will be assessed by coursework only; this will take the form of a 15 minute oral presentation of the research findings (10%), an objective assessment of project planning and execution (30%) and a 5,000-word written report (60%). Details of the precise format required for the oral presentation and written report will be provided to students by the School Office.

**Module aims:** The module aims to provide a detailed training in research work. At the end of the module, students should be familiar with the relevant published literature in the field, have become familiar with some of the fundamental techniques necessary to do the prescribed research and published their findings as both an oral report and a comprehensive written report.

**Module objectives:** The objectives are to enable students to:

- i) Identify and analyse problems
- ii) Undertake good experimental design
- iii) Search for, analyse and interpret relevant literature
- iv) Carry-out competent laboratory, field or survey research
- v) Analyse data using appropriate methods
- vi) Write and deliver an oral presentation
- vii) Prepare and write a detailed report

### **Transferable skills**

Transferable skills associated with this module include:

- i) Literature searching using a range of databases
- ii) Use of relevant laboratory, field or survey research methods
- iii) Statistical analysis as appropriate
- iv) Computing and word processing skills
- v) Problem solving
- vi) Oral communication skills
- vii) Time management

### **Subject specific information**

In some project areas, it is necessary to begin project work in semester 4 because of factors such as seasonal availability of crops or farm animals. This phase of the project forms a discrete, 10-credit, Part I module

# D235Z1 Biotechnology in Animal Physiology

**Module Convenor:** Dr Ramiro Alberio [Ramiro.Alberio@nottingham.ac.uk](mailto:Ramiro.Alberio@nottingham.ac.uk)

**Total Credits:** 10

**Level:** 3, Autumn Semester

**Number of Places:** 60

**Target Students:** Unrestricted. Availability to Exchange Students

**Module Details:** This module gives an introduction into the Structure of the biotechnology industry. The content of the module reflects recent advances in biotechnology. A series of lectures is presented by the module convenor and guest lecturers to cover the following topics: use of recombinant DNA technology; concept of epigenetics in gene regulation and disease. Epigenetics in therapeutics and diagnostics of disease. Applications of genetic engineering to production of vaccines, antibodies, and enzymes; genetic improvement and assisted reproduction; use of embryo manipulation technologies and animal transgenesis; ethical regulatory framework for genetic modification of animals.

## Lecture Programme: Example:

Week	Date	Duration		Subject	Format	Rm No	Staff
		From	To				
1	-				Choose an item.		
2	Monday 3 <sup>rd</sup> October Week 2	10	12	The biotech industry and DNA Technologies (Part 1)	Lecture	B04	R Alberio
3	Monday 10 <sup>th</sup> October Week 3	9.30	12	DNA technologies and Protein expression systems (Part 2)	Student Centred Learning	B04	R Alberio
4	Monday 17 <sup>th</sup> October Week 4	10	12	Microarray, next generation sequencing	Lecture	B04	S May
5	Monday 24 <sup>th</sup> October Week 5	9.30	12	Vaccines and Monoclonal Antibodies	Student Centred Learning	B04	R Alberio
6	Monday 31 <sup>st</sup> October Week 6	10	12	Animal Transgenesis	Lecture	B04	R Alberio
7	Monday 7 <sup>th</sup> November Week 7	10	12	Chromatin and Epigenetics	Lecture	B04	R Stoger
8	Monday 14 <sup>th</sup> November Week 8	10	12	Epigenetics - disease and therapy & Gamete biology and manipulation	Lecture	B04	R Alberio
9	Monday 21 <sup>st</sup> November Week 9	9.30	12	Stem cells basics	Student Centred Learning	B04	R Alberio
10	Monday 28 <sup>th</sup> November Week 10	9.30	10.30	Stem Cell Biology II and	Lecture	B04	R Alberio
10	Monday 28 <sup>th</sup> November Week 10	11	12	workshop in grant writing	workshop	B04	R Alberio

11	Monday 5 <sup>th</sup> December Week 11	9.30	12	Animal Biotechnology: Ethics and Law	Student Centred Learning	B04	K Millar
12	Monday 12 <sup>th</sup> December Week 12	9.30	12	Mock Vivas + MODULE EVALUATION	Student Centred Learning	B04	R Alberio

**Timetable:** Personal timetables will be available to all students via  
[www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Assessment:**

Exam 1	100%	2 hour exam
Coursework 1	0%	Formative assessment
Coursework 2	0%	Formative assessment

**Aims and Objectives:** The aim of this module is to provide an understanding of the structure of the biotechnology industry, of the techniques involved, and of the working opportunities offered by the biotech sector. Students will learn about genetic and epigenetic basis of gene regulation, and how this knowledge is used to develop treatments for disease. Students will also learn how assisted reproductive technologies are currently used for generating transgenic animals.

**Learning Outcomes:**

- To describe about the current status of animal biotechnology and the applications.
- To recognize which molecular tools can be used in animal biotechnological.
- To identify the principal growth areas in animal biotechnology.
- To assess the commercial opportunities and constraints involved in the exploitation of novel technologies.
- To explain the ethical implications of genetic manipulation of animals.



# D236F5 Rapid Methods in Microbial Analysis

**Module Convenor:** Dr Jon Hobman [Jon.Hobman@nottingham.ac.uk](mailto:Jon.Hobman@nottingham.ac.uk)

**Total Credits:** 10

**Level:** 3, Spring Semester

**Pre-requisite(s):**

D21BF7 Physiology of Microbes; OR D212F7 Bacterial Physiology; OR D211P1 Genes and Cells I; OR C12461 Microbial Biotechnology; OR C42418 Bacterial Genes and Development

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Module Details:** The use of viable counting as a standard for determining bacterial contamination of foods will be evaluated. Alternative methods used industrially (e.g. impedance, DEFT) will be examined. The limitations of sampling methods for quality control will be discussed. Antibody based and ELISA systems will be described and demonstrated. The role of electrical signal monitoring (impedance) will be discussed as will emerging techniques based on gene engineering that include DNA probes, RNA probes, PCR and phage based assays. A particular emphasis will be placed on the problems of technology transfer into the food microbiology laboratory.

**Aims and Objectives:** The purpose of the module is to enable students to understand and evaluate the methods used industrially for microbiological analysis including rapid methods. Students will benefit by being able to put into perspective the different approaches to enumeration and detection of microorganisms. By the end of the module the student will be able to determine appropriate microbiological sampling plans for food

quality control and select current microbial analysis regimes with due regard to their advantages and limitations.

**Learning Outcomes:** On successful completion of this module students will be able to:

- (1) Comprehend the terminology, nomenclature and fundamental principles used in rapid microbiological methods.
- (2) Apply fundamental principles to understand the advantages and limitations of traditional and modern detection and identification methods.
- (3) Analyse where novel advances in rapid microbiological methods are likely to occur.
- (4) Evaluate rapid pathogen identification methods safely in the laboratory under ACDP2 conditions.
- (5) Synthesize subject knowledge in order to solve problems in a logical manner.

**Lecture Programme:**

Time	Content	Staff
<b>Week 1</b>		
09.00-09.30	Introduction, module aims, coursework etc.	CD
09.30-10.45	Detection and identification of microorganisms; an introductory seminar	TBA
11.05-11.55	Sampling Plans	TBA
12.05-12.50	Rapid methods of microbial detection an introduction	TBA
<b>Week 2</b>		
09.00-10.00	Physical methods of microbial detection, including DEFT and flow	

10.00-10.45	cytometry	TBA
11.05-12.00	DNA probes; the polymerase chain reaction	TBA
12.00-12.45	Other emerging techniques of detection	TBA
	Antibody-linked detection systems, including ELISA	TBA
<b>Week 3</b>		
10.00-11.00	Impedance microbiology	TBA
11.05-13.00	Impedance Demonstration	TBA
<b>Week 4</b>		
09.00-10.00	Cleaning and disinfection an introductory seminar	TBA
10.05-10.45	Cleaning and disinfection I	TBA
11.05-12.00	Cleaning and disinfection II	TBA
<b>Week 5</b>		
09.00-10.00	Phage and its application	CR
10.05-12.45	ELISA Demonstration	JW
<b>Week 6</b>		
10.05-12.45	Sterilisation Assurance Test demonstration	3M to be confirmed
<b>Week 7</b>		
09.00-10.00	Immunomagnetic separation	TBA
10.00-11.00	Immunomagnetic separation demonstration	TBA
11.05-12.45	Petri film demonstration	3M to be confirmed
<b>Week 8</b>		
10.00-12.00	Sub-species typing of bacteria: classical and phenotypic methods	CD
<b>Week 9</b>		
10.00-12.00	Sub-species typing of bacteria: DNA-based methods	CD
<b>Week 10</b>		
10.00-12.00	Course summary and revision	TBA
	The written examinations	
	Course evaluation and feedback	

### Assessment Details:

Exam 1                    60%    1 hour 30 mins examination

Coursework 1        20%    Letter - 300 words

Coursework 2        20%    Memorandum - 600 words

# D236F6 Microbial Fermentation

**Module Convenor:** Dr Jon Hobman [Jon.Hobman@nottingham.ac.uk](mailto:Jon.Hobman@nottingham.ac.uk)

**Lecturers:** Prof C Dodd, Dr L Whitley

**Total Credits:** 10

**Level:** 3, Spring Semester

**Pre-requisite(s):** D21BF7 Physiology of Microbes; OR D212F7 Bacterial Physiology; OR D211P1 Genes and Cells I; OR C12461 Microbial Biotechnology; OR C42418 Bacterial Genes and Development.

**Expected Number of Students Taking Module:** 30

**Target Students:** Optional for students reading for degrees in Food Microbiology, Food Science, Microbiology, Nutrition & Food Science, Applied Biology, and Biotechnology

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Module Details:** This module commences with a review of microbial fermentation, including beer, cheese, yoghurt, meat and single-cell protein production, as well as sewage treatment. The underlying principles of microbial fermentation will be discussed, in addition to specific examples which will be examined in depth. From this basic knowledge the problems of microbial contamination and spoilage of the finished product will be analysed. A visit will be an important part of the module.

**Aims and Objectives:** The purpose of the module is to provide an understanding of the activity of microorganisms during fermentation, particularly with regard to food production. On completion of the module students will understand how microorganisms act to preserve food by the production of chemicals which prevent the growth of those microorganisms associated with food spoilage and food borne illness. Students will develop an understanding of microbial growth and associated problem solving skills.

**Learning Outcomes:** On successful completion of this module students will be able to:

- (1) Comprehend the terminology and fundamental biochemical pathways involved in microbial fermentations.
- (2) Identify the uses of, and processes involved in, fermentations- both in food production and elsewhere.
- (3) Collect, record, and analyse data generated during microbial fermentation experiments, and present these data in the form of a scientific paper.
- (4) Synthesize subject knowledge in order to address specific problems and questions.

## Assessment:

Exam 1                      60%    1 hour 30 min examination.

Coursework 1    40%    Lab Report - 3000 words

## Lecture Programme:

Time	Content	Staff
<b>Week 1</b> 09.00-10.00 10.00-12.00  12.00-13.00	Module introduction: aims; timetable; coursework, exam A review of microbial energetics: fermentation, fermentative pathways, energy production, metabolic products. Batch vs. continuous culture Overview of fermentation, with particular reference to food, but touching on 'new' biotechnology	TBA TBA  TBA
<b>Week 2</b> 09.00-10.00 10.00-11.00 11.00-12.00 12.00-13.00 Trip to brewery	The microbiology of brewing, beers, lagers and wines Improvement of beer yeast including genetic manipulation Introduction to brewing practical Fermentation practical part 1 Need to arrange for a fully detailed description of the process	TBA TBA TBA TBA
<b>Week 3</b> 09.00-10.00 10.00-13.00	Microbial spoilage of beer Fermentation practical part 2	TBA TBA
<b>Week 4</b> 13.00-17.00	Visit to Coors Brewery, Burton-upon-Trent	
<b>Week 5</b> 09.00-10.00 10.00-11.00 11.00-13.00	General dairy microbiology and the normal microflora of milk The microflora of cheese Problems encountered in cheese production	TBA LW TBA
<b>Week 6</b> 09.00-10.00 10.00-11.00  11.00-13.00	Yoghurt production: the methods/microbiology/biochemistry Fermented meat products: products/methods/microbiology/biochemistry Demonstration of novel methods for detecting antimicrobials	TBA CERD  CERD
<b>Week 7</b> 9.00-10.00 10.00-11.30 11.30-13.00	Acetic acid production 'Traditional' fermentations (eg miso, tempeh and tea) Cocoa and casava production	TBA TBA TBA
<b>Week 8</b> 9.00-10.00 10.00-11.00 11.00-13.00	An introduction to 'new' biotechnology Mycoprotein production Production of industrially useful compounds: historically (eg acetone and butanol); current (eg GMOs for insulin and industrial enzymes)	TBA  TBA
<b>Week 9</b> 09.00-10.00 10.00-12.00 12.00-13.00	Normal microflora of water Sewage fermentation and bioremediation Module feedback and revision session	TBA TBA TBA
<b>Week 10</b> 09.00-13.00	Trip to sewage farm	
<b>Week 11</b>	Study week	
<b>Week 12</b>	Spring semester exams begin	

## Lecturers:

TBA To be agreed; CERD Prof Chris Dodd; LW Dr Liz Whitley

Lectures: 24h. Practicals/demonstrations: 7h. Site visits: 8h. Student-centred learning: 41h.

