SCHOOL OF PHARMACY & PHARMACEUTICAL SCIENCES

SF, JS & SS YEAR
B.SC. (PHARM.) DEGREE COURSE 2015/16

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This handbook applies to all students taking the B.Sc. (Pharm.) Degree taught by the School of Pharmacy & Pharmaceutical Sciences. It provides a guide to what is expected of you on this programme, and the academic and personal support available to you. Please retain for future reference. The information provided in this handbook is accurate at the time of preparation. Any necessary revisions will be notified to students via email. Please note that, in the event of any conflict or inconsistency between the General Regulations published in the University Calendar and information contained in course handbooks, the provisions of the General Regulations will prevail.

1  INTRODUCTION

1.1  SCHOOL VISION AND MISSION

Our vision is to provide an environment where excellence in teaching and research is valued and encouraged. Our mission is to deliver continuous learning in the science and practice of pharmacy, supported by innovative teaching and a culture which is aligned with best practice. We strive to ensure that our staff and students contribute to society as world class professionals and leaders.

1.2  TRADITION

Brief history
The School of Pharmacy and Pharmaceutical Sciences at Trinity College Dublin has been offering a pharmacy degree since 1977.

The School has world class research and teaching facilities on the main College campus, in the Panoz Institute. These include purpose built teaching spaces such as the Boots Unit – comprising a technology enhanced learning space for clinical skills and patient care, a practice area designed to facilitate the development of communication skills, and adaptable small group teaching rooms. The School has further facilities in the collaborative research space provided by the Trinity Biomedical Sciences Institute (TBSI), through which Trinity's leadership position in immunology, bioengineering and cancer is maintained. These facilities drive a step-change in the level and impact of research in these fields.

The main academic focus of the School of Pharmacy and Pharmaceutical Sciences at the undergraduate level is the five-year Pharmacy (Integrated) programme. Structured professional placements are a key element of the new programme and occur throughout the five years. The teaching on this programme includes lectures, problem-based learning, small group teaching, laboratory and dispensing practicals, clinical and patient care activities to encourage the understanding of aspects of healthcare, drug sources, medicines preparation, analysis, quality control, chemistry, metabolism, safety, efficacy, regulation, etc. Our programme includes an individual research project, which gives students an opportunity to develop focused research with one-to-one supervision. There is the opportunity to undertake this research project abroad at international partner universities.

The School offers dynamic and successful postgraduate taught programmes in Pharmaceutical Manufacturing Technology, in Pharmaceutical Sciences, Community Pharmacy and in Hospital Pharmacy. The School is active in CPD (Continuing Professional Development) and was the first School in TCD to offer modular postgraduate delivery with the Cardiology in Clinical Pharmacy module, which has attracted postgraduate students from across Hospital and Community Pharmacy Practice.

The School of Pharmacy and Pharmaceutical Sciences is at the forefront of international pharmacy research. Our research activities are broadly described as consisting of five main research areas: 1) Drug Development; 2) Disease, Drug Mechanisms and Safety; 3) Cancer Research; 4) Pharmaceutics & Pharmaceutical Technology; 5) Clinical Pharmacy and Pharmacy Practice.

The Pharmacy undergraduate syllabus leading to a B.Sc. (Pharm.) degree is taught over 4 years and satisfies the accreditation requirements of the Pharmaceutical Society of Ireland, i.e., the statutory registration body. It also complies with the training standards defined in three pharmaceutically relevant EU Directives: 2005/36/EC as amended, 2001/82/EC as amended and 2001/83/EC as amended. Directive 2005/36/EC specifies the educational requirements necessary for the mutual recognition of registered pharmacists within the European Economic Area (EEA) member states. Directives 2001/82/EC and 2001/83/EC specify the
educational requirements necessary to perform the functions in the pharmaceutical industry of the ‘Qualified Person’, i.e., one who is responsible for the supervision and control of the manufacture of pharmaceutical products for human and veterinary use.

2 STRUCTURES, MANAGEMENT AND SYSTEMS IN PLACE

2.1 COLLEGE
For details see: http://www.tcd.ie/vpcao/academic-governance/

2.2 SCHOOL GOVERNANCE
The School of Pharmacy & Pharmaceutical Sciences is one of the four Schools which make up the Faculty of Health Sciences. The other three are the School of Dental Science, the School of Medicine and the School of Nursing and Midwifery.

HEAD OF SCHOOL
Professor Anne Marie Healy, B.SC. (PHARM.), PH.D., M.P.S.I., F.T.C.D. (2010)
Heads of School are appointed by, and are formally accountable to, the Board.
The Head of School is a member of the College Head of Schools Committee.
http://www.tcd.ie/teaching-learning/academic-governance/head-of-school.php

DIRECTOR OF TEACHING AND LEARNING (UNDERGRADUATE)
Asst. Professor Astrid Sasse, STAATSEXAMEN PHARMAZIE (BERLIN), DR. RER. NAT. (BERLIN), M.A., M.P.S.I.
The Director of Teaching and Learning (Undergraduate) has delegated responsibility for the undergraduate affairs of the School and plays a central strategic role with regard to both existing and new teaching programmes. The Director of UGTL is a member of the College Undergraduate Studies Committee.

DIRECTOR OF TEACHING AND LEARNING (POSTGRADUATE)
Assoc. Professor John Gilmer, B.A., PH.D.
The Director of Teaching and Learning (Postgraduate) has delegated responsibility for the postgraduate affairs of the School and plays a central strategic role with regard to both existing and new research programmes. The Director of PGTL is a member of the College Postgraduate Teaching & Learning Committee.

DIRECTOR OF RESEARCH
The Director of Research has delegated responsibility for the development of research and innovation in the School. The Director plays a strategic role in promoting and enabling research in the School, working closely with the Head of School.
http://www.tcd.ie/teaching-learning/academic-governance/dir-of-research.php
### 2.3 SCHOOL COMMITTEES AND STUDENT SUPPORT STRUCTURES

**School Committee**  
[https://www.tcd.ie/Secretary/academic-governance/school-committee.php](https://www.tcd.ie/Secretary/academic-governance/school-committee.php)  
This Committee currently includes one undergraduate and one postgraduate representative.

**School Executive Committee**  
[https://www.tcd.ie/Secretary/academic-governance/school-executive.php](https://www.tcd.ie/Secretary/academic-governance/school-executive.php)  
This Committee currently includes one undergraduate and one postgraduate representative.

**Course Management Committee (PMC)**  
This is a sub-committee of the School Executive and responsible for monitoring, reviewing and making recommendations on the development of the pharmacy degree course.  
This Committee currently includes at least one representative from Freshman Pharmacy and at least one representative from Sophister Pharmacy.

**Student Representation**  
Undergraduate students in each of the four years of the course select a representative to relay the ideas and concerns of their year and to report to their year on developments within the School.

**Student Forum**  
This is a student-led forum which, together with tutor representatives, discusses issues of student importance. It currently comprises the four student representatives - one from each year of the B.Sc. (Pharm.) programme.

**College Tutors**  
The Tutorial Service is unique, confidential and available to all undergraduate students offering student support in all aspects of College life. You can find your tutor’s name and contact number by logging in to [https://my.tcd.ie](https://my.tcd.ie)

- Asst. Prof. John Quigley: jquigley@tcd.ie  
- Assoc. Prof. John Walsh: jjwalsh@tcd.ie  
- Assoc. Prof. Andrew Harkin: aharkin@tcd.ie  
- Assoc. Prof. Lorraine O’Driscoll: lodrisc@tcd.ie  
- Asst. Prof. Fabio Boylan: fabio.boylan@tcd.ie  
- Asst. Prof. Astrid Sasse: sassea@tcd.ie  
- Asst. Prof. Sheila Ryder: sryder@tcd.ie  
- Asst. Prof. Sinead Smith: smithsi@tcd.ie

**Disability Liaison Officer**  
Assoc. Prof. Helen Sheridan: hsheridn@tcd.ie

**Undergraduate - Year Coordinators**
- Junior Freshman year: Assoc. Prof. John Walsh: jjwalsh@tcd.ie
- Senior Freshman year: Asst. Prof. John Quigley: jquigley@tcd.ie
- Junior Sophister year: Asst. Prof. Fabio Boylan: fabio.boylan@tcd.ie
- Senior Sophister year: Asst. Prof. Deirdre D’Arcy: ddarcy@tcd.ie

**Erasmus/International Contact & Undergraduate Research Liaison Officer**  
Asst. Prof. Carlos Medina: carlos.medina@tcd.ie

**Transition year coordinator / Science without Borders contact**  
Asst. Prof. Fabio Boylan: fabio.boylan@tcd.ie

**Trinity Access Programmes (TAP) contact**  
Assoc. Prof. John Walsh: jjwalsh@tcd.ie
Student 2 Student (S2S)
From the moment you arrive in College right the way through to your end of year exams Student 2 Student (S2S) is here to make sure your first year is fun, engaging and a great foundation for the rest of your time in Trinity. You will meet your two S2S mentors in Freshers’ Week and they’ll make sure you know other people in your course before your classes even start. They’ll keep in regular touch with you throughout your first year and invite you to events on and off campus. They will also give you useful information about your course and what to look out for. Mentors are students who have been through first year and know exactly what it feels like, so you never have to worry about asking them a question or talking to them about anything that’s worrying you.

S2S also offers trained Peer Supporters if you want to talk confidentially to another student or just to meet a friendly face for coffee and a chat.

S2S is supported by the Senior Tutor’s Office and the Student Counselling Service.

http://student2student.tcd.ie, E-mail: student2student@tcd.ie, Phone: 01 896 2438

SCHOOL NOTICE BOARDS
Notice boards for undergraduates are located in the School lobby and also at the entrance to the laboratories.

2.4 COLLEGE SUPPORT SERVICES

Student Counselling Service
Confidential, free to students, emergency appointments, online counselling, one to one counselling
Groups, Workshops, Podcasts
3rd Floor, 7-9 South Leinster Street
Tel: 896 1407
student-counselling@tcd.ie
http://www.tcd.ie/Student_Counselling/

Student Learning Development
Study Skills, Exams, Presenting, Self Management, Writing
Drop-In Service, Workshops, 1:1 Appointments
3rd Floor, 7-9 South Leinster Street
Tel: 896 1407
student.learning@tcd.ie
http://www.tcd.ie/Student_Counselling/student-learning/

Chaplains
The Chaplains run a Bereavement Support Group for those who have experienced loss (please contact the Chaplains). The Chaplains will also help you make contact with other religious communities in Dublin. Free simple lunch on Tuesdays during term time between 12.30 and 14.00 h.
House 27 (Senior Tutor’s House)
Tel: Paddy Gleeson / Peter Sexton: 896 1260, Darren McCallig : 896 1402 ; Julian Hamilton : 896 1901
chaplaincy@tcd.ie
http://www.tcd.ie/Chaplaincy/

College Health Service
Appointments may be made in person or by telephone.
This service is free to most students
House 47 (beside the rugby pitch)
Tel: 896 1556
http://www.tcd.ie/collegehealth/
Disability Service
Room 2054, beside the Lecky Library, in the Arts Building
Tel: 896 3111
disab@tcd.ie
http://www.tcd.ie/disability/

Niteline
A confidential help-line for students run by students is available during term-time, by freephone between 9 pm and 2.30 am 7 nights a week at 1800 793 793.

Academic Skills for Successful Learning
is an online resource offering e-learning modules in Blackboard Learn on:
Writing skills; referencing and understanding plagiarism; reading and notemaking and critical thinking skills. It comprises a wide variety of interactive activities which you complete before taking a module assessment to see how much you learned.
Available 24 hours a day, 7 days a week. Log in via http://mymodule.tcd.ie/
2.5 THE SCHOOL OF PHARMACY & PHARMACEUTICAL SCIENCES ACADEMIC STAFF

Head of School
Professor in Pharmaceutics and Pharmaceutical Technology

Chair/Professor of Pharmacology

Assoc. Professor in Pharmacology
Neil Frankish, B.SC. (C.N.A.A.), M.A., PH.D.(STRATH.)

Asst. Professors in Pharmacology
Carlos Medina, M.B. (LA LAGUNA), PH.D. (A.U. BARCELONA)

Professor in Pharmaceutical Chemistry

Assoc. Professor in Pharmaceutical Chemistry
John Gilmer, B.A., PH.D.

Asst. Professors in Pharmaceutical Chemistry
Astrid Sasse, STAATSEXAMEN PHARMACIE (BERLIN), DR. RER. NAT. (BERLIN), M.A., M.P.S.I.

Assoc. Professor in Pharmaceutics and Pharmaceutical Technology
Carsten Ehrhardt, STAATSEXAMEN PHARMACIE (HAMBURG), DR. RER. NAT. (SAARBRÜCKEN, GERMANY), F.T.C.D. (2013)
Lidia Tajber, M.PHARM. (MEDICAL UNIVERSITY OF SILESIA), PH.D., P.G.DIP. Q.I

Asst. Professors in Pharmaceutics and Pharmaceutical Technology
Deirdre D’Arcy, M.PHARM. (R.GORDON). PH.D. DIP. CLIN.PHARM. (LIV.J.MOORES), M.P.S.I.

Assoc. Professors in Practice of Pharmacy
Martin Henman, B.PHARM. (BRAD.), M.A., PH.D. (BRAD.), M.R.PHARM.S., M.P.S.I.
Cicely Roche, B.SC. (PHARM.), M.SC. (HEALTHCARE ETHICS & LAW), M.SC. (COMM PHARM), M.Ed. (HIGHER EDUCATION), M.P.S.I. (PART-TIME)
Tamásine Grimes, B.SC. (PHARM.), M.SC (HOSP.PHARM.), P.G. DIP (HEALTH SERVICES MANAGEMENT), PH.D. (R.C.S.I), M.P.S.I. (PART-TIME)

Asst. Professor in Practice of Pharmacy
Sheila Ryder, B.SC. (PHARM.), M.SC. (BELFAST), M.P.S.I.

Teacher Practitioner (PART-TIME) Boots the Chemists
Karen Rossi, B.SC. (PHARM.), M.SC. (COMM. PHARM.), M.P.S.I.

Practice Educator (PART-TIME)

Assoc. Professors in Pharmacognosy
John Walsh, B.A., PH.D.

Asst. Professor in Pharmacognosy
Fabio Boylan, B.SC. (PHARM.) (UNIVERSITY OF RIO), PH.D. (UNIVERSITY OF RIO), M.A.

Adj. Assoc. Professor
Tim Delaney, B.SC. (PHARM), M.SC. (IMI)

Adj. Asst. Professors
Ingrid Hook, B.SC. (PHARM) (MANC.), M.A., M.SC. (N.U.I.), M.R.PHARM.S.
Catriona Bradley, B.SC. (PHARM), PH.D., M.P.S.I.
Evelyn Deasy, B.SC. (PHARM), M.SC., M.P.S.I.
Ronan MacLoughlin, B.SC. (N.U.I), PH.D. (N.U.I)
Conor McCrystal, B.Sc. (Pharm.), Ph.D. (Belfast), M.R.Pham.S., M.P.S.I.
Ronan Quirke, B. Pharm. (Bradford), M.Sc. (Clin. Pharm.) (Derby), M.Ed. (Clin. Pharm. Teaching) (Leeds), M.P.S.I.

Asst. Professor in Nanopharmaceutical Drug Discovery (Ussher)
Maria Jose Santos Martinez, M.B. (La Laguna); M.D. (U.A. Barcelona); Ph.D. (T.C.D.)

Asst. Professor in Cancer, Biology and Therapeutics (Ussher)
David Finlay, B.A. (Mod), Ph.D.

Asst. Professor in Applied and Translational Medicine (Ussher)
Sinead Smith, B.Sc., Ph.D.

2.6 Administrative Staff, Executive Officers and Technical Staff in the School of Pharmacy & Pharmaceutical Sciences

School Administrative Manager
Dr. Cecilia McAllister  mcallisc@tcd.ie  Ext. 2938

School Office
Ms. Betty Daly  edaly3@tcd.ie  Ext. 2809

Undergraduate Student Administration
Ms. Helen Byrne Jacob  hjacob@tcd.ie  Ext. 2803

Technical Staff

Mr. Ray Keaveny  Chief Technical Officer  rkeaveny@tcd.ie  Ext. 2814
Ms. Therese Moloney  Senior Technical Officer  tmalony@tcd.ie  Ext. 2824/2859
Ms. Rhona Prendergast  Senior Technical Officer  rprndgst@tcd.ie  Ext. 2831/2855
Mr. Brian Talbot  Senior Technical Officer  talbotb@tcd.ie  Ext. 2859/2862
Mr. Joseph Reilly  Senior Technical Officer  jreilly@tcd.ie  Ext. 2854/2856
Ms. Maureen Brunt  Senior Lab Attendant  bruntm@tcd.ie  Ext. 2854/2856
Ms. Pauline McGlue  Senior Lab Attendant  mcgluep@tcd.ie  Ext. 2833
Mr. Conan Murphy  Senior Lab Attendant  murphyc5@tcd.ie  Ext. 2833
Ms. Irene Pelow  Senior Lab Attendant  pelowi@tcd.ie  Ext. 2931
3 SAFETY WITHIN THE SCHOOL

3.1 General Information:

(i) Students are encouraged to bring any concerns regarding safety to the attention of both the School (see Safety Officers below) and the College Safety Officer, Mr. Tom Merriman, ext. 1914 (email: tom.merriman@tcd.ie).

(ii) All undergraduate students presenting in each years’ practical classes are advised by the Staff Supervisor about general safety issues such as fire hazards, smoking, eating, protective clothing, etc. and first aid facilities.

Health and Safety Manual: It is the obligation of every student to familiarise him/herself with the content of the safety manual. The Health and Safety Manual was handed out to every student at the Orientation Day and is also available on the School’s website: http://pharmacy.tcd.ie/Safety/school_safety_manual.php

SCHOOL SAFETY OFFICERS

Asst. Prof. M. Santos Biological Safety Officer santosmm@tcd.ie
Mr. R. Keaveny Chemical Safety Officer rkeaveny@tcd.ie
Assoc. Prof. A. Harkin Radiation Safety Officer aharkin@tcd.ie

The B.Sc. (Pharm.) course consists of lectures, laboratory classes, seminars, study visits, tutorials and some work experience. Laboratories by their nature require those working in them to be highly aware of the safety implications of that particular working environment.

The School wishes to establish and maintain a working environment in which the physical and mental well-being of staff and students is maintained at the highest levels practicable, and to provide a basis whereby problems of safety that arise in the working environment are solved in co-operation with staff and students and their representative organisations.

3.2 Staff and students are obliged to operate the ‘neighbour principle’.

This involves:

(i) Taking reasonable care for their own safety and health and that of others who may be affected by their acts or omissions while at work;
(ii) Co-operating with the College to such an extent as will enable the College to comply with the provisions of legislation and to meet its general duties on safety, welfare and health;
(iii) Not intentionally interfering with or misusing any means, appliance, equipment or other aid provided for securing the health, safety or welfare of the College community;
(iv) The use of any clothing, equipment or appliance required for the purpose of securing his/her health, safety and welfare at work;
(v) Reporting to the College management any defects in plant, equipment or procedures which are a danger to safety, health or welfare.

N.B. In the interests of safety, any student who fails to obey regulations or instructions from academic or technical staff, including demonstrators, may be excluded from the laboratory.
3.3 Important Safety Precautions - PLEASE READ CAREFULLY

(i) Smoking in College buildings is not allowed.
(ii) Hallways and passageways must be kept clear.
(iii) The location of fire exits should always be noted.
(iv) The location of fire extinguishers and their mode of use should be noted.
(v) The location of the first aid cabinet in each laboratory should be noted.
(vi) Dress code when working in the laboratories:
   • White lab coats must always be worn and closed
   • Safety spectacles must be worn when appropriate
   • Appropriate masks may need to be worn when working with certain types of equipment and /or chemicals
   • No open-toed shoes or sandals may be worn while in the laboratory.
   • Long hair must be tied back and kept from covering the face.
(vii) Use of mobile/camera phones, iPods, radios and all other electronic equipment unrelated to practical work is prohibited while working in laboratories.
(viii) In the event of an accident taking place in the laboratory involving injury, no matter how trivial it may seem, the proper procedure is to:
   • Call the ‘First-Aider’ associated with the laboratory to give first-aid if appropriate.
   • Phone the College Health Service (Ext. 1556) for advice and refer for medical evaluation if he/she is ambulatory and not in distress or otherwise seriously injured.
   • If the victim is known to be or likely to be seriously injured always call the College emergency number (1999) for help.
      Never transport the victim to hospital in a private car or taxi.
   • Report all accidents to a School of Pharmacy & Pharmaceutical Sciences Safety Officer.
(ix) Laboratory work must be performed where at all possible only during normal working hours. No laboratory work of any kind should be undertaken after hours unless at least two persons are present.
(x) Eating and drinking in the laboratories is strictly forbidden, this includes chewing gum.
(xi) Any suspicious persons / packages / floods etc. must be immediately reported to the College Emergency Number (1999) at Front Gate.

