Chemistry Department Undergraduate Level 3

Course Handbook

2016 - 2017

- Chemistry (USA/Industry/EU)
- Chemistry with Forensic Science (USA/Industry/EU)
- Pharmaceutical Chemistry (Industry)
# Table of Contents

Calendar 2016 - 2017 .................................................................................................................................................. 5  
Welcome back from the Head of Department ...................................................................................................... 6  
Introduction ............................................................................................................................................................ 6  
Department Details ................................................................................................................................................. 7  
Research in the Department of Chemistry ............................................................................................................. 7  
Departmental Communications ............................................................................................................................... 8  
Staff List and Key Contacts ................................................................................................................................. 8  
Staff Directory ....................................................................................................................................................... 9  
Student Communications and Personal Details .................................................................................................. 11  
Information on the Web ....................................................................................................................................... 11  
Department Facilities ............................................................................................................................................ 11  
Learn at Leicester .................................................................................................................................................. 13  
University Library ................................................................................................................................................ 13  
IT Services ............................................................................................................................................................ 14  
Student Learning Development ............................................................................................................................ 14  
Students’ Union Education Unit (ED) .................................................................................................................. 14  
Learn a New Language with Languages at Leicester ............................................................................................ 15  
Other University Facilities .................................................................................................................................. 15  
University Regulations ......................................................................................................................................... 15  
Student Responsibilities ...................................................................................................................................... 16  
Attendance and Engagement Requirements ....................................................................................................... 16  
Neglect of Academic Obligations ......................................................................................................................... 16  
Examination Regulations ................................................................................................................................... 17  
Degree Programmes and Module Information .................................................................................................... 18  
Degree Courses .................................................................................................................................................... 18  
Modules, Semesters and Levels ............................................................................................................................. 18  
Change of Course ................................................................................................................................................ 18  
Programme and Module Specifications ................................................................................................................ 18  
ERASMUS Exchanges, Years Abroad, Industrial Placements ........................................................................... 18  
Attendance Requirements .................................................................................................................................... 19  
Coursework Submission ....................................................................................................................................... 19  
Marking and Assessment Practices ...................................................................................................................... 19  
Feedback and the Return of Work from Staff ...................................................................................................... 20  
Progression and Classification of Awards ........................................................................................................... 20  
Referencing and Academic Integrity ................................................................................................................... 21  
What we mean by ‘plagiarism’, ‘self-plagiarism’ and ‘collusion’ ........................................................................... 21
Resources and advice to help you study with integrity and avoid committing plagiarism........................................... 21
Referencing style .................................................................................................................................................. 22
Mitigating Circumstances ....................................................................................................................................... 22
Personal Support for Students ........................................................................................................................................ 23
    Departmental Student Support Arrangements .................................................................................................. 23
    Equal Opportunities ..................................................................................................................................... 23
    Athena SWAN ........................................................................................................................................... 24
University Student Support Arrangements ........................................................................................................... 24
    AccessAbility Centre .................................................................................................................................. 24
    Student Welfare Centre ............................................................................................................................... 25
    Health Care and Registering with a Doctor .................................................................................................. 26
Careers and Skills Development .......................................................................................................................... 27
    Career Development Service ...................................................................................................................... 27
Feedback from Students ........................................................................................................................................... 28
    Student Feedback Questionnaires ............................................................................................................... 28
    Student Staff Committees .......................................................................................................................... 30
Departmental Prizes ............................................................................................................................................... 31
Societies ................................................................................................................................................................. 31
Safety and Security .............................................................................................................................................. 31
    Problem Classes and Laboratory Information ............................................................................................ 31
Personal Belongings ........................................................................................................................................... 33
Complaints and Academic Appeals Procedures .................................................................................................. 34
Personal Tutors .................................................................................................................................................... 34
    Student Skills Record/Personal Development Planning .................................................................................. 34
The Weighting of Modules for your Degree .......................................................................................................... 35
    Module Assessment ................................................................................................................................... 36
Examinations ....................................................................................................................................................... 36
    Finding out your exam marks ........................................................................................................................ 36
    Calculators .................................................................................................................................................. 36
    Anonymity ................................................................................................................................................ 36
    Progression to Level 4 (MChem degrees only) .............................................................................................. 36
    External moderation of examinations and degrees .......................................................................................... 36
Private Study and Vacations .................................................................................................................................... 37
Assessment Deadlines .......................................................................................................................................... 38
Level 3 Modules for Each Degree ........................................................................................................................ 39
LEVEL 3 MODULES .......................................................................................................................................... 40
    Module CH3200/3500 Chemistry General Skills ......................................................................................... 41
Module CH3201/3501 Advanced Organic Chemistry ................................................................. 42
Module CH3202/3502 Advanced Inorganic Chemistry ............................................................... 43
Module CH3203/3503 Advanced Physical Chemistry ................................................................. 44
Module CH3204/CH3504 Biological Chemistry ..................................................................... 46
Module CH3205/3505 Metals in Synthesis ................................................................................. 47
Module CH3206/3506 Advanced Analytical Chemistry ............................................................. 48
Module CH3207 Industrial Chemistry ......................................................................................... 49
Module CH3211/3511 Pharmaceutical Chemistry .................................................................. 50
Module CH3212/3512 Forensic Science .................................................................................... 51
Module CH3251/2 Chemistry Project Parts 1 & 2 .................................................................. 52
Module CH3255 Advanced Chemistry Practical Part A ............................................................. 57
Module CH3256 Advanced Chemistry Practical Part B ............................................................. 58
Module CH3257 Advanced Chemistry Practical Part C ............................................................. 59
Calendar 2016 - 2017

Semester 1: 26 September – 20 January 2017

September
- Monday 26th WEEK 1: Autumn Term & 1st Semester begins

October
- Monday 3rd WEEK 2
- Monday 10th WEEK 3
- Monday 17th WEEK 4
- Monday 24th WEEK 5
- Monday 31st WEEK 6

November
- Monday 7th WEEK 7
- Monday 14th WEEK 8
- Monday 21st WEEK 9
- Monday 28th WEEK 10

December
- Monday 5th WEEK 11: Autumn Term ends Friday 9th December

CHRISTMAS VACATION (4 weeks)

January
- Monday 9th WEEK 12: Spring Term and Exams begin
- Monday 16th WEEK 13: Exams end Friday 20th January

Semester 2: 23 January 2017 – 23 June 2017

January
- Monday 23rd WEEK 14: Semester 2 begins
- Monday 30th WEEK 15

February
- Monday 6th WEEK 16
- Monday 13th WEEK 17
- Monday 20th WEEK 18
- Monday 27th WEEK 19

March
- Monday 6th WEEK 20
- Monday 13th WEEK 21
- Monday 20th WEEK 22: Spring Term ends Friday 24th March

EASTER VACATION (5 weeks)

May
- Monday 1st WEEK 23: Summer Term begins*
- Monday 8th WEEK 24: Revision Week
- Monday 15th WEEK 25: Exams begin Monday 15th May
- Monday 22nd WEEK 26
- Monday 29th WEEK 27: Exams end Friday 2nd June

June
- Monday 5th WEEK 28
- Monday 12th WEEK 29
- Monday 19th WEEK 30: Summer Term ends Friday 23rd June

August/September
- Monday 4th Resit Exams begin Monday 4th September
- Monday 19th Resit Exams end Saturday 9th September

[For those students who did not pass their modules and have to resit/sit the failed modules in September]

TERM DATES AT A GLANCE

Autumn Term: 26 September 2016 – 9 December 2016
Spring Term: 9 January 2017 – 24 March 2017
Summer Term: 1 May 2017* – 23 June 2017

* Summer term officially starts on Bank Holiday Monday, teaching starts on the Tuesday following the Bank Holiday
Welcome back from the Head of Department

Welcome back! We hope you had an enjoyable summer and that you are now eager to press on with your studies.

This handbook provides information for your level 3 modules in chemistry along with more general information on the course structure, regulations, and our expectations of you. The format is similar to the handbooks you have seen in previous years but I would encourage you to take a close look through this particular booklet to refresh your memory. You will of course also want to see what topics are included in the level 3 modules and how these will be assessed.

You will by now have some idea about how your studies have been progressing. However, the outcome of your degree is far from settled. Level 3 provides some real challenges but also some important opportunities. As ever if you want to succeed, and who doesn’t, it is largely down to planning and effort. It is vital that you attend all teaching sessions and meet all deadlines. In addition, you must find sufficient time for private study. The formal teaching we offer provides you with the knowledge you need to work on and practice in laboratory skills and problem-solving. However, it is often through private-study, such as the reading of textbooks, that delivers a good understanding of a particular topic. If you want to be a high-flyer it is that extra degree of understanding that makes the real difference.

I do also want to emphasise that the staff within the department are here to help and you should never be reticent in asking any of us for advice and assistance. It is in our interest, as well as yours, that you succeed and enjoy the course.

Good luck for the new academic year!

Professor Andrew M. Ellis
Head of Department

Introduction

This handbook has been written to provide information to all our undergraduate students. It aims not only to explain the workings of the Department but also to provide information that you will require throughout your degree programme. Its contents will:

- outline the structure and organisation of the Department;
- advise on study skills and written work;
- explain our teaching and assessment methods;
- outline our programme structures and module content;
- advise on the aims and objectives of each degree programme;
- offer information on support services for students.

Further information will be provided for you at appropriate times during your studies. In the meantime, we would be pleased to receive your suggestions and ideas for topics that might be included in this handbook in future by e-mail to chemadmin@le.ac.uk
Department Details

The Department of Chemistry at the University of Leicester is recognised both internationally for its research and its excellence in teaching. We have invested in modern, state-of-the-art facilities for carrying out agenda setting research and for the provision of high quality undergraduate teaching.

With substantial funding for industrial and government sponsored research, our research interests are multidisciplinary, focussing on diverse topics such as biological chemistry, green chemistry, atmospheric chemistry and laser spectroscopy.

This research ranges from fundamental cutting-edge work on bio-inspired nanomaterials to global studies of chemicals and their effect on climate change. Recent research work has led to the formation of "spin-out" companies and three purpose built demonstrator units to display our technology to industry.

The Department is a friendly and supportive environment in which to both study and carry out research and consistently we have been rated very highly in the National Student Satisfaction Survey (95% overall satisfaction in the 2016 survey).

We offer a range of three and four year courses that reflect the modern needs for chemistry in industry and society and all our BSc and MChem Chemistry degree programmes have full accreditation from the Royal Society of Chemistry.

What sets us apart from other departments is our dedication to providing student-focussed, multi-media learning methods to ensure high quality modern teaching. The result is that our graduates are equipped with both the specialist chemistry knowledge and a host of important transferable skills highly valued by employers.

Research in the Department of Chemistry

The academic and teaching staff of the Department are researchers as well as teachers. In addition to teaching the discipline of Chemistry to students at the undergraduate and postgraduate levels, they actively contribute to the development and dissemination of new ideas in Chemistry.

The close relationship between teaching and research is one of the great advantages of studying at University. You will come into contact with staff who are actively engaged in the subject – not just teaching it as a fixed body of knowledge.

Members of the Department of Chemistry at Leicester are active in many different research areas. With substantial funding from government and industrial sponsors, our research interests are multidisciplinary and diverse, which enables the Department to offer a wide choice of topics for undergraduate research projects.

Full details can be found at: http://www2.le.ac.uk/departments/chemistry/research
# Departmental Communications

## Staff List and Key Contacts

As well as administrative staff and your personal tutor you may need to contact other staff members if you have a specific query. Please e-mail them at the below e-mail address with your query or to book an appointment with them.