# D236P3 Plant Disease Control

**Module Convenor:** Dr R Ray [Rumiana.Ray@nottingham.ac.uk](mailto:Rumiana.Ray@nottingham.ac.uk)

**Total credits:** 10

**Level:** 3 Spring Semester

**Expected number of Students Taking Module:** 60

**Target Students:** Students in the Schools of Biosciences and Life Sciences

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Module Details:** This is a course which deals with the applied aspects of plant disease control, comprising transmission, epidemiology, detection and diagnosis and control options. Control strategies based on application of fungicides, biological control, deployment of disease resistant varieties and biotechnological approaches are described. The relative strengths and weaknesses of the different approaches will be considered.

## Lecture Programme 2016-2017

Week	Date	Topic	Activity
1	02/02	Introduction to the module	RR
		Cause of disease, symptoms and assessment	RR
		The concept of IDM	RR
2	09/02	Plant health risk and policy	NB
		Molecular diagnostics	NB
		Plant disease epidemiology	RR
3	16/02	Cultural control methods	RR
		Disease resistance	RR
		Tutorial	RR
4	23/02	Dispersal of plant pathogens	BF
		Case study – Phoma in OSR	BF
		Independent study	
5	02/03	Durable resistance	GJ
		Breeding for disease resistance	GJ
		Tutorial	RR
6	09/03	Field walk	RR
7	16/03	Cereal diseases	RR
		Management strategies	RR
		Chemical control	RR
8	23/03	Fungicide mode of action	RO
		Fungicide resistance	RO
		Tutorial	RR

9	30/03	Virus transmission and sugar beet diseases Integrated pest management	MS TB
10	06/04	Nematodes and potato diseases	MB
11	11/05	Agronomy in practice Feedback and module overview	KN RR

RR= Dr Rumiana Ray, NB= Prof Neil Boonham (Fera), TB= Prof Toby Bruce (Rothamsted Research), MS= Dr Mark Stevens (BBRO), MB= Dr Matt Back (Harper Adams University), GJ= Prof Graham Jellis (formerly HGCA), RO= Prof Richard Oliver (Curtin University), BF= Prof Bruce Fitt (University of Hertfordshire), KN= Mr Keith Norman (Velcourt)

**Lecture Programme:** Practical exercise to support taught material on diagnosis.

### **Assessment:**

Exam 1      100%    2 hour examination

**Aims and Objectives:** The module aims to instruct students in the current practices, which are available for crop protection, and to provide an understanding of how new measures are developed. The objectives of this module are to enable students to: i) appreciate the problems associated with plant disease ii) develop an understanding of the crop protection options available iii) develop skills associated with disease diagnosis iv) understand the commercial considerations associated with crop protection

**Learning outcomes:** On successful completion of the module, students will be able to:

- Compare the strategies used by plant pathogens to spread between plants and cause disease epidemics
- Critically analyse methods available for disease diagnosis in different situations
- Explain the range of approaches used in plant disease control and how to integrate them
- Evaluate the strengths and weaknesses of these methods when used in crop protection

# D235F1 The Microflora of Foods

**Module Convenor:** Prof CER Dodd [Christine.Dodd@nottingham.ac.uk](mailto:Christine.Dodd@nottingham.ac.uk)

**Total Credits:** 20

**Level:** 3 Autumn Semester

**Pre-requisite(s):** D224FA Microbial Mechanisms of Food Borne Disease (20 credit)

**Target Students:** Compulsory for Food Science. Required choice option for students reading for degrees in Microbiology. **Availability to Exchange Students** Yes where some prior experience of working with microorganisms at ACDP2 exists.

**Module Details:** The intrinsic and extrinsic factors which affect the growth of micro-organisms in foods will be considered. The impact of food structure and microflora will also be discussed. The limitations of these parameters for predicting the growth of micro-organisms will be considered together with commercially available predictive models and alternative safety assurance approaches HACCP. The micro-organisms associated with spoilage and the physical changes which occur in a food will be outlined. The microbial profiles of particular foods, including dairy products, fish and red meat, will be described and the changes that occur in the microflora during spoilage will be considered in relation to storage parameters. Practicals will cover methods for isolating and identifying micro-organisms from foods and will evaluate the limitations of these procedures.

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentsservices](http://www.nottingham.ac.uk/studentsservices)

## Lecture and practical contents

The final timetable will be given out at the first session. An indicative timetable is given below:

### Week 1

10.00-13.00 Introduction to the module

Examining microbial growth in foods 1: factors controlling growth Examining microbial growth in foods 2: predictive modelling

14.00-16.00 Canning practical 1

### Week 2

10.00-12.00 Examining microbial growth in foods 3: enrichment procedures

Examining microbial growth in foods 4: *in situ* detection 12.00-13.00 *Salmonella* isolation: practical 1 - enrichment procedures 14.00-16.00 Canning practical 2

### Week 3

10.00- 12.00 Spoilage The microflora of specific foods: meat and poultry I

12.00-13.00 Canning practical 3

14.00-16.00 *Salmonella* isolation: practical 2 - selection of isolates

### Week 4

10.00-11.00 Practical

11.00-13.00 *Campylobacter* The microflora of specific foods: meat and poultry II

14.-00-16.00 *Salmonella* isolation: practical 3 - characterisation of isolates

#### Week 5

10.00-13.00 The microflora of specific foods: fish and shell fish *Clostridium botulinum* and food borne botulism. Prof Mike Peck (Institute of Food Research - Norwich)

14.00-16.00 Discussion group on *Salmonella* isolation. Introduction to *Listeria* practical

#### Week 6

10.00-11.00 The microflora of specific foods: dairy products

11.00-13.00 *Campylobacter*: practical 1

14.00-16.00 Submission of *Listeria* protocol

#### Week 7

10.00-13.00 *Campylobacter*: practical 2

14.00-16.00 *Listeria* isolation: practical 1 – isolation from cheeses

#### Week 8

10.00-13.00 The microflora of specific foods: bakery products The microflora of specific foods: miscellaneous

14.00-16.00 *Listeria* isolation: practical 2 - selection of presumptives

#### Week 9

9.00-13.00 Competitive microflora. Dr. Tim Aldsworth (Coventry University) Food structure and microbial growth. Dr Sharon Johnson (DSTL)

14.00-16.00 *Listeria* isolation: practical 3 confirmatory tests

#### Week 10

10.00 -13.00 HACCP: an introduction

Group exercise on HACCP

14.00-16.00 *Listeria* isolation: practical 4 - final identification

#### Week 11

10.00- 11.00 Bacterial suicide - a new hypothesis.

11.00-13.00 Discussion group on *Campylobacter* and *Listeria* practicals Seminar on past examination papers and module evaluation

**Lecture Programme:** Available on 1<sup>st</sup> day of module

**Non Lecture Programme:** Available on 1<sup>st</sup> day of module

**Coursework:** Course work constitutes 50% of the marks for the semester. This is broken down as:

Canning practical report 30%

*Listeria* isolation protocol (group exercise) 20%



**Assessment Details:**

Exam 1	50%	3 hour exam; 3 questions: compulsory data evaluation based on practicals; 3 short answer questions: 1 essay
Coursework 1	30%	Individual practical report written as report to industry - 2000 words
Coursework 2	20%	Group (4 people) practical report (2000 words) on protocol as developed in practical sessions and its analysis and written instructions issued to technician

**Learning Outcomes:** On successful completion of this module students will be able to:

- 1) Comprehend the underlying principles of the factors which control microbial growth and their relevance in foods
- 2) Relate the microbial composition of major food materials with the impact of food composition, storage and processing.
- 3) Apply a range of practical techniques and methodologies for isolation and characterisation of specific bacteria
- 4) Design, carry out and evaluate appropriate tests or experiments to address fundamental microbiological problems in the food industry
- 5) Collect, record and analyse data by making accurate observations and measurements and use appropriate methods for presentation.

**Recommended Reading:** M R Adams and M O Moss (2008) *Food Microbiology* 3<sup>rd</sup> Edition; J M Jay *Modern Food Microbiology* Fourth Edition; Collins, Grange, Lyne and Falkinham (2004) *Collins and Lyne's Microbiological Methods* Eighth Edition.

# D235P2 Plant Cell Signalling

**Module Convenor:** Dr A Bishopp, [Anthony.Bishopp@nottingham.ac.uk](mailto:Anthony.Bishopp@nottingham.ac.uk)

**Lecturers:** Dr TP Robbins, Dr R Swarup, Prof M Dickinson, Prof M Holdsworth, Dr Darren Wells

**Module Details:** Level 3, Spring Semester, 10 credit

**Pre-requisites:** A selection of genetics and plant science modules at levels one and two.

**Expected Number of Students Taking Module:** 25

**Target Students:** Students in the Schools of Biosciences and Life Sciences.

**Summary of Content:** The module deals with the production and perception of plant signaling molecules. The ways in which these signals are integrated to ensure appropriate responses to environmental conditions or plant pathogen attack are discussed.

## Assessment:

Exam            70%   2 hour exam.

Coursework 30%   1500-word essay. Essay is set at this length because of technical detail required at Level 3 and to give student chance to develop a sufficiently cogent argument with detail.

## General

- 1    Introduction to the module; types of signals and receptors, basic concepts of receptors and signal transduction cascades (RGF).
- 2    Auxin transport and signalling (RS)
- 3    ABA, (MH)
- 4    Ethylene perception and signal transduction (JAR)
- 5    Gibberellic acid signalling (RGF)
- 6    Plant defences – signalling to keep pathogens out (MD)
- 7    Cytokinin (and Brassinosteroids) (RGF)
- 8    Phytochromes and perception and response to light. (RS)
- 9    Signalling in pollen tubes (TPR).  
     Practical (DW)
- 10   Practical (DW)
- 11   Hormone crosstalk: Integration of signalling pathways (RS)  
     Revision and module debriefing (RGF).

**Aims:** The aims are to provide a detailed knowledge of how plants use intercellular and intracellular signalling strategies to provide information about their environment.

Particular emphasis will be placed on the way in which molecular genetics is enabling us to determine the nature of the signals, their perception and the cross-talk that takes place between them. The objectives of this module are: - i. To impart an appreciation of the properties of receptors and the transduction chains activated by them. ii. To illustrate the range of genes induced by signals from other cells and external stimuli and how they differ from other plant genes. iii. To develop a range of transferable skills.

**Learning outcomes:** On Successful completion of the module, students will be able to;

- Compare different mechanisms used by plants to convert a hormone or environmental signal into altered gene expression.
- Evaluate research papers in the general area of plant cell signalling.
- Describe the how plants control the synthesis and turnover of growth regulators.
- Explain how key plant hormones interact to co-ordinate plant growth.
- Discuss the agricultural importance of manipulating plant growth habits.

# D235F5 Molecular Microbiology and Biotechnology

**Module Convenor:** Dr P Hill (Convenor)

[phil.hill@nottingham.ac.uk](mailto:phil.hill@nottingham.ac.uk), **Lecturers:** Dr C Rees, Prof I

Connerton, Prof D Archer, Dr K Mellits **Module Details:** Level 3,

Autumn Semester, 20 credits

**Pre-requisite(s):** D212F7 Microbial Physiology or equivalent.

Students who have not taken this module may be allowed to register if they can demonstrate the essential prerequisite laboratory skills.

**Number of Places:** 30

**Target Students:** Optional for BSc Biotechnology, BSc Microbiology

**Availability to Exchange Students** Yes

**Summary of Content:** The module begins with a review of DNA structure, gene transcription and protein synthesis and will then review gene cloning, protein expression vectors and protein analysis. Advanced aspects of protein expression, stability and secretion are then introduced followed by the application of gene engineering to the biotechnology industry. Finally the practical classes provide some experience of detailed planning and execution of practical molecular bacteriology and give experience of protein over-expression in bacterial and macromolecular separation/analysis. The coursework exercise gives training in manuscript preparation.

**Lecture Programme:** More detailed information will be given in the first session. Topic

- 1 Bacterial/gene transcription and translation
- 2 Cloning in expression vectors
- 3 Protein analysis and macromolecular separation
- 4 Protein structure and protein folding
- 5 Protein stability and gene fusions
- 6 Protein secretion
- 7 Expression in eukaryotic systems
- 8 Protein engineering and biotechnology
- 9 Post-translational modification
- 10 Regulatory constraints and patents

**Non-Lecture Programme:** 1 day per week throughout the semester to include formal lectures (approx 33 h) together with 6 x 4h practical classes during the semester (approx 24 h) and 5 x 2h seminars.

**Assessment:**

Exam 1: 65% 3 hour examination

Coursework 1: 5% Tutorial presentation

Coursework 2: 30% Lab planning exercise - 2 page summary of seminar material plus calculations. Lab report - written in style of research manuscript; 4000 word limit but no minimum length

**Aims:** To enable students to comprehend the opportunities that protein engineering provides in applied microbiology and to appreciate some of the practical limitations associated with technology. Students will gain a detailed understanding of prokaryotic protein expression and examples of its application to biotechnology. Practical classes and seminars will provide an insight into the necessary constraints and practicalities of experimental design and execution. The major coursework assignment introduces students to the rigour required for writing scientific papers.