4 UNIVERSITY STUDY

The B.Sc. (Pharm.) course is accredited by the Pharmaceutical Society of Ireland and is also recognised for “free movement” purposes under the various European Union Directives on Pharmacy which lay down the subjects to be studied. The minimum number of study hours for a Pharmacy course form part of national and European accreditation criteria. There are two types of study hours set out in this booklet.

1. Supervised study which consists of the lecture and laboratory practical courses, tutorials, workshops, seminars, study visits and specified work experience. It can also include laboratory report preparation. School regulations require you to attend all scheduled classes and you may be refused permission to take your written examinations if your attendance is deemed non-satisfactory. (See University Calendar; Part 2, General regulations and information, Non-satisfactory attendance and course work, §25, http://www.tcd.ie/calendar)

2. Guided study comprises directed but unsupervised study you must do outside the formal course. It can consist of suggested reading of text book references, published articles in scientific and medical journals, use of electronic data bases (e.g., Micromedex Healthcare Series), exercises in problem solving, reading and extension of your lecture notes, revision for term tests and annual examinations. The amount of guided study on average involves 2-3 hours per lecture and 1 hour for each hour of practical work. The hours specified are very much minimum hours of guided study expected of you over the four years of the course.
Independent study, note-taking at lectures and the writing of laboratory reports etc., are an important way of developing your learning abilities and capacity for study. For pharmacists in particular, the ability to learn continuously is absolutely essential because of the necessity for continuing professional development as a practising pharmacist. If you are concerned about study technique at University level you should discuss this
with your tutor and avail of the courses made available each year in College. It is vital that you learn how to use the library efficiently, particularly the electronic databases of relevance to Pharmacy and the Pharmaceutical Sciences.

Continuous assessment marks will be allocated based on attendance at practicals, performance and practical write-ups. Laboratory notebooks/manuals/reports must be presented for assessment by the date specified in the manual or by College staff.

IMPORTANT
Late submissions will not be assessed unless a valid reason is provided, and students will be deemed not to have satisfied the School’s examination requirements.

Academic Integrity and Plagiarism
There is a well-established academic convention that work performed and published by other people is acknowledged fully if it is being used in any written work submitted for assessment. This convention applies to all academic work (theses, research papers, text books etc.) but in your case it applies to all material used in assessments, lab books and written examinations. College takes breaches of its regulations on plagiarism very seriously and you must read the next section very carefully.

In order to support students in understanding what plagiarism is and how they can avoid it, an online central repository to consolidate all information and resources on plagiarism was created. The central repository is being hosted by the Library and is located at http://tcd-ie.libguides.com/plagiarism.

It includes the following:
(i) The 2015-16 Calendar entry on plagiarism for undergraduate and postgraduate students;
(ii) The matrix explaining the different levels of plagiarism outlined in the Calendar entry and the sanctions applied;
(iii) Information on what plagiarism is and how to avoid it;
(iv) ‘Ready, Steady, Write’, an online tutorial on plagiarism which must be completed by all students;
(v) The text of a declaration which must be inserted into all cover sheets accompanying all assessed course work;
(vi) Details of software packages that can detect plagiarism, e.g. Turnitin.

When submitting assessed work, cover sheets containing the following declaration must be completed and handed in together with the assignment:

I have read and I understand the plagiarism provisions in the General Regulations of the University Calendar for the current year, found at: http://www.tcd.ie/calendar

I have also completed the Online Tutorial on avoiding plagiarism ‘Ready, Steady, Write’, located at http://tcd-ie.libguides.com/plagiarism/ready-steady-write

See University Calendar http://www.tcd.ie/calendar/, Part 2, General regulations and information, §§82-91 and on page 116 of this Student Handbook.
5 OVERVIEW OF THE B.SC. (PHARM.) DEGREE COURSE

The aim of the B.Sc. (Pharm.) course is to provide students with a basic education in the Pharmaceutical Sciences and the Practice of Pharmacy in all its forms. To quote from the Accreditation Standards of the Pharmaceutical Society of Ireland (PSI), "The purpose of undergraduate pharmacy education (the pharmacy degree programme) is to produce pharmacy graduates who have the knowledge, skills and attributes to safely participate in the National Pharmacy Internship Programme (NPIP). Graduates should be prepared for patient-centered pharmacy practice, and their learning should be based upon and underpinned by appropriate and sufficient understanding of the principles and techniques of the pharmaceutical, biomedical and social sciences." (Interim Accreditation Standards for the Level 8 Bachelor Degree awarded on the successful completion of the 4 year undergraduate pharmacy degree programme. Approved by the Council of the PSI on 28th March 2012.)

In order to achieve the aims of the course, the syllabus has been designed to provide you firstly with learning opportunities in some of the basic sciences (such as aspects of Chemistry, Biochemistry, Biology, Physics, Physiology, Microbiology, Mathematics and Statistics) which are relevant to an understanding of the Pharmaceutical Sciences and to the Practice of Pharmacy. Subsequently the Pharmaceutical Sciences (Pharmaceutics and Pharmaceutical Technology, Pharmaceutical Chemistry, Pharmacognosy, Pharmacology) are introduced and taught in an integrated way, and your knowledge of them and their relevance to pharmacy will develop progressively over the four years of the course. Interwoven through the entire programme are classes in the Practice of Pharmacy, designed for you to contextualise, build upon and apply the knowledge and skills gained in the scientific modules in a harmonized manner.

The Pharmaceutical Society of Ireland has specified that the purpose of undergraduate pharmacy education (the pharmacy degree programme) is to produce pharmacy graduates who have the knowledge, skills and attributes to safely participate in the National Pharmacy Internship Programme. Graduates should be prepared for patient-facing pharmacy practice, and their learning should be based upon and underpinned by appropriate and sufficient understanding of the principles and techniques of the pharmaceutical, biomedical and social sciences.

The provision of a common Pharmacy Syllabus allows individual graduates to choose for themselves the branch of pharmacy within which they wish to practice. Work experience in community and/or hospital pharmacy practice is required to progress through the course. While the minimum requirements are stated in the Junior Sophister module, PH3006 and the Senior Sophister module, PH4006, we encourage students and graduates to obtain experience in as many different facets of pharmacy practice as possible since the differing experiences will enrich your subsequent professional career.

The B.Sc. (Pharm) is awarded on the successful completion of the four year undergraduate course. In order to become a registered pharmacist, a one-year in-service practical training programme (National Pharmacy Internship Programme) must be undertaken followed by the Professional Registration Examination. The National Pharmacy Internship Programme and the Professional Registration Examination are the responsibility of the Pharmaceutical Society of Ireland.

5.1 GARDA VETTING

Students undertaking the B.Sc. (Pharm.) are required to undergo vetting by the Garda Síochána or other relevant police force prior to commencing any work experience/pharmacy practice attachments. If, as a result of the outcome of these vetting procedures, a student is deemed unsuitable to attend clinical or other professional attachments/work experience, he/she may be required to withdraw from his/her programme of study.

5.2 FITNESS TO PRACTISE AND CODE OF CONDUCT

Students undertaking the B.Sc. (Pharm.) are expected to abide by the Code of Conduct for Pharmacy students which may be found on the School website (see https://pharmacy.tcd.ie/undergraduate/course-notices/coursenotes.php and on page 104 of this Student Handbook).

Students should also note the School’s procedures for dealing with Fitness to Practise issues (School website, see https://pharmacy.tcd.ie/undergraduate/course-notices/coursenotes.php and page 91 of this Student
5.3 **ERASMUS / SUMMER RESEARCH PLACEMENTS**
Our summer research placement programme (coordinated by Asst. Prof. Carlos Medina), including ERASMUS, encourages pharmacy students to perform a research project over the summer at another University, as part of their undergraduate degree programme. The following universities currently participate in Erasmus exchanges: University of Montpellier, France; University of Lyon, France; University of Munich, Germany; University of Vienna, Austria; and University of Bath, UK. The School has also signed academic exchange agreements (covering the exchange of undergraduate and postgraduate students, as well as academic staff) with the School of Pharmacy at the University of Southern California (USA) and the Faculty of Pharmaceutical Sciences, University of Toyama (Japan).

5.4 **LEARNING OUTCOMES FOR THE B.SC. (PHARM.) DEGREE PROGRAMME**
The Pharmacy graduate should be able to:
(i) Commit to the ethos of professionalism and in particular should have a duty of care to and respect for the patient and a maturity to make professional decisions in the best interests of the patient;
(ii) Commit to life-long learning, in particular an awareness of the need for continuing education and professional development in the chosen field of pharmacy practice and;
(iii) Adapt to developments in pharmacy and medicine.

The graduate will be able to:
- Demonstrate a foundation level of knowledge and understanding of the biological, physical and quantitative sciences underpinning Pharmacy;
- Explain how medicines are developed, manufactured, tested and brought to the market place;
- Demonstrate and describe how different types of medicinal preparations are formulated and be capable of preparing medicines extemporaneously, where appropriate;
- Supply medicines in accordance with pharmaceutical knowledge, legislation and codes of professional conduct and practice;
- Apply pharmacological, pharmaceutical and clinical knowledge to safely and effectively interpret and evaluate prescriptions and other orders for medicines;
- Fulfil their professional role as a pharmacist in advising and counselling patients, other healthcare professionals and others about medicines and their usage;
- Recognise common disease states and make appropriate responses to presented symptoms;
- Apply the principles of quality and quality assurance mechanisms in all aspects of scientific and professional activities;
- Employ research methodologies relevant to natural, clinical and social sciences;
- Apply an empirical approach to problem solving.

5.5 **ATTENDANCE AND COURSE WORK**
Students must attend for appropriate academic instruction in each term of each academic year and must satisfy the Head of the School as to their academic progress in each term in order to proceed with their year. The School may, from time to time, draw up regulations determining the required attendance of students at the various forms of instruction.

To rise with their class students must (a) attend satisfactorily the lectures, seminars, tutorials etc. given in the modules of their course each term as required by the University Council and the School of Pharmacy and Pharmaceutical Sciences regulations, (b) perform and complete all laboratory work to the satisfaction of the Head of the School, (c) attend and complete to a satisfactory standard all visits and teaching exercises at Practice sites and the prescribed periods of work experience and (d) pass the prescribed examinations (including practical tests and continuous assessment components).

Please also see ‘Examination and Progression Regulations of the School of Pharmacy and Pharmaceutical Sciences’, page 111.
Non-satisfactory attendance and course work
At the end of the teaching term, students who have not satisfied the School requirements with regard to attendance may be returned to the Senior Lecturer as non-satisfactory for that term. In accordance with the regulations laid down by the University Council, non-satisfactory students may be refused permission to take their annual examinations and may be required by the Senior Lecturer to repeat their year.

5.6 EXEMPTIONS – MATURE STUDENTS AND TRANSFER STUDENTS
Mature, graduate or transfer students may apply for exemptions from coursework and lectures. They do so by applying to the appropriate module coordinator, either directly or through their College Tutor. The module coordinator will make a recommendation to the Director of Teaching & Learning (Undergraduate). All applications for exemption must be made within four calendar weeks of the start of Michaelmas Teaching Term and must be approved by the Director of Teaching & Learning (Undergraduate). All students must present for written examinations in all modules. In the case of those who have been granted an exemption from practicals, their theory mark is returned.

N.B. PLEASE NOTE EXAMINATION REGULATIONS AND DETAILS ON COURSE MODULES MAY BE SUBJECT TO AMENDMENT.
## 5.7 COURSE MODULES

### SENIOR FRESHMAN

<table>
<thead>
<tr>
<th>Module code</th>
<th>Module Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>PH2001</td>
<td>Pharmaceutical Properties of Materials Used in Medicines</td>
<td>5</td>
<td>18</td>
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<tr>
<td>PH2002</td>
<td>Physical Pharmacy II</td>
<td>5</td>
<td>20</td>
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<tr>
<td>PH2003</td>
<td>Isolation, Separation &amp; Analysis of Substances Used in Medicines</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>PH2004</td>
<td>Formulation &amp; Pharmaceutical Technology</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>PH2005</td>
<td>Microbiology and Biochemistry</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>PH2006</td>
<td>Practice of Pharmacy II</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>PH2007</td>
<td>Professional Development &amp; Career Planning</td>
<td>5</td>
<td>33</td>
</tr>
<tr>
<td>PH2008</td>
<td>Pharmaceutical Biotechnology I</td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>PH2009</td>
<td>General Principles of Pharmacology</td>
<td>5</td>
<td>37</td>
</tr>
<tr>
<td>PH2010</td>
<td>Molecular and Chemotherapy Pharmacology</td>
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### JUNIOR SOPHISTER

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<tbody>
<tr>
<td>PH3002</td>
<td>Medicinal &amp; Pharmaceutical Chemistry III</td>
<td>10</td>
<td>42</td>
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<tr>
<td>PH3003</td>
<td>Natural Sources of Drugs and Medicines</td>
<td>10</td>
<td>45</td>
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<tr>
<td>PH3004</td>
<td>Sterile Products</td>
<td>10</td>
<td>47</td>
</tr>
<tr>
<td>PH3005</td>
<td>Pharmaceutical Data Analysis &amp; Bioinformatics</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>PH3006</td>
<td>Practice of Pharmacy III</td>
<td>5</td>
<td>52</td>
</tr>
<tr>
<td>PH3008</td>
<td>Pharmaceutical Biotechnology II</td>
<td>5</td>
<td>56</td>
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<tr>
<td>PH3009</td>
<td>Endocrine &amp; Reproductive Pharmacology and Veterinary Pharmacy</td>
<td>5</td>
<td>58</td>
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<tr>
<td>PH3010</td>
<td>Respiratory &amp; Gastrointestinal Pharmacology</td>
<td>5</td>
<td>61</td>
</tr>
<tr>
<td>PH3011</td>
<td>Blood, Cardiovascular &amp; Renal Pharmacology</td>
<td>5</td>
<td>63</td>
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</tbody>
</table>

### SENIOR SOPHISTER

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>PH4002</td>
<td>Medicinal and Pharmaceutical Chemistry IV</td>
<td>5</td>
<td>68</td>
</tr>
<tr>
<td>PH4003</td>
<td>Ectoparasiticides Natural Remedies and Complementary Medicine</td>
<td>5</td>
<td>70</td>
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<tr>
<td>PH4004</td>
<td>Advanced Drug Delivery</td>
<td>5</td>
<td>72</td>
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<tr>
<td>PH4005</td>
<td>Pharmacokinetics, Pharmacodynamics, Biopharmaceutics &amp; Drug Metabolism</td>
<td>5</td>
<td>73</td>
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<tr>
<td>PH4006</td>
<td>Practice of Pharmacy IV-1</td>
<td>5</td>
<td>76</td>
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<tr>
<td>PH4007</td>
<td>Practice of Pharmacy IV-2 (including electives)</td>
<td>10</td>
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<tr>
<td>PH4008</td>
<td>Addiction Pharmacy &amp; Integrated Pharmacy Skills</td>
<td>5</td>
<td>82</td>
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<tr>
<td>PH4009</td>
<td>Neuropharmacology</td>
<td>5</td>
<td>84</td>
</tr>
<tr>
<td>PH4011</td>
<td>Malignant Disease, Immunopharmacology &amp; Pharmacology of the Eye</td>
<td>5</td>
<td>86</td>
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<tr>
<td>PH4012</td>
<td>Research Project</td>
<td>10</td>
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</table>

**Definition of the ECTS:**

“The European Credit Transfer and Accumulation System (ECTS) is a student-centred system based on the student workload required to achieve the objectives of a programme of study.” Ref: ECTS Users’ Guide (Feb 2005) EU Commission, DG for Education and Culture”.

ECTS equivalent for each year of the course is 60 credits.

[https://www.tcd.ie/teaching-learning/academic-development/ects.php](https://www.tcd.ie/teaching-learning/academic-development/ects.php)
5.8 **FOUNDATION SCHOLARSHIP EXAMINATION**

University Calendar, Part 2, General information and regulation, Foundation and Non-Foundation Scholarships, [http://www.tcd.ie/calendar/](http://www.tcd.ie/calendar/)

**N.B.** This examination will be held in January, before the commencement of Hilary Teaching Term. Candidates are examined in their course work up to the end of Michaelmas Term of the Senior Freshman year, together with such additional reading as may be required by the Head of the School of Pharmacy & Pharmaceutical Sciences.

The Scholarship Examination for the Pharmacy course consists of three examination papers. Papers 1 and 2 will identify students who can consistently demonstrate exceptional knowledge and understanding of key subjects of the Senior Freshmen curriculum. Paper 3 is designed for candidates to demonstrate a high level of skill in integrating knowledge across different subject areas on one common theme and to reflect and demonstrate rigorous and informed critical thought.

**Paper 1 – Pharmaceutical Sciences 1**

Topics will be drawn from the following modules: Pharmaceutical Properties of Materials used in Medicines (PH2001) and Isolation, Separation and Analysis of Substances used in Medicine (PH2003). 3 hour paper. Four questions to be answered from four.

**Paper 2 – Pharmaceutical Sciences 2**

Topics will be drawn from Formulation & Pharmaceutical Technology (PH2004), Practice of Pharmacy II (PH2006) and General Principles of Pharmacology (PH2009). 3 hour paper. Four questions to be answered from six, at least one question must be attempted from each of the Modules examined therein, namely PH2004, PH2006 and PH2009.

**Paper 3 – General Paper (‘Tuberculosis’)**

Disease management based on a scenario/case: Interdisciplinary understanding and research 3 hour paper. Candidates will be given selected scientific papers at the beginning of the Michaelmas Term. Candidates will be asked questions relating to, for example;

- the disease state and its molecular basis
- the types of treatment used at present
- the nature of the API and excipients, its presentation and the forms of delivery in use
- the provision of care for patients with the condition
- future developments in understanding of the disease, potentially new types and forms of delivery, treatment and the challenges of care.

Recommendation for Scholarship: The board of examiners will evaluate results of all papers for all candidates. In order for students to be proposed for election to scholarship, they must obtain an overall average first class result (70% or higher) in the Scholarship examinations, with a mark of at least 70% in two of the examination papers and a mark of at least 65% in the third paper.

Further information: [https://www.tcd.ie/academicregistry/exams/scholarship/](https://www.tcd.ie/academicregistry/exams/scholarship/)


YouTube video on Foundation Scholars in TCD: [https://www.youtube.com/watch?v=0RweAxp6vs](https://www.youtube.com/watch?v=0RweAxp6vs)

Scholarship Examinations: 11th - 15th January 2016

(although it may be necessary to schedule some examinations in the preceding week)

Announcement of Election to Scholarship 2016: Trinity Monday, 11th April 2016, 10 am, Front Square.
5.9 PRIZES

Please also see: http://www.tcd.ie/calendar

- **Gold Medal**: The Board of Trinity College may award Gold Medals to candidates who show exceptional merit at the degree examination.

- **Pfizer Healthcare Ltd. Junior Freshman Pharmacy Prize**: This prize is awarded for overall first place in the Junior Freshman Pharmacy Annual Examination.

- **Sanofi Prize**: This prize is awarded to the student who attains the highest overall combined mark in modules PH3003 and PH4003.

- **Pfizer Healthcare Ltd. Prize in Pharmacology**: This prize is awarded to the student who attains the highest overall combined mark in modules PH3009, PH3010, PH3011, PH4009 and PH4011.