<table>
<thead>
<tr>
<th>Departmental Communications</th>
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<tbody>
<tr>
<td><strong>Programme Co-ordinators and Tutors</strong></td>
<td></td>
</tr>
<tr>
<td>Head of Department (HoD)</td>
<td>Prof. Andrew Ellis</td>
</tr>
<tr>
<td>Programme Co-ordinators and Tutors</td>
<td></td>
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<tr>
<td>Chemistry (USA/Ind/EU)</td>
<td>Dr Sandeep Handa</td>
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<tr>
<td>Chemistry with Forensic Science (USA/Ind/EU)</td>
<td>Prof. Rob Hillman</td>
</tr>
<tr>
<td>Pharmaceutical Chemistry (Ind)</td>
<td>Dr Sandeep Handa</td>
</tr>
<tr>
<td>Erasmus Co-ordinator</td>
<td>Dr Antonio Guerreiro/Dr Sandeep Handa</td>
</tr>
<tr>
<td>Level 1</td>
<td>Dr Mark Lowe</td>
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<tr>
<td>Level 2</td>
<td>Dr Dylan Williams</td>
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<tr>
<td>Level 3</td>
<td>Dr Greg Solan</td>
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<tr>
<td>Level 4</td>
<td>Dr Sandeep Handa</td>
</tr>
<tr>
<td><strong>Officers &amp; Tutors</strong></td>
<td></td>
</tr>
<tr>
<td>Careers Tutor &amp; Personal Development Plan Co-ordinator</td>
<td>Dr Kal Karim</td>
</tr>
<tr>
<td>Special Needs Tutor (AccessAbility)</td>
<td>Prof. Paul Cullis</td>
</tr>
<tr>
<td>Director of MSc Postgraduate Admissions</td>
<td>Prof. Eric Hope</td>
</tr>
<tr>
<td>Senior Tutor</td>
<td>Prof. Andy Abbott</td>
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<tr>
<td>Head of Teaching</td>
<td>Dr Sandeep Handa</td>
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<tr>
<td>Postgraduate Tutor</td>
<td>Prof. Karl Ryder</td>
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<td>Admissions Officer</td>
<td>Dr Richard Blackburn</td>
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<td>Examinations Officer</td>
<td>Dr Andrew Hudson</td>
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<tr>
<td>Department Safety Officer</td>
<td>Dr Michael Whitcombe</td>
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<tr>
<td>Building Safety Supervisor/Technical Manager</td>
<td>Dr Dominic Banks</td>
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<tr>
<td>Plagiarism Officer</td>
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<td>Outreach Officer</td>
<td>Dr Barbara Villa-Marcos</td>
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<tr>
<td>Library Liaison Officer</td>
<td>Dr Dylan Williams</td>
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<tr>
<td>Athena SWAN</td>
<td>Dr Alison Stuart</td>
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Administrative Staff

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Administration Manager</td>
<td>Claire Cartwright</td>
</tr>
<tr>
<td>Programme Administrator</td>
<td>Zahira Ahmed</td>
</tr>
<tr>
<td>Programme Administrator</td>
<td>Caroline Bilson</td>
</tr>
<tr>
<td>Programme Administrator</td>
<td>Vicky Robbins</td>
</tr>
<tr>
<td>Administrative Assistant</td>
<td>Gigi Law</td>
</tr>
</tbody>
</table>

Staff Directory

Day-to-day queries should be sent to chemadmin@le.ac.uk. We would recommend using this e-mail address to ensure you receive the most efficient response. If you need to contact a member of staff individually please see the contact list below. You can also find up-to-date contact details on the Department’s website: www.le.ac.uk/departments/chemistry/people

<table>
<thead>
<tr>
<th>Name</th>
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**MC = Materials Centre**

**Administrative & Support Staff**

Day-to-day teaching and administrative enquiries – chemadmin@le.ac.uk

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<td>2111</td>
<td><a href="mailto:ds130@le.ac.uk">ds130@le.ac.uk</a></td>
</tr>
</tbody>
</table>
Student Communications and Personal Details

The University keeps a record of your personal details such as your full name, addresses i.e. home address and term-time address, telephone numbers, personal email address and your emergency contact details. It is important to keep your details up to date as this will help you to receive information about your studies and exams and also ensure that official documents are provided to you with the correct name details.

You can check and update your details by logging-in to MyStudentRecord http://mystudentrecord.le.ac.uk using your University username and password. Click on the My Details tab and you will then be able to review and change your personal details.

It is important that you check your University email account frequently to ensure that you do not miss any important communication from the University. If you are experiencing any difficulties with your computer account, you should advise IT Services who will attempt to assist you in resolving the problem.

Information on the Web

Departmental Website: http://www.le.ac.uk/chemistry/

Department Facilities

Instrumentation and specialist facilities

Cutting-edge chemistry requires access to all sorts of specialised facilities. This includes modern instruments for chemical analysis. Knowledge and the use of these instruments is an important part of your training as a chemist.

The Department contains a wide variety of equipment, including numerous small instruments such as FTIR spectrometers and gas/liquid chromatographs (e.g., GC, GC/MS and HPLC), through to major specialised equipment such as high-field NMR spectrometers, atomic force microscopes, high-resolution mass spectrometers, and a X-ray diffractometer.

You will encounter these, and much more during your undergraduate studies. The Department also has extensive technical support from its own mechanical, electronic, and glassblowing workshops.

Teaching laboratories

The Department is equipped with spacious fully equipped teaching laboratories. In the summer of 2014 the teaching labs were expanded and refurnished. Different parts of the teaching laboratory now focus on specific areas of chemistry. For example, a section of the laboratory is setup specifically for Physical Chemistry experiments. This allows students to experience both synthetic and physical chemistry experiments in a given semester. This also results in better overlap between experiments and course modules enhancing the student learning experience. There are also instrument rooms which contains a variety of spectrometers (e.g., UV-Vis/FTIR/HPLC/GC) for routine undergraduate use.

First year students will have laboratory sessions in the undergraduate teaching lab. This is on the first floor of the George Porter building and is fully equipped with all items needed for level experiments.
**Computers**

Computer skills are vital in the modern world and will form an important part of your training. The university has over 850 networked PCs linked to a central server, which students will have access to. Furthermore, the department has WiFi so students can access the internet anywhere in the building.

An enormous range of software is accessible, all of which runs under Windows. This includes Office 2013, graphical analysis software, specialised chemistry programs (e.g., ChemDraw), and access to the internet and email (via your IT account).

There are PCs in many different locations on and around campus including the Department (Chemistry Computer Room on the second floor), the main library and the halls of residence.

The department has a colour and a black and white student printer. The colour student printer is located in the computer room on the second floor, the black and white student printer is on the ground floor next to the bus shelter.

**Lecture theatres**

The Chemistry Department houses three lecture theatres. These lectures are used by all Departments in the University.

**Student Reading Room**

A spacious student Reading Room provides a quiet working area for students. The Reading Room can be used by anyone; however, it is predominantly used by Chemistry students to complete tutorial problems sheets, write laboratory reports, or simply as a place to do some reading. The Reading Room also has a selection of text books available for student use.

**Molecular Modelling Laboratory**

The molecular modelling laboratory in the Department is an ideal space for holding seminars, tutorials or workshops sessions as well as a quiet study area for students.

The Molecular Modelling Laboratory can be booked out for student use. In order to book this please e-mail chemadmin@le.ac.uk or come into the main office during office hours (8am – 5pm) and the team will be happy to book this for you if possible.

Students are also welcome to use the foyer for group discussions as long as these do not disturb the lecture theatres.
Learn at Leicester

Whatever your subject or level of study, there are many, many different ways in which you can access academic advice and support. The Learn at Leicester webpage provides you with further details of this support, together with direct links to a wide range of resources and services to help you:

- Make the most of the Library
- Develop your IT skills
- Manage your own learning
- Improve your English language
- Get independent advice about your course
- Manage your student information
- Sharpen your mathematics and statistics skills
- Improve problem solving ability
- Improve team-working ability
- Improve ability to present with confidence

You can access all of this by visiting: www.le.ac.uk/learnatleicester

University Library

The Library is your gateway to high quality information relevant to your studies. Using it effectively contributes directly to your success.

The Library provides you with:

- access to a huge range of specialist digital and print information resources for your subject;
- help in finding and using information - online, face to face and by telephone;
- individual and group study space;
- PCs and wireless networking for your own device throughout the David Wilson Library;
- services for distance learners.

The Library is a shared resource for all members of the University. Please respect it and observe the Library regulations available at www.le.ac.uk/library/about.

To get started, visit www.le.ac.uk/library.

For information about your subject, please visit http://www2.le.ac.uk/library/find/subjects/chemistry
IT Services

Whilst studying at the University you will have a University IT account and email address. There are hundreds of University PCs available with Office 2013 and many specialist programs to help you with your studies.

Visit www.le.ac.uk/it4students for more information about:

- **Student email**: access your email and calendar anywhere; on your laptop or mobile device
- **Printing**: print from any device to a University printer
- **Microsoft Office**: available at no cost whilst you study at the University
- **IT Help**: visit the Help Zone in the Library, phone 0116 252 2253, ithelp.le.ac.uk for IT Self Service, web chat or email ithelp@le.ac.uk
- **IT Training**: attend our workshops in Word, PowerPoint and Excel
- **WiFi**: free access to eduroam wifi on campus, in student accommodation or at other universities
- **PCs on campus**: there are over 900 PCs available, with 350 located in the David Wilson Library (including 24/7 access during exam periods)
- **OneDrive**: the online storage location for all your files
- **Blackboard Virtual Learning Environment**: support and information for all your courses
- **Leicester Digital Library**: access to journals, databases and electronic books online

Student Learning Development

Studying for a degree is a stimulating, challenging and rewarding experience. In order to make the most of this experience, the University of Leicester provides a wide range of resources and services to support and enhance your academic development in areas such as essay-writing, critical thinking, independent learning and time-management. The Student Learning Development Team is here to help you develop the skills and abilities you need in order to succeed in your studies.

To find out more about how we can help you develop your academic skills and abilities, visit our website: www.le.ac.uk/succeedinyourstudies.

Students’ Union Education Unit (ED)

Education help and advice is provided by the Students’ Union for all students.

If you would find it helpful to talk to someone outside of your department, we offer a free, confidential service to help and advise you about where to go and what to do. If you wish to come and talk to us about your personal circumstances or academic worries, for example, exams or putting together an academic appeal, we will provide professional and friendly support.

You will find the Education Unit staff in the Students’ Union Building on the first floor, within the West Wing. Opening hours are 10.00 am to 4.00 pm, and you can either pop in or book an appointment by contacting us on the following details:

**Contact**: Students’ Union Education Unit (ED), Students’ Union (First Floor)
+44 (0)116 223 1132 | educationunit@le.ac.uk | http://leicesterunion.com/support/education

Online chat facilities are also available for appointments and drop in sessions.

Facebook – https://www.facebook.com/talktoED (Drop in on Wednesdays, 3:30pm-4:30pm)

Skype - @ed_ucation1 (Drop in on Tuesdays, 9am-10am)
Learn a New Language with **Languages at Leicester**

There are many benefits to learning a new language. Not only could you **enhance your career prospects** and broaden your cultural horizons, but studies show that you could also improve your literacy skills, boost your memory, increase your attention span and even help to grow your brain!

Study with the **Languages at Leicester** Team on campus, and you will be taught by expert native tutors who are based within our School of Modern Languages, which has been ranked **3rd in the country in the University League Tables, The Guardian University Guide 2016.**

We offer **16 different languages** including Arabic, British Sign Language, Chinese, German, Korean and Spanish to name just a few, six levels of learning and two course lengths, so you can study in a way that suits you. Classes take place during evenings and Wednesday afternoons, as well as intensive ‘fast track’ courses on Saturday mornings.

Find out more about **Languages at Leicester**, including fees and term dates at: [www.le.ac.uk/ml/lal](http://www.le.ac.uk/ml/lal).

The successful completion of a **Languages at Leicester course** will appear on your **Higher Education Achievement Report (HEAR)** when you graduate. For further details about the HEAR, please visit: [www.le.ac.uk/hear](http://www.le.ac.uk/hear).

**Contact:** Languages at Leicester +44(0)116 252 2662 | lalenquiries@le.ac.uk | [www.le.ac.uk/ml/lal](http://www.le.ac.uk/ml/lal)

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**Other University Facilities**

- English Language Training Unit (ELTU) [http://www2.le.ac.uk/offices/eltu](http://www2.le.ac.uk/offices/eltu)
- Languages at Leicester [http://www2.le.ac.uk/departments/modern-languages/lal](http://www2.le.ac.uk/departments/modern-languages/lal)
- Victoria Park Health Centre [http://www.victoriaparkhealthcentre.co.uk](http://www.victoriaparkhealthcentre.co.uk)
- University Chaplaincy & Prayer Rooms for students [http://www2.le.ac.uk/institution/chaplaincy](http://www2.le.ac.uk/institution/chaplaincy)

**University Regulations**

[Senate Regulations](http://www2.le.ac.uk/offices/eltu) contain rules and other important information about being an undergraduate or taught postgraduate student at the University of Leicester. The Regulations are part of the formal contract between you and the University; you will have confirmed when completing registration that you will comply with procedures defined in the University’s Regulations.

The **Quick Guide to Student Responsibilities** ([www.le.ac.uk/sas/regulations/responsibilities](http://www2.le.ac.uk/offices/eltu)) summarises some of your most important responsibilities as a student at Leicester, as defined in detail in the Regulations. These responsibilities relate to:

- attendance
- submission of work by set deadlines
- term time employment (full-time students – Home/EU and International)
- illness or other circumstances impacting upon studies
- maintaining your personal details
- the additional responsibilities of international students

Failure to adhere to student responsibilities can have serious consequences and may lead to the termination of your studies.
Student Responsibilities

The University expects its students to behave responsibly and with consideration to others at all times. The University’s expectations about student behaviour are described in:

- the Student Charter
- the Regulations governing Student Discipline
- the Student Code of Social Responsibility
- the Code of Practice governing Freedom of Speech
- the University’s regulatory statement concerning Harassment and Discrimination

These can be found at [www.le.ac.uk/senate-regulations](http://www.le.ac.uk/senate-regulations).

It is reasonable for teaching staff to expect students to:

- observe the University’s regulations and code of conduct;

(See [http://www.le.ac.uk/sas/regulations](http://www.le.ac.uk/sas/regulations) or [http://www.le.ac.uk/sas/regulations/responsibilities](http://www.le.ac.uk/sas/regulations/responsibilities) for full details);

- attend all classes and arrive on time;
- meet assessment deadlines and submit only original work for assessment; you will lose marks if you miss deadlines; see later for policy on cheating and plagiarism;
- register for modules and exams by the set deadline;
- keep a diary of appointments and classes;
- manage their own time and workload and use study periods in a disciplined way;
- inform the Department as soon as possible if you cannot attend a class or keep an appointment;
- make optimum use of the University’s opportunities and resources.
- check e-mails, Blackboard, notice board and pigeon holes regularly for communication from staff;
- fill in module questionnaires to provide feedback.

Attendance and Engagement Requirements

Attendance and engagement with your course is an essential requirement for success in your studies. The University’s expectations about attendance are defined in Senate Regulation 4: governing student obligations (see [www.le.ac.uk/senate-regulation4](http://www.le.ac.uk/senate-regulation4)). Full-time students must reside in Leicester, or within easy commuting distance of the city, for the duration of each semester. You should attend all lectures, seminars, practical sessions and other formal classes specified in your course timetable, unless you have been officially advised that attendance at a particular session is not compulsory or you have received formal approval for absence. You are also expected to undertake all assessments set for you.