**Learning Outcomes:**

On successful completion of this module, students will be able to;

- Explain advanced aspects of protein synthesis in bacteria and how bacteria are used to produce recombinant proteins
- Compare the differences between using bacteria or eukaryotic cells for producing recombinant proteins
- Evaluate the most appropriate techniques used for preparation and purification of a particular given protein.
- Design and implement practical experimental procedures for protein expression and purification.
- Prepare scientific manuscripts based on laboratory data appropriate for publication

**RECOMMENDED READING LIST:**

- Instant notes molecular biology / P.C. Turner ... [et al.], 2nd ed. Bios, 2000.
- Lesk, Arthur M. Introduction to protein science : architecture, function, and genomics / Arthur M. Lesk, 2nd ed. Oxford University Press, 2010.
- Price, Nicholas C. Exploring proteins : a student's guide to experimental skills and methods / Nicholas C. Price and Jacqueline Nairn. Oxford University Press, 2009.
- Practical skills in biomolecular sciences / Rob Reed ... [et al.], 3rd ed. Pearson Education, 2007
- Chemistry for the Biosciences: the essential concepts / Jonathan Crowe ... [et al.], Oxford University Press, 2006

**Recommended background reading:** Genes VII (onwards) Lewin Instant Notes in Molecular Biology. Turner et al. Introduction to Protein Architecture, Lesk.

# D236M1 Virology and Cellular Microbiology

**Module Convenor:** Dr Ken Mellits [Ken.Mellits@nottingham.ac.uk](mailto:Ken.Mellits@nottingham.ac.uk)

**Module Details:** Level 3, Spring Semester, 10 credits

**Pre-requisites for admission to the module:** D223F7 Virology, D224F9 Analysis of Bacterial Gene Expression or equivalent. D224F9 Analysis of Bacterial Gene Expression can be substituted with C71GMC Genes, molecules and cells, or C42418 Bacterial Genes and Development

**Co-requisites for the module:** None

**Expected Number of Students Taking Module:** 25

**Target Students:** Food Microbiology and Microbiology. Also for students reading Animal Sciences, Applied Biology, Biotechnology, Food Science and Plant Science

**Availability to Exchange Students** Yes

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** The module will provide an in-depth induction into the relationship of bacterial and viral pathogens and their hosts. This will include an understanding the underlying molecular basis of the adaptive response of bacteria to the host environments and the mechanisms by which bacteria and viruses subvert cellular machinery.

## Assessment details:

Exam 1	70%	90 minutes	1 Hour 30 Mins
Coursework 1	30%	Lab based practical report length (1000 words)	2 x A4
Coursework 2 (formative)	0%	Assessed by Group presentation.	
Coursework 3 (formative)	0%	Assessed by Group presentation.	

**Aims:** The module aims to describe the underlying molecular basis of the adaptive response of bacteria to various environments and to describe the mechanisms by which bacteria and viruses invade eukaryotic cells. In addition students are given experience of literature analysis, preparing material for a problem based learning exercise, to investigate host-pathogen interaction. The practical exercise will provide some experience of designing experimental strategies.

## Learning Outcomes:

- Understand aspects of adaptive and population gene control and sensing in bacteria, in relation to their environment or host cell.
- Understand mechanisms by which bacteria and viruses invade eukaryotic cells, and how they use cellular machinery to their own advantage to infect.
- Acquire basic skill in critical appraisal of data, experimental design strategy, and problem solving for use in group based learning

# D235Z5 Applied Bioethics 1: Animals, Biotechnology and Society

**Module Convenor:** Dr K Millar (Convenor) [kate.millar@nottingham.ac.uk](mailto:kate.millar@nottingham.ac.uk)

**Module Details:** Level 3 Autumn semester, 10 credit

**Pre-requisite(s):** None. **Co-requisite(s):** None.

**Expected Number of Students Taking Module:** 90

**Target Students:** Students in the School of Biosciences.

**Availability to Exchange Students:** Yes

The timetable will be finalised at the beginning of the semester.

**Teaching Staff:** Dr Kate Millar (Centre for Applied Bioethics)

**Summary of Content:** The module consists of lectures and associated seminars on: bioethical theory, research with animals, animal agriculture, applications of modern biotechnology to animals, animals and professional ethics, generic issues concerning: risk, precaution and trust; political dimensions of the biosciences; research bioethics.

**Assessment:**

Exam 1 (60%) 2 hour exam

Coursework 1 (40%) - One 2000-word essay

**Aims:** The module aims to provide students with a sound understanding of widely accepted ethical principles and encourage the application of these insights to the analysis of contemporary issues concerning modern biotechnologies and research in the biosciences, in relation to both humans and non-human species.

The module consists of lectures and associated seminars on: bioethical theory, research with animals, animal agriculture, applications of modern biotechnology to animals, animal and professional ethics, generic issues concerning: risk, precaution and trust; political dimensions of the biosciences; research bioethics.

**Learning outcomes:**

On successful completion of the module, students will be able to:

- Recognise and explain the ethical dimensions of prominent issues raised by animal-human interactions
- Interpret the main ethical theories and principles and apply these to specific animal and biotechnology cases to inform professional decision-making
- Describe and apply ethical frameworks to analyse specific dilemmas raised by the human use of animal

# D236Z6 Applied Bioethics 2: Sustainable Food Production, Biotechnology and the Environment

**Module Convenor:** Dr K Millar (Convenor), [kate.millar@nottingham.ac.uk](mailto:kate.millar@nottingham.ac.uk)

**Module Details:** Level 3, Spring Semester, 10 credit

**Pre-requisites:** D235Z5 Applied Bioethics 1: Animals, Biotechnology and Society. Applied Bioethics 1 except in the exceptional circumstances where the student already has an appropriate academic background.

**Co-requisites:** None.

**Expected Number of Students Taking Module:** 60

**Target Students:** Students in the School of Biosciences.

**Availability to Exchange Students:** Yes subject to appropriate background.

**Summary of Content:** The module consists of lectures and associated seminars on: bioethical theory; the ethical dimensions of the nutritional needs of the global population; ethics of population management, use of new reproductive technologies and development; agricultural practices designed to meet the nutritional needs of the global population (including the use of GM crops); the impacts of agricultural and industrial activities on the sustainability of the global environment

The timetable will be finalised at the beginning of the semester.

**Teaching Staff:** Dr Kate Millar (Centre for Applied Bioethics)

## **Assessment:**

Coursework 1	(50%)	One 2000-word essay
Coursework 2	(30%)	One 1000-word position paper
Oral Assessment	(20%)	Assessed oral presentation

**Aims:** The module aims to provide students with a sound understanding of widely accepted ethical principles and encourage the application of these insights to the analysis of contemporary issues in the agricultural, food and environmental sciences.

## **Learning outcomes:**

On successful completion of the module, students will be able to:

- Recognise and explain the ethical dimensions of prominent issues raised by agricultural practices (including the use of biotechnology) designed to meet the nutritional needs of the global population;
- Demonstrate how ethical theory can inform professional choices and public policies related to food production and environmental management
- Using team-based approaches to apply value-aware communication skills to discuss the ethical dimensions of agriculture and food production
- Set out and support an ethical position on an agricultural or environmental issue by applying arguments that draw on science and ethics literatures



# D23BN3 Molecular Nutrition

**Module Convenor:** Professor Tim Parr (MC) [Tim.Parr@nottingham.ac.uk](mailto:Tim.Parr@nottingham.ac.uk)

**Lecturers:** Dr J Brameld, Dr L Coneyworth, Professor A Salter, Dr S Welham

**Module Details:** Level 3, Year Long, 20 credits

**Pre-requisites:** Biochemistry–The Building Blocks of Life (D21BN2) Principles of Immunology (D223N6)

**Expected Number of Students Taking Module:** 60

**Target Students:** BSc Nutrition (B400)

**Summary of Content:** This module will examine the regulatory effects of nutrients, either directly or indirectly, on cellular signaling processes and gene expression and how this influences metabolism and growth in eukaryotic systems. The mechanisms of controlling gene expression will be described. The module will explore the regulation of signaling processes as well as gene expression and the potential for manipulating metabolic processes through nutrient supply. The module will seek to enable an understanding of the molecular mechanisms by which nutrients regulate cell function, the basis of their effects on whole organisms and how variation in genomic sequence is likely to impact on nutrients' influence on gene expression.

**Timetable:** Typically two or three one-hour timetabled sessions per week consisting of: lectures, tutorials or computer based practical class. Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Lecture Programme:** Lecture programme is provisional and detailed information will be given to you in the first session.

Week	Subject
2	Introduction to module
	Introduction and revision: Regulation of the cellular response
	Molecular nutrition and the health of populations
3	Gene organisation and structure
4	Regulation of gene expression (transcription)
5	Regulation of gene expression (post-transcription)
6	Regulation of gene expression (translation)
7	Techniques for assessing gene expression
8	Introduction to coursework 1: Bioinformatics Introduction lecture and practical computer session
9	Coursework 1: Bioinformatics (practical computer session)
10	Coursework 1: Bioinformatics (practical computer session)
11	Coursework 1: Bioinformatics (additional tutorial)

12	Coursework (student centred study)
	Christmas vacation
19	Introduction to semester 2
	Nuclear Receptors: Vitamins A
	Coursework feedback
20	Nuclear Receptors: Vitamins D
21	Lipids
	Lipids
22	Lipids: Q&A session tutorial
23	Carbohydrates
	Amino acids
24	Carbohydrates & amino acids: Q&A session tutorial
25	Minerals
	Minerals
26	Minerals and vitamins: Q&A session tutorial
	Easter vacation
31	Nutrigenetics & nutrigenomics: Zinc, Nutrigenetics: "Personalised" Nutrition
32	Revision class

### Assessment:

Exam 1	(50%) – 2 hour Computer-based (Rogo) examination
Coursework 1	(50%) – Data interpretation and bioinformatics computer-based exercise including interpretation of experimental data; Computer-based (Rogo) assessment and written assessment (2000 words)

**Aims:** Through the provision of relevant biochemical and molecular biology information, this module aims to enable students to gain an understanding of the regulatory effects of nutrients, either directly or indirectly, on gene expression and how this influences metabolism and growth in eukaryotic systems. To demonstrate through coursework and/or examination an understanding of the factors involved in regulation of signalling processes and gene expression and the potential for manipulating metabolic processes through nutrient supply.

**Learning Outcomes:** On successful completion of the module, students will be able to:

- 1) Explain the structure of the genome and mechanisms by which genes are expressed and translated into proteins
- 3) Explain the molecular mechanisms by which nutrients regulate gene expression.
- 4) Illustrate how experimental methodologies can be used to assess how nutrients influence gene expression.
- 5) Analyse molecular biology and biochemical experimental data generated from experiments examining the effects of a nutrient on gene expression.

**Recommended background reading:**

**The Molecular Biology of the Cell.** Alberts *et al*

The contents of the book are available through the following webpage:

<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowTOC&rid=mboc4.TOC&depth=10>

# C136E6 Environmental Biotechnology

**Module Convenor:** Dr H West [Helen.West@nottingham.ac.uk](mailto:Helen.West@nottingham.ac.uk)

**Module Details:** Level 3, Spring Semester, 10 credits at University Park

**Pre-requisites:** Completed Part 1 year in Environmental Science, Environmental Biology or Biology

**Expected Number of Students Taking Module:** 40

**Target Students:** BSc Environmental Science, BSc Environmental Biology, BSc Biology, BSc Biotechnology. Available to JYA/Erasmus students.

**Summary of Content:** This module provides training in environmental biotechnology, with particular emphasis on the interaction between microorganisms and the environment. The main topics covered will be wastewater treatment, bioremediation of organic and inorganic pollutants, microbes as indicators of risk factors in the environment, microbes in agriculture (biocontrol and biofertilisers) and the role of microorganisms in bioenergy production.. Each topic will be introduced by a formal lecture followed by workshops during which students will study the topics in greater detail through problem-based learning techniques facilitated by the Convenor and by independent research. Knowledge and understanding of the lecture material will be assessed by Rogo examination and students will present the problem based exercises and case studies within an individual portfolio during the final week of the module.

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentsservices](http://www.nottingham.ac.uk/studentsservices)

**Further Activity Details:** Activities may take place every teaching week of the Semester or only in specified weeks. It is usually specified above if an activity only takes place in some weeks of a Semester. 36 hours of lectures and facilitated workshops.

## Assessment Details:

Exam 1            100%   1.5 hour examination

**Aims:** To provide students with a sound understanding of environmental biotechnology; the role of microbes and other organisms in natural processes and their application in waste water treatment, bioremediation processes and bioenergy production.

**Learning Outcomes:** Knowledge and understanding of: - The way microbes interact with the environment - The applied effects of microbes on the environment and on human activity and welfare. Intellectual Skills - the ability to - Critically analyse and interpret published information and data - Understand complex ideas and relate them to specific problems or questions. Professional Skills - the ability to - Work safely in the laboratory and to assess related safety issues Undertake appropriate experimental design and statistical analysis Transferable Skills - the ability to - Work productively with others - Communicate effectively by oral presentation - Manage and manipulate numerical data

# D236Z8 Epigenetics and Development

**Module Convenor:** [Dr Reinhard Stöger](#) [reinhard.stoger@nottingham.ac.uk](mailto:reinhard.stoger@nottingham.ac.uk)

**Lecturers:** Dr Reinhard Stöger      Dr Ramiro Alberio

**Module Details:** A level 3, 10 credit module taught in the Spring Semester at Sutton Bonington. The module consists of lectures and practical classes.