- **Paul Higgins Memorial Medal/UNIPHAR Prize in Pharmaceutical Chemistry**: This prize is awarded to the student who attains the highest overall combined mark in modules PH3002 and PH4002.

- **LEO Pharma Prize in Pharmaceutics**: This prize is awarded to the student who attains the highest overall combined mark in modules PH4004 and PH4005.

- **McNeil Practice of Pharmacy Prize**: This prize is awarded to the student who attains the highest overall combined mark in modules PH4006 and PH4007 (including electives).

- **Alumni Prize**: This prize is awarded for the best overall combined mark in the Junior Sophister year.

- **The Senior Sophister Pharmacy Prize**: This prize is awarded to the student who obtains the highest overall mark in the B.Sc. (Pharm.) Degree.

Please note that it is not possible to predict the value of the prizes in advance as it may vary from year to year.
SENIOR FRESHMAN (2\textsuperscript{nd} Year)

Module details may be subject to corrections/amendments.

- \textit{It is each student’s responsibility to be aware of dates, times, locations, etc. of lectures, tutorials, seminars and practical classes.}

- \textit{Reports, continuous assessments and laboratory notebooks must be presented for assessment by the date specified by the examiner.}

- \textit{Reports, continuous assessments and laboratory notebooks submitted after the specified date will not be assessed unless a valid reason is given, and students will be deemed not to have satisfied the School’s examination requirements.}

\textbf{PRE-REQUISITES:} Successful completion of Junior Freshman (Year 1)
PHARMACEUTICAL PROPERTIES OF MATERIALS USED IN MEDICINES
Year 2 (Senior Freshman)  

Code: PH2001

Staff of the School of Pharmacy & Pharmaceutical Sciences: Prof. M. J. Meegan (MM), Assoc. Prof. J. Gilmer (JG)

Co-ordinator: Assoc. Professor John Gilmer

AIMS: To develop and consolidate the fundamental pharmaceutical and bioorganic chemistry of the materials used in medicines from first year with emphasis on more advanced topics. Stereochemistry is introduced, the chemistry of some important heterocycles is covered, as is polymer chemistry relevant to pharmacy.

PRE-REQUISITES: Successful completion of Junior Freshman (Year 1)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
- Describe the characteristics of pharmaceutical materials containing conjugated and aromatic systems and consolidate ideas about chemical bonding and its representation.
- Explain the reactivity of benzene and related compounds using mechanistic conventions
- Explain what an azo bond is and how the group behaves in vivo
- Discuss the process of ionisation in acids and bases and electronic and structural factors that affect equilibria
- Identify amine salts and describe their role in solubilisation and stabilization
- Discuss why shape is important in drug molecules;
- Describe how stereochemistry is classified, analysed and how it is accommodated in pharmaceutical science and regulations.
- Explain what a heterocycle is and describe their chemistry and importance in pharmacy
- Explain what a synthetic polymer is, how they are produced, characterised and used in pharmacy.
- Be competent in preparation, purification and characterization of drug substances

COURSE OUTLINE:

Unit PH2001A: Conjugation, aromaticity and reactivity in pharmaceutical compounds (JG)
1. Review of bonding and electronic structure of unsaturated molecules
2. Conjugation; thermodynamic and reactivity issues
3. MO Theory and modelling of pharmaceutically relevant compounds
4. Aromaticity, stability, electronic structure, 4n+2 rule, quasi-aromatics
5. Electrophilic aromatic substitution, metabolism of benzene containing compounds
6. Directing effects in electrophilic substitution
7. Azo compounds, the diazonium reaction, azocoupling, applications in pharmaceutical analysis and drug delivery

Unit PH2001B: Pharmaceutical properties of drugs containing amines and carboxylic acids; physical and electronic characteristics (JG)
8. Amines, the concepts of basicity, relationship between pH and lipophilicity
9. Factors affecting amino drug basicity
10. Acidity in organic compounds, review of pKa and relationship to electronic structure.
11. Acid derivatives: stability, reactivity, amides, ester drugs

Unit PH2001C: Pharmaceutical properties of drugs containing carbonyl groups; physical and electronic characteristics (JG)
12. Structure and reactivity of aldehydes and ketones, a review
13. Acetals and ketal, the concept of the protecting group

Unit PH2001D: Stereochemistry and pharmacy (MM)
14. Definition and concepts of stereochemistry, nomenclature, single and multiple chiral centres
15. Sources and production of chiral drugs
16. Characterisation of chiral drugs
17. Pharmacology of chiral drugs
18. Regulatory aspects of chiral drugs
Unit PH2001E: Basic heterocyclic chemistry relevant to pharmacy (JG)
19. What is a heterocycle? distribution, nomenclature and uses in pharmacy
20. Six membered compounds: Pyridine, reactivity, tautomerism.
21. Six membered pyrimidine
22. Five membered heterocycles: pyrrole, furan, thiophene, imidazole

Unit PH2001F: Properties of pharmaceutical polymers (MM)
23. Free radical chemistry
24. Monomers, polymers, copolymers; structures and definitions
25. Addition polymerization
26. Condensation polymerization

PRACTICAL CLASSES: Drug specifications and process chemistry (MM)
1. Sulfonamide preparation and specifications
2. Phenytoin preparation and characterisation
3. Heterocyclic chemistry: Pyrimidine synthesis
4. Pharmaceutical process chemistry I: Nitration of aromatic substrates
5. Pharmaceutical process chemistry II: Alkylation of aromatic substrates
6. Pharmaceutical process chemistry III: Oxidation and reduction chemistry

DIRECTED READING
Essentials of Organic Chemistry for Students of Pharmacy, Medicinal Chemistry and Biological Chemistry. Dewick.
Wiley 2006.
Mechanism in Organic Chemistry. Sykes.

ASSESSMENT

| Written Paper: (2 hours) 4 Questions from 5 | 80% of total marks |
| Continuous Practical Assessment | 20% of total marks |

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practicals</th>
<th>Tutorials</th>
<th>Total contact</th>
<th>Practical reports</th>
<th>Guided study</th>
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N.B. Students are expected to satisfy the examiners in both written examination and practical components. The pass mark for examinations is 40%. Students who obtain an overall mark of less than 40% will be required to sit the supplemental examinations. Students who fail to satisfy the written requirement (i.e. less than 40%) of the annual examination, but who obtain 40% or better overall for the module will be returned as ‘qualified fail’ (QF) and will be required to take a supplemental examination in the written examination only. Students who fail to satisfy the practical requirement (i.e. less than 40% of the practical component) of the annual examination, but who obtain a Class III or better overall for the module will be returned as a ‘qualified fail’ (QF) and will be required to resubmit in the practical component.

This module cannot be compensated.
PHYSICAL PHARMACY II
Year 2 (Senior Freshman) Course Code: PH2002

Staff of the School of Pharmacy & Pharmaceutical Sciences: Asst. Prof. J. Quigley (JQ), Assoc. Prof. L. Tajber (LT), Prof. A.M. Healy (AMH)

Coordinator: Asst. Professor John Quigley

AIMS: To explain more fully physicochemical aspects of substances used in pharmacy and medicine.

PRE-REQUISITES: SUCCESSFUL COMPLETION OF JUNIOR FRESHMAN (YEAR 1)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Appreciate the importance of pH – rate profiles in respect of the stability of pharmaceutical systems
- Describe the principal mechanistic pathways of drug degradation
- Explain the role of physicochemical properties in relation to drug distribution and activity
- Describe the occurrence of polymorphism in pharmaceutical systems
- Summarise the fundamental theory of electrochemical systems
- Discuss the rheological aspects of pharmaceutical systems and products
- Demonstrate competence in related practical laboratory skills.

COURSE OUTLINE:

LECTURES

<table>
<thead>
<tr>
<th></th>
<th>Lectures</th>
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<tbody>
<tr>
<td>1-2</td>
<td>Accelerated Stability Analysis; Extrapolation, Criteria &amp; Limitations</td>
<td>JQ</td>
</tr>
<tr>
<td>3-4</td>
<td>pH – rate profiles; V-graphs, determination of minimum pH value</td>
<td>JQ</td>
</tr>
<tr>
<td>5</td>
<td>Sigmoid curves (ionisation &amp; pKa) &amp; Bell-shaped curves</td>
<td>JQ</td>
</tr>
<tr>
<td>6</td>
<td>Selected examples and Pharmaceutical calculations</td>
<td>JQ</td>
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<tr>
<td>7-10</td>
<td>Hydrolysis &amp; Oxidation of Pharmaceutical Agents</td>
<td>JQ</td>
</tr>
<tr>
<td>11-14</td>
<td>Physicochemical properties of drugs in solution (buffers, solubility)</td>
<td>JQ</td>
</tr>
<tr>
<td>15</td>
<td>pH – partition profiles / ionisation</td>
<td>JQ</td>
</tr>
<tr>
<td>16-18</td>
<td>Electrochemical Definitions; Redox Potentials; Glass Electrode</td>
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<tr>
<td>19-20</td>
<td>Enhancing solubility – complexation and other methods</td>
<td>LT</td>
</tr>
<tr>
<td>21-22</td>
<td>Pharmaceutical implications of Polymorphism</td>
<td>JQ</td>
</tr>
<tr>
<td>23</td>
<td>Introduction to rheology</td>
<td>AMH</td>
</tr>
<tr>
<td>24</td>
<td>Pharmaceutical disperse systems</td>
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</tr>
<tr>
<td>25</td>
<td>Non-Newtonian systems</td>
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<tr>
<td>26</td>
<td>Measurement of viscosity</td>
<td>AMH</td>
</tr>
<tr>
<td>27</td>
<td>Texture of pharmaceutical systems</td>
<td>AMH</td>
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</table>

PRACTICAL CLASSES (2 hours each)

1. Colour & Clarity of Solutions / Refractive Index / Optical Rotation.
3. Spectrophotometric determination of the ionisation constant (pKₐ). Determined for both bromophenol blue and procaine.
5. The standardisation of molecular size by viscosity measurements

DIRECTED READING

ASSESSMENT
Written theory examination: 2 hour; all 4 questions to be answered
Practical: Continuous Assessment

Weighting
Written theory examination: 90% of total marks
Practical: 10% of total marks

SUMMARY OF HOURS

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<tr>
<th>Lectures</th>
<th>Practicals</th>
<th>Tutorials</th>
<th>Total contact</th>
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N.B. Students are expected to satisfy the examiners in both written examination and practical components. The pass mark for examinations is 40%. Students who obtain an overall mark of less than 40% will be required to sit the supplemental examination. Students who fail to satisfy the written requirement (i.e. less than 40%) of the annual examination, but who obtain 40% or better overall for the module will be returned as ‘qualified fail’ (QF) and will be required to take a supplemental examination in the written examination only. Students who fail to satisfy the practical requirement (i.e. less than 40% of the practical component) of the annual examination, but who obtain a Class III or better overall for the module will be returned as ‘qualified fail’ (QF) and will be required to resubmit in the practical component.

This module cannot be compensated.
ISOLATION & ANALYSIS OF SUBSTANCES USED IN MEDICINES
Year 2 (Senior Freshman)  
Course Code: PH2003

Staff of the School of Pharmacy & Pharmaceutical Sciences: Asst. Prof. F. Boylan, Asst. Prof. J. Quigley (JQ), Asst. Prof. A. Sasse (AS)

Coordinator: Asst. Professor Fabio Boylan

AIMS: to reinforce the concepts of quality, together with appropriate regulatory frameworks and guidance, and the application of analytical techniques to pharmaceutical materials (this is a continuation of the course given at JF level). Herbal drugs used as human medicines are introduced as is pharmaceutical spectroscopy in preparation for the instrumental analysis component at JS level.

PRE-REQUISITES: Successful completion of Junior Freshman (Year 1)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Demonstrate competence in obtaining and interpreting data in relation to standard pharmacopoeial monographs.
- Have the ability to verify the identity of synthetic and crude herbal drug material by reference to the chemical, chromatographic, macroscopic and microscopic characteristics;
- Discuss the regulatory framework for specifications of drug substances and products, including those from herbal sources.
- Be proficient in the application and utilisation of chromatographic and chemical techniques to quantify synthetic and herbal drugs in crude samples, formulated products and clinical samples.
- Discuss the theory and evaluate the application of spectroscopic techniques in pharmaceutical analysis (e.g. IR, UV, NMR and MS).
- Interpret and predict spectral data of drug molecules and deduce the structural fragments/functional groups and the molecular structure of a drug from spectral data

COURSE OUTLINE:

LECTURES

Methods in Pharmacognosy (12 Lectures) (Asst. Prof. Fabio Boylan)
1. Herbal drugs/medicines
2. Pharmacopoeial definitions & methods
3-4. Cell inclusions & vacuolar contents used in pharmacy (e.g., starch)
5-6. Cell types and tissues used in the identification of herbal drugs
7-8. Leaf-derived herbal drugs of pharmaceutical/ Ph Eur importance
9. Bark-derived herbal drugs of pharmaceutical/ Ph Eur importance
10. Root -derived herbal drugs pharmaceutical/ Ph Eur importance
11-12. Pharmacopoeial methods used in the Quality Control of herbal drugs

Specifications and regulatory outline (3 lectures) (Asst. Prof. Astrid Sasse)
13. Introduction to ICH guidelines
14. Setting specifications for drug substances: ICHQ6A
15. Impurities: ICHQ3A; Residual Solvents: ICHQ3C

Pharmaceutical spectroscopy (22 Lectures) (Asst. Prof. Astrid Sasse)
16-19. UV-Vis Spectroscopy: theory and application in pharmaceutical analysis (4 lectures)
20-21. Fluorescence: theory and application in pharmaceutical analysis (2 lectures)
22-25. Infrared Spectroscopy (IR): theory and application in pharmaceutical analysis (4 lectures)
26-31. Nuclear Magnetic Resonance Spectroscopy (1H NMR, 13C NMR): theory and application in pharmaceutical analysis (6 lectures)
32-37. Mass Spectrometry (MS): theory and application in pharmaceutical analysis (6 lectures)
PRACTICALS
Part 1 (FB)
1. Plant cell inclusions, Plant cells and tissues
2. Examination and qualitative methods used for standardisation of leaves/herbs used in pharmacy
3. Examination and qualitative methods used for standardisation of leaves/herbs used in pharmacy
4. Examination and qualitative methods used for standardisation of leaves/herbs used in pharmacy
5. Quality Evaluation of a herbal drug

Part 2 (JQ)
2. Iodine displacement titrations*
3. Determination of the iodine value of an oil*
4. To determine the % w/v Ca as Ca2+ in Calcium gluconate injection. To determine the % w/v of zinc in zinc gluconate mouthwash/injection
5. To determine the % w/w aluminium in sample provided. To determine the %w/w Bismuth in Bismuth carbonate

Practicals with (*) 2 hours each, otherwise 3 hours.

TUTORIALS
Tutorials in groups (2 tutorials (FB), 5 tutorials (AS) - 2 hrs each) arranged to complement the lecture theory and practical programme

DIRECTED READING
- European Pharmacopoeia.
- ICH Q6A, Q3A, Q3C [http://www.ich.org]

ASSESSMENT
- Written examination (1) for the section on Pharmacognosy to be held in Michaelmas Term (2 hours):
  Consists of 2 sections. 35% of the total
  [Section A 70%, Section B 30%]
  Section A: 2 long questions
  Section B: 1 short question and 5 MCQs (negative marking, +1/-0.25)

- Written examination (2) for the sections on Spectroscopy & Regulatory Guidelines to be held during the annual examination period (2 hours):
  Consists of 2 sections. 50% of the total
  [Section A 70%, Section B 30%]
  Section A: 2 long questions
  Section B: 1 short question and 5 MCQs (negative marking, +1/-0.25)

- Practical Examination to be held before Christmas (3 hours): 10% of the total

- Continuous assessment: Practical Book Report 5% of the total
SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practicals</th>
<th>Tutorials</th>
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<th>Practical reports</th>
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N.B. Students are expected to satisfy the examiners in all examinations (written examination 1, written examination 2 as well as the practical examination). Each examination must be passed individually. The pass mark for examinations in this module is 40%. Students who obtain an overall mark of less than 40% will be required to sit the supplemental examination only in the examination(s) failed. Students who fail an examination (i.e. less than 40%), but who obtain overall a Class III or better for this module will be returned as ‘qualified fail’ (QF) and will be required to take a supplemental examination in the failed examination(s) only.

This module cannot be compensated.
FORMULATION AND PHARMACEUTICAL TECHNOLOGY
Year 2 (Senior Freshman)                                             Course Code: PH2004

Staff of the School of Pharmacy & Pharmaceutical Sciences: Prof. A.M. Healy (AMH)
Asst. Prof. M.J. Santos-Martinez (MS), Assoc. Prof. L. Tajber (LT)

Coordinator: Assoc. Professor Lidia Tajber

AIMS: To provide a continuation course in the formulation of some common pharmaceutical dosage forms, together with aspects of unit operations related to the production of effective medicines.

PRE-REQUISITES: Successful completion of Junior Freshman (Year 1)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
• Describe theoretical and practical aspects of colloids and colloidal preparations
• Outline therapeutic relevance of pharmaceutical nanomaterials
• Discuss physical stability problems associated with production of stable pharmaceutical emulsions
• Describe the manufacture stable pharmaceutical suspensions, solubilised preparations, ointments, creams, and emulsions
• Explain the mass and heat transfer processes of pharmaceutical importance
• Discuss the various unit processes used in the manufacture of pharmaceutical materials and formulations
• Describe the operation of various types of equipment used in unit processes
• Outline the importance of particle size, particle size analysis and powder flowability of pharmaceuticals and discuss different techniques to characterise powder size and flow
• Discuss the steps involved in pharmaceutical preformulation studies in the context of production of solid dosage forms
• Describe the formulation, production and characterisation of compressed tablets

COURSE OUTLINE

LECTURES

Unit PH2004A: FORMULATION – COLLOIDS AND EMULSIONS
1. Colloids and pharmaceutical nanotechnology                        LT
2. Classification of colloids, lyophobic and lyophilic colloids        LT
3. Kinetic, optical and electrical properties of colloids, physical stability of colloids. LT
4. Micellar colloids, solubilisation by micelle formation, ternary phase diagrams LT
5. Liposomes and liposomal drug delivery systems                      LT
6-7. Introduction to nanomedicine                                    MS
8. Terminology and classification of emulsions, emulsion-based drug delivery systems LT
9. Thermodynamics of emulsions, primary and secondary emulgents, HLB classification LT
10. Major emulgent types, emulsion formulation by HLB method          LT
11. Factors affecting emulsion stability, Pickering emulsions, preparation of emulsions LT
12. Creams and other topical formulations                             LT

Unit PH2004B: PHARMACEUTICAL UNIT PROCESSES
13. Introduction to mass transfer processes, mass transfer in still/stagnant gases AMH
14. Mass transfer in moving fluids, interfacial mass transfer, examples of mass transfer options AMH
15. Heat transfer by conduction and convection, heat transfer through walls and across pipes and tubes, heat exchange between fluids across a solid boundary. Heat transfer to boiling liquids. AMH
16-17. Comminution AMH
18-19. Mixing AMH
20-21. Filtration AMH
22-23. Drying AMH
24. Evaporation AMH
25. Distillation AMH
Unit PH2004C: MICROMERITICS
26. Microscopy as a technique for particle size analysis AMH
27. Sieving as a technique for particle size analysis AMH
28. Particle size analysis using sedimentation and electrical sensing zone (Coulter counter) methods AMH
29. Particle size analysis using laser light scattering techniques - laser diffraction particle size analysis and photon correlation spectroscopy AMH
30. Surface area measurement techniques - gas adsorption and permeametry AMH
31. Methods of presentation and interpretation of particle size analysis results AMH
32. Particulate solids in bulk - fundamental and derived properties, factors affecting the flow properties of powders AMH
33-34. Assessment of powder flow, angle of repose and friction, Carr’s index, use of glidants, flow of solids in hoppers and through orifices, the behaviour of powders in the fluidised state AMH

Unit PH2004D: TABLETTING
35. Introduction to tableting terminology, types of tablets LT
36. Preformulation testing of drugs for compressed tablets LT
37-38. Formulation of compressed tablets LT
39. Tablet presses, tooling and mechanism of tablet compression LT
40. Direct compression LT
41. Dry and moist granulation procedures LT
42. Coating of tablets LT
43. Processing problems LT
44. Tablet evaluation LT

PRACTICAL CLASSES (3 hours each) / CONTINUOUS ASSESSMENT
1. Colloidal and solubilised preparation
2. Ointments
3. Emulsifying waxes, ointments and creams
4. Creams continued
5. Oral emulsions
6. Dilutions
7. Revision and repeat
8. Powder mixing
9. Tablet production using a direct compression base (DCB)
10. Tablet evaluation – pharmacopoeial tests

TESTS: One MCQ/short questions test on pharmaceutical calculations

TUTORIALS: Three tutorials on pharmaceutical calculations, formulations and processing/manufacture of pharmaceuticals (LT) - 3 hours

DIRECTED READING
European Pharmacopoeia
British Pharmacopoeia
United States Pharmacopoeia
Martindale
ASSESSMENT

Written theory paper: 3 hours; 5 questions (no choice)  
Practical examination: 2.5 hours; 3 questions (no choice)  
Continuous assessment of practical classes,  
including a calculation test  

The pass mark for the written theory paper is 40%.  
The pass mark for the practical examination is 50%.