The University operates a Student Attendance Monitoring procedure. Your attendance will be monitored throughout the academic year and if sessions are missed without an acceptable explanation being provided to your department then neglect of academic obligations procedures will be initiated. This may result in your course of study being terminated.

If you are an international student and your course is terminated this will be reported to UK Visas and Immigration (UKVI), in line with University sponsor obligations.

Neglect of Academic Obligations

You are expected to attend all learning and teaching events which are timetabled for you. These include lectures, tutorials or practical classes. You are also expected to submit work within the deadlines notified to you. Persistent failure to attend taught sessions and/or to submit work, without good cause, will be considered to be a neglect of academic obligations. Departmental procedures for dealing with neglect are set out within the University’s regulations (see [http://www.le.ac.uk/senate-regulation4 ‘Neglect of academic obligations’](http://www.le.ac.uk/senate-regulation4)). In the most serious of cases of neglect the University has the right to terminate a student’s course.
Examination Regulations

If your course involves any exams you must ensure that you are familiar with the University’s Examination Regulations (www.le.ac.uk/sas/assessments/examregs). These contain a variety of regulatory information and instructions relating to exams, including the rules governing:

- scheduling
- admittance
- student conduct
- permitted and prohibited items and clothing
- use of calculators and dictionaries
- absence due to illness
- cheating

You can also find information about exams in the Students’ Guide to Exams (www.le.ac.uk/sas/assessments/examsguide)
Degree Programmes and Module Information

Degree Courses

Chemistry (USA/Industry/EU)
Chemistry with Forensic Science (USA/Industry/EU)
Pharmaceutical Chemistry (Industry)

Modules, Semesters and Levels

The Degree courses listed above are based on 'Levels' corresponding to the three or four years of the BSc or MChem degree courses, respectively. They are modular in structure and comprise a series of Core and Optional Modules which are self-contained in one of the two semesters. The academic year is divided into two semesters – see next page for details.

Change of Course

If you wish to change course, please discuss the matter first with your personal tutor and with the third year tutor. At this stage, a change of course is usually only allowed in special circumstances.

Programme and Module Specifications

View the programme and module specifications for your course via www.le.ac.uk/sas/courses

In the programme specification you will find a summary of the aims of your course of study and its learning outcomes, alongside details of its teaching and learning methods and means of assessment. The programme specification also identifies the core modules that make up the course and any choice of optional modules. Each module has its own specification that formally records that module’s aims, teaching and learning methods, assessment components and their percentage weighting.

ERASMUS Exchanges, Years Abroad, Industrial Placements

If you are out on your year abroad this year you should receive a full induction. Your first few days overseas are spent on an orientation course designed to ease you into the way of life. This is organised by the International Office at the host university. The International Office can deal with all sorts of issues associated with foreign students, whether it be travel, financial advice, or other issues. We also have well-established contacts in the Chemistry Departments of our exchange Universities. These members of academic staff will act as your tutor for your Year Abroad.

For those students on industrial placements you will have a supervisor looking after you during your year with the host company. In addition, the Year Out tutor will meet with you and your supervisor twice during the year to make sure everything is going smoothly. You and your supervisor out in industry will also be contacted by e-mail on at least a monthly basis to ensure that everything is going well.
Attendance Requirements

Attendance is an essential requirement for success in your studies. The University’s expectations about attendance are defined in Senate Regulation 4: governing student obligations (see www.le.ac.uk/senate-regulation4). Full-time students must reside in Leicester, or within easy commuting distance of the city, for the duration of each semester. You should attend all lectures, seminars, practical sessions and other formal classes specified in your course timetable, unless you have been officially advised that attendance at a particular session is not compulsory or you have received formal approval for absence.

In addition to other attendance monitoring practices, departments will monitor international student attendance at two ‘checkpoints’ during each academic year, typically at a compulsory learning and teaching session appearing in course or examination timetables. Students will not normally be notified of checkpoint dates in advance. If you are an international student and you fail to meet attendance and/or checkpoint requirements this may result in the termination of your course and the subsequent reporting of this to UK Visas and Immigration (UKVI), in line with University sponsor obligations.

‘Swipe Green to be Seen’

A new way of registering your attendance at timetabled taught events has been introduced at the University.

Most of our teaching spaces have card readers installed inside. When you attend a teaching event, all you need to do is touch your student ID card against one of the readers in the room until it turns green. This will register your attendance at this event. When you do this for the first time, this may take up to five seconds as your card is being activated.

You should attend all lectures, seminars, practical sessions and other formal classes specified in your course timetable. You’ll need to register your attendance by touching your student ID card against a card reader at all of these sessions (unless otherwise notified).

You can register your attendance up to 10 minutes before the start time of a teaching event. If you arrive late, please ensure you still touch your card against a reader.

For further information please see the following webpage https://www2.le.ac.uk/offices/sas2/attendance-management/attendance-management-for-students?uol_r=36e30b25

Coursework Submission

You should make sure that you submit your assignments by their due date to avoid any marks being deducted for lateness. Penalties for late submission of coursework follow the University scheme defined in Regulations governing the assessment of taught programmes (see www.le.ac.uk/senate-regulation7 or www.le.ac.uk/sas/assessments/late-submission).

Marking and Assessment Practices

Student anonymity will be preserved during the marking of all formal examinations. Summative coursework (i.e. coursework that contributes to your module mark or grade) will be marked anonymously unless there are sound educational reasons for not doing so, or the type of assessment makes marking impractical.

Each programme at the University has one or more External Examiners, who are members of staff of other institutions that review the academic standards at the University and confirm that these are appropriate and comparable with other Universities.

The External Examiners for your courses are listed at:

www.le.ac.uk/sas/assessments/external/current-undergraduate
Feedback and the Return of Work from Staff

Coursework

The Department complies with the University’s policy for the return of marked coursework (see [www.le.ac.uk/sas/quality/student-feedback/return-of-marked-work](http://www.le.ac.uk/sas/quality/student-feedback/return-of-marked-work) for details of the full policy):

General principles:

- Feedback and provisional grading on coursework will be returned within 21 days of the submission date;
- In exceptional circumstances where this is not possible, you will be notified in advance of the expected return date and the reasons for the longer turn-round time and where possible staff will provide some interim feedback: for example in the form of generic feedback to the class regarding common errors and potential areas for improvement.

Written feedback will be given for all tutorial, PBL and practical work either on a cover sheet or through Blackboard within 21 days of the submission date. To improve your performance you should act on this feedback. In exceptional circumstances where this is not possible, you will be notified in advance of the expected return date and the reasons for the longer turn-round time.

[For full details see [http://www.le.ac.uk/sas/quality/student-feedback/return-of-marked-work](http://www.le.ac.uk/sas/quality/student-feedback/return-of-marked-work)]

At the end of all theory modules there will be an opportunity for you to comment on the difficulty of the course, quality of the lectures, handouts and associated workshops or tutorials. This information is used by the Department to improve the quality of the courses. The results will be fed back to the Student/Staff Committee in the following academic year.

Examinations

The Department complies with the University’s policy for the return feedback on examinations (see [www.le.ac.uk/sas/quality/student-feedback/return-of-marked-work](http://www.le.ac.uk/sas/quality/student-feedback/return-of-marked-work) for details of the full policy):

General principles:

- Following the approval of the provisional results by examination boards, departments will make the results available to students within 14 days. Where appropriate this will include a breakdown at the level of the examination and coursework.
- Departments will arrange for feedback on examination performance to be provided.

Progression and Classification of Awards

The University’s system for the classification of awards and the rules of progression are defined in Senate Regulation 5: Regulations governing undergraduate programmes of study ([www.le.ac.uk/senate-regulation5](http://www.le.ac.uk/senate-regulation5)) Alternatively, refer to the Student and Academic Services website for information about degree classification and progression: [www.le.ac.uk/sas/assessments/progression-ug](http://www.le.ac.uk/sas/assessments/progression-ug)

Any specific progression requirements for your course are stated in its programme specification ([www.le.ac.uk/sas/courses/documentation](http://www.le.ac.uk/sas/courses/documentation))
Referencing and Academic Integrity

Principles of academic integrity apply to the work of everyone at the University, staff and students alike, and reflect the University’s commitment to maintaining the highest ethical and academic standards. A key part of this is acknowledging where and when, in the process of producing your own work, you have drawn on the work of others. In practice, this means that the ideas, data, information, quotations and illustrations you use in assignments, presentations, reports, research projects etc. must be credited to their original author(s). This process of crediting the work of others is achieved through referencing (see the section below on ‘Referencing styles’). Failure to do this properly is to risk committing plagiarism: the repetition or paraphrasing of someone else’s work without proper acknowledgement.

What we mean by ‘plagiarism’, ‘self-plagiarism’ and ‘collusion’

Plagiarism is used as a general term to describe taking and using another’s thoughts and writings and presenting them as if they are our own. Examples of forms of plagiarism include:

• the verbatim (word for word) copying of another’s work without appropriate and correctly presented acknowledgement;
• the close paraphrasing of another’s work by simply changing a few words or altering the order of presentation, with or without appropriate and correctly presented acknowledgement;
• unacknowledged quotation of phrases from another’s work;
• the presentation of another’s concept as one’s own;
• the reproduction of a student’s own work when it has been previously submitted and marked but is presented as original material (self-plagiarism).

Collusion is where work is prepared or produced with others but then submitted for assessment as if it were the product of individual effort. Unless specifically instructed otherwise, all work you submit for assessment should be your own and must not be work previously submitted for assessment either at Leicester or elsewhere. For more detailed information on how the university defines these practices, see also: www.le.ac.uk/sas/assessments/plagiarism

The University regards plagiarism and collusion as very serious offences and so they are subject to strict penalties. The penalties that departments are authorised to apply are defined in the Regulations governing student discipline (see www.le.ac.uk/senate-regulation11 ‘Plagiarism and collusion: Departmental penalties for plagiarism and/or collusion).

Resources and advice to help you study with integrity and avoid committing plagiarism

Negotiating these various rules, regulations and conventions can sometimes be a challenge, especially if they are new or different from previous experiences of studying. Check the Student Learning Development website for guidance on how to manage your studies so that you meet the required standards of critical scholarship and academic integrity: www2.le.ac.uk/offices/ld/resources/study/plagiarism-tutorial

If you are in any doubt about what constitutes good practice, ask your personal/academic tutors for advice or make an appointment with Student Learning Development for individual advice. You can book an appointment online by visiting: www.le.ac.uk/succeedinyourstudies.

One of the most important practices in ensuring the academic integrity of your work is proper referencing. The following section contains details of how to ensure your work meets the specific referencing requirements for the discipline(s) you are studying.
Referencing style

You must use a consistent referencing style when referring to books and other publications that you have read for your coursework. Most subject areas have a specific referencing style which you are required to use. If you are on a Joint or Major/Minor programme you may find that your subjects use different referencing styles and it is important that you use the correct ones. To find out which referencing style each department uses, and for information and help on each referencing style, please visit http://www.le.ac.uk/library/help/referencing.

Requirements differ on how to arrange bibliographies (complete list of all reference and other sources at the end of your coursework) and whether references are included within the word count for your coursework – please refer to any separate guidance provided on these points.

Mitigating Circumstances

The University recognises that students may suffer from a sudden illness or other serious event or set of circumstances which adversely affects their ability to complete an assessment or the results they obtain for an assessment. In such cases the mitigating circumstances regulations and procedures may be applied. These regulations are designed to ensure the fair and consistent treatment of all students.

You must keep your department(s) informed at all times of any personal circumstances that may impact upon your ability to study or undertake assessments. Tell your department(s) or Distance Learning Hub about any such circumstances at the time they occur. You need to fill out a mitigating circumstances form which can be found at the link below. You need to supply supporting documentation (e.g. a medical certificate) as soon as possible and no later than the deadline relevant to the assessment(s) affected. Normally, the deadline for submission of a mitigating circumstances claim will be no later than five working days after the assessment deadline to which it relates.

See www.le.ac.uk/sas/regulations/mitigation for full details of the mitigating circumstances regulations and procedures, including the University’s definition of a mitigating circumstance.

The Chemistry Department procedures for mitigating circumstances and absence from the University are described below (see also Blackboard site CH5001).

Absence from the University

Your attendance at workshops, practicals, tutorials and some other sessions (e.g. Problem Based Learning) is monitored and if you miss more than 3 sessions in a 2 week period you will be e-mailed to visit your personal tutor to explain your absence. Continued lack of attendance will be dealt with by the senior tutor, Professor Abbott, or the Head of Department. Serious lack of attendance could result in a Gross Neglect Warning which may result in the removal of the right to resit any exams you fail.

If you have any problem which is affecting your work or causing you to miss any of your commitments, you should discuss this with your personal tutor who will respect the confidentiality of your discussion. Your personal tutor may advise you to see a Student Counsellor or a Chaplain (see above). Students who are absent from the university are required to report this to the Department:

(a) if the illness leads to absence from classes at which attendance is compulsory (tutorials, workshops, laboratory sessions, assessments or university exams);

(b) where it might be a contributory factor in a failure to meet deadlines or to perform up to expectations in any academic assignment.