**Expected Number of Students Taking Module:** 30

**Target Students:** Biosciences

**Summary of Content:** This module introduces current concepts of molecular mechanisms in animal development. A goal is to convey how developmental programs are remarkably conserved among species, including humans. Insights gained from molecular studies of the fruit fly, zebra fish and chicken are directly relevant to our understanding of mammalian development. Signals and factors regulating key events in establishing the body plan of an animal are discussed. Epigenetic processes that mediate X-chromosome inactivation and genomic imprinting will be described.

**Timetable:** Two-hour timetabled sessions per week: nine lectures, one practical session and one seminar session. Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Lecture Programme:** Lecture programme is provisional and more detailed information will be given to you in the first session.

- |                                      |                    |
|--------------------------------------|--------------------|
| • Model systems and techniques       | Dr Reinhard Stöger |
| • Segmentation in drosophila         | Dr Reinhard Stöger |
| • Vertebrate segmentation            | Dr Ramiro Alberio  |
| • Practical – chicken embryo culture | Dr Reinhard Stöger |
| • Introduction to Epigenetics        | Dr Reinhard Stöger |
| • X-chromosome inactivation          | Dr Reinhard Stöger |
| • Genomic imprinting                 | Dr Reinhard Stöger |
| • Seminars in epigenetics            |                    |
| • Limb development                   | Dr Reinhard Stöger |
| • Muscle formation                   | Dr Reinhard Stöger |
| • MicroRNA in Development            | Dr Reinhard Stöger |

**Assessment:** (summative) Exam 1 80% 1.5 hours examination. Presentation 20% epigenetics presentations

**Aims:** This module aims to provide students with a detailed understanding of developmental biology and epigenetic regulation in mammalian species and introduces current concepts of molecular mechanisms in animal development. A goal is to convey how developmental programs are remarkably conserved among species, including humans. Insights gained from molecular studies of the fruit fly, zebra fish and chicken are directly relevant to our understanding of mammalian development. Signals and factors regulating key events in establishing the body plan of an animal are discussed. Epigenetic processes that mediate X-chromosome inactivation and genomic imprinting will be described.

**Learning outcomes:** On successful completion a student will be able to:

1. Describe the morphological and phenotypic changes that take place during animal development and how this is regulated by genetic and epigenetic mechanisms
2. Analyse research papers by explaining the data presented and how this informs our

understanding of animal development and epigenetics

3. Interpret morphological changes in embryo development and relate this to published literature
4. Relate how genome level information and changes result in evolution of novel forms and functions

# C135P2 Molecular Plant Pathology

**Module Convenor:** Prof Matthew Dickinson [Matthew.Dickinson@nottingham.ac.uk](mailto:Matthew.Dickinson@nottingham.ac.uk)

**Module Details:** A level 3 course taught in the Autumn Semester at University Park. 10 credits

**Pre-requisite(s):** D224P7 (Plant Pests and Diseases) and/or C12461 (Microbial Biotechnology) recommended but not essential

**Expected Number of Students Taking Module:** 50

**Target Students:** Unrestricted

**Availability to Exchange Students** Yes

**Summary of Content:** This module will cover the molecular techniques being used to develop an understanding of plant/pathogen interactions. It will then cover the molecular biology of plant pathogens, how these cause disease, and the mechanisms used by plants to defend themselves against such pathogens.

**Timetable:** Typically one two-hour timetabled session per week: twenty-two hours of lectures/tutorials, seventy-eight hours of student led studies and revision. Personal timetables will be available to all students via [www.nottingham.ac.uk/student-services](http://www.nottingham.ac.uk/student-services)

**Lecture Programme:** Lecture programme is provisional and more detailed information will be given to you in the first session.

- 1 Introduction and Bacterial diseases I (MD)
- 2 Bacterial diseases continued (MD)
- 3 Plant viruses (MD)
- 4 Fungal diseases (MD)
- 5 Fungal diseases (John Lucas)
- 6 Fungal genetics (MD) and Fungal sex (Paul Dyer)
- 7 Tutorial session
- 8 Resistance genes (MD)
- 9 Signalling in disease resistance and Systemic resistance
- 10 Diseases in natural plant populations and crops
- 11 Module review and revision session

**Assessment:** Exam 1 100% 2 hour examination.

**Aims:** This module will explore the modern molecular techniques being used to investigate plant/microbe interactions and will examine the way in which pathogens cause disease and the means by which plants defend themselves.

**Learning outcomes:** On successful completion of this module, students will be able to:

- Describe the current models for how plant pathogens cause disease.
- Relate knowledge of pathogens to how plants defend themselves against disease.
- Explain the molecular basis of plant pathogen interactions.
- Evaluate and critically assess recent research in plant pathogen interactions.

**Recommended background reading:** Dickinson M (2003) Molecular Plant Pathology BIOS Scientific Publishers. Lecturers will provide information on the best reviews and primary sources for the information that they cover in their lectures as the module progresses.

# D236P4 Sex, Flowers and Biotechnology

**Module Convenor:** Prof ZA Wilson (convenor) [Zoe.Wilson@nottingham.ac.uk](mailto:Zoe.Wilson@nottingham.ac.uk)

**Lecturers:** Dr D Dietrich, Dr RG Fray, Dr TP Robbins

**Module Details:** level 3, Spring Semester, 10 credit

**Pre-requisites:** A suitable range of plant science and genetic modules in previous semesters.

**Availability to Exchange Students** Yes

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** The processes of floral development and reproduction are some of the most critical stages occurring during plant growth and development. They are fundamental for plant breeding, crop productivity and horticulture. The significance of plant reproduction is particularly pertinent to issues of food security and the future development of high yielding crops. This module will focus on recent developments that have been made in the understanding of floral development, reproduction and seed production. Topics will focus on how such processes can be manipulated for commercial exploitation and to provide an understanding of the current goals, methods and achievements in the genetic engineering of crop and horticultural plants.

## Lecture Programme

- 1 The goals and problems for plant biotechnology- how can we achieve food security? The importance of flowering and fruiting in crop production. (ZAW)
- 2 Genetic control of floral initiation 1: Flowering time signals: the influence of environmental stimuli. (ZAW)
- 3 Genetic control of floral initiation 2: Vernalization and epigenetic control of flowering. (ZAW)
- 4 Floral development and floral organ identity genes: Homeotic mutants and models of flower development in *Arabidopsis* and *Antirrhinum*. (TPR)
- 5 Cell and Molecular Biology of sexual reproduction in plants. (ZAW)
- 6 Applied aspects of flowering and reproduction: Pollen development and male sterility in plant breeding and commercial production of hybrid seed. (ZAW)
- 7 Molecular basis of self-incompatibility in gametophytic and sporophytic systems. Model systems for the study of cell-cell signalling in plants: the RNase system of *Solanaceae*; receptor kinases in Brassica. (TPR)
- 8 Student Seminars: Small group presentations relating to key areas of plant developmental biology. (ZAW)
- 9 Floral senescence and cell death: Processes associated with programme cell death during plant reproduction. (ZAW) Seed development and germination. Hormonal aspects of regulation of seed development. (DD)
- 10 Physiological, biochemistry and molecular biology of fruit ripening. (RF)

**Coursework:** A small group assessed (10%) presentation of library work. Assessed (15%) journal style reviews (1000 words) summarising the individual group's presented topic.

**Assessment:** 2-hour written examination (75%) Answer 2 essay style questions out of 5 in 2 hours. Continuous assessment (25%) see coursework.

Exam 1	75%	2-hour examination.
Coursework 1	25%	15-20 minute group presentation



**Aims:** Advances in molecular biology and genetics have provided the basis for improving crop quality and performance. This module will explore recent innovative research in plant developmental biology and genetics, and demonstrate how such processes can be manipulated to optimise horticultural and crop production. Particular emphasis will be placed on floral and reproductive pathways in higher plants and how such information can be utilised to minimise the ecological impact of genetically modified crops. The significance of plant reproduction is particularly pertinent to issues of food security and the future development of high yielding crops.

**Learning outcomes:** On successful completion of this module, students will be able:-

- 1) To demonstrate knowledge and understanding of the fundamental principles and practices that underpin plant reproductive development.
- 2) Synthesise specialist information focusing on floral and reproductive development and its biotechnological applications.
- 3) Develop an appreciation of the targets of the Agro-industry and the approaches that can be used to meet these targets.
- 4) To communicate effectively knowledge of different aspects of floral and reproductive development.

# D236A3 Current Issues in Crop Science

**Module Convenor:** Dr MJ Foulkes [John.Foulkes@nottingham.ac.uk](mailto:John.Foulkes@nottingham.ac.uk)

**Lecturers:** plus various speakers from industry and research. Dr S Ramsden

**Pre-requisites:** D223P9 Applied plant physiology: from cell to crop

**Module Details:** Spring, 10 credit module.

**Expected Number of Students Taking Module:** 20

**Availability to Exchange Students** Yes

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/student-services](http://www.nottingham.ac.uk/student-services)

**Summary of Content:** This integrative module considers future options and possible strategies for crop production in UK and world agriculture. Students are introduced to a number of issues that have current or possible future impacts on crop production systems and the environment. Examples of issues that will be addressed include: the future of genetically modified crops, impact of crop production on biodiversity and prospects for organic crop production. The content will change every year to reflect current issues in crop science. This module is suitable for students interested in applied plant science, crop science agriculture and the environment.

Changes to the module introduced this session: The content will change each year depending on current issues.

**Lecture Programme: (provisional)** Introduction to the module and course work. Impact of crop production on biodiversity. The future of genetically modified crops. Prospects for organic crop production. Climate change. Energy crops. Biological control in cropping systems

## **Non- Lecture Programme:**

Week 9 Paper review exercise

Week 11 Research and presentation exercise

**Coursework:** This module is assessed entirely by coursework: essay 40%, paper review 30%, research and presentation exercise 30%.

## **Assessment:**

Coursework 1 100% Essay 2000 words.

Coursework 2 Paper review exercise 10 minute presentation individually (formative exercise, not assessed).

Coursework 3 Research and presentation exercise - 20 minute presentation in pairs (formative exercise, not assessed).

**Aims:** To raise awareness of students to current issues in crop science. To enable students to analyse the advantages and disadvantages of a range of current and future developments in crop science.

**Learning Outcomes:** Knowledge and Understanding - to learn of 1) Appropriate terminology and nomenclature to appreciate and express knowledge of contemporary issues in crop science 2) A diverse range of the essential information, major concepts, principles and theories associated with current issues in crop science, including genetically modified crops, organic production, biodiversity 3) The latest trends and

developments within crop science, and the philosophical, ethical and policy issues associated with them 4) The ability to acquire, interpret and critically analyse biological and/or management data and information data derived from a variety of sources.

**Intellectual Skills** - the ability to 1) Recognise and use appropriate theories, concepts and principles from a range of relevant disciplines and use these to critically analyse current issues associated with crop science 2) Collect and integrate several lines of evidence and apply them in a balanced manner to support an argument, taking ethical considerations into account where appropriate 3) Apply subject knowledge and understanding to address familiar and unfamiliar problems 4) Critically analyse, synthesise and summarise information drawn from various sources, including published research papers and reports 5) Demonstrate the provisional nature of facts and principles associated with the latest developments within crop science.

**Practical/Professional Skills** - the ability to 1) Collect, record and analyse information and data in the library, and to summarise it using appropriate techniques.

**Transferable/Key Skills** - the ability to 1) Communicate accurately, clearly, concisely and confidently to a variety of audiences in written, verbal and visual form 2) Work productively as an individual or as part of a team including identification, allocation and assessment of individual and collective roles and responsibilities 3) Listen to, appreciate and evaluate views of others and contribute to group discussions 4) Manage and organise time efficiently and work to deadlines by using flexible and effective approaches to study 5) Process, analyse and present data using a variety of methods, including the use of computer based information handling and data processing tools where appropriate 6) Use the internet and other electronic means critically for communication and as a source of information.

**Recommended Reading:** The nature of this module means that there are no key texts associated with it. However, students will be expected to read widely around the issues discussed. It will be particularly important for students to be aware of recent publications, both in terms of refereed papers and of articles in New Scientist etc.

**Reading List:** To be given to students at the beginning of the module.

# D23BA7 Genetic Improvement of Crop Plants

**Module Convenor:** Dr Sean Mayes [Sean.Mayes@nottingham.ac.uk](mailto:Sean.Mayes@nottingham.ac.uk)

**Module Details:** Level 3 Autumn and Spring, 20 credits

**Target Students:** Students registered on the undergraduate courses Students interested in Plant Breeding and biotechnology

**Summary of Content:** The genetic improvement of crop plants is critical to address issues of food security for a growing world population. It is also the key to tackling environmental degradation and to meeting the increasing strict regulations on agricultural pollution which are coming into force in many Western countries. While these issues are not identical, they are linked and efficient plant breeding can be part of the solution to both. The module will use lectures, case and literature studies, research plan presentations, external expert seminars and practical exposure to crop breeding and molecular techniques to provide a firm basis for future crop breeding. The emphasis is the application of Biotechnology to conventional breeding, but the place of Genetic Modification in the genetic improvement of crops is also addressed. Crops covered include temperate and tropical, annual and perennial, in-breeding and out-breeding with emphasis on how genetic improvement will be achieved in the near future, while recognising the potential of novel techniques and the existence of varying priorities, in the face of a changing climate.