SUMMARY OF HOURS

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NB. Students are expected to satisfy the examiners in both written and practical examination components. The pass mark for the module is 40%. Students who obtain an overall mark of less than 40% will be required to sit the Supplemental examination. Students who fail to satisfy the written requirement (i.e. less than 40%) in the annual examination, but who obtain 40% or better overall for the module will be returned as ‘qualified fail’ (QF) and will be required to take a supplemental examination in the written examination only. Students who fail to satisfy the practical requirement (i.e., less than 50% in the practical examination), but who obtain 40% or better overall for the module will be returned as ‘qualified fail’ (QF) and will be required to supplement in the practical examination only.

This module cannot be compensated.
MICROBIOLOGY AND BIOCHEMISTRY
Year 2 (Senior Freshman)  
Course Code: PH2005

Lecturers:
Dept of Microbiology: Asst. Prof. J. Geoghegan (JG), Assoc. Prof. R. Russell (RR); Asst. Prof. K. Roberts (KR), Asst. Prof. S. Corr (SC), Asst. Prof. C. Kroeger (CK)
Dept of Clinical Microbiology: Prof. T. Rogers (TR), Asst. Prof. S. Smith (SS).
Dept. of Biochemistry and Immunology: Assoc. Prof. A. Molloy (AM), Assoc. Prof. G. Davey (GD), Assoc. Prof. R. Porter (RP), Asst. Prof. J. Hayes (JH).

Coordinators:
Microbiology Unit (PH2005A): Asst. Prof. Sinead Smith (smithsi@tcd.ie),
Biochemistry Unit (PH2005B): Asst. Prof. David Finlay (finlayd@tcd.ie)

AIMS
PH2005A (MI2005): To enable the student to appreciate how microbiology impinges on many aspects of Pharmacy
PH2005B (BI2005): To provide an overview of biochemical aspects of metabolism

PRE-REQUISITES: Successful completion of Junior Freshman (Year 1)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
• Describe microbial structure, culture and identification
• Describe medically significant bacteria and fungi and protozoa and their pathogenic mechanisms
• Explain the mechanisms of action of the major antimicrobial drugs
• Discuss infectious-disease epidemiology and zoonoses
• Discuss the determinants of the immune response, autoimmunity, immunocompetence & immunotherapy
• Describe viral structure, multiplication and viral diseases
• Discuss nutrition and metabolism – intermediary and alcohol

COURSE OUTLINE

LECTURES

UNIT PH2005A (MI2005) MICROBIOLOGY  
(Michaelmas Term: subject to minor changes)

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>1-4</td>
<td>Bacteria</td>
<td>JG</td>
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<tr>
<td>5-7</td>
<td>Viruses</td>
<td>KR</td>
</tr>
<tr>
<td>8-11</td>
<td>Immunology</td>
<td>SC</td>
</tr>
<tr>
<td>12</td>
<td>Vaccines</td>
<td>RR</td>
</tr>
<tr>
<td>13</td>
<td>Protozoal infections</td>
<td>CK</td>
</tr>
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<td>14</td>
<td>Gastrointestinal infections</td>
<td>CK</td>
</tr>
<tr>
<td>15</td>
<td>Urinary tract infections</td>
<td>CK</td>
</tr>
<tr>
<td>16</td>
<td>Hospital acquired infections</td>
<td>CK</td>
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<tr>
<td>17</td>
<td>Respiratory infections</td>
<td>TR</td>
</tr>
<tr>
<td>18</td>
<td>Fungi &amp; antifungal therapies</td>
<td>TR</td>
</tr>
<tr>
<td>19</td>
<td>Meningitis/septicaemia</td>
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PRACTICAL CLASSES (8 hrs)

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<tr>
<th>Week</th>
<th>Activity</th>
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<tbody>
<tr>
<td>1</td>
<td>Identifying and staining bacteria</td>
</tr>
<tr>
<td>2</td>
<td>Aseptic Technique/Nutritional and atmospheric requirements</td>
</tr>
<tr>
<td>3</td>
<td>Differential and selective media</td>
</tr>
<tr>
<td>4</td>
<td>Enumeration of bacteria</td>
</tr>
<tr>
<td>5</td>
<td>Antibiotics</td>
</tr>
<tr>
<td>6</td>
<td>Identification of bacteria</td>
</tr>
<tr>
<td>7</td>
<td>Virology</td>
</tr>
</tbody>
</table>
DIRECTED READING
Hugo and Russell, Pharmaceutical Microbiology 7th ed. (2011) and other material to be advised by the lecturers.

UNIT PH2005B (BI2005) BIOCHEMISTRY

LECTURES: (Biochemistry with JF Med/SF RT)  Lecturer
1-4 Intermediary metabolism (lipids)      JH
5-8 Intermediary metabolism (amino acids) RP
9-10 Cholesterol, bile salts and lipoproteins RP
11-12 Alcohol metabolism                 GD
13-17 Nutrition – anaemias, iron, folate & B12 AM

ASSESSMENT

UNIT A: MICROBIOLOGY  Weighting
Written Paper: 2 hours 48%
Multiple-choice, 30 questions
4 short questions (no choice)
Practical assessment (reports, attendance, lab book) 12%

UNIT B: BIOCHEMISTRY
MCQ examination (1 hour) which will include negative marking. 40%

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th></th>
<th>Lectures</th>
<th>Practicals</th>
<th>Total contact</th>
<th>Practical reports</th>
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</table>

The pass mark for Unit PH2005A is 40%. Compensation is allowed between the written paper and the practical assessment of PH2005A.

Unit PH2005B can be compensated, however a minimum mark of 35% must be achieved in the written examination.

PLEASE NOTE:
Students are expected to satisfy the examiners in both written examinations and the practical component. The pass mark for the module is 40%. Students who obtain an overall mark of less than 40% will be required to sit the supplemental examination(s). Students who fail to satisfy the written requirement(s) of the annual examination(s), but who obtain 40% or better overall for the module will be returned as ‘qualified fail’ (QF) and will be required to take supplemental examination(s) in the written examination(s) only.

This module is not compensatable.
PRACTICE OF PHARMACY II
Year 2 (Senior Freshman)  Course Code: PH2006

Staff of the School of Pharmacy & Pharmaceutical Sciences: Assoc. Prof. M. Henman (MH), Asst. Prof. S. Ryder (SR), Assoc. Prof. C. Roche (CR), Assoc. Prof. T. Grimes (TG), Assoc. Prof. I. Hook (IH), Asst. Prof. F. Boylan (FB)
Teacher-Practitioner: Ms. K. Rossi (KR)

Coordinator: Asst. Professor Sheila Ryder

AIMS: Students will appreciate the impact of nutrition on health and illness, the importance of nutritional support for specific patients, and the different forms of nutrient delivery. They will also develop an understanding of appliances and dressings, expand their knowledge of pharmacy legislation and develop their clinical skills in responding to symptoms and prescribed therapy.

PRE-REQUISITES: See general pre-requisites for Senior Freshman year (page 17). Exceptions may be made in individual cases for students who have transferred from a pharmacy degree programme in another university, including one-year international students.

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Describe the components of adequate nutrition and their role in maintaining health.
- Explain the provision of energy by the body in response to trauma and illness and discuss the role of nutritional support in patients.
- Describe the characteristics of oral, enteral and parenteral nutrition and their role in supporting patients who have undergone surgery or have ongoing illness.
- Describe the types and uses of ostomy appliances, vascular support hosiery and related materials.
- Explain the significance of dietary supplements of lipids and of chemoprevention.
- Tabulate the poisonous properties of certain plants and food contaminants.
- Describe common oral and dental conditions and their treatment.
- Illustrate wounded skin and the healing process.
- Tabulate the actions and uses of different dressing types.
- Critically discuss the provisions of the Medicinal Products (Prescription and Control of Supply) Regulations, the controls on unlicensed medicines and the requirements for dispensing prescriptions.
- Describe the requirements for establishing and operating a retail pharmacy business.
- Systematically collect, interpret and apply knowledge about patients, their conditions and their medicines, in order to provide and justify treatment recommendations and patient counselling, in a diverse range of patient case studies [more complex cases than in PH1006].
- Dispense mock prescriptions in accordance with legal, clinical, administrative, ethical and professional requirements [more complex prescriptions than in PH1006].
- Devise a care plan to identify, prevent and manage drug-related problems.
- Critically evaluate existing literature and demonstrate the principles of academic writing by presenting a structured dissertation on an assigned topic.

COURSE OUTLINE:
Note: Due to timetabling constraints, the sequence of classes may differ from that below.

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<th>Lecturer</th>
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<tr>
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<td>15-17</td>
<td>TG</td>
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</tr>
<tr>
<td>24</td>
<td>FB</td>
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<tr>
<td>25-27</td>
<td>KR</td>
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</table>
28-29 Vascular support hosiery and surgical hosiery  KR
30-31 Dental health  KR
32-35 Wound types, healing, wound dressings; bandages  KR
36 Patient factors in drug treatment  MH
37-39 Clinical laboratory tests: Urea and electrolytes (U&E), renal function, full blood count (FBC)  TG
40 Adverse drug reactions (ADRs)  TG

PRACTICAL CLASSES / WORKSHOPS (36 hours)
Nutrition: Administration and consideration of medication use (2h)  TG
Nutrition: Disorders of absorption and special foods (2h)  MH
Ostomy and vascular support hosiery (2h)  KR
Surgical dressings (2h)  KR
Clinical skills 2.1: Responding to requests for prescription only medicines (3h)  MH
Clinical skills 2.2: Responding to requests for OTC medicines (3h)  MH
Clinical skills 2.3: Responding to symptoms (3h)  MH
Clinical skills 2.4: Drug interactions and other drug-related problems (3h)  TG
Dispensing and patient care 2.1: Prescription and control of supply regulations (2h)  SR/KR/CR/TG
Dispensing and patient care 2.2: Emergency supply (2h)  SR/KR/CR/TG
Dispensing and patient care 2.3: Primary-secondary care interface (2h)  SR/KR/CR/TG
Dispensing and patient care 2.4: Unlicensed and extemporaneous medicines (2h)  SR/KR/CR/TG
Dispensing and patient care 2.5: Hospital dispensing (2h)  SR/TG/CR/TG
Pharmacy practice practical test (1h timetabled; test duration: 50 mins)  SR/KR/CR/TG
Objective structured clinical examination (OSCE): Required knowledge/skills and their evaluation (1h)  SR
Preparation for OSCE (2h)  SR/MH/KR/CR/TG
Assessment by OSCE (2h)  SR/MH/KR/CR/TG

TUTORIALS (5 hours)
Dispensing and patient care 2.1 feedback (1h)  SR/KR/CR/TG
Dispensing and patient care 2.2 feedback (1h)  SR/KR/CR/TG
Dispensing and patient care 2.3 feedback (1h)  SR/KR/CR/TG
Dispensing and patient care 2.4 feedback (1h)  SR/KR/CR/TG
Dispensing and patient care 2.5 feedback (1h)  SR/KR/CR/TG

DISSERTATION
Literature review and critical analysis of topic associated with the SF course (25h)  MH/guided study

ASSESSMENT
Each component must be passed (see notes below)  Weighting
Written examination: 1.5 hours. Section A: 1 essay (from choice of 2). Section B: 40 MCQs (no choice; negative marking, +1/-0.25). Students must independently pass both Section A and Section B.  75% of total marks
Dispensing and patient care worksheets; minimum 60% in each worksheet  7% of total marks
Pharmacy practice practical test (50 mins, 2 cases, no choice); minimum 60%  3% of total marks
Clinical skills and nutrition assessments  5% of total marks
Dissertation  10% of total marks
OSCE and associated exercises – satisfactory/unsatisfactory  ---
Reflective continuing professional development e-portfolio – satisfactory/unsatisfactory  ---

NB: Students will be expected to draw upon knowledge and skills gained in this module when undertaking the Clinical Pharmacy Assessment that forms part of the evaluation for modules PH3009A, PH3010 and PH3011. Pharmacy legislation and all aspects of clinical skills/dispensing/patient care are also examinable in subsequent years (Practice of Pharmacy theory papers, clinical skills, dispensing and patient care evaluations, practical tests and OSCEs in all years).
SUMMARY OF HOURS

<table>
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<th>Lectures</th>
<th>Practicals/Workshops</th>
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Pass mark, plagiarism
The pass mark for examinations and assessments is 40% except where otherwise indicated. See ‘Assessment’ above. Students should note that College penalties for plagiarism apply to both examinations and continuous assessment.

Late work
Continuous assessment exercises for this module must be presented for evaluation by the specified date(s). They must be presented to a designated member of staff in the manner requested (e.g., in person/by email/through the virtual learning environment), and signed in on the form for this purpose where applicable. Work submitted late will not be assessed unless a valid reason is provided, and permission for late submission should be obtained in advance of the submission deadline from the staff member responsible for the continuous assessment component. Where late work with a valid excuse is accepted for assessment, a penalty may be applied (deduction of up to 60% of the maximum marks available for the component) with the effect that marks for the late work will not normally exceed the pass mark.

Missed classes/assessments
In common with other modules for the pharmacy degree, attendance at all scheduled classes for this module is compulsory. A student who is unable to attend a class for any reason must notify his/her tutor of the reason for absence without delay, and present certification as appropriate. However, all continuous assessment components must be completed even if the student is absent for a valid reason. It is the student’s responsibility to obtain details of the assessment for the missed class(es) from the relevant staff member without delay, and to complete it on a self-study basis. The deadline for submission of the completed assessment to the relevant staff member is five days from the student’s return to College (return date notified to staff member by tutor, based on certification as appropriate) unless otherwise agreed in advance with the relevant staff member. Where feedback on the assessment has already been provided to the class prior to submission, a penalty may be applied (deduction of up to 60% of the maximum marks available for the assessment), with the effect that marks for the assessment will not normally exceed the pass mark. See above for late submissions.

Progression and supplementals
Students must satisfy the examiners in each component of the module independently. A student may be returned as a ‘qualified fail’ (QF) and refused permission to progress with his/her class until he/she has satisfied the examiners in all components of the module. This may necessitate sitting a supplemental examination and/or repetition/(re)submission of one or more continuous assessment components (including submission of one or more alternative exercises that have been set to replace failed/missed continuous assessment components). Penalties may be applied to practical tests and/or other continuous assessment components (deduction of up to 60% of the maximum marks available for the relevant element(s)), with the effect that marks for such elements will not normally exceed the pass mark.

Non-satisfactory reports
Students who have not fulfilled the module requirements with regard to attendance and/or coursework may be reported to the Senior Lecturer as non-satisfactory for one or more terms. Students reported as non-satisfactory for the Michaelmas and Hilary terms may be refused permission to take their annual examinations and may be required by the Senior Lecturer to repeat the year.

Compensation
Because of the importance accorded to this aspect of the course by the PSI, who accredit the degree, it is not possible to compensate in this module.

Professional dress code
Students are required to dress appropriately and behave in a professional manner for elements of the course entailing attendance at external facilities (professional experience in pharmacies, case review in hospitals, health service facilities etc.).
PROFESSIONAL DEVELOPMENT AND CAREER PLANNING

Year 2 (Senior Freshman)  
Course Code: PH2007

Staff of the School of Pharmacy & Pharmaceutical Sciences: Assoc. Prof M. Henman (MH);  
Teacher-practitioners and allied staff: Ms. K. Rossi (KR); Ms. N. McMahon (NMcM); postgraduate students in the School of Pharmacy and Pharmaceutical Sciences (PG)  
External staff: Selected external speakers representing a range of pharmacy career paths (Ext)  
Staff of Careers Advisory Service (CAS).

Coordinator: Assoc. Professor Martin Henman

N.B. This module may be substituted with a Broad Curriculum module. Students who elect to take the Broad Curriculum course must inform the Module Coordinator of PH2007. In the case where a student is taking a Broad Curriculum module attendance at the Community Pharmacy attachment is required. Attendance at lectures, submission of curriculum vitae and completion of the online self-evaluation tools (GradIreland Career Report etc. provided by CAS) are strongly recommended.

AIMS: The students will acquire an understanding of the purpose and potential value of work experience within the undergraduate degree programme. Students will consider the relative merits of Continuing Education and of Continuing Professional Development for Pharmacists in Ireland and their relation to Fitness-to-Practice requirements. Students will acquire knowledge of and practice the skills needed for self-development and career planning.

PRE-REQUISITES: Successful completion of Junior Freshman (Year 1)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Describe the role and functions of various bodies responsible for postgraduate education for pharmacists in Ireland
- Compare and contrast Continuing Education and Continuing Professional Development in the Health Professions
- Describe the requirements for re-certifications and Fitness-to-Practice in the Health Professions in Ireland
- Describe the different skills required to practice in different branches of pharmacy
- Describe the facilities offered by the Careers Advisory Service
- Develop a curriculum vitae and practice interviewing techniques
- Describe the process of undergraduate education and professional registration of selected health care professional in Ireland
- Reflect upon work experience to develop their professional competencies
- Use a self-reflective approach to analyzing their personal motivation, values, interests and skills and to devising a plan to meet their personal development goals

COURSE OUTLINE

<table>
<thead>
<tr>
<th>LECTURES</th>
<th>LECTURER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pharmacy Education and Continuous Professional Development</td>
</tr>
<tr>
<td>2</td>
<td>Career Planning</td>
</tr>
<tr>
<td>3</td>
<td>Community Pharmacy</td>
</tr>
<tr>
<td>4</td>
<td>Hospital Pharmacy</td>
</tr>
<tr>
<td>5</td>
<td>Industrial Pharmacy</td>
</tr>
<tr>
<td>6</td>
<td>Postgraduate Research</td>
</tr>
<tr>
<td>7</td>
<td>Regulatory Careers</td>
</tr>
<tr>
<td>8</td>
<td>Curriculum vitae</td>
</tr>
<tr>
<td>9</td>
<td>Work Experience, Internships and MPharm</td>
</tr>
<tr>
<td>10-11</td>
<td>Interview techniques &amp; Career Progression</td>
</tr>
</tbody>
</table>
WORKSHOPS & ROLE PLAY

Interview skills (2 hrs)  
SRy/FH

Presentation of group research projects to class (3 hrs)  
MH/SRy/FH

ASSIGNMENT: Group project to determine skill set and research career opportunities in one of a number of areas.