This should be done using the appropriate online form.

https://www2.le.ac.uk/departments/chemistry/current-students/ug/mitigating-circumstances-and-absence-reporting
Minor illness/absence for a period of up to five working days

_Students must self-certify absence by filling in the online form as soon as they return, giving details of the reason for the absence and submit any corroborating evidence._

**Illness/absence is of six or more days duration.**

In this case medical advice should be sought and a medical certificate obtained and submitted. Students are responsible for collecting medical certificates from the Victoria Park Health Centre (or their own GP) and supplying a copy to the Department. Students should fill in a form after 1 week and a second one when they return to the University.

**Serious or on-going medical problem**

If you have a serious or on-going medical condition it is up to you to decide (in consultation with your personal tutor and/or student counsellor) if you are fit to continue with your studies. The University does not allow us to continue making allowances for an on-going condition unless the condition worsens, _i.e. if you continue to study you are agreeing that you are fit to study and that the illness/condition is not significantly affecting your performance._ You always have the right to withdraw temporarily and restart your studies the following year if your condition has improved.

_You should fill in the appropriate form._

**Absence from University exams in January, May/June or September**

In this case a medical certificate is required regardless of the duration of the absence. _The form must be submitted before the end of Week following the exam period (Jan/June) or by the Monday immediately following the exam period in September._

_The examiners are unable to make allowance for your illness unless you fill in the form and submit appropriate documentation._

**Personal Support for Students**

**Departmental Student Support Arrangements**

From discussion of academic progress, to friendly advice on personal matters; personal tutors are there to provide support, advice and guidance on an individual level. Common topics for discussion may include course changes, study progress, module choices, exam results, career opportunities or more personal problems such as accommodation or financial difficulties. The Department’s personal tutor system operates in accordance with the _Code of Practice on Personal Support for Students:_ [www.le.ac.uk/sas/quality/personaltutor](http://www.le.ac.uk/sas/quality/personaltutor)

**Equal Opportunities**

The Department’s Equal Opportunities officer is Professor Paul Cullis (pmc@le.ac.uk). If you would like to raise any concerns related to equal opportunities (ethnicity, gender, disability etc.) please contact Paul at the e-mail address above.
Athena SWAN

The Department of Chemistry was successful in achieving a Bronze Athena SWAN award in September 2013. This achievement shows the department’s commitment to advancing women’s careers in higher education and research in science, technology, engineering, maths and medicine (STEMM).

The beliefs underpinning the Athena SWAN Charter are:

- The advancement of science, technology, engineering, maths and medicine is fundamental to quality of life across the globe.
- It is vitally important that women are adequately represented in what has traditionally been, and is still, a male-dominated area.
- Science cannot reach its full potential unless it can benefit from the talents of the whole population, and until women and men can benefit equally from the opportunities it affords.

The good practice that arises from implementation of the Athena SWAN ethos is of benefit to everyone in higher education.

- Good practice is of benefit to all staff and students; bad practice adversely affects the careers of women more than men.
- Good practice does not target initiatives solely at women, processes that are transparent and fair are of benefit to everyone.

For further information on Athena SWAN please see the following webpage:
http://www2.le.ac.uk/departments/chemistry/athena-swan-1

If you have any suggestions for embedding the Athena SWAN ethos in the Chemistry department, or would like to get involved in Athena SWAN activities, please contact the Chair of the departmental Athena SWAN committee, Dr Alison Stuart (amc17@le.ac.uk).

University Student Support Arrangements

Please note that the University of Leicester offers a holistic service to meet your needs in the major areas of student life, health and well-being, practical matters and learning and career development.

AccessAbility Centre

The Centre offers a range of services to all students who have specific learning difficulties, such as dyslexia, disabilities or long-term conditions including mental health which have a substantial day to day impact on their studies. Staff offer one to one support, the co-ordination of alternative examination arrangements and assistance with applications for the Disabled Students' Allowance. It is possible to be screened for specific learning difficulties and access to formal assessment is available. Students are means tested to see if they are eligible for assistance with the cost of formal assessments. The open access Centre acts as a resource base for students and staff and is a relaxed place for students to work. Its computers are equipped with specialised software for screen enlargement. Essay planning and speech output software is on the University network. The Centre has some specialised equipment (CCTV, enlarged keyboard, and chairs) and some for loan (chairs, writing slopes and digital recorders). Photocopying and printing facilities are also available. The Centre welcomes self-referrals as well as referrals from academic staff.

Contact: AccessAbility Centre, David Wilson Library
Tel/minicom: +44 (0)116 252 5002 | Fax: +44 (0)116 252 5513 | accessible@le.ac.uk
www.le.ac.uk/accessability

Please note that the departmental AccessAbility officer is Professor Paul Cullis (pmc@le.ac.uk), who would be happy to answer any questions you may have.
Student Welfare Centre

The Student Welfare Service offers wide ranging practical support, advice, and information for students. Financial advice is offered, with information on budgeting and funding. Specialised staff can advocate over late loans and other financial issues. Students can apply for hardship grants and loans through the Service.

Information, advice and guidance is available on finance issues and budgeting. In addition, students can apply for hardship awards and loans through the welfare service.

For international students, the Student Welfare Service coordinates The International Welcome Week in September and January. Expert immigration advice is available and students are strongly advised to renew their visas through the scheme provided by Student Welfare. Specialised Officers also support students who experience financial or personal problems.

Contact: Student Welfare Service, Percy Gee Building (First Floor).
Tel: +44 (0)116 223 1185 | Fax: 0116 223 1196 | welfare@le.ac.uk | www.le.ac.uk/welfare

Counselling and Wellbeing Service

This Service offers a range of expertise and support for the psychological aspects of health and wellbeing.

Services on offer include

Student Counselling Support

Time-limited, free and confidential one-to-one counselling to help students find ways of dealing with academic-related or personal issues that may be affecting ability to study or engage with student life. Helping students to build on their skills to cope with the challenges of study, work and relationships through workshops.

For information see our website: www.le.ac.uk/counselling

Contact: Student Counselling Service
+44 (0)116 2231780 | counselling@le.ac.uk

Student Mental Wellbeing Support

Practical, emotional and skills based one-to-one support to students managing mental health issues whilst at the University. Helping students to build on their skills to cope with the challenges of study, work and relationships through workshops.

Contact: Student Support (mental wellbeing)
+44 (0)116 252 2283 | mentalwellbeing@le.ac.uk

www2.le.ac.uk/offices/ssds/student-support-mental-wellbeing

Student Healthy Living Service

The Student Healthy Living Service provides direction to health care and health related activity which will contribute to wellbeing and help students to enjoy a balanced life. Students should register for health care local to the University; The University works closely with the Victoria Park Health Centre where staff have expertise in student health. More information can be found on the Healthy Living Service website.

Contact: Student Healthy Living Service
+(0)116 223 1268 | healthyliving@le.ac.uk | go.le.ac.uk/healthyliving
Health Care and Registering with a Doctor

Illness can affect any one of us at any time and for this reason the University strongly advises you to register with a doctor in Leicester. The Victoria Park Health Centre (www.victoriaparkhealthcentre.co.uk) has expertise in student health and has provided medical care to the University’s students for many years. The Health Centre is located conveniently close to the main-campus and registration is free.

If when you come to University you are already under the care of a ‘specialised team’, have a known medical condition including mental health or waiting for an appointment it is still advisable to register at the Victoria Park Health Centre. Soon after arrival, make an appointment to discuss with one of the doctors who will then be in a better position to communicate with the relevant doctors and help you to manage your condition to avoid any unnecessary disruption to your studies. Please take with you information from your current doctor or consultant which includes diagnosis, current management, including medication (provide a certified English translation if the original is not in English). This is essential for international students as some conditions may be managed differently in this country, particularly in relation to medication which may be licensed differently and may need changing to something which is available to prescribe in this country. If you take medication for your condition you must bring 12 weeks supply with you to ensure continuity until the registration process is complete.

More information about registering with a doctor and other health and well-being services can be found at: http://www2.le.ac.uk/offices/healthy-living-for-students/new-students/uk-students
Careers and Skills Development

Career Development Service

With your drive and determination, the Career Development Service can help you develop the skills and abilities that will not only help get you to where you want to be after university, but will stay with you for life.

Career development at Leicester isn’t just about getting some work experience and writing a CV; we make sure that you get personal support to achieve your aspirations. We’re here for you from the moment you arrive, through to your graduation and beyond. We’ll give you the opportunity to try new things and to figure out what you want from your career— what it is that really drives, motivates and inspires you.

We’ll also help you identify your personal strengths and what you need to develop to be ahead of the crowd. Even if you’re not sure what it is you want to do yet, we can help you develop the skills and experience that you need to get that first job out of university, but also the ability to manage your own career development and succeed on whichever path you choose.

It’s your career development journey and you decide where it is that you want to go. By working with us you make sure that you’re giving yourself the best possible chance to get there. We’ve got the knowledge and resources to spur you on to success so, by working with us, you really will make the most of you!

As a Leicester student you will have access to MyCareers: https://mycareers.le.ac.uk, our career management system, by simply using your university username to login. This is the gateway to:

- Booking one-to-one appointments with our career consultants for support with career planning, job hunting, CVs and applications, and mock interviews
- Booking workshops, such as mock assessment centres and psychometric testing
- Meeting employers who are coming on campus
- Finding all the opportunities available exclusively for Leicester students such as paid internships, volunteering, and extra-curricular activities

If you are looking for part time work whilst studying, make sure you sign up to Unitemps, based in the Students’ Union, for opportunities on campus and in the city.

We’re here to support you throughout your time at university so make sure that you come and visit us and log-in to your MyCareers account to get started!

Contact the Career Development Service:

0116 252 2004 | careershelp@le.ac.uk | www.le.ac.uk/careers

@uolcds | fb.com/uolcds
Feedback from Students

Student Feedback Questionnaires

The Department values your feedback on all of our teaching activities and makes every effort to act upon it to improve the teaching experience for all of our students. You will have the opportunity to give your feedback on every module that you take in the Department through the end of module questionnaires which are made available on Blackboard. Your feedback from these questionnaires is considered by the module convenor during the annual course review which takes places over the summer and each convenor must propose a plan of action to deal with any substantial issues that may have been raised. The Departmental Learning & Teaching Committee oversees the process and ensures that appropriate changes are indeed made in response to feedback. A summary of the list of actions from the course review is made available to students through the Student Staff Committee (SSC) and Blackboard during semester 1.

We appreciate that sometimes students will want to raise specific issues during a module rather than wait until the questionnaire. You can do this through the SSC, your personal tutor and/or the year tutors or by contacting the Head of Teaching (Dr Handa) directly. We would encourage you to raise any potential issues through one of these channels as soon as possible so that we can respond quickly and take any necessary action. Any actions arising as a result will be reported back through the SSC and/or Blackboard.

Listed below are just some of the changes that we have made during the last two years specifically in response to student feedback.

(We have also made other changes to improve the student educational experience but the ones below were in response to issues raised through module questionnaires / the SSC / feedback to year tutors).

All Levels:

- Introduced lecture capture for the majority of core modules (for teaching events where rooms were equipped for lecture capture).
- Improved exam feedback – giving students a chance to look through their marked exam scripts.
- Tutorial feedback (Levels 1 & 2) – an opportunity for students to indicate difficult topics on the cover sheets.

Level 1:

- Introduced some additional revision sessions for students failing semester 1 modules.
- CH1003 (maths) - switched delivery from lecture followed by workshop to workshop then lecture, this allowed students to get help first and then review their answers in the lecture. Also provided detailed model answers for a representative selection of the problems.
- CH1002 & 1006 – lecture note booklets now provided.
- CH1007 – introduced group work practice problems & provided audio lectures to listen to before lectures.
- CH1031/32 – Moved parts of the introductory biology material from semester 2 to semester 1. Also reviewed material to provide more of a chemistry perspective on biochemistry topics.
Level 2:
CH2005 – answers to workshop questions now supplied.
CH2007 – increased the amount of time spent covering topics students indicated as particularly difficult and also updated lecture notes for these areas.
CH2009 – lectures notes for aromatic / heteroaromatic chemistry rewritten to improve presentation and content.
CH2013 – removed final exam from the assessment, careers activities moved earlier (to help those applying for industrial placements) & changed timing of continuous assessments to avoid clashes with other Level 2 assessments.
CH2023 - students allowed to work in groups for problem classes / continuous assessment (previously done independently).
CH2040 – lecture notes for Dr Evans part completely revamped and updated.
Level 2 practical – reviewed length and instructions for some experiments to ensure enough time for lunch breaks and suggested points where breaks could be taken.
Pharm Chemists - arranged for access to lecture captures for some Level 1 Biochemistry material to help with background for the BS2013 module.

Level 3:
CH3201 – introduced short videos of worked examples of spectroscopy problems.
CH3202 - practice B’board questions made available for the continuous assessment.
CH3203 – increased the fraction of the continuous assessment (now 100%) based on previous exam questions.
CH3204 – drop in / revision sessions arranged for after Easter.
BSc projects – introduced a formative feedback exercise for the practical element to allow students to gauge their performance against the marking criteria.
MChem practical – improved mark sheet & feedback forms for the Phys chem labs; simplified proformas for the synthetic techniques.
Industry students – put procedures in places to allow students to take end of semester examinations at their placement company and so avoid having to travel back to Leicester.
Level 4:

Changed programme specifications so that modules now run across the whole year. This has two consequences – students now have greater choice over module options (no longer restricted to 2 modules each semester) and also allows paced delivery of material throughout the year (with more time for assimilation).

Added two extra module choices to Level 4 (Bioinorganic Chemistry & Nanotechnology)

Introduced some module choice for Pharmaceutical Chemists (previously the programme specifications had none).