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/student-services](http://www.nottingham.ac.uk/student-services)

## Lecture Programme: Example:

Week	SUBJECT	LECTURER
1	GMOs: ethics, commercial interests, consumer concern and environmental impact.	TBC
2	Engineering transgenic plants: transgene delivery strategies.	RS
3	Expressing transgene products in chloroplasts.	RGF
4	Post-transcriptional regulation of gene expression.	RGF
5	Revision	RGF

**Teaching Staff:** Mike Holdsworth (MH), John Foulkes (JF), Erik Murchie (EM); Tim Robbins (TM); Mike Davey (MD); Rumiana Ray (RR); Martin Broadley (MB); Debbie Sparkes (DS); Martin Blythe (MBI) (PM) Penny Maplestone (British Society of Plant Breeders); (DF) David Feuerhelm (Syngenta seeds); Alastair Clemence (Consultant on GM regulation)

## Assessment Details:

Exam 1	45%	2 Hour examination- Spring semester
Practical	25%	Lab amplification of marker loci in a wheat population, write up and analysis (max 1500 words)
Presentation	30%	Groups investigate a topic in genetic improve and report a 20 minute presentation to the wider group and assessors, plus a one-page executive summary.

**Aims:**

To provide students with an understanding of crop genetic improvement through lectures, practicals and case studies

To provide students with an appreciation of how modern and technological approaches can enhance crop breeding programmes and be able to assess the limitations of these approaches

To give students the intellectual and practical skills to form a basis for a potential career in biotechnology as applied to crop breeding.

**Learning Outcomes:** On successful completion of this module, students will be able to

Explain the domestication of crops, the genetics of traits and how crops are bred.

Describe the application of molecular markers as a way to assist crop breeding and their use for the development of genetic maps.

Identify major traits and issues which will need to be tackled by crop breeding and improvement.

Compare multiple approaches that are currently being used in genetic improvement programmes.

Test the use of genetic markers for genetic linkage in wide cross mapping populations.

# C13594 Gene Regulation

**Module Convenor:** Dr A Chambers

**Module Assessment Period:** Autumn, assessed by end of autumn semester

**Target Students:** Final year students taking Genetics, Human Genetics, Biochemistry and Genetics degrees.

**Total credits:** 10

**Level:** 3

**Pre-requisite(s):** C42418 Bacterial Genes and Development is desirable.

**Number of Places:** 80

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

## Summary of Content:

This module will deal with the mechanisms through which eukaryotic genes are expressed and the ways in which the expression of genes is modulated. Gene regulation at different levels and by distinctive mechanisms will be illustrated by detailed consideration of examples drawn from a variety of eukaryote models. Particular emphasis will be placed on recent research into the molecular details of transcriptional control in yeast and post-transcriptional control in multicellular eukaryotes.

**Lecture Programme:** Lecture programmes will be given to Students at the beginning of module.

## Practical Class Programme:

Lecture 1 per week, 3 hours, centrally.

## Assessment:

Exam 1 (100%) - 2 hour exam

## Aims and Objectives:

To explain and explore the mechanisms through which eukaryotic genes are expressed and the ways in which their expression is modulated.

## Learning outcomes:

Knowledge and understanding: A5 This module addresses in detail the mechanisms underpinning gene expression in eukaryotes. A6 This module addresses the development of novel techniques and approaches in the field of molecular genetics relevant to research into the mechanisms of gene control

Intellectual skills: B1 This module involves critical evaluation of research literature through directed reading. B3 Understanding complex ideas regarding the molecular functioning of the gene expression apparatus and relating these to examples of gene control.

Transferable/key skills: D4 Accessing the support material for the module involve using and accessing information and communication technology.

## Recommended Reading/Resources:

Appropriate Lecture Theatre

# F13CBE Chemical Biology and Enzymes

**Module Convenor:** Professor P Soultanas

**Module Assessment Period:** Autumn, accessed by end of autumn semester.

**Target Students:** FC1R, CF71, C720 C721. Optional for C700. F101 students need to consult with the Module Convenor in the first instance.

**Total credits:** 10

**Level:** 3

**Pre-requisite(s):** Any F101 student wishing take this Module must first discuss it with the Module Convenor (Prof Panos Soultanas) to confirm they are fully aware of the background Biology required. Anyone who does not do this may have their registration of the Module revoked.

**Number of Places:** 96

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** This module develops an understanding of the nature and structure of enzymes, the characteristics of enzyme catalysed reactions and their inhibition. The mechanisms of action and structures of specific proteases, DNA helicases (PcrA, DnaB and RecBCD), translocases, recombinases and molecular motors, FoF1ATPase and Rho transcriptional terminator are covered. Experimental methodology in biochemistry, molecular biology and chemical biology for cloning genes, expressing proteins in bacteria, strategies for purifying proteins, protein engineering through mutagenesis procedures, N-terminal protein sequencing, protein electrophoresis, determination of protein concentrations, probing biomolecular interactions, assaying the activity of ATPases, protein structure determination (X-ray crystallography and protein NMR) and the use of a range of biophysical techniques. At the end of the module the students should have an understanding of the basic principles of: protein expression, mutagenesis and purification, yeast two and three hybrid technology (Y2H, Y3H), equilibrium sedimentation and velocity sedimentation ultracentrifugation techniques, phage display, surface plasmon resonance (SPR), fluorescence resonance energy transfer (FRET), ATPase assays, microarrays, protein NMR and X-ray crystallography. The students should be able to understand the applications of the above technologies in life science research.

**Lecture Programme:** Lecture programmes will be given to Students at the beginning of module.

**Practical Class Programme:**

**Assessment:** Exam 1 written (Compulsory) 100% three hour exam, short/medium questions 3 hours.

**Aims and Objectives:** Students should gain a good appreciation of the applications for a range of enzymological, chemical and molecular biological techniques to probe cellular processes and catalysis at the forefront in Chemical Biology research. This module represents a culmination of principles and techniques from a biophysical, molecular, biochemical and genetic perspective.

**Learning outcomes:** At the end of the module, a student should:

- 1) Be able to calculate protein concentrations of protein solutions spectrophotometrically.

- 2) Understand the principles behind the use of pET vectors for heterologous expression of proteins.
- 3) Appreciate the different expression systems available and understand the challenges behind expressing proteins heterologously in *Escherichia coli*.
- 4) Be able to devise basic protein purification protocols based upon the properties of individual proteins.
- 5) Understand the basic principles of biophysical techniques used to study molecular interactions.
- 6) Differentiate between velocity and equilibrium ultracentrifugation experiments.
- 7) Understand the principles behind crystallography and NMR for determination of protein structure.
- 8) Understand how the Michaelis-Menten equation is derived and how to produce Lineweaver-Burk plots for reversible inhibitors.
- 9) Differentiate between competitive and irreversible mechanism based inhibition.
- 10) Gain an understanding of the structure and nature of enzymes and how they are classified.
- 11) Appreciate the structure/function relationships that underpin enzymatic activities.
- 12) Appreciate the molecular mechanisms that motor enzymes like DNA helicases and RecBCD use to convert chemical energy into mechanical motion.
- 13) Understand the enzymatic mechanisms used to cleave the peptide bond.
- 14) Understand the enzymatic molecular mechanism of ATP synthesis.



# C135E9 Computer Modelling in Science: Applications

**Module Convenor:** Dr Dov Stekel [Dov.Stekel@nottingham.ac.uk](mailto:Dov.Stekel@nottingham.ac.uk)

**Module Details:** Level 3, Autumn Semester, 20 credits

**Pre-requisites:** D224E4

**Expected Number of Students Taking Module:** 40

**Target Students:** All School of Biosciences and Natural Sciences students and Ningbo 2+2 Environmental Sciences students (based in Geography).

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Lecture Programme:** All teaching will be mixed mode (lecture/computer practical) in computer rooms. Lecture programme is provisional and more detailed information will be given to you in the first session.

11. Module introduction and Jupyter (Stekel)
12. Python and image processing (French)
13. Image processing (French)
14. Image processing (French)
15. Spatial modeling introduction (Band)
16. Multiscale modeling (Band)
17. Steady states (Stekel)
18. Spatial modelling (Stekel)
19. Fitting models to data (Stekel)
20. Fitting models to data (Stekel)

**Summary of Content:** The use of computer-based models has become widespread in the biological and environmental sciences. This module contains the development and application of models in the context of biological and environmental sciences. Fundamental methods (e.g. model building, solution of differential equations, steady state analysis, fitting models to data, use of empirical models) are introduced and applied to a number of example applications. The examples include pollutant transfer and fate, population dynamics, protein synthesis, molecular switches and epidemics of humans and animals. Practical work is undertaken using modelling software to illustrate key aspects of the module. The module is designed for students with relatively little mathematical or computing experience or confidence and is an ideal opportunity to develop a knowledge of applying mathematical skills in an environmental science context.

## Assessment:

Practical	40%	Patchwork Assessment (Parts 1 and 2)
Practical	60%	Patchwork Assessment (Parts 3, 4 and 5)

**Aims:** The aim of this module is to show the range of techniques for computer-based models applied to the biological and environmental sciences using suitable important examples

**Learning Outcomes:** A student who has successfully completed this module should be able to:

- (i) Understand and articulate the relevance of computer-based mathematical models to a range of applications in the biological and environmental sciences.
- (ii) Construct a simple model from a description of the processes in a biological or environmental system.
- (iii) Simulate simple and complex models using appropriate computer software.
- (iv) Use appropriate computer software to fit simple models to data.
- (v) Critically evaluate a model and its simulation results in the context of the environmental and biological science underpinning the model.
- (vi) Write appropriate computer programs to carry out image processing for biological and environmental images.

**Reading List:** To be given to students at the beginning of the module.

# C135P3 Basic Introduction to Omic Technologies

**Module Convenors:** Prof Zoe A Wilson [Zoe.Wilson@nottingham.ac.uk](mailto:Zoe.Wilson@nottingham.ac.uk)

**Total Credits:** Level 3 Autumn Semester, 10 credits

**Co-requisite(s):** None.                    **Pre-requisite(s):** None

**Expected Number of Students Taking Module:** 15

**Target Students:** Available to JYA/Erasmus students.

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Module Details:** Over the past few years major developments have been made regarding the study of genomes. Sequencing programmes now mean that the complete DNA sequence is now known for many species. Such information is revealing the high degree of similarity and conservation between different species and organisms, which in turn is revolutionising the way in which gene function analysis is carried out. An extensive range of post-genomic technologies have been established based on this information and these are revolutionising the analysis that is possible.

This module will provide a basic overview of recent research in the field of “omics” with emphasis on genomics, proteomics and metabolomics. Case studies will be presented detailing how different approaches have been used to study genomes and how such developments are influencing the way genetic analysis and biotechnological improvement can be made. Particular emphasis will be paid to the importance of bioinformatics and IT in the study of genomes and the commercial biotechnological applications of gene isolation. Hands-on experience of these approaches will be provided via problem-based lab and computer training sessions.

## **Assessment Details:**

Exam 1	50%	1.5-hour written examination (2 questions from 4)
Coursework 1	50%	An assessed report based on the transcriptomic and database practicals

**Aims and Objectives:** To introduce the student to the fields of genomics, transcriptomics, metabolomics, proteomics and bioinformatics. Particular focus will be the use and application of bioinformatics for understanding of the functional roles of genes, metabolites and proteins and how they can be analysed using a variety of new technologies e.g. Deep Sequencing, proteomics, mass spectrometry, transcriptomics.

**Learning Outcomes:** On successful completion of this module, students will be able:-  
1) To demonstrate knowledge and understanding of the fundamental principles and practices that underpin genomics, proteomics and metabolomics, and their biotechnological applications. 2) To evaluate current research in -omics and related biotechnological disciplines. 3) To acquire substantial quantities of information systematically and process it selectively and effectively. 4) To discriminate between the different approaches and techniques used in the genomics, proteomics and metabolomics 5) To develop ideas and opinions through the use of information from a wide variety of sources. 6) To communicate effectively knowledge of different -omic technologies and their applications

# N13330 Technology Entrepreneurship in Practice

**Module Convenor:** Dr H Noke

**Module Assessment Period:** Spring (Default) Assessed by end of Spring Semester

**Target Students:** Available to all Part I and Part II students.

**Total credits:** 10

**Level:** 3

**Number of Places:** N/A

**Timetable:** Personal timetables will be available to all students via [www.nottingham.ac.uk/studentservices](http://www.nottingham.ac.uk/studentservices)

**Summary of Content:** This module aims to provide students with the skills, knowledge and practical experience required to respond to the challenges involved in managing, commercialising and marketing technological innovation and new business development.

**Lecture Programme:** Lecture programmes will be given to Students at the beginning of module.

**Practical Class Programme:**

Lecture 1 1hr 30min

Seminar 1 1hr 0min

Further Activity Detail: 11 ninety-minute lectures; 2 one-hour seminars. Please note all non-lectures will be timetabled in the Business School

**Coursework:**

Coursework 1 50% One 2,000 word individual essay

**Assessment:**

Coursework 1 50% One 2,000 word individual essay

Project 1 35% Group presentation of a Business Plan

Project 2 15% Individual assessment of presentation skills

**Aims and Objectives:** This will introduce the process of commercialising for science and technology. Commercialisation deals with developing intellectual property within the science and technology domain to a point where it is ready to enter the market. An ever increasingly important activity where Government and business is placing much importance on the wealth creation.