COMMUNITY PHARMACY ATTACHMENT (2 hours)

Community pharmacy practice: pharmacy layout and organisation; staff roles and responsibilities; clinical activities (dispensary, pharmacy counter, consultation room)  
MH/KR

ASSESSMENT

Submission of a curriculum vitae and its revision  
Satisfactory/unsatisfactory

Development and submission of a personal reflection on your course and career planning  
Satisfactory/unsatisfactory

Community pharmacy attachment report  
Satisfactory/unsatisfactory

Interprofessional learning exercise  
Satisfactory/unsatisfactory

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Workshops</th>
<th>Presentation</th>
<th>Pharmacy attachment</th>
<th>Contact hours</th>
<th>Guided study</th>
<th>TOTAL</th>
<th>ECTS</th>
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<tbody>
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<td>2</td>
<td>16</td>
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</tbody>
</table>

ADVANCE NOTIFICATION: Pharmacy Work Experience (Module PH3006)

During the summer vacation between the Senior Freshman and Junior Sophister years, each student is required to undertake 35 hours of practice experience in a community or hospital pharmacy setting during a one week full-time period, i.e. the work experience is expected to take the form of a standard 5-day working week. Its satisfactory completion must be signed off by a registered pharmacist in the workplace, and the student must complete a structured work experience report. The student’s report and pharmacist’s declaration associated with this component must be submitted by the start of the Junior Sophister academic year, and they form part of the assessment for module PH3006, where they will be graded as satisfactory/unsatisfactory.
PHARMACEUTICAL BIOTECHNOLOGY I
YEAR 2 (SENIOR FRESHMAN)  
COURSE CODE: PH2008

Staff of School of Pharmacy & Pharmaceutical Sciences: Asst. Prof. D. Finlay (DF), Prof. M. Meegan (MM), Assoc. Prof. L. O’Driscoll (LOD), Asst. Prof. A. Sasse (AS)

Staff from the School of Biochemistry: Prof. A. Bowie (AB), Assoc. Prof. D. Zisterer, (DZ).

Coordinator: Asst. Professor Astrid Sasse

AIMS: Students will study the characteristics of proteins and carbohydrates and their components and will be provided with an introduction to Pharmaceutical Biotechnology including gene structure and expression, genetic engineering and upstream processing.

PRE-REQUISITES: Successful completion of Junior Freshman (Year 1)

LEARNING OUTCOMES: On successful completion of the module the student will be able to:

- Explain the term ‘pharmaceutical biotechnology’
- Discuss the basic principles of gene transcription and translation.
- Describe the process of genetic engineering.
- Describe techniques routinely used when genetically engineering mammalian cells for recombinant protein production.
- Describe the structure and properties of amino acids, peptides, nucleosides and carbohydrates and discuss the source, preparation and use of representative examples of therapeutically important peptides.
- Illustrate the hierarchy of carbohydrates and protein structure and some of the characteristics of carbohydrates and proteins relevant to medicines production and use.
- Explain and illustrate stereochemistry, chemical reactivity and medical use of carbohydrates.

COURSE OUTLINE:

<table>
<thead>
<tr>
<th>LECTURES</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gene structure and expression – DNA structure</td>
</tr>
<tr>
<td>2</td>
<td>Gene structure and expression – DNA Replication</td>
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<tr>
<td>3-4</td>
<td>Gene structure and expression – Transcription</td>
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<tr>
<td>5</td>
<td>Gene structure and expression – Translation</td>
</tr>
<tr>
<td>6</td>
<td>Introduction to Pharmaceutical Biotechnology</td>
</tr>
<tr>
<td>7-8</td>
<td>Genetic Engineering; the recombinant process</td>
</tr>
<tr>
<td>9-11</td>
<td>Upstream processing</td>
</tr>
<tr>
<td>12</td>
<td>α-Amino acids; structure, sources and pharmaceutical uses</td>
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<tr>
<td>13</td>
<td>α-Amino acids; chemistry, bioorganic chemistry and production methods</td>
</tr>
<tr>
<td>14-15</td>
<td>Physical properties and ionization of -Amino acids</td>
</tr>
<tr>
<td>16</td>
<td>Pharmaceutical peptides: primary structure and physicochemical characteristics</td>
</tr>
<tr>
<td>17</td>
<td>Production of pharmaceutical peptides: solid phase synthesis</td>
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<tr>
<td>18</td>
<td>Chemical and physical stability of pharmaceutical peptides</td>
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<td>19</td>
<td>Pharmaceutical peptide sequencing methods</td>
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<tr>
<td>20</td>
<td>Peptide drugs, design and pharmaceutical properties</td>
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<tr>
<td>21</td>
<td>Pharmaceutical proteins; tertiary structure and physico-chemical properties</td>
</tr>
<tr>
<td>22</td>
<td>Classification and stereochemistry of carbohydrates</td>
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<tr>
<td>23</td>
<td>Identification reactions for carbohydrates</td>
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<tr>
<td>24</td>
<td>Reactivity and degradation of carbohydrates</td>
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<tr>
<td>25</td>
<td>Mono- and disaccharides: structure and physico-chemical characteristics</td>
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<tr>
<td>26-27</td>
<td>Glycosproteins – biosynthesis and physiological function</td>
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<tr>
<td>28</td>
<td>Polysaccharides, aminoglycosides</td>
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<tr>
<td>29-30</td>
<td>Introduction to laboratory techniques used throughout the process of gene cloning, genetic engineering, and assessing the success of subsequent recombinant protein production</td>
</tr>
</tbody>
</table>
The following practicals from BIOCHEMISTRY accompany this pharmaceutical biotechnology course.

**PRACTICAL CLASSES (4 hours each)**
1. Introduction to safety in the lab, Good Laboratory Practice (2 hrs)
2. Subcellular Fractionation (Part 1)
3. Subcellular Fractionation (Part 2)
4. Protein purification
5. Detecting Polymorphisms (Part 1)
6. Detecting Polymorphisms (Part 2)
7. Oxidative Phosphorylation

Practical Tutorials (2x 2 hrs, 1x 1 hr)

**DIRECTED READING**

**ASSESSMENT**
- Theory written paper: 2 hours; 5 questions out of 5 to be answered (some internal choice may be available) 80% of total marks
- Continuous assessment of practical work 20% of total marks

**SUMMARY OF HOURS**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practicals</th>
<th>Tutorials</th>
<th>Total contact</th>
<th>Pr. reports</th>
<th>Guided study</th>
<th>TOTAL</th>
<th>ECTS</th>
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<td>61</td>
<td>5</td>
<td>54</td>
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</tbody>
</table>

N.B. Students are expected to satisfy the examiners in both written examination and practical components. The pass mark for examinations is 40%. Students who fail to satisfy the practical requirement (i.e. less than 40% of the practical component), but who obtain 40% or better overall for this module will be returned as ‘qualified fail’ (QF) and will be required to resubmit in the practical component.

Students who fail to satisfy the written requirement (i.e. less than 40%) of the annual examination, but who obtain 40% or better overall for this module will be returned as ‘qualified fail’ (QF) and will be required to take a supplemental examination in the written examination only.

This module is not compensatable.
AIMS: To introduce the student to the basic principles of pharmacology, drug development and experimental techniques used in pharmacology.

PRE-REQUISITES: Successful completion of Junior Freshman (Year 1)

LEARNING OUTCOMES: On successful completion of this course the student will be able to:

- State the variety of targets to which drugs bind in the body and illustrate their transduction and cell signalling mechanisms
- Define agonist (full, partial and inverse), antagonist (competitive and non-competitive) and recall selected examples of each
- Analyse receptor binding experiments and deduce the receptor binding parameters $B_{\text{MAX}}$ and $K_D$
- Construct dose response curves and calculate drug potency of both agonists and antagonists
- Illustrate the principles of drug absorption, distribution, metabolism and excretion and define the terms, $pK_a$, bioavailability, volume of distribution, clearance, half-life, and Kel.
- Illustrate the organisation and mode of neurotransmission within the sympathetic, para sympathetic, enteric and somatic nervous systems
- Describe the mechanisms of action and clinical uses of cholinergic and adrenergic drugs within the peripheral nervous system
- Define the key steps associated with excitatory and inhibitory neurotransmission in the brain and provide selected examples of drugs which influence these steps
- Describe the various stages of drug discovery, development and the clinical trials process

COURSE OUTLINE:

LECTURES (AH)
1. Introduction to Pharmacology
2. Targets of drug action.
3. Receptors (ligand gated ion channels)
4. Receptors (G protein coupled, kinase linked and intracellular receptors)
5-6. Dose response; agonism and antagonism
7. Therapeutic and toxic doses
8. Overview of pharmacokinetic processes; absorption and distribution
9. Drug metabolism and excretion
10. Pharmacokinetic modelling
11. Neurotransmission
12. Autonomic nervous system
13. Cholinergic transmission
14. Cholinergic agents; anticholinesterases
15. Muscarinic blockers; ganglionic blockers
16. Adrenergic transmission
17. Direct/indirect sympathomimetics; $\alpha/\beta$-stimulants
18. NANC transmitters
19. Somatic system and skeletal neuromuscular blocking agents
20. Excitatory neurotransmitters in the central nervous system
21. Inhibitory neurotransmitters in the central nervous system
22-23. Monoaminergic neurotransmission
24. Peptide transmitters
25-26. Drug design, development and testing
PRACTICAL CLASSES (3 hours each)
1. Drug targets and receptor transduction
2. Introductory Pharmacokinetics Workshop. Computer simulated experiments and data analysis
3. Dose response – the guinea pig ileum preparation. Computer simulated experiments and data analysis
4. Quantifying Antagonist Activity – the pA2 scale: Computer simulated experiments and data analysis
5. Receptor Binding Workshop – saturation binding: Laboratory demonstration
6. Receptor Binding Analysis
7. Blood Pressure

TUTORIALS: (1 hour)
Course review.

DIRECTED READING:
by Kenneth P. Minneman
The Biochemical Basis of Neuropharmacology, 8th Ed., J. R. Cooper, F. E. Bloom, R. H. Roth, OUP USA (2002)

ASSESSMENT:
Written Examination: 2 hours Weighting
Part 1 (54%), answer 3 questions out of 5 90% of total marks
Part 2 (36%), 20 multiple choice questions, negative marking scheme
Continuous assessment practicals (5 Assignments carrying 2% each) 10% of total marks

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Practicals</th>
<th>Total contact</th>
<th>Practical reports</th>
<th>Guided study</th>
<th>TOTAL</th>
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<td>48</td>
<td>21</td>
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</tbody>
</table>
MOLECULAR AND CHEMOTHERAPEUTIC PHARMACOLOGY
Year 2 (Senior Freshman)  
Course Code: PH2010

Staff of the School of Pharmacy and Pharmaceutical Sciences: Prof. M. Radomski (MR); Asst. Prof. M.J. Santos-Martinez (MS); Assoc. Prof. N. Frankish (NF); Asst. Prof. C. Medina (CM), Assoc. Prof. C. Roche (CR)

Coordinators: Assoc. Professor Neil Frankish

AIMS: To allow the student to understand how chemical mediators modulate the body’s response to injury and infection; to enable the student to appreciate how microbiology impinges on many aspects of Pharmacy; to acquire a knowledge of the mode of action of antibiotics, anti-parasitic drugs and anti-viral agents.

PRE-REQUISITES: Successful completion of Junior Freshman (Year 1)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
- Recall the various chemical mediators of inflammation and their physiology and pathology
- Identify the mechanism of action of the different classes of anti-inflammatory drugs, their clinical use, cautions and side effects.
- Identify the mechanism of action of the different groups of antibiotics as a basis for their selective toxicity.
- Recall the clinical use of antibiotics, their side effects and cautions to use.
- Recall the nature of antibiotic use and the means to reduce antimicrobial resistance.
- Recall the epidemiology of zoonoses and fungal infections
- Identify the mechanism of action of antifungal drugs, their clinical use and side effects
- Classify determinants of the immune response, autoimmunity, immunocompetence & immunotherapy
- Identify viral structure, mechanisms of viral multiplication and viral diseases
- Identify the mechanism of action of the different classes of antiviral drugs, their clinical use and side effects
- Describe key ethical issues surrounding human research and experimentation and explain the importance of peer review in the publication process.

COURSE OUTLINE: The Module is divided into two Units.

Unit PH2001A CHEMICAL MEDIATORS AND DISEASE

<table>
<thead>
<tr>
<th>LECTURES</th>
<th>Lecturer</th>
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</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Inflammation and inflammatory mediators</td>
</tr>
<tr>
<td>3-4</td>
<td>Nitric Oxide</td>
</tr>
<tr>
<td>5-6</td>
<td>Aspirin &amp; Non-selective COX inhibitors</td>
</tr>
<tr>
<td>7</td>
<td>Selective COX inhibitors</td>
</tr>
<tr>
<td>8-9</td>
<td>Corticosteroids</td>
</tr>
<tr>
<td>10</td>
<td>DMARDS</td>
</tr>
<tr>
<td>11</td>
<td>Anti-lymphocyte agents</td>
</tr>
<tr>
<td>12</td>
<td>Anti-cytokine drugs</td>
</tr>
</tbody>
</table>

SEMINAR (2x 2 hours)
Clinical pharmacology and treatment of selected inflammatory diseases  
Ethics of and in research  
MR/CR  
CR/MR

DIRECTED READING
Reference material supplied
UNIT PH2010B – CHEMOTHERAPY OF INFECTIOUS DISEASE

LECTURES

<table>
<thead>
<tr>
<th></th>
<th>Lectures</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antimicrobials: mechanism of action of main antibiotics</td>
<td>NF</td>
</tr>
<tr>
<td>2</td>
<td>Antimetabolite</td>
<td>NF</td>
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<tr>
<td>3</td>
<td>Cell wall Inhibitors</td>
<td>NF</td>
</tr>
<tr>
<td>4</td>
<td>Drugs acting at the cell membrane</td>
<td>NF</td>
</tr>
<tr>
<td>5–6</td>
<td>Inhibitors of DNA/Protein synthesis</td>
<td>NF</td>
</tr>
<tr>
<td>7–8</td>
<td>Tuberculosis and antitubercular drugs</td>
<td>NF</td>
</tr>
<tr>
<td>9–10</td>
<td>Fungal Diseases and antifungal agents</td>
<td>NF</td>
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<td>11</td>
<td>Endotoxin shock</td>
<td>NF</td>
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<td>12–13</td>
<td>Protozoal &amp; Parasitic diseases in man and their treatment</td>
<td>NF</td>
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<tr>
<td>14–17</td>
<td>Antivirals</td>
<td>CM</td>
</tr>
</tbody>
</table>

SEMINAR (2 hours)

Drug resistance & strategies to counteract it                                         NF

DIRECTED READING


ASSESSMENT

Written examination (2 hours, 20 short-answer questions)                          90% of total marks
Continuous assessment                                                           10% of total marks

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th></th>
<th>Lectures</th>
<th>Seminars</th>
<th>Total contact</th>
<th>Guided study</th>
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</table>
JUNIOR SOPHISTER (3\textsuperscript{rd} Year)

Module details may be subject to corrections/amendments.

- It is each student’s responsibility to be aware of dates, times, locations, etc. of lectures, tutorials, seminars and practical classes.

- Reports, continuous assessments and laboratory notebooks must be presented for assessment by the date specified by the examiner.

- Reports, continuous assessments and laboratory notebooks submitted after the specified date will not be assessed unless a valid reason is given, and students will be deemed not to have satisfied the School’s examination requirements.

PRE-REQUISITES: COMPLETION OF THE SENIOR FRESHMEN YEAR (YEAR 2)
MEDICINAL and PHARMACEUTICAL CHEMISTRY III
Year 3 (Junior Sophister)
Course Code: PH3002

Staff of the School of Pharmacy & Pharmaceutical Sciences: Prof. M.J. Meegan (MM); Asst. Prof. J.M. Quigley (JQ), Assoc. Prof. J.F. Gilmer (JG); Asst. Prof. A. Sasse (AS)

Coordinator: Professor Mary J. Meegan

AIMS: To develop an understanding of the theory and practice of medicinal chemistry in the context of pharmacy and to provide an understanding of analysis and characterisation of pharmaceutical materials in a regulatory context.

PRE-REQUISITES: Pharmaceutical properties of Materials used in Medicines (PH2001); Physico-chemical Aspects & Specifications of Substances used in Medicines II (PH2002); Isolation, Separation & Analysis of Substances used in Medicines (PH2003)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Apply and interpret Quantitative Structure - Activity Relationship studies (QSAR) in pharmaceutical applications.
- Explain the function of receptors, agonists and antagonists together with the action of drugs at selected receptors
- Describe the medicinal chemistry of selected major therapeutic classes of drugs which act as enzyme inhibitors e.g. NSAIDs, ACE inhibitors and various antibiotics
- Demonstrate competence in the practical laboratory techniques used in the analysis and characterisation of pharmaceutical materials
- Demonstrate ability to interpret and evaluate a research paper in a topic in pharmaceutical chemistry

COURSE OUTLINE

LECTURES

Unit PH3002A: Techniques in Drug design and optimization
Quantitative Structure Activity Relationships; Physical organic chemistry of drugs (JQ)
1. Biological Activity and Physicochemical Properties
2. Electronic Parameters: The Hammett Constant
3. Resonance Contributions, Inductive Substituent Constants; Structure/Activity Studies
4. Lipophilic Parameters: The Partition Coefficient, The Hansch-Fujita Substituent Constant
5. Determination of the Partition Coefficient
6. Empirical Approaches to Estimation of Log P
7. Complications in QSAR due to ionization
8. The Fragmentation Constant
9. The Additivity Concept; Structural explanation of deviations observed
10. Structure/Activity Studies: Linear & Nonlinear dependence
11. The Hansch Kinetic Model (multicompartmental analysis), log P0
12. Steric Parameters: Taft & STERIMOL Parameters

Unit PH3002B: Enzyme Inhibitors (JG, MM)
1. Overview of enzyme inhibitors in pharmacy
2. Kinetic models of enzyme inhibition 1
3. Kinetic models of enzyme inhibition 2
4. Methods and prospects in enzyme inhibitor drug design
5. Case History: the development of the ACE inhibitors
6. COX-1 inhibitor medicinal chemistry, SARI, MOA
7. COX-2 inhibitors, development SAR and biological effects
8. Kinetic models of interactions between COX and NSAIDs, aspirin and Coxibs
9. Inhibitors of acetylcholinesterase I
10. Inhibitors of acetylcholinesterase II
Unit PH3002C: Medicinal Chemistry: Chemotherapeutics, Antibiotics and Antimicrobial Agents (MM)
1. Molecular targets for antibiotics: Penicillin and cephalosporin antibiotics: structure and clinical examples; Molecular mechanism of action of penicillins;
2. Characterisation and chemical stability properties of penicillins
3. Production methods for 6-APA and semisynthetic penicillins
4. Broad spectrum semisynthetic penicillins; SAR and clinical prodrugs
5. Cephalosporins; structures, characterization and chemical reactivity
6. Production methods for 7-ACA; SAR for semisynthetic cephalosporins
7. Case study development of a semisynthetic cephalosporin
8. Beta-lactamase inhibitors; structure and clinical role of betalactamase inhibitors
9. Macrolides, aminoglycosides, glycopeptide, oxazoladiones and quinolones: structures, clinical examples and mechanism of action

Unit PH3002D: Drugs acting at Nuclear Receptors: Steroid Drugs (AS)
1. Introduction to Nuclear Receptors & Steroids
2. Steroid drugs: Introduction to steroid drug structure and stereochemistry
3. Androgens: Biosynthesis, metabolism, signal transduction, physiological/pharmacological effects
4. Androgens: SAR, anabolics, 5α-reductase inhibitors
5. Estrogens: Biosynthesis, metabolism, physiological/pharmacological effects, SAR, SERM
6. Progestins: Biosynthesis, classification, SAR, physiological/pharmacological effects, SPRM
7. Adrenocorticoids: Structural modification and activity (JG)
8. Glucocorticoids: SAR, classification, genomic & non-genomic response
9. Case studies & review

Unit PH3002E: Drugs acting at Cholinergic and Adrenergic receptors (MM)
1. Cholinergic receptor structure: The role of acetylcholine as a neurotransmitter
2. Cholinergic agonists
3. Cholinergic antagonists
4. Adrenergic receptor antagonists

Unit PH3002F: Design of H2 Receptor antagonists and related drugs (JQ)
1. Histamine: protonation, tautomerism, ionisation & conformation
2. Chemical evidence of active form at H1 & H2 receptors
3. The lead compound - N4-guanylhistamine; Isothiourea analogue
4. Thiourea derivative (pure antagonist); development of burimamide
5. Development of metiamide (pKs of the imidazole ring)
6. Analogue of cimetidine; Effect of pKs of substituent
7. Conformational isomers of cimetidine; Desolvation and dipole orientation of derivatives wrt activity
8. Gastric acid secretion inhibitors: Proton Pump Inhibitors 1
9. Gastric acid secretion inhibitors: Proton Pump Inhibitors 2

PRACTICAL LABORATORY CLASSES: (3 hours each)
1. UV Spectroscopy
2. Quality Specifications
3. Quantitation by Extraction
4. Stability Study of Nifedipine
5. Hydrolysis of Aspirin
6. Polarimetry, Identification of Carbohydrates
7. HPLC-Fluorescence
8. Infrared Spectroscopy
9. Aquametry
10. Gas Liquid Chromatography (GLC)
11. pH Measurements, Diazotitration
12. NMR & NIR

RESEARCH PRESENTATION
Oral presentation (10 minutes plus 5 minutes discussion) of a “cutting edge” research paper on a topic in the area of pharmaceutical chemistry (total seminar time 3 hours).
SEMINARS AND TUTORIALS: 1x2 hour seminar (AS)
Seminar based on assigned topics in Pharmaceutical Analysis.