MChem projects – introduced a formative feedback exercise for the practical element to allow students to gauge their performance against the marking criteria.

CH4201 – introduced written answers to selected spectroscopic problems to allow for individual feedback (previously this was a group exercise with feedback at group level).

CH4202 – changed the continuous assessment to focus on unseen retrosynthetic problem solving with detailed individual feedback.

CH4203 – added two classes on calculations & numerical problems (practice for the unseen problems on the final exam).

CH4204 – introduced a new essay based continuous assessment to give students training and practice in analysis of research papers (helpful for the final exam).

CH4206 – some additional formative coursework introduced.

Student Staff Committees

Student representatives are invited to sit on the Student/Staff Committee (SSC), usually from each year group, one representative for each degree course. The Committee meets at least once each semester to discuss any issues about the courses or other matters of concern. If you wish any matters to be raised, please contact your year/course representative. Elections for student representatives are usually held by the Student Union, early in the first semester (or at the end of the previous year for returning students).

The Agenda for committee meetings are circulated by email to all members at least one week prior to the meeting date and minutes are circulated as soon as possible following.

For more information about the SSC please see the noticeboard in the George Porter foyer.

The terms of reference will be circulated to all representatives at the start of the year but are also located at: http://www2.le.ac.uk/offices/sas2/quality/codes/documents/sscommittees.pdf

To see the elected representatives for this year: https://www.leicesterunion.com/top-navigation/voice/academic-representation/current-representatives
Departmental Prizes

The prizes for Level 3 and 4 students are:

Best graduating student (BSc or MChem) **Hunter Medal**

Top graduating BSc and MChem students **Dunlop Polymer Engineering Prizes**

Best graduating student in Pharmaceutical Chemistry **Celltech Prize**

Best graduating Chemistry with Forensic Science student **Treatt & Eartheoil Plantations Prize** – prize to be confirmed for 2016/17 academic year

Societies

ChemSoc is the department’s Chemistry society. ChemSoc organises regular social and academic events for anyone with an interest in Chemistry. Events include joint socials with other societies, the ChemSoc Easter Ball, curry nights, laser tag, quiz nights, post-exam celebrations and pre-exam relaxation. The ChemSoc chair for the 2016-17 academic year is Angus Hope (ah521@student.le.ac.uk). For further information on ChemSoc please see their noticeboard in the foyer.

Safety and Security

As part of your induction and when you first start using the department’s labs you will be given detailed safety and security information. Specific safety information is covered under ‘Laboratory Work’.

Problem Classes and Laboratory Information

Problem Classes

These will usually involve demonstrations or supervised learning and/or problem solving. You will often be expected to work in small groups. In addition these sessions will be used to provide an induction to skills training, e.g. writing and oral presentation skills.

Laboratory Work

Laboratory work is designed to make you familiar with practical methods available to the chemist, to give you confidence in your ability to use these methods and to keep proper records, and to give you an opportunity to handle experimental data. Doing practical work also helps you to appreciate the experimental basis on which theoretical concepts are founded and thus should enhance your understanding of these concepts. Later in the course you will also learn how to plan experiments to solve problems, and this will culminate in research projects at Level Three or Four.

Demonstrators in the laboratory are there to give advice about your practical technique and to help you to understand the other lessons which can be learned from each experiment. You will get the most benefit out of laboratory work only if you bring your difficulties to the attention of demonstrators. Although practical work is assessed, you will not be penalised for discussing your problems with demonstrators before you have finished an experiment. Furthermore, it is essential to hand in your practical reports/book for assessment on time.
You cannot proceed to the next level of the degree without passing the practical course. There are no resit practical examinations.

If you are ill and miss a practical session you must complete a mitigating circumstances form or you will be given zero for that session. If you miss several sessions through illness you will be offered the opportunity to catch up. If you do not complete at least 75% of your scheduled sessions, you will fail practical and your course will be terminated.

Sometimes it may happen that, through no fault of your own, an experiment may fail - for example through instrument breakdown. Should this occur, you should not be penalised either by scoring low marks or by having to spend extra time completing the experiment. You must explain immediately to the senior demonstrator on duty what has happened so that he/she can advise you on the correct course of action. This will vary with circumstances, but may (for example) involve giving you a sample with which to continue working or giving you specimen data to interpret. Whatever happens, you must record this in your completed laboratory report. Some of your practical work will be carried out with a partner, especially in Physical Chemistry. When this is so, it is not possible for both of you to carry out every technical or practical manipulation, but it is important, as with work done individually, that you observe and understand each part of the experiment. You must discuss the processing and the interpretation of data with your partner.

**Laboratory Books for recording your experiments**

A special notebook for recording your experiments is provided in your starter pack.

**Broken glassware**

If your glassware breakages total more than £50, you will be invoiced for breakages over and above this amount.

**Safety in the Chemistry Laboratories**

Every effort is made to teach you the hazards associated with handling chemicals. Special risks are identified in the laboratory manuals. For women who are pregnant or are anticipating pregnancy, it is essential that they see the University 'Guidance Notes for New or Expectant Mothers'. This booklet and advice can be obtained from the Students' Union Welfare Office.
Pregnancy

The Department has a duty of care for everyone working in the Chemistry buildings, however under current health and safety legislation pregnant workers are considered to be at special risk. The most important aspect for a student who becomes pregnant is to inform the Department as soon as their pregnancy is confirmed.

The Department’s primary advice to a student in this situation is to take temporary withdrawal from their degree course or defer their registration.

In exceptional cases the Department recognises this may not be practicable and will then consider each case on an individual basis. If the Department decides to allow the student to continue it will advise the student of the risks involved and will instigate the following procedures to minimise the risk.

- The Course Convener with co-operation from other staff as required will produce a full risk assessment of all the practical’s being undertaken by the student in the UG laboratory, assessing the implications to a pregnant worker.
- Further risk assessments (including COSHH) will also be undertaken of the chemicals you use and may come into contact with in your practical studies in the various laboratories you may work in.
- The completed risk assessment will be given to you and a copy will be retained by the Department for their records.
- If the Course Convener deems it necessary, a written protocol will be issued highlighting the procedures the student must follow.
- The written protocol will be issued to you and also held by the Department for their records.
- Where practicable further consideration will be given to other experimental work being carried out in the shared laboratories when you are present, any special advice regarding risk from other work will be communicated to you and a record held by the Department.

The Department will strive to minimise the risks you may encounter working in a shared UG laboratory, however all risks cannot be eliminated.

On receipt of the risks assessments and any special instructions from the Course Convener you will be required to sign a declaration that you agree to adhere to the risk assessments, follow any special instructions, have read and understood the course of action that the Department is taking to enable you to continue your studies while pregnant and that you have considered and accept the risk involved to you and your unborn child.

Personal Belongings

Your personal belongings are not covered by the University’s insurance. You are therefore advised to check whether your parents’ or family policies provide adequate protection. If not, private insurance arrangements should be made.

A lost property service operates from the Security Lodge, which is situated at the far end of the Fielding Johnson Building on Wyggeston Drive, University entrance No. 1.

Bicycles may be brought onto the main campus but must be placed in the cycle racks provided, and appropriate security measures taken to help to prevent theft and damage. For advice on preventing cycle theft and details of the University’s Coded Cycle Scheme visit: [www.le.ac.uk/estates/facilities & services/security/CodedCycleScheme.html](http://www.le.ac.uk/estates/facilities & services/security/CodedCycleScheme.html)
Complaints and Academic Appeals Procedures

The University has robust systems in place governing the quality and standards of its degree programmes and your experience as a student here. We are confident that, like the vast majority of students here, you will enjoy and be satisfied with your course. In most instances your department will be able to resolve any issues that do occur but we recognise that this will not always be possible. For this reason, the University has official procedures that allow eligible cases to be formally reviewed.

Information about these procedures, including the relevant forms, can be found on the Student and Academic Services website: see www.le.ac.uk/sas/regulations/appeals-complaints. These pages should be read in conjunction with the University's Regulations governing student appeals (www.le.ac.uk/senate-regulation10) and Regulations governing student complaints (www.le.ac.uk/senate-regulation12).

Personal Tutors

Your personal tutor continues to be the same person as last year. You are required to see your personal tutor in the first term and again in Semester 2 (to discuss your PDP Skills portfolio). It is important to continue seeing her/him and you should feel free to turn to her/him if you have difficulties of any kind, and in particular you should discuss any circumstances which may affect your academic work or your enjoyment of University life.

Very occasionally, a student has wished to change personal tutor. Should you ever wish to do this, you should raise the matter with Dr Greg Solan, the Tutor with special responsibility for all third year students, or, if this is not possible with the Head of Department.

Student Skills Record/Personal Development Planning

During your course you will be expected to keep a record of your learning and skills development. This is useful in helping you identify your strengths and weaknesses. Many employers now ask to see this record. You should discuss this with your Personal Tutor.

Personal Development Planning (PDP) is a structured and supported process designed to give you the opportunity to reflect on your progress and plan for your future development. In doing so, it is hoped that PDP will better enable you to improve and enhance both your academic performance and your prospects for professional and career success after graduation. PDP will help you to:

- recognise the skills and abilities you are developing;
- identify areas for improvement and development; and
- think about how you can improve your employability and career prospects

In addition, Learning Development provides some more general information about what PDP is, and how you can engage with it: www2.le.ac.uk/offices/ld/personal-development-planning-pdp.
The Weighting of Modules for your Degree

For all degrees your performance in the first year does not count towards your overall mark. Your mark in years 2, 3 (and 4) counts towards your overall Degree classification as shown below.

<table>
<thead>
<tr>
<th>BSc degrees (3 year)</th>
<th>MChem degrees (including USA/Ind/EU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>0%</td>
</tr>
<tr>
<td>Level 2</td>
<td>40%</td>
</tr>
<tr>
<td>Level 3</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>Level 4 50%</td>
</tr>
</tbody>
</table>

Note: In order to qualify for the Hons degrees you must gain 120 credits each year (and average more than 40%). In order to gain credit in a module you must achieve at least 35% in that module (and average more than 40%).

<table>
<thead>
<tr>
<th>Average mark</th>
<th>Credits over final 2 years (see below for MChem)</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 credits or more failed</td>
<td>Fail</td>
</tr>
<tr>
<td>&gt; 70%</td>
<td>120 credits at 70% or better, failed modules &lt; 40 credits</td>
<td>1st</td>
</tr>
<tr>
<td>67-69</td>
<td>If not 120 credits &gt;70% or 40-45 credits failed</td>
<td>2.1</td>
</tr>
<tr>
<td>60-66</td>
<td></td>
<td>2.1</td>
</tr>
<tr>
<td>57-59</td>
<td>120 credits at 60% or better, failed modules &lt; 40 credits</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>If not 120 credits &gt;60% or 40-45 credits failed</td>
<td>2.2</td>
</tr>
<tr>
<td>50-56</td>
<td></td>
<td>2.2</td>
</tr>
<tr>
<td>47-49</td>
<td>120 credits at 50% or better, failed modules &lt; 40 credits</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>If not 120 credits &gt;50% or 40-45 credits failed</td>
<td>3rd</td>
</tr>
<tr>
<td>40-46</td>
<td></td>
<td>3rd</td>
</tr>
<tr>
<td>35-39</td>
<td>this is not an honours degree.</td>
<td>Pass</td>
</tr>
<tr>
<td>&lt;35</td>
<td></td>
<td>Fail</td>
</tr>
</tbody>
</table>

For MChem degrees the scheme is essentially the same except that years 2, 3 and 4 are considered; for promotion to the higher category students will need 180 credits (out of 360, i.e. years 2,3 and 4) in the higher category.

[Note: Candidates on a borderline may have a viva with the external examiners. For details of border-line categories, see http://www.le.ac.uk/academic/quality/Codes/examining/]
Module Assessment

Assessment of performance is relative to defined criteria, which means that your mark depends only on your performance and not on that of the rest of your class. The bulk of the assessment of each module consists of the end-of-semester exam. For details of the amount of continuous assessment and length of the exams see the individual module details (appendix).

Students must be available to attend examinations on any date within the formal assessment periods, including Saturdays.

Examinations

Finding out your exam marks

You will be able to see your exam results by logging onto MyStudentRecord. For Midsummer exams, marks will be available just before the end of term.

Calculators

Permitted calculators are the Casio FX83 and FX85 models. See http://www.le.ac.uk/sas/assessments/examsguide for the most up to date information.

Anonymity

Formal University end of semester exams are marked anonymously. You will need to take your student ID card with you to all exams, this has your candidate number on it. During the first semester you will be sent confirmation of modules for which you have registered. Ensure that you cross check this.

Progression to Level 4 (MChem degrees only)

In order to continue on the MChem degree, you must have gained (at least 105 credits) in all your modules and have failed no more than 15 credits. If you fail to get credit in a module you will resit that module.

External moderation of examinations and degrees

All Level Three Module examination papers are scrutinised by one of three external examiners. These examiners may also see the student scripts and they are present at the final examiners' meeting at which degree classifications are decided. They also conduct oral (viva) examinations on students who are borderline between degree classifications.

The three external examiners this year are:

- **Organic:** Professor S. Flitsch (MIB)
- **Inorganic:** Professor P. Walton (York)
- **Physical:** Professor B. Binks (Hull)

The purpose of external examiners is to moderate the standard of the examination papers and their marking to ensure that degree classifications in Chemistry in Leicester are not out of line with similar degrees in other British Universities. The examiners have a three year term of service. They may make suggestions and criticisms on the degree course and standards which we are expected to respond to. Their active participation in the examination process helps to make Leicester University Chemistry degrees respected nationally.
Course Transcript

A Course Transcript is given to you when you are awarded your Degree. This lists all the modules you have taken, with the associated marks.