**Learning outcomes:**

*Knowledge and understanding*

This module develops a knowledge and understanding of:

- The development, access and operation of markets for resources, goods and services
- The sources, uses and management of finance
- The management of resources
- The comprehension and use of relevant communications for application in business and management, including the use of digital tools

- The development of appropriate policies and strategies within a changing environment to meet stakeholder interests
- The need for individuals and organisations to manage responsibly and sustainably and behave ethically in relation to social, cultural, economic and environmental issues
- The different approaches for segmentation, targeting, positioning, generating sales and the need for innovation in product and service design
- Taking innovative business ideas to create new products, services or organisations including the identification of Intellectual Property and appreciation of its value
- Intellectual property and its exploration, sources of investment for high technology companies, commercial strategies.

Key components in the development of a business plan.

#### *Intellectual skills*

This module develops:

- The ability to analyse facts and circumstances to determine the cause of a problem and identifying and selecting appropriate solutions
- The ability to analyse and evaluate a range of business data, sources of information and appropriate methodologies, which includes the need for strong digital literacy, and to use that research for evidence-based decision-making

#### *Professional practical skills*

This module develops:

- People management, to include communications, team building, leadership and motivating others
- Commercial acumen based on an awareness of the key drivers for business success, causes of failure and the importance of providing customer satisfaction and building customer loyalty
- The ability to act entrepreneurially to generate, develop and communicate ideas, manage and exploit intellectual property, gain support and deliver successful outcomes
- Presentation skills - developing a pitch for investment.

#### *Transferable (key) skills*

This module develops:

- Communication and listening including the ability to produce clear, structured business communications in a variety of media
- An awareness of the interpersonal skills of effective listening, negotiating, persuasion and presentation and their use in generating business contacts
- Self-management and a readiness to accept responsibility and flexibility, to be resilient, self-starting and appropriately assertive, to plan, organise and manage time
- Ability to work with people from a range of cultures
- Articulating and effectively explaining information
- Building and maintaining relationships
- Emotional intelligence and empathy

#### **Recommended Reading/Resources:**

Adequate resources are available

## 30 MyNottingham Terminology

The University of Nottingham is introducing a new student records system across its campuses in the UK, Malaysia and China. Students will access the new system through a web portal called **MyNottingham**.

When **MyNottingham** is launched in the UK it will introduce some new terminology that you will need to understand and become familiar with. The guide below has been developed to help prepare you for this change. You will receive more information about MyNottingham and what this means for you before we launch the system to UK students.

<b>MyNottingham Language</b>	<b>Current Language</b>	<b>Definition</b>	<b>Examples</b>
<b>Academic Plan</b>	<b>Course or Programme of Study</b>	An approved plan of study that provides a coherent learning experience and leads to a qualification.	BSc Nursing – Adult; Chemical Engineering MEng; Music and Philosophy BA; Brewing Science MSc; Law with French and French Law BA.
<b>Accommodation</b>	<b>Reasonable adjustment</b>	Learning adjustments for a student's particular circumstances (not a reference to living accommodation).	Alternative examination arrangements.
<b>Advisee</b>	<b>Tutee/ Student</b>	A student receiving advice from a tutor, supervisor or advisor.	N/A.
<b>Career</b>	No direct equivalent	Qualification level.	Undergraduate, Postgraduate.
<b>Class</b>	No direct equivalent	An umbrella term for specific units of teaching.	Lectures, seminars or labs.
<b>Course</b>	<b>Module</b>	A self-contained, formally-structured unit of study, with a coherent and explicit set of learning outcomes and assessment criteria.	Applied Ethics, Advanced Financial Economics, Biochemistry of Disease, Public Health and Epidemiology.
<b>eDocs</b>	No direct equivalent	Electronic document repository for documents that are uploaded and attached to a student record	Evidence in support of an extenuating circumstances claim etc.
<b>Financial Aid</b>	No direct equivalent	An umbrella term for any scholarships, stipends or other funding awards given to students.	Core bursaries, Aspire scholarships, industry scholarships etc.
<b>Session</b>	No direct equivalent	A specific teaching period, usually one semester but other defined teaching periods may exist.	Autumn Semester, Spring Term etc.
<b>Term</b>	<b>Academic Year</b>	A defined period of time, refers to the academic year, which runs from September to August.	September 2017 to August 2018.

## 31 Appendices

- 1 Qualitative Assessment Criteria - General Guidelines for Examinations\*
- 2 Qualitative Assessment Criteria - General Guidelines for Essays & Reports\*
- 3 Qualitative Assessment Criteria - General Guidelines for Posters\*
- 4 Qualitative Assessment Criteria - General Guidelines for Oral Presentations\*
- 5 Qualitative Assessment Criteria – Research Project Experimental Work\*
- 6 Progression and Compensation Charts
- 7 Marking at Different Levels within Degree Programmes
- 8 School of Biosciences Tutoring Statement

\*Marking schemes may be subject to change 2017/18, students will be notified in advance of any changes

# Appendix 1

QUALITATIVE ASSESSMENT CRITERIA – GENERAL GUIDELINES FOR ESSAYS & REPORTS		
CLASS	%	
First		
<b>A1</b>	100	a. Excellent report structure with professional presentation of figures, tables, diagrams, references etc.; evidence of originality/novelty in presentation.
<b>A2</b>	90	b. Deep understanding of subject; all arguments carefully developed and clearly expounded.
<b>A3</b>	80	c. Considerable and effective use of literature information, beyond that supplied as taught material.
<b>A4</b>	73	d. Clear evidence of critical thinking, originality and novelty.
Upper Second		
<b>B1</b>	68	a. Well organised report; appropriate choice of illustrative figures, tables, diagrams etc.; clearly presented throughout.
<b>B2</b>	65	b. Sound grasp of subject material; generally logical arguments.
<b>B3</b>	62	c. Reasonable evidence of wider study beyond lecture material.
		d. Some evidence of independent thinking and originality.
Lower Second		
<b>C1</b>	58	a. Generally clear report conforming with accepted format but with some errors in style and/or omissions in presentation of illustrative figures.
<b>C2</b>	55	b. Reasonable understanding of subject material, but some flaws in the logic of arguments and factual errors.
<b>C3</b>	52	c. Only limited evidence of wider study and use of literature information.
		d. Very little evidence of independent thinking or originality.
Third		
<b>D1</b>	48	a. Little attention given to report structure; limited use of illustrative figures, tables etc.; serious flaws in presentation.
<b>D2</b>	45	b. Limited understanding of subject; considerable factual errors demonstrated.
<b>D3</b>	42	c. Virtually no inclusion of literature information beyond lecture material.
		d. Virtually no evidence of independent thinking or originality.
Soft Fail		
<b>E</b>	35	a. Very poorly structured; disorganised; missing sections; minimal presentation of supporting data, figures etc.
		b. Minimal understanding of subject; serious factual errors; general lack of any logical arguments.
		c. Virtually no inclusion of literature information.
		d. No evidence of independent thinking or originality.
Fail		
<b>F1</b>	25	Very poor coverage of material with little information that is relevant.
		Virtually no evidence of understanding the question; minimal attempt to provide a structured answer.
Fail		
<b>F2</b>	10	A few lines of relevant material
Fail		
<b>F3</b>	0	No relevant material

1. Only broad classes (A,B,C,D and E) have qualitative criteria attached; the division into (e.g.) C1, C2, C3 etc. is at the discretion of the examiner.
2. The qualitative criteria include consideration of :
  - a. The quality of the report/essay etc. - the use of sections; diagrams; figures etc.; citation of references; general neatness etc.
  - b. Student's knowledge of subject; depth and quality of answer.
  - c. Evidence of reading / study beyond regurgitation of standard taught material.
  - d. Independent or critical thinking / originality etc.



## Appendix 2

CLASS	%	QUALITATIVE ASSESSMENT CRITERIA - GENERAL GUIDELINES FOR EXAMINATIONS
First		
<b>A1</b>	100	a. Deep understanding of subject; carefully balanced arguments clearly presented; all material highly relevant to the question.
<b>A2</b>	90	b. Considerable and effective use of literature information, beyond that supplied as taught material.
<b>A3</b>	80	c. Clear evidence of critical thinking, originality and novelty
<b>A4</b>	73	d. Excellent structure and good use of illustrative diagrams etc.; evidence of originality/novelty in presentation.
Upper Second		
<b>B1</b>	68	a. Sound grasp of subject material; presentation of logical arguments relevant to the question.
<b>B2</b>	65	b. Reasonable evidence of wider study beyond lecture material.
<b>B3</b>	62	c. Some evidence of independent thinking and originality.
		d. Well organised answer; appropriate use of illustrative diagrams; clear presentation.
Lower Second		
<b>C1</b>	58	a. Reasonable understanding of subject material, but some flaws in the logic of arguments and factual errors; possibly some irrelevant material.
<b>C2</b>	55	b. Only limited evidence of wider study and use of literature information.
<b>C3</b>	52	c. Little evidence of independent thinking or originality.
		d. Fairly clear presentation; generally conforming with accepted format but with some flaws in style; little use of illustrative diagrams.
Third		
<b>D1</b>	48	a. Limited understanding of subject; numerous flaws in the logic of arguments; considerable factual errors and/or irrelevant material.
<b>D2</b>	45	b. Virtually no inclusion of literature information beyond lecture material.
<b>D3</b>	42	c. Virtually no evidence of independent thinking or originality.
		d. Little attention given to structure; very limited use of illustrative diagrams; serious flaws in presentation.
Soft Fail		
<b>E</b>	35	a. Minimal understanding of subject; serious factual errors; general lack of any logical arguments; considerable amount of irrelevant material.
		b. Virtually no inclusion of literature information.
		c. No evidence of independent thinking or originality.
		d. Very poorly structured answer; disorganised and untidy; missing sections; virtually no use of illustrative diagrams.
Fail		
<b>F1</b>	25	Insubstantial answer; very poor coverage of material with little information that is relevant. Virtually no evidence of understanding the question and minimal attempt at structure
Fail		
<b>F2</b>	10	A few lines of relevant material
Fail		
<b>F3</b>	0	No relevant material

- Only broad classes (A,B,C,D and E) have qualitative criteria attached; the division into (e.g.) C1, C2, C3 etc. is at the discretion of the examiner.
- The qualitative criteria include consideration of :
  - Student's knowledge of subject; depth, relevance and quality of answer.
  - Evidence of reading / study beyond regurgitation of standard taught material.
  - Independent or critical thinking / originality etc.
  - The quality of presentation - structure of answer, the use of sections; diagrams etc., general neatness etc.

# Appendix 3

CLASS	%	QUALITATIVE ASSESSMENT CRITERIA - GENERAL GUIDELINES FOR POSTERS
First		
<b>A1</b>	100	a. Excellent use of headings, text appropriate size, figures and diagrams clear and well-labelled, very easy to follow progression of poster theme.
<b>A2</b>	90	b. Visually very attractive and creative.
<b>A3</b>	80	c. Factually very accurate and informative with clear evidence of extensive knowledge of published literature.
<b>A4</b>	73	d. All relevant aspects of own data presented, where inclusion is appropriate.
Upper Second		
<b>B1</b>	68	a. Good use of headings, text of appropriate size, some loss of figure clarity or slight errors in labelling, easy to follow progression of poster theme.
<b>B2</b>	65	b. Visually quite attractive and creative.
<b>B3</b>	62	c. Factually accurate and informative with some evidence of knowledge of published literature.
		d. Most relevant aspects of own data presented, where inclusion is appropriate
Lower Second		
<b>C1</b>	58	a. Adequate use of headings, text a little too small, figures not clear and inadequately labelled, more difficult to follow progression of poster theme.
<b>C2</b>	55	b. Visually unstimulating.
<b>C3</b>	52	c. Some factual inaccuracies with only limited evidence of knowledge of published literature.
		d. Several aspects of own data omitted, where inclusion is appropriate.
Third		
<b>D1</b>	48	a. Very poor use of headings, text too small or hand-written, figures unclear and unlabelled, no obvious progression of poster theme.
<b>D2</b>	45	b. Visually unattractive and dull.
<b>D3</b>	42	c. Many factual inaccuracies with very limited evidence of knowledge of published literature.
		d. Most of own data omitted, where inclusion is appropriate.
Soft Fail		
<b>E</b>	35	a. No headings used and poster somewhat disorganised.
		b. Visually unattractive and dull.
		c. Inaccurate with virtually no evidence of knowledge of published literature.
		d. None of own data included.
Fail		
<b>F1</b>	25	a. No headings used and poster very disorganised and difficult to understand.
		b. Visually very unattractive and dull.
		c. Inaccurate with no evidence of knowledge of published literature.
		d. None of own data included.
Fail		
<b>F2</b>	10	A few lines of relevant material presented
Fail		
<b>F3</b>	0	No poster presented

1. Only broad classes (A,B,C,D and E) have qualitative criteria attached; the division into (e.g.) C1, C2, C3 etc. is at the discretion of the examiner.

2. The qualitative criteria include consideration of :

- Structure and organisation of the poster.
- Visual impact and attractiveness.
- Accuracy and completeness of the content.
- Where appropriate, inclusion of students' own experimental data.