DIRECTED READING
Principles of Medicinal Chemistry; Foye, Lemke and Williams; 7th Ed. Lippincott Williams & Wilkins; 2013.

ASSESSMENT

Written Paper: 3 hours, 5 questions out of 5 to be answered
(some internal choice may be available)

Practical component:
Continuous assessment (5%),
Final lab reports (15%),
Research presentation (5%)
Written test (MCQ and short questions) (10%)

Students are required to take a written test in Hilary Term. This Examination comprises short questions and multiple choice questions based on the theory underlying the practical class in the Junior Sophister year.

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practicals</th>
<th>Seminars</th>
<th>Total Contact</th>
<th>Practical write-ups</th>
<th>Guided study</th>
<th>TOTAL</th>
<th>ECTS</th>
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</tbody>
</table>

N.B. Students are expected to satisfy the examiners in both written examination and practical component. The pass mark for examinations is 40%. Students who obtain an overall mark of less than 40% will be required to sit the supplemental examinations. Students who fail to satisfy the written requirement (i.e. less than 40%) of the annual examination, but who obtain 40% or better overall in the module will be returned as a qualified fail (QF) and will be required to take a supplemental examination in the written examination only. Students who fail to satisfy the practical requirement (i.e. less than 40% in the practical component), but who obtain 40% or better overall in the module will be returned as a qualified fail (QF) and will be required to resubmit/resit aspects of the practical component.

This module is not compensatable.
NATURAL SOURCES OF DRUGS AND SUBSTANCES USED IN MEDICINES
Year 3 (Junior Sophister)  
Course Code: PH3003

Staff of the School of Pharmacy & Pharmaceutical Sciences: Assoc. Prof. J. Walsh (JW),  
Assoc. Prof. H. Sheridan, (HS), Asst. Prof. F. Boylan (FB) and Assoc. Prof. I. Hook (IH)

Coordinator: Assoc. Professor John J. Walsh

AIMS: To provide the student with an understanding of the sources and properties of those drugs and related pharmaceutical materials used in medicine, which are produced from natural sources.

PRE-REQUISITES Isolation, Separation and Analysis of Substances used in Medicines (PH2003)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Describe the biosynthetic pathways employed by plants and fungi to produce compounds of pharmaceutical importance
- Identify and describe the sources and general properties of key phytochemical groups especially alkaloids, anthranoids, phenolics, cardiac glycosides, saponins, mono-, di- and sesquiterpenes
- Recognise and explain methods for the isolation of natural products
- Use both analytical and structural techniques to determine the purity and identity of compounds from natural sources
- Outline the different types, sources and properties of lipids, including fatty acids, and explain their importance in living systems and their influence on health and disease
- Outline the types and importance of analytical procedures used to identify and determine the quality of lipids used in the preparation of medicines and nutraceuticals (dietary supplements)
- Advise on and critically assess the importance of lipid types in the diet and their use in medicine formulations
- Describe the types of toxic and allergenic constituents produced by plants, animals and microorganisms occurring naturally in the environment and food, identify the risks associated with their occurrence, together with their treatment and/or prevention
- Recognise and discuss the importance of biodiversity prospecting as well as being aware of biodiversity preservation
- Recognise and describe several approaches to screening natural materials for bioactivity and identify when it is appropriate to apply each of these different approaches.
- Recognise and describe each step involved in the bench to bedside development of commonly prescribed drugs derived from natural sources.

COURSE OUTLINE

LECTURES  
Lecturer

1-8  Module overview and Plants as phytochemical laboratories  
JW
9-14  Biodiversity prospecting  
FB
15-20  Alkaloids – general properties and phytochemistry  
HS
21-24  Key alkaloid groups (tropane, quinoline, isoquinoline, indole)  
HS
25-28  Glycosides (general properties), anthranoids, simple and complex phenolics  
FB
29  Plant polysaccharides  
FB
30-34  Dietary lipids (simple & complex): isolation, composition, uses.  
IH
35-39  Phytotoxiciology, mycotoxins, allergens.  
IH
40-48  Bench to bedside development of naturally derived substances 
in use to treat anxiety/insomnia, depression, cancer, migraine, lower-back pain, Alzheimer’s disease and hypercholesterolaemia.  
JW
PRACTICALS (27 hours)
   **Part 2**: Opium Alkaloids and *Papaver* species.
2. Studies on the Cinchona alkaloids (2x 3hrs)
4. Examination of Caffeine containing Products and Beverages.
5. Isolation of Valtrate from *Centranthus ruber*. Analysis of Commercially Available Valerian Preparations (2x 3 hrs)
6. Workshop on Plant poisons

STUDENT-LED SEMINARS (6 hours)
1. Student-led seminar: Bench to bedside seminar on Nature’s treatment for Depression and Irritable Bowel Syndrome.
2. Student-led seminar: Bench to bedside seminar on Nature’s treatment for Alzheimer’s disease.

DIRECTED READING
*European Pharmacopoeia*
Trease & Evans’ *Pharmacognosy* 16th Ed. WC Evans, Elsevier (2009)
*Medicinal Natural Products* 3rd Ed., PM Dewick, John Wiley & Sons (2009)

ASSESSMENT
Written paper: 3 hours; 3 Sections; 7 questions, 5 to be answered - one from each Section** 90% of total marks
Practical Book reports: continuous assessment 10% of total marks

**Failure to comply with the instruction will result in a requirement to sit the Supplemental examination in Michaelmas term.

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practicals</th>
<th>Seminars</th>
<th>Total contact</th>
<th>Practical reports</th>
<th>Guided study</th>
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STERILE PRODUCTS
Year 3 (Junior Sophister)  
Course Code: PH3004

Staff of the School of Pharmacy & Pharmaceutical Sciences: Asst. Prof. D’Arcy (DD),  
Asst. Prof. L. Tajber (LT), Asst. Prof. S. Smith (SS).

Coordinator: Asst. Prof. Deirdre D’Arcy

AIMS: To provide a continuation course in formulation and production, concentrating on sterile medicinal product  
and radiopharmaceuticals.

PRE-REQUISITES: Introduction to Pharmaceutics and Formulation module (PH1004),  
Formulation and Pharmaceutical Technology module (PH2004), Microbiology and Biochemistry  
module (PH2005)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
• Discuss the requirement for sterility for certain classes of pharmaceutical products.
• With respect to the formulation of the major classes of sterile products, such as injections, infusion fluids and  
eye drops, explain the necessity for certain classes of excipients (and packaging), and perform appropriate  
calculations in the formulation of these products.
• Describe the main sterilisation methods relevant to pharmaceuticals; define the common terms used when  
describing sterilisation kinetics.
• Summarise common tests and parameters measured in assessing the microbial/particulate quality of a sterile  
product and its environment, and of the sterilisation method used.
• Describe the main aspects of pharmaceutical clean room design, operation and environmental control, and  
summarise the applications of a clean room environment within a hospital/clinical pharmacy setting.
• Access and interpret basic compatibility information in the context of administration of parenteral products in  
a clinical setting.
• Discuss the testing and use of commonly used disinfectants and antiseptics
• Discuss the applications of and risks associated with production and use of radiopharmaceuticals.

COURSE OUTLINE

Unit PH3004A: INTRODUCTION TO FORMULATION, TESTING AND USE OF STERILE PRODUCTS

LECTURES  
1. Introduction; definitions; microbial limits for non-sterile pharmaceuticals; products  
required to be sterile; official categories in BP  
   Lecturer: DD
2. Concept and requirement for isotonicity, calculation of isotonicity  
   Lecturer: DD
3. Vehicles for parenteral medicaments; aqueous/non-aqueous;  
   Lecturer: DD
4. Formulation of parenterals: buffers, antioxidants, preservatives  
   Lecturer: DD
5. Electrolytes, LVP’s LVP’s – composition and use particulate contamination: clinical  
   consequences compatibility?  
   Lecturer: DD
6. Labelling: SVP, LVP  
   Lecturer: DD
7. Ophthalmic preparations: approaches to ophthalmic drug delivery, solutions,  
suspensions, excipients - viscosity  
   Lecturer: DD
8. Ophthalmic preparations – excipients – toxicity, preservative, buffer, stabiliser  
   Lecturer: DD
   Lecturer: DD
   Lecturer: DD
Unit PH3004B: PHARMACEUTICAL PROCESSING FOR STERILE PRODUCTS

11. Sterilisation: Official procedures, kinetics, sterility concepts and resistance
12. Moist heat sterilisation – steam lethality, autoclave design and operation
13. Dry heat sterilisation, equipment, use, applications, heat resistance
14. Filtration sterilisation, filter testing, blow-fill-seal
15. Ionising radiation sterilisation
16. Gaseous sterilisation – introduction to validation
17. Validation and process monitoring (physical and biological indicators)
18. Sterility testing

Tutorial

19. Clean room: Intro, concept, aseptic services.
20. Clean room: sources of contamination, design
21. Clean room: operation, validation, standards, monitoring
22. Clean room/Aseptic services
23-25. Principles of disinfection 1-3

UNIT PH3004C: RADIOPHARMACEUTICALS

26. Introduction to radiopharmaceuticals, modes of radioactive decay, radioactive units, calculation and use of decay constant/half life
27. Production of radioisotopes of pharmaceutical importance, instrumentation for measuring radioactivity
28. Gamma cameras, theory and use of generators for short-lived radioisotopes
29. Radionuclidic and radiochemical purity determination, radioimmunoassay

Note: due to timetabling constraints the order in which the lectures are delivered may differ from the list above.

ADDITIONAL DIRECTED READING:
This will involve the student being directed towards specific reference sources and the following topics are covered by the student outside of direct lectures. These topics are examinable.

1. Endotoxins/pyrogens; pyrogen/endotoxin tests, limits
2. Packaging: glass, plastic, elastomeric closures
3. Principles of preservative efficacy test
4. Particulate tests – visible, subvisible, PhEur, BP

PRACTICAL CLASSES (3 hours each)
1. Sterile Products - Introduction, Packaging labeling (DD)
2. Sterile Products (DD)
3. Sterile Products (DD)
4. Sterile Products (DD)
5. Sterile Products (DD)
6. Revision lab before practical exam (DD)
7. Gaseous and radiation sterilization - (rotation) (SS) (2 hours)
8. Aseptic procedures – broth transfer trial (Aseptic Suite rotation) (SS) (2 hours)

Note: due to timetabling constraints the order in which practicals are delivered may differ from the list above.

Sterile Products 2-5 examine aspects of parenteral and ophthalmic formulation, quality control tests, heat sterilization methods and compatibility issues on product administration in clinical setting.
DIRECTED READING
European Pharmacopoeia
British Pharmacopoeia
Martindale
Micromedex
FDA and EU guides to production of sterile products – as indicated in lecture notes.

ASSESSMENT
Written paper: 70% of total marks
2 hours, MCQs and short answer questions.

Practical Exam: 20% of total marks
2 questions in 2 hours

Continuous Assessment:
Structured practical assessments 5% of total marks
Aseptic practical assignment 5% of total marks
(this assignment contributes 5% of both PH3004 and PH3008)

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical</th>
<th>Tutorials</th>
<th>Total contact</th>
<th>Practical reports</th>
<th>Guided + private study</th>
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<th>ECTS</th>
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NB. Students are expected to satisfy the examiners in both written and practical examination components. The pass mark for the module is 40%. Students who obtain an overall mark of less than 40% will be required to sit the Supplemental examinations. Students who fail to satisfy the written requirement (i.e., less than 40%) in the annual examination, but who obtain 40% or better overall for this module will be returned as a ‘qualified fail’ (QF) and will be required to take a supplemental examination in the written examination only. Students who fail to satisfy the practical requirement (i.e., less than 50% in the practical examination), but who obtain 40% or better in the written section and overall in this module will be returned as a ‘qualified fail’ (QF) and will be required to supplement in the practical examination only. In addition to the practical exam, students are required to obtain at least 50% in the continuous assessment component of the course. If less than 50% in the continuous assessment component is achieved, the student will be returned as a ‘qualified fail’ (QF) and will be required to fulfill the continuous assessment requirements.

This module is not compensatable.
PHARMACEUTICAL DATA ANALYSIS AND BIOINFORMATICS
Year 3 (Junior Sophister)  
Course Code: PH3005

External contributor: Dr. Tim S. Grant (TSG)

Coordinator: Dr. Timothy Sean Grant / Asst. Prof. Astrid Sasse

AIMS: Students will encounter statistical ideas and methods during their careers as pharmacists in many different settings: in community surveys, clinical trials, laboratory practice, academic research, drug development and manufacture, as well as in epidemiological studies. The aim of this course is to introduce students to these ideas and methods, using a broad range of real examples to assist students better connect the information presented to the real application.

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
• Discuss the importance and sources of variation in the data derived from surveys, drug development studies, epidemiological investigations, clinical trials, measurement systems, and drug manufacturing processes.
• Apply and understand the basic statistical methods that appear regularly in pharmaceutical and medical journals.
• Discuss critically the statistical sections that appear in their professional journals.
• Discuss the relationship between statistical methods and research methods and be able to critically identify which methods are most appropriate, the strengths and weaknesses, and elaborate on the statistical considerations required in study design.
• Carry out elementary analyses using a statistical package.

COURSE OUTLINE:

LECTURES (TSG)
The central core of the course will be based on the following list of topics:
1-7 Basic statistical concepts: populations versus samples, validity, variables, measurement, distributions, estimation and presentation of data to describe groups of individuals.
8-10 Hypothesis testing: parts of a hypothesis test, constructing a hypothesis test, logic underlying a hypothesis test, types of errors and power.
11-13 Simple comparative experiments: t-tests, confidence intervals, design issues.
14-16 Count data: measures, estimation and testing.
17-20 Comparative experiments with multiple groups: one-way analysis of variance (ANOVA), multiple comparisons.
21-22 Design and analysis of factorial studies of many system parameters simultaneously: two-way ANOVA.
23-24 Correlation and simple regression analysis
25-26 Multiple regression
27 General linear model and other topics.

WORKSHOPS / Practical Exercises (5x 2h): TSG
The material covered in the lectures will form the basis of a series of statistical laboratories, which will involve use of output from statistical packages. These will come towards the end of the semester, by which time a reasonable body of material will have been discussed in class. Most statistical packages produce essentially the same output, so students should be able to pick up very quickly other packages should they have need to do so in the future. Solutions to the classroom examples will be presented in the form of computer output, so, at the end of the course, students should have a strong grasp of how to interpret analyses presented in this way. Each practical exercise will include a continuous assessment assignment to be completed by each student.

1. Simple experiments
2. One-way ANOVA
3. Two-way ANOVA
4. Regression analysis
5. Multiple regression analysis

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DIRECTED READING
The course will not be based on any one book; students will be given illustrative handouts of key methods during the semester. The following are, however, useful references for particular aspects of the course. They will also be useful where students need to go beyond the topics covered – for example, in their Senior Sophister research project (PH4012) and dissertation (PH4007).


ASSESSMENT
Written paper
Continuous Assessment (Practical Exercise)

<table>
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<tr>
<th></th>
<th>Weighting</th>
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<tbody>
<tr>
<td>Written paper</td>
<td>90% of total marks</td>
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<tr>
<td>Continuous Assessment (Practical Exercise)</td>
<td>10% of total marks</td>
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SUMMARY OF HOURS

<table>
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<tr>
<th>Lectures</th>
<th>Practicals/Tutorials</th>
<th>Total contact</th>
<th>Guided study</th>
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Staff of the School of Pharmacy & Pharmaceutical Sciences: Assoc. Prof. M. Henman (MH), Asst. Prof. S. Ryder (SR), Assoc. Prof. C. Roche (CR), Assoc. Prof. T. Grimes (TG)

Coordinator: Asst. Professor Sheila Ryder

AIMS: To develop students' understanding and knowledge of pharmacy practice particularly in epidemiology and public health, pharmacovigilance and pharmacoepidemiology, health economics and the principles of evidence-based assessment. To introduce students to the legislation concerning drugs that may be misused and animal remedies, and to the practical requirements when supplying and using medicines containing those drugs.

PRE-REQUISITES: See general pre-requisites for Junior Sophister year (page 41). Exceptions may be made in individual cases for one-year international students. Where components of this module are unsuitable for international students (e.g. the work experience component undertaken in the summer vacation preceding the Junior Sophister academic year), arrangements may be made for replacement by other relevant material on a case by case basis.

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Describe epidemiology, the sources of data, the incidence of common conditions and their relationship to public health in Ireland.
- Explain the global burden of disease and role of international bodies in recording and responding to this challenge.
- Describe the research methods used in epidemiology, in clinical pharmacology and in assessing interventions.
- Discuss drug utilization and the monitoring and follow up of adverse drug reactions in Ireland and internationally.
- Describe key methods for estimating risk.
- Explain the different types of clinical trials, the importance of blinding and randomisation.
- Describe the use of 'number needed to treat' (NNT) data and the evidence-based approach to drug evaluation.
- Outline the significance of the scarcity of resources and the importance of accurate estimation of costs in economics and health economics.
- Distinguish between the various approaches to the evaluation of benefits including health-related quality of life (HRQoL).
- Discuss and critically appraise cost containment strategies for healthcare and pharmaceutical expenditure.
- Critically discuss legislation relating to drugs of abuse, clinical trials, animal remedies, poisons, health and safety, and data protection.
- Demonstrate the appropriate use of ophthalmic, nasal and aural medicinal products.
- Systematically collect, interpret and apply knowledge about patients, their conditions and their medicines, in order to provide and justify treatment recommendations and patient counselling, in a diverse range of patient case studies [more complex cases, requiring students to draw on a broader knowledge base, than those in preceding modules].
- Dispense mock prescriptions in accordance with legal, clinical, administrative, ethical and professional requirements [more complex prescriptions, requiring students to draw on a broader knowledge base, than those in preceding modules].
- Create and present a dissertation on an assigned topic that demonstrates critical assessment of relevant literature and the ability to argue a personal view, employing the conventions of academic writing.
### COURSE OUTLINE:

*Note: Due to timetabling constraints, the sequence of classes may differ from that below.*

#### LECTURES (33 hours)

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<tbody>
<tr>
<td>1</td>
<td>Introduction. Clinical skills and dissertation</td>
<td>MH</td>
</tr>
<tr>
<td>2</td>
<td>Feedback. Competencies, reflective practice and continuing professional development (CPD)</td>
<td>SR</td>
</tr>
<tr>
<td>3-6</td>
<td>Misuse of drugs legislation</td>
<td>SR</td>
</tr>
<tr>
<td>7-9</td>
<td>Animal remedies legislation</td>
<td>SR</td>
</tr>
<tr>
<td>10-11</td>
<td>Poisons legislation</td>
<td>SR</td>
</tr>
<tr>
<td>12</td>
<td>Data protection legislation</td>
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<tr>
<td>13</td>
<td>Clinical trials legislation</td>
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<tr>
<td>14-15</td>
<td>Health and safety legislation</td>
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<tr>
<td>16</td>
<td>Epidemiology and descriptive data</td>
<td>MH</td>
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<tr>
<td>17</td>
<td>Epidemiology, causation and investigative methods</td>
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<tr>
<td>18</td>
<td>Public health and antibiotic usage, resistance and policies</td>
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</tr>
<tr>
<td>19</td>
<td>Case studies and case control studies</td>
<td>MH</td>
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<tr>
<td>20</td>
<td>Cohort studies</td>
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<tr>
<td>21</td>
<td>Clinical trials</td>
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<td>22</td>
<td>Clinical trials and meta-analysis</td>
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<tr>
<td>23</td>
<td>Risk estimation</td>
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<td>24</td>
<td>Pharmacoepidemiology and pharmacovigilance</td>
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<td>25</td>
<td>Health service organisation and drug use control</td>
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<tr>
<td>26</td>
<td>Evidence-based assessment of information</td>
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<tr>
<td>27-29</td>
<td>Dispensing procedures, medication errors and risk management</td>
<td>KR</td>
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<tr>
<td>30-33</td>
<td>Pharmacoeconomics and health economics: costs, benefits and analysis techniques</td>
<td>TG</td>
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#### PRACTICAL CLASSES / WORKSHOPS (37 hours)