At the end of an academic year if you need a transcript you can order one at the following website http://www2.le.ac.uk/offices/sas2/studentrecord/transcripts/year

If you need information on your marks (for instance for an interview) before the end of an academic year please contact the administrative team in the front office or by e-mail to chemadmin@le.ac.uk and a letter with your marks to date can be produced. Please note that marks are subject to change before the end of the academic year and this letter will state this.

Provisional Exam dates

First semester:  9th – 20th January 2017
Second Semester:   15th May – 2nd June 2017

The Final Exam Board Meeting will take place during either Week 29 or Week 30. All students will be notified in plenty of time of the exact date of this Meeting in the event of potential viva voce examinations.

Postgraduate Research - BSc Students

You will be informed of postgraduate opportunities and application procedures during the year.

The Department offers a number of MSc Chemistry courses.

Private Study and Vacations

Time for private study is not timetabled, but it is the most important aspect of your work while you are at University. Private study includes the time you will need to spend consolidating your understanding of the information given during lectures. It is very important that you do this as the course proceeds and that you do not think that hasty revision just before a formal examination will be adequate. Study in the Christmas and Easter vacation periods are particularly important since examinations are held soon after your return.

Private study also includes reading round the subject and putting some flesh on the skeleton provided by the formal course. This means not only reading the recommended texts, but also thinking about them and questioning them, and making additional notes to supplement the lectures. On average you should be doing around two hours’ private study for each lecture. You should also read books of general scientific interest and periodicals such as the New Scientist and Scientific American. As the course progresses you will be, increasingly, reading more specialist chemical journals. You will find copies of most of the basic chemistry text books in the Main Library: you should explore this collection at an early stage.

Some students find it very productive to study together in groups of 3 or 4. This can generate a good work atmosphere, provide mutual support and an opportunity to help each other with difficulties and even supply an element of competition.
Assessment Deadlines

Almost all of the modules that you are taking will have some continuous assessment that contributes towards the final mark. These assessments can take a variety of forms e.g. tutorial work, practical reports, written assignments (some under exam conditions), Blackboard tests, presentations, poster exercises etc. During the course of the year you will need to meet numerous deadlines for submitting these assessments and will also need to plan your work accordingly such that you are prepared for any tests. To help you plan your time the Department will list the major assessment deadlines/dates of continuous assessment test at the start of each semester (available on Blackboard). You should note that the list of deadlines is only provisional and the actual date may change slightly (any changes will be communicated to you by the module convenor/lecturer), however you should find them useful when planning ahead.
Level 3 Modules for Each Degree

BSc Degrees: C = Core; O = Option

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>CR</th>
<th>Chem</th>
<th>Forensic</th>
<th>Pharm</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH3200 Chemistry General Skills (Year)</td>
<td>5</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>CH3251 Chemistry Project – Part 1</td>
<td>20</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>CH3201 Advanced Organic Chemistry</td>
<td>15</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>CH3202 Advanced Inorganic Chemistry</td>
<td>15</td>
<td>C</td>
<td>C</td>
<td>C</td>
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Total Core Credits (BSc) = 105  105  120

BSc. Chemistry and Chemistry with Forensic Science – choose one option in Semester 2

MChem Degrees: C = Core; O = Option

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Total Core Credits (MChem) = 90  105  120

MChem. 3 – choose two options in Semester 2.

MChem. Chemistry with Forensic Science – choose one option in Semester 2

All students are advised to think about which area they may like to do their 4th year project in when considering which Level 3 options to choose. Students doing Chemistry with Forensic Science who wish to get a job in the Forensic or Analytical area are advised to consider a project in these areas. In this case, these students are advised to choose Advanced Analytical Chemistry as their Level 3 option.
LEVEL 3 MODULES

The following pages contain a brief description of each module and the learning outcomes for these modules. These learning outcomes are only intended as a guide to the content of the course and the skills you will be expected to have gained by the end of the course.

The ILOs will provide you with an overview of the general competencies you should achieve by completing the module but they are not meant to be a detailed, itemised list of everything that appears in a module so should not be used as the basis of revision.

Similarly, not all learning outcomes will necessarily be tested.
Module CH3200/3500 Chemistry General Skills

Convenor: Dr Handa
Lecturers: Dr Handa, Dr Williams & Careers Service
Semesters: Semester 1 & 2
Course credits: 5

Aims and contents:
The aim of this module is to test your knowledge of the general principles covered in the core modules during years 1 and 2. They are the principles that underpin the more difficult concepts covered in levels 3 and 4 and are the minimum knowledge you should have across the full breadth of chemistry. These topics are also ones that are often covered in oral exams for projects and/or with external examiners. The module also covers key research literature, communication and employability skills.

Learning Objectives:
The CORE material from modules CH1000, CH1002, CH1007, CH1008, CH2005, CH2006, CH2007, CH2009, CH2010 and CH2011. You will also be provided with a list of topics which you should know.

Further sessions will deals with
- Key written communication skills
- Key employability skills
- Use of Chemistry Databases

Methods: Self-learning, practice multiple choice questions, workshops.

Assessment:
2 hour multiple choice exam (75%); continuous assessment (25%). The continuous assessment will include exercises on (i) chemical databases, (ii) a careers/skills, (iii) poster communication (iv) peer paper review.

Other information
Many of the basic principles will be reinforced in your level 3 modules particularly CH3201 and CH3202.
Module CH3201/3501 Advanced Organic Chemistry

Convenor: Dr Handa
Lecturers: Dr Handa, Dr Villa-Marcos
No. of sessions: 30 First semester
Course credits: 15

Aims:
To develop skills in the determination of structure and stereo-structure using modern spectroscopic methods.
To explore concerted (pericyclic) and non-concerted (radical and carbene) reactions, to understand reasons for differences in reactivity and selectivity (including stereoselectivity), and to exploit ways of imposing selectivity and achieving control.

Learning Outcomes:

Subject knowledge: at the end of this module students should:

- Appreciate the importance of spectroscopy (particularly NMR and MS) in the determination of the structure and shape of organic compounds;
- Be able to analyse spectra and hence deduce the structure of molecules;
- Recognise and be able to classify the principal types of pericyclic reaction;
- Appreciate how the mechanism relates to the selectivity of such pericyclic reactions and why thermally and photochemically activated molecules frequently exhibit contrasting selectivity;
- Know and understand how radicals and carbenes can be generated, and the types and mechanisms of reaction that they most commonly exhibit;
- Appreciate how the reactivity of transient species can be investigated;
- Recognise the advantages and limitations of the high reactivity of transient intermediates.
- Employ mechanistic principles to explain the reactivity of (and the products formed in) pericyclic, radical and carbene reactions.

Key skills: at the end of this module students should be able to:

Obtain new information from textbooks, describe relevant chemistry and discuss it with peers and teachers, use knowledge and understanding to predict and explain reactivity, solve problems.

Methods: Set text(s), lectures, example problems, group problem solving workshops. Application of the ideas encountered in lectures to the solution of problems is an essential part of the module and some of the lecture slots will be given over to problem solving classes. Problem sheets will be distributed in advance and students are required to bring their written solutions to these classes.

Assessment: 2.5hr examination (75%); continuous assessment (25%). The written examination assesses the learning and understanding of material covered in lectures and further reading.

Further reading
J. McMurry, Organic Chemistry, sets the scene but little more.
I. Fleming, Pericyclic Reactions, Oxford Chemistry Primer Series. [547.1393 FLE]
C.J. Moody and G.H. Whitham, Reactive Intermediates, Oxford Chemistry Primer Series. [547.2 MOO]
J. Clayden et al., Organic Chemistry, Oxford University Press. [547 CLA]

Other information
This module builds upon the core material of organic reactivity and spectroscopy from Levels 1 & 2.
Module CH3202/3502 Advanced Inorganic Chemistry

Convenor: Dr Solan
Lecturers: Dr Lowe, Dr Solan & Prof. Hope
No. of lectures/workshops: 30 First semester
Course credits: 15

Aims: To revise and develop the basic concepts of inorganic chemistry through an appreciation of key techniques and then examine the role of modern inorganic chemistry in metals in medicine and catalysis.

Course structure: The module begins with a series of lectures covering some of the key techniques in inorganic chemistry – Prof. Hope. It then proceeds to focus on specific areas namely, Metals in medicine – Dr Lowe and Catalysis – Dr Solan. Each component of the module will be supported by a number of problem classes and in-lecture problems. It is important that students work through all of these problems independently to aid both their progress and comprehension of the academic material.

Learning Outcomes

Subject knowledge: at the end of this module students should:

- Understand the basic principles of diffraction techniques.
- Know what information can be obtained from each technique, appreciate the significance/relevance of the data available from each technique to inform interpretation of the data and be able to select which technique is most appropriate for a given situation.
- Appreciate that the principles of NMR spectroscopy can apply to all NMR active nuclei, including non-100% spin ½ and quadrupolar nuclei.
- Appreciate the information that can be determined from a study of IR (and Raman), UV spectroscopy.
- To examine how magnetism and EPR can be used together to interpret physical behaviour of inorganic compounds.
- To show what information mass spectrometry and cyclovoltammetry can give with inorganic compounds.
- Appreciate how the understanding of basic inorganic chemistry and appropriate physical methods can be applied to solve unseen inorganic chemical problems.
- To appreciate the importance of inorganic chemistry in Biomedicine, small molecule binding in haemoglobin, cis-platin, metals in medicine, lanthanide chemistry, MRI, fluorescence, spin-orbit coupling.
- To appreciate the importance of inorganic chemistry in catalysis: hydroformylation, acetic acid manufacture, polymerisation of alkenes, oligomerisation of alkenes and relation to the SHOP process, ring opening polymerisation (e.g., synthesis of biodegradable polymers like polylactide and polycaprolactone),

Assessment: 2.5 hour examination (75%); the continuous assessment will involve a Blackboard test (25%).

Further reading

B D Cullity, Elements of X-ray diffraction, Prentice-Hall, 2001 [548.83 CUL]
W Clegg, Crystal structure determination, Oxford University Press, 1998. [548.83 CLE]
R. Wyman, Applied Organometallic Chemistry and Catalysis, OUP, Oxford 2001
R.H. Crabtree, Organometallic Chemistry of Transition metals, Wiley [547.05CRA].
Module CH3203/3503 Advanced Physical Chemistry

Convenor: Dr Ball
Lecturers: Dr Ball, Dr Hudson
No. of Lectures: 30 Second Semester
Course credits: 15

Aims:
This module further develops the theoretical concepts that underpin modern chemistry. At the molecular level, quantum mechanics provides the energies and symmetries of quantum states; these concepts are then applied to build a fundamental description of chemical bonding between atoms. At the macroscopic level, statistical mechanics uses information about quantised energy levels to rationalise the properties of collections of molecules, thereby enabling the ab initio (“from first principles”) calculation of bulk thermodynamic quantities such as reaction enthalpy, entropy, and the position of chemical equilibria. Spectroscopy provides experimental verification of the quantum mechanical results, e.g. the spacing between energy levels. Spectroscopy also links to macroscopic collections of molecules through, for example, the intensity of spectroscopic lines which is determined partly by whether the transition is allowed or forbidden and partly by the number of molecules occupying the energy levels (i.e. the Boltzmann distribution).

Delivery:
The module is delivered as three parallel streams in the following topic areas:

- Molecular structure & bonding,
- Statistical thermodynamics,
- Molecular spectroscopy.

There are Lectures (24 sessions), Problem classes (6 sessions) and Continuous assessment feedback sessions (3) divided equally across the three topic areas.

Subject Knowledge: at the end of this course students should be able to:

- Appreciate the mutual reliance of quantum theory, statistical methods and spectroscopy.
- Write down Schrödinger equations for light atoms (H, He) and simple diatomic molecules (H₂⁺, H₂); identify the various terms and their contributions to the energy of the system.
- Rationalise the properties of wave functions (energy, symmetry, quantum numbers, electron density).
- Construct molecular orbitals (MOs) from a linear combination of atomic orbitals (LCAO approximation); establish the symmetry of the MOs; construct molecular orbital energy level diagrams and interpret them to predict molecular properties (e.g. bond strengths, electronic term symbols, unpaired electrons/radicals).
- Implement Hückel theory to predict the properties of π-bonded molecules and aromatic organic compounds.
- Explain key processes in the interaction between light and matter (absorption, spontaneous and stimulated emission, non-radiative relaxation); use the information content of spectroscopic lines (frequency, intensity, line shape) to infer properties of the molecule.
- Apply symmetry and group theory to establish whether the spectroscopic transition between a lower and upper state is quantum mechanically allowed or forbidden.
- Discuss how the Boltzmann distribution determines how a collection of molecules occupy their available energy levels and how that distribution changes with temperature. [Not included in CH3503 for Distance Learners]
- Define the molecular partition function. Evaluate partition functions for electronic, translational, rotational and vibrational energy levels and critically examine their contributions to thermodynamic quantities such as internal energy, heat capacity and entropy. [Not for CH3503]
- Apply partition functions to predict the position of chemical equilibria. [Not for CH3503]
Assessment:
End of module exam 2.5 hours (75%): mixture of descriptive questions and calculations.
Continuous assessments x2 (25%): two question sheets containing unseen descriptive questions and numerical problems.