# Appendix 4

QUALITATIVE ASSESSMENT CRITERIA - GENERAL GUIDELINES FOR ORAL PRESENTATIONS		
<b>CLASS</b>	<b>%</b>	
First		
<b>A1</b>	100	a. Clearly audible, well-paced presentation delivered without obviously reading from notes in the time allocated. Addressed to the audience.
<b>A2</b>	90	b. Very well-planned with a clear logical structure focused on the topic being presented. Excellent introduction and summary.
<b>A3</b>	80	c. Excellent use of visual aids which are easy to read and understand. Main points of slides clearly explained.
<b>A4</b>	73	d. Content of presentation very well-researched with relevant data where appropriate. Response to questions asked indicates thorough understanding.
Upper Second		
<b>B1</b>	68	a. Clearly audible, well-paced presentation delivered with some reading from notes in the time allocated. Mainly addressed to the audience.
<b>B2</b>	65	b. Quite well-planned with logical structure focused on topic being presented. Good introduction and summary.
<b>B3</b>	62	c. Good use of visual aids which are quite clear to read and understand. Good attempt to explain main points of slides.
		d. Content of presentation quite well-researched with relevant data where appropriate. Response to questions asked indicates good understanding.
Lower Second		
<b>C1</b>	58	a. Audible presentation which may be too fast or too slow. Tendency to read from notes and to address floor or ceiling. May be outside time allocated
<b>C2</b>	55	b. Some flaws in structure and not always focused on the topic being presented. Weak introduction and summary.
<b>C3</b>	52	c. Adequate use of visual aids which are not always easy to read and understand. Little attempt to explain main points of slides.
		d. Some omissions in literature research and little relevant data presented. Response to questions asked indicates incomplete understanding.
Third		
<b>D1</b>	48	a. Difficult to hear. Too fast or too slow. Read from notes and little attempt to address the audience. Outside allocated time.
<b>D2</b>	45	b. Poorly-structured, rambling presentation which strays from topic being presented. Very weak introduction or summary.
<b>D3</b>	42	c. Poor visual aids which are difficult to read and understand. Poor explanation of main points of slides.
		d. Little evidence of literature research and no data presented. Response to questions indicates poor understanding.
Soft Fail		
<b>E</b>	35	a. Mumbled, halting presentation. Much too fast or too slow. No attempt to address audience and well outside allocated time.
		b. No discernible structure to presentation with some relevant material. No introduction or summary.
		c. Very poor visual aids. No explanation of main points of slides.
		d. Poor literature research and no data presented. Response to questions shows serious weakness in understanding.
Fail		
<b>F1</b>	25	a. Extremely difficult to hear presentation and well outside allocated time.
		b. No discernible structure and very little relevant material. No introduction or summary.
		c. No visual aids used.
		d. Little evidence of research. Response to questions shows minimal understanding.
Fail		
<b>F2</b>	10	Very minimal attempt to give a presentation.
Fail		
<b>F3</b>	0	Failed to give a presentation.

- Only broad classes (A,B,C,D and E) have qualitative criteria attached; the division into (e.g.) C1, C2, C3 etc. is at the discretion of the examiner.
- The qualitative criteria include consideration of :
  - Presentation of talk; audibility, speed, use of notes, addressed to audience, time keeping.
  - Organisation of talk; logical coherent progression with introduction and summary.
  - Use of visual aids; clarity and explanation of salient points.
  - Research and response to questioning; evidence of extensive reading, presentation of own data (where relevant), evidence of wider understanding.

# Appendix 5

QUALITATIVE ASSESSMENT CRITERIA - RESEARCH PROJECT EXPERIMENTAL WORK		
CLASS	%	
First		
<b>A1</b>	100	a. Extremely independent and able to work with minimal direct supervision. Shows a great deal of initiative and perseverance when things go wrong.
<b>A2</b>	90	b. Very well organised; able to plan time in laboratory/field with minimal assistance.
<b>A3</b>	80	c. Technically extremely competent; learns new methods quickly with minimal training.
<b>A4</b>	73	d. Excellent critical ability and able to appreciate limitations of techniques used.
Upper Second		
<b>B1</b>	68	a. Able to work independently with little direct supervision. Shows some initiative and perseverance.
<b>B2</b>	65	b. Well organised; able to plan time in laboratory/field with little assistance.
<b>B3</b>	62	c. Technically competent; learns new methods quite quickly when given training.
		d. Some critical ability and appreciation of limitations of techniques used.
Lower Second		
<b>C1</b>	58	a. Needs quite close supervision and shows little initiative. Tendency to give up too quickly when things go wrong.
<b>C2</b>	55	b. Quite well organised but needs considerable help to plan experiments and time spent in laboratory/field.
<b>C3</b>	52	c. Technically quite competent, but liable to make mistakes is not supervised closely. Slow at learning new techniques.
		d. Limited critical ability and little appreciation of limitations of techniques used.
Third		
<b>D1</b>	48	a. Little or no ability to work independently. Shows very little initiative. Liable to give up when things go wrong.
<b>D2</b>	45	b. Poorly organised; unable to plan time in laboratory/field without direct instruction.
<b>D3</b>	42	c. Technically incompetent. Liable to make mistakes even when supervised closely. Very slow at learning new techniques.
		d. Virtually no critical ability or appreciation of limitations of techniques used.
Soft Fail		
<b>E</b>	35	a. No ability to work independently. Minimal effort put into work.
		b. Poorly organised and liable to miss planned work sessions.
		c. Technically very incompetent. Often makes mistakes, even when closely supervised. Extremely slow at learning new techniques.
		d. No critical ability or appreciation of limitations of techniques used.
Fail		
<b>F1</b>	25	a. Rarely does any experimental work.
		b. Very likely to miss planned work sessions.
		c. Often makes errors when carrying out simple procedures.
		d. No critical ability or appreciation of limitations of techniques used.
Fail		
<b>F2</b>	10	Very minimal laboratory/field work attempted.
Fail		
<b>F3</b>	0	No laboratory/field work attempted

- Only broad classes (A,B,C,D and E) have qualitative criteria attached; the division into (e.g.) C1, C2, C3 etc. is at the discretion of the examiner.
- The qualitative criteria include consideration of :
  - Independence and initiative. Perseverance when work does not go according to plan.
  - Organisational ability; can the student plan their use if time effectively and efficiently?
  - Technical ability; can the student carry out work competently and learn new techniques quickly
  - Critical ability and appreciation of the limitations of the work.

# Progression and Compensation BSc Hons (to Parts I and II) and MNUtr (to Part I)

## Appendix 6

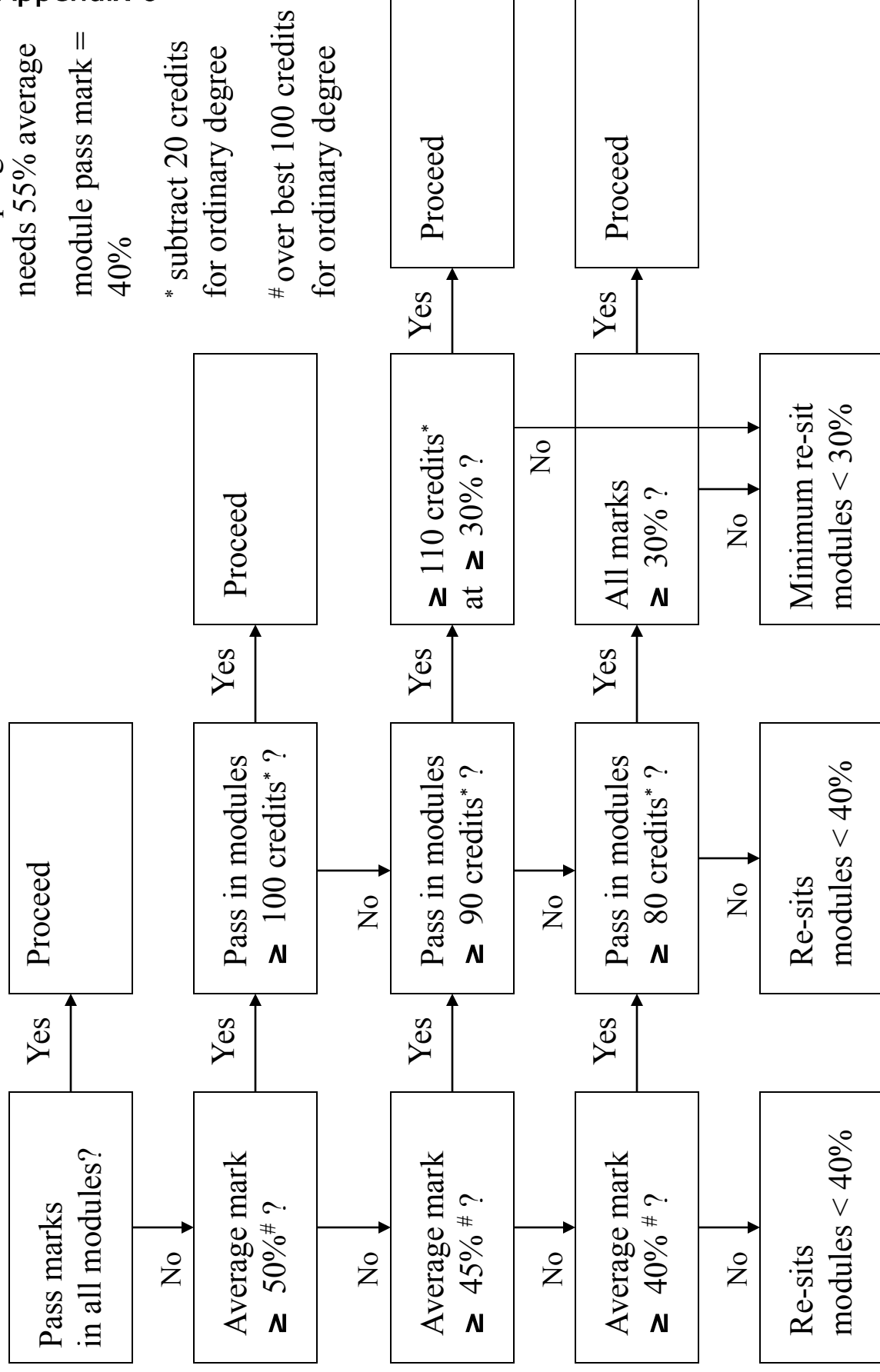
MSci prog to Part II

needs 55% average

module pass mark = 40%

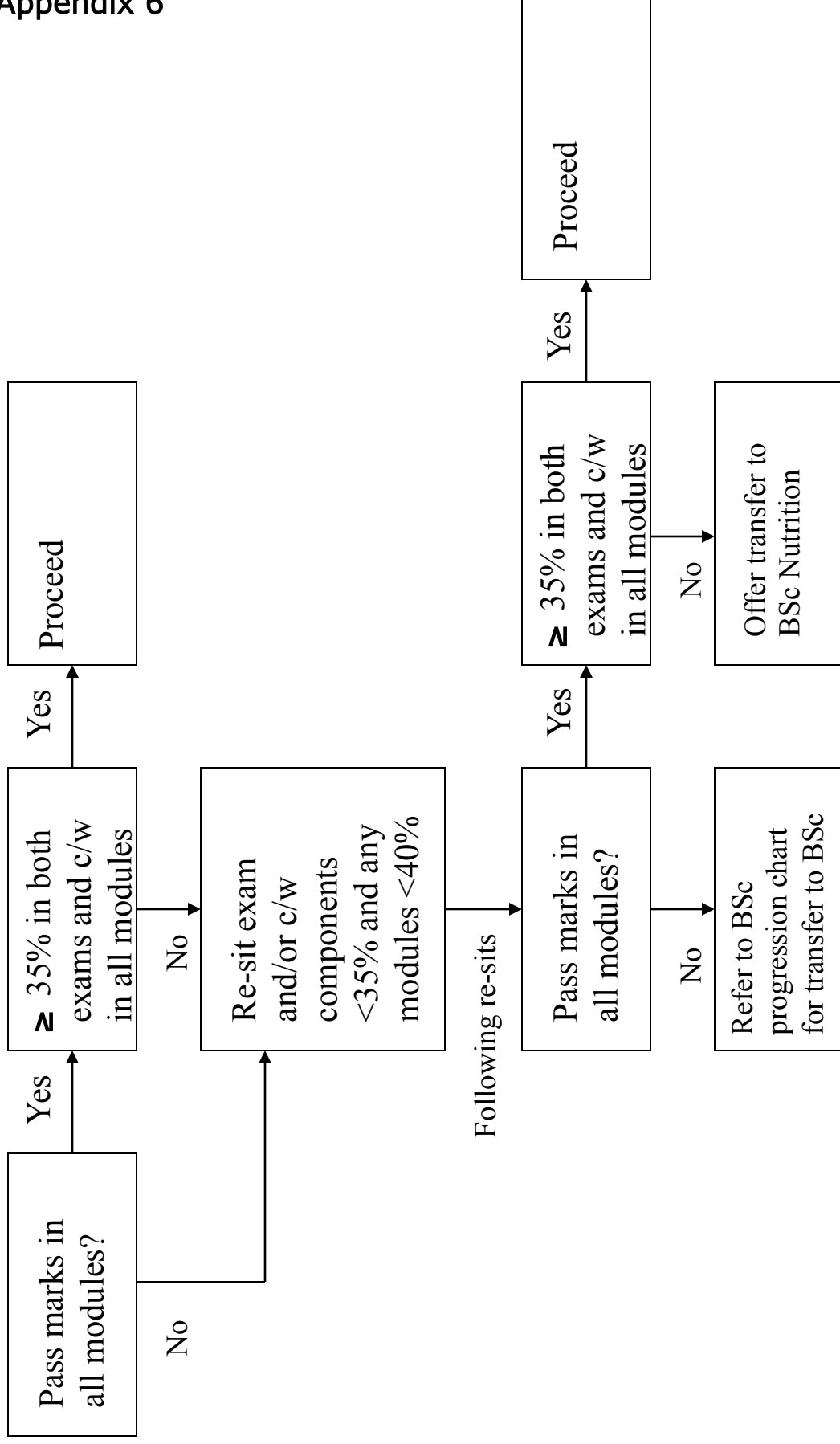
\* subtract 20 credits for ordinary degree

# over best 100 credits for ordinary degree



# Progression and Compensation MNutr (to Parts II and III)

## Appendix 6



## Appendix 7

### School of Biosciences Qualitative Marking Schemes Supplementary Guidelines

#### Marking at Different Levels Within Degree Programmes

The School's qualitative marking schemes provide general guidance for assessment of various types of work. However, in applying these schemes to individual assessments, account must be taken of the level at which students are working. The criteria outlined below provide general guidance, and not all criteria will be applicable to all forms of assessment.