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<td>Dispensing and patient care 3.2: Methadone and emergency supply of controlled drugs (2h)</td>
<td>SR/KR/CR/TG</td>
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<td>Dispensing and patient care 3.3: Veterinary prescriptions and requisitions (2h)</td>
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<td>Dispensing and patient care 3.4: Veterinary cascade, midwife’s written order, data protection (2h)</td>
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<td>Dispensing and patient care 3.5: Hospital dispensing (2h)</td>
<td>SR/KR/CR/TG</td>
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<td>Dispensing and patient care 3.6: Compliance devices and promotion of compliance (3h)</td>
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<td>Dispensing and patient care 3.7: Ophthalmic, nasal and aural medicinal products (2h)</td>
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<td>Dispensing and patient care 3.8: Quality, safety and risk management (2h)</td>
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<td>Pharmacy practice practical test (1h timetabled; test duration: 50 mins)</td>
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<tr>
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<td>Clinical skills 3.1 – Counselling patients on POMs (3h)</td>
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<td>Clinical skills 3.2 – Counselling patients on OTCs (3h)</td>
<td>MH</td>
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<tr>
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<td>Clinical skills 3.3 – Clinical interviewing and responding to symptoms (3h)</td>
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<tr>
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<td>Clinical skills 3.4 – Identification and management of drug-related problems (3h)</td>
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<td>Objective structured clinical examination (OSCE): Required knowledge/skills and their evaluation (1h)</td>
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<td>Preparation for OSCE (2h)</td>
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<td>Assessment by OSCE (2h)</td>
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#### TUTORIALS (5 hours)

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<td>Dispensing and patient care 3.2 feedback (1h)</td>
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#### DISSERTATION

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<tbody>
<tr>
<td></td>
<td>Literature review and critical analysis of topic associated with the JS course (3,000 word essay)</td>
<td>MH/guided study</td>
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WORK EXPERIENCE (35 hours, during a one week full-time period)
During the summer vacation between the Senior Freshman and Junior Sophister years, each student is required to undertake 35 hours of practice experience in a community or hospital pharmacy setting during a one week full-time period, i.e. the work experience is expected to take the form of a standard 5-day working week. Its satisfactory completion must be signed off by a registered pharmacist in the workplace, and the student must complete a structured work experience report. The student’s report and pharmacist’s declaration associated with this component must be submitted by the start of the Junior Sophister academic year, and they form part of the assessment for module PH3006, where they are graded as satisfactory/unsatisfactory. This should not be confused with the work experience and associated exercises undertaken between the Junior Sophister and Senior Sophister years, which form part of the assessment for module PH4006. See advance notification at the end of this module descriptor.

ASSESSMENT
Each component must be passed (see notes below)                      Weighting
Written examination: 1.5 hours. Section A: 1 essay (from choice of 2). Section B: 40 MCQs (no choice; negative marking, +1/-0.25). Students must independently pass both Section A and Section B. 70% of total marks
Dispensing and patient care practical exercises; minimum 60% for each practical Pharmacy practice practical test; minimum 60% and no level 1 errors. 7% of total marks 3% of total marks
Level 1 error: Automatic failure of the entire test, irrespective of the marks awarded. Level 2 error: Zero marks for the question in which the error is made. Level 3 error: Deduction of 41% of the maximum marks available for the question in which the error is made. Level 4 error: Deduction of 20% of the maximum marks available for the question in which the error is made. Level 5 error: Deduction of 10% of the maximum marks available for the question in which the error is made. Level 6 error: Deduction of 5% of the maximum marks available for the question in which the error is made.
Dissertation Clinical skills evaluation – satisfactory/unsatisfactory Health economics/pharmacoeconomics evaluation – satisfactory/unsatisfactory OSCE and associated exercises – satisfactory/unsatisfactory Reflective continuing professional development e-portfolio – satisfactory/unsatisfactory Work experience [35 hours during a one week full-time period in summer vacation between SF and JS years]: student’s report and pharmacist’s declaration – satisfactory/unsatisfactory 20% of total marks --- --- --- ---

NB: Students will be expected to draw upon knowledge and skills gained in this module when undertaking the Clinical Pharmacy Assessment that forms part of the evaluation for modules PH3009A, PH3010 and PH3011. Veterinary medicines legislation is also examinable in module PH3009. All aspects of pharmacy legislation, clinical skills, dispensing and patient care are also examinable in 4th year (Practice of Pharmacy theory papers, clinical skills, dispensing and patient care evaluations, practical test, OSCE).

SUMMARY OF HOURS (excludes work experience)

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practicals/ workshops</th>
<th>Tutorials</th>
<th>Total contact</th>
<th>Practical reports</th>
<th>Guided study</th>
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<th>ECTS</th>
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<td>5</td>
<td>75</td>
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</table>

Pass mark, plagiarism
The pass mark for examinations and assessments is 40% except where otherwise indicated. See ‘Assessment’ above. Students should note that College penalties for plagiarism apply to both examinations and continuous assessment.

Late work
Continuous assessment exercises for this module must be presented for evaluation by the specified date(s). They must be presented to a designated member of staff in the manner requested (e.g., in person/by email/through
the virtual learning environment), and signed in on the form for this purpose where applicable. Work submitted late will not be assessed unless a valid reason is provided, and permission for late submission should be obtained in advance of the submission deadline from the staff member responsible for the continuous assessment component. Where late work with a valid excuse is accepted for assessment, a penalty may be applied (deduction of up to 60% of the maximum marks available for the component) with the effect that marks for the late work will not normally exceed the pass mark.

**Missed classes/assessments**

In common with other modules for the pharmacy degree, attendance at all scheduled classes for this module is compulsory. A student who is unable to attend a class for any reason must notify his/her tutor of the reason for absence without delay, and present certification as appropriate. However, all continuous assessment components must be completed even if the student is absent for a valid reason. It is the student’s responsibility to obtain details of the assessment for the missed class(es) from the relevant staff member without delay, and to complete it on a self-study basis. The deadline for submission of the completed assessment to the relevant staff member is five days from the student’s return to College (return date notified to staff member by tutor, based on certification as appropriate) unless otherwise agreed in advance with the relevant staff member. Where feedback on the assessment has already been provided to the class prior to submission, a penalty may be applied (deduction of up to 60% of the maximum marks available for the assessment), with the effect that marks for the assessment will not normally exceed the pass mark. See above for late submissions.

**Progression and supplementals**

Students must satisfy the examiners in each component of the module independently. A student may be returned as a ‘qualified fail’ (QF) and refused permission to progress with his/her class until he/she has satisfied the examiners in all components of the module. This may necessitate sitting a supplemental examination and/or repetition/(re)submission of one or more continuous assessment components (including submission of one or more alternative exercises that have been set to replace failed/missed continuous assessment components). In such circumstances, the marks available for the supplemental examination may be capped at the pass mark, while penalties may be applied to practical tests and/or other continuous assessment components (deduction of up to 60% of the maximum marks available for the relevant element(s)), with the effect that marks for such elements will not normally exceed the pass mark. This is separate from, and in addition to, any penalties imposed for level 1 to level 6 errors in the pharmacy practice practical test. (See ‘Assessment’ above.)

**Non-satisfactory reports**

Students who have not fulfilled the module requirements with regard to attendance and/or coursework may be reported to the Senior Lecturer as non-satisfactory for one or more terms. Students reported as non-satisfactory for the Michaelmas and Hilary terms may be refused permission to take their annual examinations and may be required by the Senior Lecturer to repeat the year.

**Compensation**

Because of the importance accorded to this aspect of the course by the PSI, who accredit the degree, it is not possible to compensate in this module.

**Professional dress code**

Students are required to dress appropriately and behave in a professional manner for elements of the course entailing attendance at external facilities (professional experience in pharmacies, case review in hospitals, health service facilities, etc.).

**ADVANCE NOTIFICATION: Pharmacy Work Experience (Module PH4006)**

During the summer vacation between the Junior Sophister and Senior Sophister years, each student is required to undertake 140 hours of practice experience in a community or hospital pharmacy setting during a four week full-time period, i.e. the work experience is expected to take the form of four standard 5-day working weeks. Its satisfactory completion must be signed off by a registered pharmacist in the workplace, and the student must complete a structured work experience report. Where agreed in advance with the Director of Undergraduate Teaching and Learning and the co-ordinators of modules PH4006 and PH4012, a student undertaking his/her final year research project (module PH4012) during the summer vacation may undertake the work experience component during the first four weeks of the Senior Sophister Michaelmas teaching term that are normally reserved for the research project. The student’s report and pharmacist’s declaration associated with the work experience component must be submitted by a specified date early in the Senior Sophister academic year, and they form part of the assessment for module PH4006, where they will be graded as satisfactory/unsatisfactory.
PHARMACEUTICAL BIOTECHNOLOGY II

Year 3 (Junior Sophister)  
Course Code: PH3008

Staff of School of Pharmacy & Pharmaceutical Sciences: Assoc. Prof. C. Ehrhardt (CE), Assoc. Prof. J.F. Gilmer (JG), Asst. Prof. F. Boylan (FB), Assoc. Prof. L. O’Driscoll (LOD), Asst. Prof. D. Finlay (DF)

Coordinator: Assoc. Professor Lorraine O’Driscoll (LOD)

AIMS: To enhance the students understanding of the contribution of biotechnology to the development of therapeutics, outlining how bio-therapeutics are derived in the context of associated safety and quality systems. This course also considers the delivery and pharmacology of key bio-therapeutics, providing an overview of the bio-therapeutics value chain, i.e., the route from discovery to the patients.

PRE-REQUISITES: Pharmaceutical Biotechnology I (PH2008), Isolation & Analysis of Substances used in Medicines (PH2003), Cell and Molecular Biology (BY1101)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
- Demonstrate an understanding of the major therapeutic applications and categories of biopharmaceuticals;
- Explain how biotech products work in the body and their disposition and dosing;
- Recall how therapeutic proteins are purified and formulated;
- Explain how biological products are defined in law, regulated and qualified for release;
- Demonstrate knowledge of specific professional issues arising in the use of biotech products in pharmacy practice;
- Outline potential future directions in this rapidly changing area.

COURSE OUTLINE

LECTURES  

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topic</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Biotherapeutics: value chain from discovery to pharmacological</td>
<td>LOD</td>
</tr>
<tr>
<td></td>
<td>intervention.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Development of antibodies as diagnostics &amp; therapeutics</td>
<td>LOD</td>
</tr>
<tr>
<td>3</td>
<td>Examples of Clinical Application of mAbs &amp; their pharmacology</td>
<td>LOD</td>
</tr>
<tr>
<td>4-8</td>
<td>Downstream processing</td>
<td>DF</td>
</tr>
<tr>
<td>9-10</td>
<td>Formulation</td>
<td>CE</td>
</tr>
<tr>
<td>11</td>
<td>Delivery of biotherapeutics</td>
<td>CE</td>
</tr>
<tr>
<td>12</td>
<td>Pharmacology of recombinant proteins I (examples: hormones)</td>
<td>LOD</td>
</tr>
<tr>
<td>13</td>
<td>Pharmacology of recombinant proteins II (examples: ILs; GFs)</td>
<td>LOD</td>
</tr>
<tr>
<td>14</td>
<td>Enzymes: production &amp; pharmacology</td>
<td>LOD</td>
</tr>
<tr>
<td>15</td>
<td>Vaccines: production &amp; pharmacology</td>
<td>LOD</td>
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<tr>
<td>16</td>
<td>Other areas of therapeutic biotechnology &amp; associated</td>
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<tr>
<td></td>
<td>pharmacological implications (incl. cell therapy; stem cells)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and pharmacology of biotherapeutic agents</td>
<td></td>
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<tr>
<td>17</td>
<td>Regulatory process for biotech, definitions, biosimilars</td>
<td>JG</td>
</tr>
<tr>
<td>18</td>
<td>ICHQ6B protein specification, protein ID, content</td>
<td>JG</td>
</tr>
<tr>
<td>19</td>
<td>Heterogeneity, purity &amp; analytical approaches</td>
<td>JG</td>
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<tr>
<td>20</td>
<td>Safety- viral safety/contamination Q5A</td>
<td>LOD</td>
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<tr>
<td>21-22</td>
<td>Plant biotechnology</td>
<td>FB</td>
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<tr>
<td>23</td>
<td>Pharmaceutical Biotechnology: Roadmap</td>
<td>LOD</td>
</tr>
<tr>
<td>24-25</td>
<td>Pharmaceutical Biotechnology: Future Prospects</td>
<td>LOD</td>
</tr>
</tbody>
</table>

Site visit to the National Institute for Bioprocessing Research and Training (NIBRT)
ASSESSMENT
Written paper - 2hrs - essay-type questions, short questions and MCQs 95% of total marks
Aseptic practical assignment 5% of total marks
(this assignment contributes 5% of both PH3004 and PH3008)

DIRECTED READING

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>NIBRT visit</th>
<th>Total contact</th>
<th>Visit reports</th>
<th>Guided + private study</th>
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<th>ECTS</th>
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<td>69</td>
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</table>
ENDOCRINE & REPRODUCTIVE PHARMACOLOGY AND VETERINARY PHARMACY
Year 3 (Junior Sophister)  
Course Code: PH3009

Staff of School of Pharmacy & Pharmaceutical Sciences: Assoc. Prof. M. Henman (MH),  
Asst. Prof. F. Boylan (FB), Assoc. Prof. L. O’Driscoll (LOD), Assoc. Prof. N. Frankish (NF),  
Assoc. Prof. T. Grimes (TG), Asst. Prof. M.J. Santos-Martinez (MS)  
External contributors: Ms. C. Garvan (CG), Mr. G. Barrett (GB), Prof. P. Deasy (PBD)

Coordinator:  
Assoc. Prof. Lorraine O’ Driscoll (LOD) (PH3009A);  
Prof. Anne Marie Healy (PH3009B)

This module consists of two separate units:

PH3009A: Endocrine & Reproductive Pharmacology

AIMS: To provide the student with knowledge of the health sciences relevant to the use of drugs and medicines in endocrinology and reproductive endocrinology.

PH3009B: Veterinary Pharmacy

AIMS: To provide a review of aspects of veterinary physiology and pharmacology, veterinary formulation and use of veterinary medicines.

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Discuss the abnormal functioning of the endocrine system, the tests and procedures used to assess those conditions and the role of drugs in the treatment of endocrine-related conditions
- Describe the pathology/symptoms, test & treatment for the different forms of diabetes
- Explain the use of show an ability to use, the drug delivery devices and monitoring devices associated with the treatment of diabetes
- Describe normal bone metabolism, of osteoporosis, Paget’s disease and hypercalcaemia, and their treatment
- Discuss the physiology and pathology of the reproductive system, including the actions and uses of drugs in the treatment of menstrual disorders, infertility, menopausal symptoms and as contraceptive preparations
- Apply knowledge to individual patient case studies
- Demonstrate delivery of pharmaceutical care as a member of a team
- Describe comparative anatomy & physiology & veterinary pharmacology
- Discuss formulation aspects of selected veterinary medicinal products
- Discuss aspects of veterinary Pharmacy in practice

PH3009A - Endocrine & Reproductive Pharmacology

LECTURES

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topic</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Endocrinology</td>
<td>LOD</td>
</tr>
<tr>
<td>2</td>
<td>Mechanisms of hormone action</td>
<td>LOD</td>
</tr>
<tr>
<td>3-5</td>
<td>Hypothalamus &amp; pituitary gland; abnormalities, test and treatment</td>
<td>LOD</td>
</tr>
<tr>
<td>6</td>
<td>Thyroid &amp; parathyroid glands; abnormalities, test and treatment</td>
<td>LOD</td>
</tr>
<tr>
<td>7-8</td>
<td>Bone metabolism &amp; metabolic disease</td>
<td>FB</td>
</tr>
<tr>
<td>9-10</td>
<td>Reproductive endocrinology</td>
<td>FB</td>
</tr>
<tr>
<td>11</td>
<td>Endocrine pancreas</td>
<td>LOD</td>
</tr>
<tr>
<td>12</td>
<td>Type 1 diabetes: including symptoms &amp; test</td>
<td>LOD</td>
</tr>
<tr>
<td>13</td>
<td>Type 2 diabetes: including symptoms &amp; test</td>
<td>LOD</td>
</tr>
<tr>
<td>14</td>
<td>Insulins: formulations &amp; delivery</td>
<td>LOD</td>
</tr>
<tr>
<td>15</td>
<td>Oral hypoglycaemics</td>
<td>LOD</td>
</tr>
<tr>
<td>16-17</td>
<td>Growth &amp; Growth Hormone; abnormalities, test and treatment</td>
<td>LOD</td>
</tr>
<tr>
<td>18-19</td>
<td>Adrenal gland; abnormalities, test and treatment</td>
<td>LOD</td>
</tr>
<tr>
<td>20</td>
<td>Hormones of the GI; abnormalities, test and treatment</td>
<td>LOD</td>
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<tr>
<td>21</td>
<td>Hormones of the pineal gland; abnormalities, test and treatment</td>
<td>LOD</td>
</tr>
<tr>
<td>22-23</td>
<td>Hormonal contributions to malignancy &amp; associated treatment</td>
<td>LOD</td>
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</tbody>
</table>
PRACTICAL (3 hours)
Drugs & devices for treatment of Diabetes

CASE STUDIES (16 hours total)
Clinical Case Study 1
Clinical Case Study 2
Clinical Case Study 3
Clinical Case Study 4

CASE STUDIES TUTORIALS (3 hours each)
Feedback on case study 1
Feedback on case study 2
Feedback on case study 3
Feedback on case study 4

DIRECTED READING – will be indicated, as relevant at each lecture

PH3009B – Veterinary Pharmacy

COURSE OUTLINE: & LECTURER
1-2 Formulation of pharmaceutical veterinary preparations
3 Comparative anatomy & physiology
4-8 Veterinary pharmacology
9 Veterinary medicines legislation

SEMINARS
Veterinary Pharmacy in community practice

DIRECTED READING
Veterinary Pharmacy, Kayne SB & Jepson MH, Pharmaceutical Press, 2004

VETERINARY PHARMACY ASSESSMENT

ASSESSMENT

PH3009A: Endocrine & Reproductive Pharmacology
Exam paper (MCQs + Essay Qs), 2 hours
Continuous assessment
Clinical Pharmacy Assessment*

PH3009B: Veterinary Pharmacy
MCQ/short answer question examination

Weighting
56% of total marks
16% of total marks
8% of total marks
20% of total marks

*Clinical Pharmacy Assessment (Coordinator Asst. Prof. M.J. Santos-Martinez)
This assessment will take place in Hilary Term. It is an “open book” examination that includes case studies based on topics covered in all Pharmacology modules (PH3009, PH3010, PH3011). Students are required to demonstrate knowledge and understanding of the case study (including clinical pharmacology and practice of pharmacy: management and goals of therapy for a given disease state; parameters to be monitored/assessed; mechanism of action, side effects, contraindications and/or interactions of therapeutic agents; patient/carer counselling).
SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lectures</th>
<th>Practical</th>
<th>Case studies</th>
<th>Tutorials/Seminars</th>
<th>Total contact</th>
<th>Guided study</th>
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<th>ECTS</th>
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<td>PH3009B</td>
<td>9</td>
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The pass mark for this module is 40%. Students must pass each unit of this module. The pass mark for each unit is 40%. The pass mark for each component (exam paper Unit PH3009A and Unit PH3009B, continuous assessment and clinical pharmacy assessment) is 40%. It is a requirement to pass all four components, no compensation is possible between components.