Recommended Textbooks:
Quantum mechanics:

Statistical thermodynamics:

Spectroscopy:


Module CH3503 Advanced Physical Chemistry for Distance Learners

Content: The Distance Learning version of this module uses the CH3203 material on Molecular structure & bonding (Dr Ball) and Spectroscopy (Dr Hudson). The CH3203 material on Statistical thermodynamics (Dr Ball) is not part of the CH3503 module.

Assessment: CH3503 has the same exam and continuous assessment elements as CH3203, weighted in the same proportions and with the same deadlines. The differences are (i) a shorter 1.5 hour end-of-module exam for CH3503 and (ii) CH3505 assessments do not include any of the Statistical thermodynamics material from CH3203.
Module CH3204/CH3504 Biological Chemistry

Convenor: Prof. Cullis  
Lecturers: Prof. Cullis, Dr Blackburn  
No. of lectures: 30 Second semester  
Course credits: 15

Aims:
The aim of this course is to provide students with an understanding of a range of fundamental topics in biological chemistry. The course will address the structure, reactions and biological roles of carbohydrates, nucleotides, nucleic acids and biologically important aromatic heterocycle. The course will use explore the pathways and mechanisms by which biological systems assemble fatty acids, polyketide derived materials and steroids from simple carbon sources and their roles in living systems.

Learning Outcomes:
Subject knowledge: at the end of this module students should be able to:
- Understand and explain the structure, nomenclature and chemistry of simple carbohydrates;
- Understand and explain strategies for the synthesis of carbohydrates and the use of carbohydrates in organic synthesis.
- Discuss in detail the structures and properties of the naturally-occurring nucleosides and nucleotides.
- Appreciate the chemical reactivity of DNA and its relevance to toxicology.
- Appreciate the contribution of chemistry to genetic engineering and drug development.
- Understand the chemistry involved in laboratory synthesis of DNA and its structure determination.
- Understand the structures, reactivities and preparations of a range of biologically important heterocyclic compounds.
- Describe the occurrence, function and mechanism of action of a range heterocyclic cofactors in biological reactions.
- Appreciate common methods and techniques of structure elucidation of natural products.
- Be able to draw the mechanisms of biological assembly of natural products via the four key building blocks (mevalonic acid, shikimic acid, amino acids and pyruvate)

Key skills: at the end of this module students should be able to:
Obtain new information from textbooks, describe relevant chemistry and discuss it with peers and teachers, solve problems.

Methods: Lectures, set texts, web-based material, example problems and tutorial questions.

Assessment: 2.5 hr examination (75%); continuous assessment (25%). The written examination assesses the learning and understanding of material covered in lectures and further reading.

Further reading
D.T. Davies, Aromatic Heterocyclic Chemistry, Oxford University Primer [547.59DAV]
J. Mann, Chemical Aspects of Biosynthesis, Oxford University Primer

Other information
This course builds on some of the material in CH2009, CH2005.
Module CH3205/3505 Metals in Synthesis

Convenor: Prof. Davies, Lecturers: Prof. Davies, Dr Handa
No. of lectures: 30 Second semester, Course credits: 15

Aims: This module aims to provide students with an understanding of the use of main group (part A) and transition metals (part B) in stoichiometric and catalytic organic synthesis, and a knowledge of the mechanisms of the reactions involved.

Learning Outcomes:

Subject knowledge: At the end of this module students should be able to:

- Explain and recognise the concepts of regioselectivity, diastereoselectivity and enantioselectivity.
- Appreciate the important features of the use of transition and main group elements in stoichiometric and catalytic organic synthesis.
- Discuss the important features of the synthetic chemistry of silicon, selenium, lithium, boron and aluminium, determine the number of valence electrons for a metal (18 e− rule) and recognise and be able to explain the basic types of organometallic reactions.
- Discuss the effect of coordination to a metal on the structure and reactivity of alkenes, dienes, allyls, arenes etc. and the use of these effects in organic synthesis, explain what is catalysis and the effect of a catalyst on the free energy of a reaction, define turnover frequency and turnover number.
- Discuss in detail specific examples of transition metal catalysed processes including information on their mechanisms and key reaction steps. These processes should include, hydrogenation of alkenes and carbonyl compounds, Wacker oxidation of alkenes, metathesis of alkenes, cyclopropanation, cross-coupling reactions, nucleophilic attack on unsaturated substrates and CH activation and functionalisation.
- Discuss asymmetric catalysis including hydrogenation, epoxidation, cyclopropanation and chiral ligand design, explain how spectroscopy, kinetics and labelling studies can be used to help elucidate reaction mechanisms.

Key Skills: At the end of this module students should be able to:

Obtain new information from textbooks, describe relevant chemistry and discuss it with peers and teachers, solve synthetic and mechanistic problems in organic synthesis using metals.

Methods: Set texts, research papers, lectures, example problems, group problem solving workshops.

Assessment: 2.5hr exam (75%); continuous assessment (literature exercise (17%) and set problems (8%)). The written examination assesses the learning and understanding of the concepts and knowledge described in the lectures and further reading, together with abilities in problem solving. The worked examples from workshops will be used for formative feedback.

Further reading

Section A: Main Group Element Chemistry
S.E. Thomas, Organic Synthesis: The Roles of Boron and Silicon, Oxford [547.2THO].
P.R. Jenkins, Organometallic Reagents in Synthesis, Oxford [547.05JEN].

Section B: Transition Metal chemistry and Catalysis
R.H. Crabtree, Organometallic Chemistry of the Transition Metals, Wiley [547.05CRA].
H. Brunner, Handbook of Enantioselective Catalysis with Transition Metal Compounds, VCH, 1993 [547.1395.BRU].
R. Whyman, Applied Organometallic Chemistry and Catalysis, OUP, Oxford 2001
J.F. Hartwig, Organotransition metal chemistry: from bonding to catalysis, University Science Books, Sausalito, California.

Other information:

This module builds on the organic chemistry covered in years 1 and 2 and the basic principles of organometallic chemistry (CH2006). Some knowledge of basic kinetics and spectroscopy is also useful.
Module CH3206/3506 Advanced Analytical Chemistry

Convenor: Professor Hillman
Lecturers: Prof. Hillman, Prof. Ryder
No. of lectures: 25 Second semester
Course credits: 15

Aims: This module aims to provide students with an understanding of the principles underlying modern analytical techniques and will focus at liquid/solid, liquid/liquid, liquid/gas and solid/gas interfaces. These techniques are vital for understanding adsorption/desorption, redox and other interfacial processes which are involved in aspects such as catalysis, fuel cells, photovoltaic devices, surface modification and detergents. Use of imaging techniques operating on different length scales will also be considered, permitting the correlation of interfacial composition, structure and dynamics.

Learning Outcomes:

Subject knowledge: at the end of this module students should:

- Have an appreciation of the methods of analytical chemistry at interfaces.
- Appreciate the relevance of sensitivity and selectivity to choice of an analytical method for a specific application.
- Have some knowledge of how to select and apply techniques to obtain the best results in a variety of situations. Show some insight into the nature, mechanism and dynamics of a range of interfacial physical and chemical processes.
- Be familiar with the fundamentals and application of a number of different analytical techniques, including those based on electrochemistry, microscopy/imaging (SEM, TEM, STM, Raman microprobe), and surface sensitive spectroscopy (XPS, Auger, SEXAFS, ellipsometry and neutron reflectivity).
- Understand the nature of the interaction between surfaces and the environment to which they are exposed; this will include isotherms for “dry” and “wet” interfaces. Describe the structure and properties of liquid/solid, liquid/liquid, liquid/gas and solid/gas interfaces. Know how interfacial structure may be experimentally determined and modelled.

Key skills: at the end of this module students should be able to:

Obtain new information from textbooks, describe relevant chemistry and discuss it with peers and teachers, solve problems.

Methods: Set text(s), lectures, example problems, group problem-solving workshops.

Assessment: Continuous assessment (25%); end of semester, 2.5 hour examination (75%).

Recommended Text(s)


Further reading


Other information

Prerequisite course is CH2007; CH2040 is useful but not required. Illustrations will be given of industrial, biological, medical, forensic and environmental applications and relevance.
Module CH3207 Industrial Chemistry

Convenor: Dr Karim
Lecturers: Dr Karim + External Visitors
No. of lectures: 10 First Semester/20 Second semester
Course credits: 15

Aims: To provide students with an insight into the use of chemistry on an industrial scale.

Learning Outcomes:

Subject knowledge: at the end of this module students should:

- have a reasonable knowledge and understanding of the specific chemistry discussed;
- appreciate the different general factors that are considered by industry and academia when deciding upon possible routes to a desired product, e.g. safety, scale of reaction, separation of products, cost and availability of reagents, intended market, quality control, etc.;
- be aware of some of the problems encountered in large-scale chemical syntheses and continuous or batch processing;
- have an appreciation of the different stages involved in drug discovery and development;
- recognise and be able to implement the principles of scale-up and process development;
- appreciate the environmental impact of the chemical industry and understand the diversity of the chemical industry.

Key skills: at the end of this module students should be able to:

- Appreciate the varied role of chemistry in both society and in an industrial setting.
- Identify some of the career choices available to a chemistry graduate.
- Describe relevant chemistry and discuss it with peers and teachers, solve problems.

Methods: Lectures (the majority will be given by a diverse range of visitors from industry), poster and essays on topics of relevance.

Assessment: 2.5 hour examination (75%); 25% continuous assessment (poster exercise & essay).

Further reading

General textbooks on industrial chemistry and industrial processes which are located in the main university library. Where possible, a summary sheet will be provided by each of the external speakers and copies of the lectures will be available on Blackboard.

Other information
The course provides insight into a variety of different areas of chemistry that are undertaken in the industrial arena and is built around a series of lectures given by leading industrialists. It may also inform possible career choices.
Module CH3211/3511 Pharmaceutical Chemistry

Convenor: Prof. Cullis
Lecturers: Dr Whitcombe, Prof. Cullis + guest speakers
No. of lectures: 8 First semester / 22 Second semester
Course credits: 15

Aims: This module aims to provide students with an understanding of the principles of how drugs are designed to interact with key receptors in the human body and how they are synthesised.

Learning Outcomes:

Subject knowledge: at the end of this module students should:

- Appreciate the different general factors that are considered by industry and academia when deciding upon possible routes to a pharmaceutical product, e.g. safety, scale of reaction, separation of products, cost and availability of reagents, intended market, quality control, etc.
- Be aware of some of the problems encountered in large-scale chemical syntheses.
- Consider the different stages involved in drug discovery and development.
- Understand the principles of scale-up and process development.
- Understand what a receptor, agonist and antagonist are.
- Appreciate modern ideas on receptor structure and signal transduction including ion channels and G-protein-coupled receptors.
- Recognise the key chemical aspects of the cholinergic and adrenergic signalling systems and their relation to the design of agonists and antagonists.
- Understand the concepts involved in qualitative structure activity studies.
- Appreciate how the concepts of chemistry can be applied to the design of specific agonists and antagonists of key receptors in the human body.
- Understand the different methods for the synthesis of heterocyclic compounds.

Key Skills: at the end of this module students should be able to:

Obtain new information from textbooks, describe relevant chemistry and discuss it with peers and staff and understand how a drug can be developed from knowledge of the structure and function of a neurotransmitter.

Methods: Lectures (including visitors from the pharmaceutical and related industries), set text(s), example problems, group problem-solving workshops.

Assessment: 2.5 hour examination (75%); continuous assessment (25%).

Recommended Text(s)

T.L. Gilchrist, Heterocyclic Chemistry, Longman. [547.49 GIL]
J. Saunders, Top Drugs: Top Synthetic Routes, Oxford Chemistry primer Series. [615.31 SAU]

Other information:

This course is built around a series of lectures given by leading industrialists. It may also inform possible career choices.
Module CH3212/3512 Forensic Science

Convenor: Prof. Hillman
Lecturers: Prof. Hillman + Guest Lecturers
No. of lectures/workshops/laboratory classes: 30 Second Semester
Course credits: 15

Aims: The generic aim of this module is to learn how chemical and other analytical methods (in some cases encountered earlier in the course) are applied by practitioners of forensic science. The module also aims, through problem solving and group activities, to develop the ability to combine different methods and the outputs they generate in order to assemble critical mass of information necessary to make operationally useful decisions.

Learning Outcomes:

Subject knowledge: at the end of this module students should:

- Have an appreciation of the capabilities of analytical techniques in a forensic context;
- understand the relevance of sensitivity and selectivity to choice of an analytical method for a specific forensic application;
- have some knowledge of how to select and apply techniques to obtain the best results in a variety of situations;
- appreciate the contributions of chemical analysis to aspects of pathology, fire investigation, road traffic accidents, forensic engineering and explosives detection.

Key skills: at the end of this module students should be able to:

- obtain new information from textbooks and other sources;
- describe the role and limitations of analytical techniques in solving forensic problems;
- be able to discuss these techniques and the information they provide with peers and teachers;
- solve problems;
- design and execute analytical procedures;
- give an oral presentation;
- work productively as part of a group;
- apply laboratory-based knowledge to the collection and identification of evidence at a crime scene.

Methods: lectures, directed reading, problem-based workshops, group work, laboratory work, primary literature critique, simulated crime scene investigation, give a presentation.

Assessment: continuous assessment (40%): group project on a student-selected topic covered in the course, resulting in oral presentation/written summary; practical work notebook recording and reports; examination at end of semester (60%): 1.5 hrs.