#### Academic Levels

- Level 1** Certificate level, generally qualifying year students
- Level 2** Diploma level, generally taken by year 2 students
- Level 3** Degree level, generally taken by year 3 students
- Level 4** Masters levels, generally taken by post-graduate or year 4 undergraduate students

#### Major considerations

##### Mark Class A

- Level 1:** Draws on available evidence to make sound conclusions supported from a range of sources.
- Level 2:** There is evidence of further reading and careful analysis offering alternative views.
- Level 3:** There is critical analysis offering alternative views. There is clear expression of own views, which are supported by appropriate literature. Draws on available evidence to make persuasive conclusions.
- Level 4:** Detailed, orderly and critical work with clearly specified focus/foci exhibiting rigorous analysis, synthesis and evaluation. There must be evidence that the student has developed their own arguments.

##### Mark Class B

- Level 1:** Content is accurate and relevant with appropriate use of supporting material.
- Level 2:** There is sound analysis with good expression and argument with evidence of independent thinking supported by appropriate material.
- Level 3:** There is sound critical analysis. Alternative views are expressed using supporting evidence from a variety of sources.
- Level 4:** Evidence of originality and significant critical analysis. There is evidence of integration of material from a variety of sources.

## **Appendix 7**

### **Mark Class C**

- Level 1:** Content is largely accurate and relevant with some evidence of understanding.
- Level 2:** There is adequate analysis with limited evidence of wider study.
- Level 3:** There is reasonable understanding, with some attempt at analysis and limited use of supporting material.
- Level 4:** There is reasonable understanding and analysis supported by a range of relevant evidence.

### **Mark Class D**

- Level 1:** Some relevant content but with evidence of only very limited understanding.
- Level 2:** Some relevant content with limited understanding but little evidence of wider study.
- Level 3:** Basic understanding with limited evidence of wider study.
- Level 4:** Basic understanding with limited evidence of understanding and some attempt at analysis.

### **Mark Classes E/F**

- All levels:** Work does not demonstrate above criteria and reference should be made to the qualitative criteria in deciding final mark.

Modules offered at levels A-C are considered intermediate between Levels 1-2, 2-3 and 3-4 respectively.



### School of Biosciences: Tutoring Statement

The following statement demonstrates how each of the specific outcomes of the University's principles of tutoring are delivered in the School of Biosciences.

Principle	Outcome achieved in Biosciences through . . .
1. The student should feel acknowledged, recognised and accepted within their school/department as an <b>individual</b> with distinct academic needs and preferences.	<p>A detailed Week One programme incorporating course-specific teaching and learning support sessions.</p> <p>A specific Course Manager for each degree from whom students can obtain individual academic advice.</p> <p>Module registration days (three times/year) when students can obtain individual academic guidance on their module choices.</p> <p>Each student is allocated a personal tutor and this is one of the first people they meet when they arrive in the School.</p>
2. The student should feel part of the school/department <b>community</b> , experiencing frequent contact with academic staff on an individual or small group basis and building relations with particular members of staff over an extended period.*	<p>Three formal meetings with tutors/year, in addition to which students are encouraged to meet mid-semester with their personal tutors.</p> <p>Learning Community Forum deals with all issues affecting campus life (eg social, residential and catering) as well as academic issues.</p> <p>Close working relationship developed with project supervisor during final year of studies.</p> <p>Student Guild – an SB-based branch of the Students' Union which has combined social and representational roles.</p> <p>Semester One tutor appointed to give particular assistance to first year students at the start of their course. Semester One discussion group at end of first semester to seek feedback on students' experiences.</p> <p>Most first year students and many from later years reside in Bonington Hall. The Hall is closely integrated with all aspects of Campus and School life and is central to the SB community.</p> <p>Campus-based alumni organisation (OKA) provides continuity for graduates and is also involved with travel awards, fund-raising, communication and development.</p>

<p>3. The <b>personal development</b> of the student should be promoted; leading to improved communication skills and greater confidence in presentation and dealing with the unfamiliar.</p>	<p>Many modules require presentations, group working and practical skills to be developed – see: <a href="http://www.nottingham.ac.uk/biosciences/study-with-us/employability/employability-skills.aspx">http://www.nottingham.ac.uk/biosciences/study-with-us/employability/employability-skills.aspx</a>.</p> <p>Final year research project involves significant personal development as an individual researcher and scientist. MSci students take undertake an additional project in which their professional skills are further developed. MNutr students undertake clinical placements giving them first-hand experience of communicating with the public.</p> <p>Project assessment includes an oral presentation.</p>
<p>4. Students should receive prompt, helpful and detailed <b>feedback</b> on their assessments, in a manner that enhances learning and improves future assessment performance.</p>	<p>Coursework returned to students (within a 21 day turn-around time) with individual comments – often on a standard assessment feedback form. Models of good practice in feedback are provided on School intranet.</p> <p>Standard module feedback which is provided at the end of each module on performance over the course of the module, including the formal summative assessment.</p> <p>Module timetables routinely specify submission and feedback dates for coursework.</p>
<p>5. Students struggling with aspects of individual modules, or more generally with their programme of studies, should have clearly signposted and ready access to a reasonable level of <b>academic advice and support</b> designed to remedy their difficulties.</p>	<p>Guidance available from Course Manager, Module Convener, Module Registration Days, Personal tutor and School Office staff.</p> <p>Colleagues from Academic Support hold drop in sessions on campus throughout term-time.</p> <p>In 2014-15, appointment of a new Student Experience and Support Officer.</p>
<p>6. Students should receive the level of support in developing their <b>study skills</b> necessary to perform satisfactorily on their programme of studies.</p>	<p>A well-developed Study Skills Handbook, to which students are introduced during a specific session in Week One. Personal tutors also provide study-skill advice.</p> <p>A year-long Academic Development and Employability module delivered to first year students.</p> <p>Provision of self-assessment materials from the Virtual Writing Centre for students' use.</p> <p>Course staff provide specific aspects of guidance, especially in relation to coursework.</p>

	<p>All students receive detailed Module Handbooks appropriate to all years of their course. Year 2 and 3 students receive a detailed Research Project handbook. Information in these documents is explained and reinforced during discussions with Personal Tutors, project supervisors and module staff.</p>
<p>7. Students with <b>personal circumstances</b> adversely affecting their studies should feel able to make these known to the school/department without difficulty and to be directed to the appropriate support service.</p>	<p>Personal tutor, the School's Senior Tutors (undergraduate or postgraduate), any other member of academic staff, and/or School Office staff who are available to talk to students about difficulties facing them. All staff are aware of support mechanisms available such as the Student Services Centre and Counselling Service.</p> <p>A well-publicised extenuating circumstances procedure, which students are encouraged to make use of as appropriate.</p> <p>The Student Experience and Support Officer who provides support for students with extenuating circumstances.</p>
<p>8. Students should receive the necessary <b>careers information, advice and guidance</b> to equip them to make informed choices about their future, to understand the options open to them, and to take advantage of available opportunities.</p>	<p>Workshops on taking an industrial placement year, CVs and application forms, mock assessment workshops are run by Careers and Employability Service during the Autumn Semester. In addition, regular employer presentations from relevant business are hosted on campus throughout each year.</p> <p>Additional drop-in clinic for CV feedback offered to finalist students in June each year.</p> <p>Careers appointments available on the Sutton Bonington Campus throughout the year.</p> <p>2014-15 a new Careers Fair held on campus in February.</p> <p>MSc mentoring scheme for interview skills/CV development.</p> <p>Some modules deliver integral employability skills.</p> <p>Guidance from tutor, PhD supervisor/assessor and external lectures.</p>
<p>9. Students should be made aware of the importance of developing and articulating their <b>employability skills</b>, including possible participation in the <b>Nottingham Advantage Award</b>.</p>	<p>Course and subject area staff provide guidance on opportunities in their own disciplines or facilitate connections with specialist resources/alumni/industrial partners/research organisations.</p> <p>Some subject areas promote placement opportunities directly; an Industrial Placement Officer provides general employment advice and opportunities for year-long internships</p>

	<p>Personal tutors provide general employment guidance.</p> <p>Additional School Placement Officer to be recruited for start of 2015-16.</p> <p>Personal tutors, project supervisors and other staff provide referee statements to support employment applications.</p> <p>Introduction to the Nottingham Advantage award given during formal Week One Induction programme and students supported to achieve this.</p> <p>Integral employability skills built into the second year and MSc curriculums.</p>
<p>10. Students should receive appropriate advice and support when considering <b>changing their programme of study</b> or contemplating <b>leaving the University</b>.</p>	<p>The following sources of advice and support are available to students considering changing their course of study or withdrawing from the University: Personal Tutor, Course Manager, School Manager (Academic Administration), Student Services – financial team.</p> <p>These resources are detailed in the Study Skills book.</p>
<p>11. Students should be prepared for <b>periods of study away</b> from their home campus and appropriately supported during those periods.</p>	<p>Students receive general information during Week One induction about the possibilities for study abroad. Students following specific courses where placement is a recognised option or obligation receive guidance and support from course staff and from the ERASMUS and Study Abroad Coordinator, and Industrial Placement Officer. Students undertaking a period of study at the Malaysian campus are provided with School briefing prior to departure. The provision of continued support for students who are studying away is a defined responsibility of personal tutors.</p>
<p>12. The procedures for submitting <b>extenuating circumstances</b> regarding assessments should be straightforward and well publicised.</p>	<p>Information about the extenuating circumstances process which is provided to all students through the Study Skills Handbooks. This is articulated to students during Week One induction.</p> <p>Reminders about how and when to submit extenuating circumstances which are sent to students twice/year.</p> <p>Tutors, Course Managers and Student Experience and Support Officer who are all able to give advice and support to students with extenuating circumstances.</p>

13. Students with <b>disabilities</b> should be clear as to the support they will receive and where it is available, and the support should be in line with University policies.	<p>The Study Skills Handbook which gives information about support available for students with disabilities. This is articulated during Week One by the Disability Liaison Officer (DLO) who gives a presentation to all new students. The DLO provides support to students throughout their course, and directs students to relevant support services.</p> <p>Tutors who are trained to deal with students with disability.</p> <p>A close working relationship which is maintained between the School's DLO and the University's Senior Disability Officer, who is available on the Sutton Bonington campus once/week.</p>
14. The procedures for submitting <b>academic appeals and complaints</b> should be well publicised and staff should be aware of their responsibilities within these procedures.	<p>The process for submitting academic appeals and complaints which is publicised in the students' Study Skills Handbooks and Course Handbooks.</p> <p>The School Manager (Academic Administration) who gives advice and support to students who wish to submit a complaint or an appeal.</p> <p>Guidance available from tutors and Course Managers.</p> <p>Learning Community Fora provide an opportunity for complaints to be resolved informally.</p>
15. Students being subjected to the <b>academic offences</b> procedure should receive clear information and advice.	<p>Information about what constitutes plagiarism and how to avoid it which is provided in the students' Study Skills Handbooks and Course Handbooks. This information is articulated in a dedicated session during Week One.</p> <p>On-going guidance on how to avoid plagiarism provided by module conveners and tutors.</p> <p>Personal tutors and the School Manager (Academic Administration) who give support for students being subjected to the academic offences procedure.</p>
16. Students should receive relevant <b>health and safety</b> guidance, especially in laboratory or workshop-based subjects.	<p>General information on health and safety is provided to all students during Week One induction and in the School's Study Skills Handbooks. Specific information related to laboratories and practical classes is included in module documentation. Students' attention is drawn to safety matters, including risk assessments and safety procedures, by individual course staff at times appropriate to their application. Some courses, such as those where pathogens will be used, contain a compulsory lab safety module.</p>
17. Students should be directed in a timely and appropriate manner to	<p>The School's Study Skills Handbooks, Course Handbooks, Personal Tutor, Senior Tutor,</p>

## Appendix 8

<b>University support services</b> for assistance with all of the above matters as necessary.	School Office staff and the Student Services Centre.
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***The student Study Skills book is produced annually and provided in hard copy to all new students. It can also be found online at <http://www.nottingham.ac.uk/~sazinfra/student/current/docs/Biosciences%20Study%20Skills%20-%20updated%20July%202014.pdf>***

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