Recommended Texts

[See also associated website: http://www.booksites.net/jackson]
https://www.crcpress.com/Fundamentals-of-Fingerprint-Analysis/Moses-Daluz/9781466597976

Other Information: Topics to be covered may include aspects of pathology, fire investigation, road traffic accidents, forensic engineering and explosives detection.
Module CH3251/2 Chemistry Project Parts 1 & 2

Convenor: Dr Solan

Course credits: 2 x 20

Learning Outcomes:

Subject knowledge: at the end of this module students should be able to:

- Plan a research project, setting shorter and longer term goals.
- Organise work efficiently.
- Use appropriate resources, including computer databases to find out information about a particular area of research.
- Consolidate knowledge of fundamental chemical principles introduced in levels 1 & 2, and be able to apply these fundamental principles to genuine, complex, chemical problems.
- Carry out a piece of scientific research using appropriate techniques, and analyse the results obtained.
- Keep a clear and accurate record of work.
- Write a detailed report of their project.
- Assess the safety issues of the work they are doing.
- Collaborate with other workers in the same field.
- Give an oral presentation of their work.
- Record, analyse and present data in an appropriate format, give a presentation, answer questions orally on topics relating to their project.

Methods: Lectures, practical classes with appropriate demonstration, individual supervision.

Assessment of research project:

The project will be assessed against specific criteria regarding your skills and commitment in four broad categories:

(a) Experimental/Practical Work (50%): Practical competence, initiative and independence, commitment, organisation and record keeping.

(b) Project Report (30%): Structure and clarity of expression, understanding and analysis, production standard and survey of the literature. Chemical database exercises count towards this section.

(c) Oral Examination (10%): Understanding of aims and results and of the relevant literature.

(d) Oral Presentation (10%): Structure, effectiveness and use of display material.

Structure of the module for BSc students:

First semester: Weeks 3-10 practical work (22 hrs per week (inc. 18 hrs scheduled lab time)

You should plan your project report and discuss this with your supervisor before the Christmas vacation.

Second semester: Weeks 14-16 prepare initial report (hand in Week 17)

Week 17 prepare presentations

Week 18 Correct/redraft reports (hand in Week 19)

Weeks 19-22 Oral presentations and Oral Examination

[NB any changes to the above dates will be communicated via Blackboard]
Handing in Reports

You will be asked to hand in an initial version of your project report, which you have produced with minimal help from your supervisor; this will be assessed. This report will be proof read by your Supervisor and returned to you with comments/suggestions. You should then use these to correct/redraft your report before you hand in the final version, which will also be assessed.

Two bound copies of your report should then be handed in to the Departmental office. There will be binding facilities available for you to bind your dissertation.

Penalties will be imposed for missed hand-in deadlines.

Experimental Work

General Laboratory Work

- Wear safety glasses and protective clothing at all times in the laboratory.
- Use gloves where necessary, but do not handle any apparatus (especially communal apparatus) with contaminated gloves and remember to wash gloves in soap and water before removing them.
- Use a fume cupboard where appropriate. Discuss safety precautions with your supervisor or a demonstrator before working with materials which may pose any hazard to you or to others and complete any necessary COSHH forms.
- All hazardous materials should be stored safely and waste material disposed of properly. Waste solvents should go into the correct waste solvent residues bottle. Chemicals should only go down the sink if they have been made safe. Toxic materials should be disposed of according to recognised procedures (see manufacturer’s recommendations).
- Do not dispose of smelly or toxic materials in the open laboratory.

Before starting an experiment make sure you are clear about:

- The aim and scale of the experiment and the correct apparatus for the job.
- The correct procedures for operating equipment, e.g. spectrometers.
- The properties of the reagents, solvents and products (as far as possible) in the interests of safety (using agreed written risk assessment procedures).
- The properties of the reagents and solvents involved and to ensure that appropriate experimental conditions are chosen (e.g. dry conditions/inert atmosphere for water-sensitive materials).
- The full literature procedure (for known experiments).
- How to work up the reaction and isolate the product.
- How to deal with any accidental spillage and how to dispose safely of any unwanted residues.

Remember: if in doubt, ask!
Day-to-day writing up and recording of spectroscopic data

Use a hard-backed notebook for laboratory use and have it in the laboratory at all times. Write down all relevant information (see below) at the time. Don’t use filter papers and other scraps of paper for recording data and don’t try to carry information in your memory to ‘write up later’. Your laboratory notebook need not be a work of art (it is a working notebook), but it should be legible to any reader. You should hand in your lab notebook along with any spectra or other raw data as an appendix to your report (see later).

Note the date at the start of each new day and record what you plan to do and why. (Experiments may be repeated [for a specific reason] and the conditions may vary).

Record important information as discussed above.

Note if any other data is acquired e.g. an NMR spectrum: give each spectrum a code number and record this in your notebook.

Your Project Report

This section offers some guidelines regarding length and format of the report. No scheme will be equally appropriate to all projects, however, the following is a useful general guide. You should aim the report at a chemically-aware reader but you should not assume specialist knowledge which you have learnt during the project.

The report should be word processed according to the following criteria:

Pages should be numbered.

The setting for margins should be: top and bottom 2.00cm; left margin 2.5cm; right margin 1.5cm using 12pt Times Roman font and 1.5 line spacing.

Paragraphs have the first line indented by 1.00cm but are not separated by a blank line.

Citations of references and any notes should be represented in the text by superscripted numbers. The list of references and notes appears at the end of the text under the major heading ‘REFERENCES’.

The reference list has a hanging indent of 1.00cm.

Guidelines on length:

<table>
<thead>
<tr>
<th>Section</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>less than 1 side</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>6-12 sides* (inc. diagrams)</td>
</tr>
<tr>
<td>RESULTS AND DISCUSSION</td>
<td>12-25 sides (inc. diagrams)</td>
</tr>
<tr>
<td>EXPERIMENTAL</td>
<td>6-12 sides</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>see below</td>
</tr>
<tr>
<td>Suggested length</td>
<td>25-50 sides (inc. diagrams)</td>
</tr>
</tbody>
</table>

For some Physical Chemistry / Analytical / Biological projects it is more appropriate for the experimental section to go before the results and discussion. All project students are advised to discuss the structure of their project report with their supervisors to determine the best approach for each project.
For Physical Chemistry projects and others which are very technique based, the introduction may include a discussion of the theory involved, in which case, this section may be larger with a corresponding reduction in one of the subsequent sections. However, it is not anticipated that the treatments and derivations available in standard texts should be included. When the theory and application is unique to the experiment the report should develop key points.

For projects involving synthetic chemistry, the experimental section may be longer.

Abstract

This should be a summary of less than one side.

Introduction

This section should include a clear statement of the aims of the project. It should also contain a summary of relevant work that has already been published so that the project work can be put in context. Your supervisor will have told you of relevant papers to read but you should augment these with your own search of the literature.

Results and Discussion

A description and discussion of what you did (but without experimental detail unless this is crucial); distinguish between important information which needs to be in this section and routine data which belong in the experimental section. A block diagram of key equipment is often valuable for technique based projects. Describe the results obtained and the proposed implications thereof. Where appropriate, give an indication of how you identified products and proved the proposed structures (including key spectroscopic data and explanations where necessary, but not routine data). A summary of your conclusions and recommendations for future work (especially the work you would like to do next if you had the time!).

The results section should not generally include the raw data e.g. spectra, unless absolutely essential. The raw data should be analysed and the resulting information reported e.g. for NMR spectra the chemical shift values should be reported but the actual spectrum does not need to be bound into the report; for kinetics projects, a plot of the experimental points would be expected but not a copy of each spectrum from which the information was obtained. Nevertheless, all the raw data and your laboratory notebook should be presented as an appendix (usually in a separate envelope folder or perhaps on disc if more appropriate). This allows the sources of derived parameters such as rate constants, equilibrium constants etc. to be available to the reader. The key steps in derivation of these parameters should be explained carefully with any assumptions being clearly indicated. Take care to define all terms and symbols and use proper units and dimensions. Where experiments produce quantitative data you should comment on their statistical significance e.g. precision and accuracy and sources of errors.

All compounds and spectra should be numbered for ease of reference.

Experimental (may be better to have this before the results and discussion esp. for physical chemistry related projects. Please check with your supervisor)

Write a clear, complete and concise account of your experimental work. If you found it necessary to repeat a reaction a number of times, write out the procedure in the most successful case and comment on (or if necessary, tabulate) variations in conditions/results in other cases. Avoid unnecessary repetition. Include all the data necessary to report your work, i.e. weights, volumes, yields, reaction times, temperatures, purity of reagents, m.p., b.p., etc. Where appropriate, quote literature data on known compounds for comparison or compare measured quantities e.g. enthalpies, emfs with published data.
References

The number of references may vary considerably for each project e.g. in a relatively new area there may not be many references whereas for a well established area there may be many more. Some areas may be well reviewed in the literature thereby reducing the number of individual references that need to be cited. The supervisor will be most able to judge how many references are suitable in each case but it is reasonable to expect a minimum of 10 references (except in exceptional circumstances) which you should have read and be familiar with. You will be asked questions about the literature in your oral exam.

Number literature references as they appear in the text. List these at the end of your report using accepted abbreviations for journal titles, e.g.


Oral Exam

The oral exam will test your understanding of the research you have done in your project, including relevant literature, as well as background theory. You may well be asked questions to which you do not know the answer, you will often be prompted to think about the problem and suggest a possible answer. Not knowing the answers to some questions does not necessarily mean you will do poorly.
Module CH3255 Advanced Chemistry Practical Part A

Convenor: Dr Ball
Duration: Weeks 1-6, Semester 1
Course credits: 10

Aims: This module provides students with training in various experimental techniques used in physical chemistry. Students gain experience in the operation of advanced instrumentation (spectroscopic, analytical etc), computational packages, and the analysis and interpretation of data. The subject areas of the experiments complement the theoretical material covered in Level 3 lecture courses.

Learning Outcomes

Subject knowledge: At the end of this module students should be able to:

- carry out advanced experimental procedures;
- plan the detail of their experimental work from an outline description of each investigation, its experimental method and the available equipment;
- organise their time effectively in order to complete the task within the timetabled laboratory hours;
- function effectively as part of a small team (the experimental work is typically carried out in pairs or a small group);
- process their data to reach scientific conclusions, including a critical consideration of the uncertainties associated with their findings;
- present complex results/conclusions in the form of a clear and concise report using appropriate scientific language and writing style.
- reference their work with papers in the primary, peer-reviewed literature.

Key Skills: At the end of this module students should be proficient in:

- recording large and complex datasets;
- data processing and data management;
- presenting results in a scientific report;
- acting on feedback from academic staff about their written reports in order to improve subsequent reports.

Methods: Introductory lecture; practical classes with appropriate demonstration; a rolling schedule of marks and written feedback on their reports.

Assessment: Laboratory work + individually assessed reports. Students perform three investigations and write-up a report for each one. The module mark is an average from these three pieces of work.
Module CH3256 Advanced Chemistry Practical Part B

Convenor: Dr Handa

Duration: Weeks 6-11, Semester 1

Course credits: **15**

**Aims:** This module has been designed to provide students with advanced training in experimental techniques and give practical experience in the generation and analysis of spectroscopic data, complimenting theoretical knowledge gained from lectures (Level 1-3 modules). The module also provides experience in carrying out a literature review.

**Learning Outcomes:**

**Subject knowledge:** *at the end of this module students should be able to:*

- carry out a number of advanced experimental procedures related to preparative chemistry;
- purify and analyse chemical products using a variety of methods;
- take charge of their experiments and design them so that they can complete their tasks;
- manage their time effectively;
- write concise scientific reports aimed at a scientific audience;
- present scientific information in a clear and concise fashion.

**Key Skills:** *at the end of this module students should be proficient in:*

- Recording, analysing and presenting data in appropriate formats. Safely performing reactions under inert atmospheres and using highly reactive reagents.

**Methods:** Lectures, workshops, practical classes with appropriate demonstration.

**Assessment:**

Laboratory work + reports.
Module CH3257 Advanced Chemistry Practical Part C

Convenors: Dr Solan

Duration: 6 Weeks, Semester 2

Course credits: 15

Aims: This module has been designed to provide students with advanced training in experimental techniques and give practical experience in the generation and analysis of spectroscopic data, complimenting theoretical knowledge gained from lectures (Level 1-3 modules). The module builds on CH3256. You will use the techniques learnt in CH3256 in a more open ended extended investigation of a research type problem. The module provides experience in working as a team, planning a series of experiments to explore a scientific problem. The module also include an exercise to give you experience in researching and summarising the chemical literature.

Learning Outcomes:

Subject knowledge: at the end of this module students should be able to:

- as a team, plan/design a series of experiments to investigate a scientific problem;
- carry out a number of advanced experimental procedures; purify and analyse chemical products using a variety of methods;
- function effectively as an individual and as part of a team;
- manage their time effectively, both lab time (which is limited) and other time to meet deadlines;
- write a comprehensive but concise scientific report presenting the experimental data in the format of a research paper;
- summarise the important points of their experiments and make suggestions for further work in that area.
- carry out a literature review on a scientific topic.

Key Skills: at the end of this module students should be proficient in:

- recording, analysing and presenting data in appropriate formats;
- summarising results concisely for an appropriate audience;
- observing scientific conventions in presentation of results;
- managing time effectively, working in a team.
- literature / database research skills
- writing a concise literature review on a specific topic

Methods: Practical classes with appropriate demonstration, guidance by experiment manager.

Assessment:

Laboratory work + report (including team work) (80%)

Literature Exercise (20%)