This module is not compensatable.
AIMS: Students will learn basic pathophysiological principles of inflammatory, gastrointestinal and respiratory tract diseases and acquire the knowledge of pharmacological use of drugs used in these conditions.

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
- Describe the basic anatomy and physiology of lungs and gastrointestinal tract
- Demonstrate the ability to recognise respiratory and gastrointestinal clinical symptoms
- Differentiate and classify several respiratory and gastrointestinal diseases
- Explain the mechanism of action of the different drugs used for the treatment of all those conditions
- Apply knowledge in advising and counselling patients with respiratory and gastrointestinal symptoms and make appropriate responses to presented symptoms
- Apply knowledge to individual patient case studies
- Demonstrate delivery of pharmaceutical care as a member of a team

PRE-REQUISITES: Completion of Year 2
CASE STUDIES (16 hours total)
Gastrointestinal pharmacology
- Upper GI
- Lower GI, Liver & Pancreas
Respiratory pharmacology
- Asthma
- COPD

PRACTICAL (2 hours)
Respiratory devices

TUTORIALS (4 hours total)
Feedback on case study 1
Feedback on case study 2
Feedback on case study 3
Feedback on case study 4

DIRECTED READING – will be indicated, as relevant at each lecture

ASSESSMENT
Exam paper (MCQs + Short Questions), 2 hours
Continuous assessment (Case Studies)
Clinical Pharmacy Assessment*

Weighting
70% of total marks
20% of total marks
10% of total marks

*Clinical Pharmacy Assessment (Coordinator Asst. Prof. M.J. Santos-Martinez)
This assessment will take place in Hilary Term. It is an “open book” examination that includes case studies based on topics covered in all Pharmacology modules (PH3009, PH3010, PH3011). Students are required to demonstrate knowledge and understanding of the case study (including clinical pharmacology and practice of pharmacy: management and goals of therapy for a given disease state; parameters to be monitored/assessed; mechanism of action, side effects, contraindications and/or interactions of therapeutic agents; patient/carer counselling).

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical</th>
<th>Case Studies/Tutorials</th>
<th>Total contact</th>
<th>Guided + private study</th>
<th>TOTAL</th>
<th>ECTS</th>
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The pass mark for this module is 40%. The pass mark for each component (exam paper, continuous assessment and clinical pharmacy assessment) is 40%. It is a requirement to pass each of the three components.

This module is not compensatable.
BLOOD, CARDIOVASCULAR AND RENAL PHARMACOLOGY  
Year 3 (Junior Sophister)  
Course Code: PH3011

Staff of the School of Pharmacy & Pharmaceutical Sciences: Prof. M. Radomski (MR), Assoc. Prof. N. Frankish (NF), Assoc. Prof. T. Grimes (TG), Asst. Prof M.J. Santos-Martinez (MS)  
Staff of the School of Medicine: Ms. E. Barrett

Coordinator: Assoc. Professor Neil Frankish

PRE-REQUISITES: Completion of Year 2

This Module is delivered in two Units, Unit A and Unit B.

UNIT A:

AIMS: The student will acquire knowledge of pharmacology relevant to the use of drugs and medicines in cardiovascular and thrombotic conditions and oedematous states.

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
- Describe the underlying pathology and aetiology of the varying forms of cardiovascular disease.
- Explain the various risk factors and how lifestyle behaviour can influence cardiovascular disease.
- Classify drugs used to treat cardiovascular disease and
- Describe their mechanism of action, their adverse effects and potential drug interactions and their clinical use.
- Describe the pathophysiology of the different forms of anaemia and their treatment
- Describe pathology and treatment of renal diseases and the use of diuretics
- Describe the physiology of lipid metabolism, the role of lipids in atherosclerosis and how drugs modify lipid metabolism and the clinical outcomes of atherosclerosis
- Describe mechanisms of haemostasis and thrombosis, pharmacology and therapeutics of classical and investigational antithrombotic drugs.
- Apply knowledge to individual patient case studies.
- Demonstrate delivery of pharmaceutical care as a member of a team.

COURSE OUTLINE:

CARDIOVASCULAR PHARMACOLOGY

<table>
<thead>
<tr>
<th>LECTURES</th>
<th>Lecturer</th>
</tr>
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<tbody>
<tr>
<td>1. Basic cardiovascular pharmacology</td>
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</tr>
<tr>
<td>2. Renin-angiotensin system</td>
<td>NF</td>
</tr>
<tr>
<td>3. Circulation and cardiac function</td>
<td>NF</td>
</tr>
<tr>
<td>4. Circulation and cardiac function</td>
<td>NF</td>
</tr>
<tr>
<td>5. Dysrhythmias</td>
<td>NF</td>
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<tr>
<td>6. Dysrhythmias</td>
<td>NF</td>
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<tr>
<td>7. Angina</td>
<td>NF</td>
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<tr>
<td>8. Angina</td>
<td>NF</td>
</tr>
<tr>
<td>9. Antihypertensive drugs</td>
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<tr>
<td>10. Antihypertensive drugs</td>
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<tr>
<td>11. Hypertension NF</td>
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<tr>
<td>12. Drugs used to treat congestive heart failure</td>
<td>NF</td>
</tr>
<tr>
<td>13. Drugs used to treat congestive heart failure</td>
<td>NF</td>
</tr>
<tr>
<td>14. Anaemia</td>
<td>NF</td>
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<tr>
<td>15. Anaemia</td>
<td>NF</td>
</tr>
<tr>
<td>16. Anaemia</td>
<td>NF</td>
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<tr>
<td>17. Renal physiology and pathology</td>
<td>MR</td>
</tr>
<tr>
<td>18. Diuretics</td>
<td>MR</td>
</tr>
<tr>
<td>19. Diuretics</td>
<td>MR</td>
</tr>
<tr>
<td>20. Lipids</td>
<td>MR</td>
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</tbody>
</table>
21. Lipid-lowering drugs  MR
22. Lipid-lowering drugs  MR
23. Haemostasis and thrombosis  MR
24. Anti-platelet drugs  MR
25. Anticoagulants and fibrinolytics  MR
26. Antithrombetics: clinical case studies  MR
27. Platelet research  ANO

CASE STUDIES (8 hours total)
Cardiovascular pharmacology: case studies 1  TG
Cardiovascular pharmacology: case studies 2  TG

SEMINARS (4 hours total)
Renal function and diuretics  MR
Anti-thrombotic therapy case studies.  MR

TUTORIALS (4 hours total)
Feedback on CV case study 1  TG
Feedback on CV case study 2  TG
Feedback on Renal function case study  TG
Feedback on Anti-thrombotic case study  TG

DIRECTED READING – will be indicated, as relevant at each lecture

ASSESSMENT

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weighting</th>
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<tbody>
<tr>
<td>Exam paper (2 hours, 20 short answer questions)</td>
<td>70% of total marks</td>
</tr>
<tr>
<td>Continuous assessment (Case Studies)</td>
<td>20% of total marks</td>
</tr>
<tr>
<td>Clinical Pharmacy Assessment*</td>
<td>10% of total marks</td>
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</table>

*Clinical Pharmacy Assessment (Coordinator Assist. Prof. M.J. Santos-Martinez)
This assessment will take place in Hilary Term. It is an “open book” examination that includes case studies based on topics covered in all Pharmacology modules (PH3009, PH3010, PH3011). Students are required to demonstrate knowledge and understanding of the case study (including clinical pharmacology and practice of pharmacy: management and goals of therapy for a given disease state; parameters to be monitored/assessed; mechanism of action, side effects, contraindications and/or interactions of therapeutic agents; patient/carer counselling).

Unit B: Inter-Professional Learning

AIMS: The aim of this course is to facilitate students understanding of the roles and priorities of all disciplines involved in patient care. It aims to improve awareness of how effective teamwork and communication can benefit patient care and outcome.

LEARNING OUTCOMES:
By the end of the course the student will be able to
- Justify the team members required to effectively manage a series of patient presentations
- Explain the role of members of the interdisciplinary team in the management of selected patient conditions.
- Demonstrate effective communication when discussing patient cases with an interdisciplinary student group.
- Justify how effective teamwork and communication can impact on patient care.
COURSE OUTLINE
Students will be presented with a series of case studies and required to work in small interdisciplinary groups. Case content will include patient histories incorporating stroke, rheumatoid arthritis and diseases of ageing. Students will be required to draw on learning from previous modules and combine with appropriate clinical skills to develop interdisciplinary management plans for selected patient cases.

INTERPROFESSIONAL CASE STUDIES (3x 1.5 hours)
Facilitated workshops using case based patient material. Small interdisciplinary groups designed to model working professional teams. Peer learning and tuition. Video based patient material supported by clinical documentation.

ASSESSMENT
Reflective writing assessment satisfactory/unsatisfactory

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Case studies</th>
<th>Tutorials</th>
<th>Total contact</th>
<th>Guided study</th>
<th>TOTAL</th>
<th>ECTS</th>
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</table>

The pass mark for this Pharmacology module is 40%. The pass mark for each component (exam paper, continuous assessment and clinical pharmacy assessment) is 40%. It is a requirement to pass each of the three components.

This module is not compensatable.
SENIOR SOPHISTER (4th Year)

Module details may be subject to corrections/amendments.

- It is each student’s responsibility to be aware of dates, times, locations, etc. of lectures, tutorials, seminars and practical classes.

- Reports, continuous assessments and laboratory notebooks must be presented for assessment by the date specified by the examiner.

- Reports, continuous assessments and laboratory notebooks submitted after the specified date will not be assessed unless a valid reason is given, and students will be deemed not to have satisfied the School’s examination requirements.

PRE-REQUISITES: Completion of the Junior Sophister Year (Year 3)
AIMS: The aims of this course are to provide the student with an understanding of the role of pharmaceutical chemistry in contemporary drug design, discovery and development. The course provides a comprehensive overview of the concepts of modern medicinal chemistry as applied to selected major therapeutic drug classes and an introduction to the concepts and uses of prodrugs for enhanced delivery of drugs.

PRE-REQUISITES: Medicinal & Pharmaceutical Chemistry III (PH3002) and Natural Source of Drugs and Medicines (PH3003)

LEARNING OUTCOMES: On successful completion of the module the student should be able to:
- Discuss the general principles and applications of modern drug design
- Explain the pharmaceutical chemistry basis of current prodrug design and use
- Describe the molecular mechanism of action of antiviral and anticancer drugs and process of new drug development in these areas
- Summarise the regulatory requirements for characterization and specification of pharmaceutical materials
- Explain the relevance of pharmaceutical chemistry in the pharmaceutical industry and in drug development
- Demonstrate competence in specialised practical laboratory techniques used in the analysis of pharmaceutical products.

COURSE OUTLINE

LECTURES

Unit PH4002A: Drug discovery and design; Advanced quantitative structure-activity relationships and related topics: 7 lectures (JQ)
1. The Bilinear Model; Introduction, The McFarland Model
2. \( \log P_{o/w} (\pi_s) \) / Transport Rate Constants
3. Three-dimensional Structure : topological Indices
4. Craig Plots
5. The Topliss scheme
6. Principal Component Analysis
7. The Free-Wilson Method

Unit PH4002 B: Prodrugs: 7 lectures (JQ)
1. Carboxyl Groups; Ampicillin prodrugs, Butyric acid prodrugs, Cytodifferentiation in neoplastic cells, examples
2. Hydroxy derivatives: Timolol prodrugs, Introduction
3. Timolol Prodrugs: degradation Kinetics
4. N-Mannich bases: Structural effects on decomposition
5. N-Hydroxyalkyl and N-Acloyxalkyl derivatives
6. Prodrugs of 5-fluorouracil: examples
7. Prodrugs of 5-fluorouracil: Lipophilicity & solubility data

Unit PH4002C: Agents acting on DNA; Medicinal chemistry of antiviral and anticancer pharmaceuticals: 10 lectures (MM)
1. Nucleoside and non-nucleoside antiviral agents active against DNA viruses
2. Production and stability of agents active against DNA polymerase
3. Nucleoside antiviral agents active against RNA viruses
4. Design, structure and function of clinical antiretroviral agents
5. Mechanism of action of protease inhibitors and antisense oligonucleotides
6. Mechanism of action and molecular targets for anticancer drugs; Alkylating agents and related drugs; stability and analogue design
7. Cisplatin and related organometallic agents
8. Intercalating agents, topoisomerase targeting and DNA chain cutting agents
9. Antimetabolite and hormone based anticancer agents
10. Antimitotic agents; current clinical drugs and future potentially useful drugs

Unit PH40020: Drug Development and Regulatory Affairs (AS, JG, JQ, MM)
(9 lectures + 1 seminar, 11 hours total)

Regulatory affairs: Stability of drug substances and drug products (AS) (6 lectures)
1. ICH Q1 – Stability testing
2. Developing a stability indicating analytical method
3. Prediction of degradation pathways of drugs
4. Stress testing & forced degradation
5. Evaluation of stability data
6. Photostability testing

Advanced spectroscopic characterisation methods for drug substances (JG, AS), (2 lectures)
Methods in drug discovery: Ligand and Structure based drug design (MM), (1 lecture)
Computer aided drug design: molecular modeling and review of calculation of molecular properties (ANO) (1x 2h seminar).

PRACTICALS (3 hours each)
1. Analytical methods for penicillins (MJM)
2. Structure/activity case studies: Determination of partition and transport rate constants for drugs (JQ)
3. Insulin studies – Peptide Mapping (JG)
4. Product evaluation (AS)

DIRECTED READING
Principles of Medicinal Chemistry; Foye, Lemke and Williams; 7th Ed., Lippincott Williams & Wilkins, 2013.
ICH Q1 – www.ich.org

ASSESSMENT
Written Examination Paper: 3 hours; 5 questions to be answered out of 5
(some internal choice may be available)
Practical

<table>
<thead>
<tr>
<th>Weighting</th>
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<tbody>
<tr>
<td>75% of total marks</td>
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<tr>
<td>25% of total marks</td>
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</tbody>
</table>

The practical mark is based on final reports (submission deadline 18th December; weighting 15%) and practical test (18th December 4 pm, weighting 10%). The practical test of 75 min duration takes the form of short answer and true/false questions based on the theory underlying the relevant practical classes of the Junior Sophister and Senior Sophister years.

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars</th>
<th>Practicals</th>
<th>Total contact</th>
<th>Practical Reports</th>
<th>Guided study</th>
<th>TOTAL</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
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<td>47</td>
<td>12</td>
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</tbody>
</table>

N.B. Students are expected to satisfy the examiners in both written examination and practical components. The pass mark for examinations is 40%. Students who obtain an overall mark of less than 40% will be required to sit the supplemental examination. Students who fail to satisfy the written requirement (i.e. less than 40%) of the annual examination, but who obtain 40% or better overall in the module will be returned as a ‘qualified fail’ (QF) and will be required to take a supplemental examination in the written examination only. Students who fail to satisfy the practical requirement (i.e. less than 40% of the practical component) of the annual examination, but who obtain 40% or better overall in the module will be returned as a ‘qualified failed’ (QF) and will be required to resit/resubmit in the practical component, as appropriate.

This module is not compensatable.
ECTOPARASITICIDES, NATURAL REMEDIES AND COMPLEMENTARY MEDICINE

Year 4 (Senior Sophister)  

Course Code: PH4003

Staff of the School of Pharmacy & Pharmaceutical Sciences: Asst. Prof. F. Boylan (FB), Asst. Prof. A. Sasse (AS), Assoc. Prof. H. Sheridan (HS)

External Contributors: Practitioners of CAM

Coordinator: Assoc. Professor Helen Sheridan

Aims: In Section A of this module will provide the students with a detailed knowledge of Alternative Medicines and Traditional Herbal Medicines. The students will learn the differences between conventional medicines and complementary alternative medicines (CAM). In addition this course also provides the students with an overview of The European regulatory framework for Herbal Medicinal Plants (HMP’s), the importance of traditional Medicine in Global Health and the Millennium Development Goals (MDGs), the TRIPs agreement and bio-piracy as relating to traditional Medicinal Knowledge. The students will also be receiving three workshops to support the lectures they have received, including a practical introduction to Yoga and Meditation. In section B of this module the students will learn about human ectoparasite infestation (lice, scabies), the products used to treat infestation and the community response to infection outbreak. They will also learn about the significance of ectoparasite infection and disease transmission in the global context.

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Explain the conceptual differences between conventional medicine and CAM.
- Describe the nature of therapies such as Reiki, Shiatsu, Naturopathy etc.
- Discuss the concepts underlying Homeopathy.
- Explain differences between Medical Herbalism and Rational Phytotherapy.
- Evaluate the phytochemical, phytopharmacological and clinical evidence base for the efficacy of Herbal Medicinal Products (HMP’s) used in Rational Phytotherapy.
- Evaluate the evidence base for the safety of HMPs, including drug-herb interactions.
- Understand current legislation relating to HMPs.
- Be familiar with the increasing importance of Traditional Medicine and its position in The Millennium Development Goals.
- Be aware of the importance of the TRIPs agreement and bio-piracy in Traditional Medicine.
- Explain the main types of human ectoparasite infestation.
- Advise on and critically assess the products used to treat and protect against ectoparasite infection.
- Analyse and critically assess the procedures for the control of infestation in residential care and acute hospital settings.
- Understand the importance of ectoparasite control in the context of disease transmission.

COURSE OUTLINE

LECTURES

PH4003: Section A

NATURAL REMEDIES, COMPLEMENTARY MEDICINE

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction. Traditional Medicine, Global Health and MDG’s</td>
<td>HS</td>
</tr>
<tr>
<td>2.</td>
<td>The TRIPS agreement and Bio-piracy</td>
<td>HS</td>
</tr>
<tr>
<td>3.</td>
<td>The European regulatory framework (HMP’s)</td>
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<tr>
<td>5.</td>
<td>Medicinal Herb Quality</td>
<td>HS</td>
</tr>
<tr>
<td>6.</td>
<td>Medicinal Herb Quality</td>
<td>HS</td>
</tr>
<tr>
<td>7.</td>
<td>Rational phytotherapy: Central Nervous System</td>
<td>FB</td>
</tr>
<tr>
<td>8.</td>
<td>Rational phytotherapy: The Respiratory System</td>
<td>FB</td>
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<tr>
<td>9.</td>
<td>Rational phytotherapy: The Digestive System</td>
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<tr>
<td>10.</td>
<td>Rational phytotherapy: The Cardiovascular System</td>
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<tr>
<td>11.</td>
<td>Rational phytotherapy: The Urinary System</td>
<td>FB</td>
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<tr>
<td>12.</td>
<td>Case studies in phytotherapy</td>
<td>FB</td>
</tr>
<tr>
<td>13.</td>
<td>Case studies in phytotherapy</td>
<td>FB</td>
</tr>
<tr>
<td>14.</td>
<td>CAM: definitions, types and concepts</td>
<td>FB</td>
</tr>
<tr>
<td>15.</td>
<td>CAM: uses</td>
<td>FB</td>
</tr>
</tbody>
</table>
16. CAM: Clinical evidence for the different types of CAM.  
17.-18. Evidence base of ADR’s

**PH4003: SECTION B**

**ECTOPARASITICIDES**

1. Introduction  
2. Human ectoparasites: Head lice, body lice and pubic lice  
3. Human ectoparasites: Treatment and control of human ectoparasites.  
4. Scabies: Treatment and control  
5. Veterinary aspects of ectoparasite control  
6. Ectoparasites and Transmission of disease  
7. Insect repellents

**WORKSHOPS:**

- Introduction to Yoga and Meditation (2 hours)  
- Workshop on an aspect of CAM (2 hours)  
- Workshop on an aspect of CAM (2 hours)

**DIRECTED READING**

Ectoparasiticides: Selected reading material will be given to students.

Kayne SB *Homeopathic Pharmacy*. 2nd Edn., Elsevier Edinburgh, 2006  
HMP’s, TRIPs, MDG’s: Selected reading material will be given to students.

**ASSESSMENT**

Essay - 2500 words  
(Choice of 6 essay titles in Michaelmas term for submission 29th January)  
Two hour exam in Hilary term (week 32, Monday 2pm): Short essay type questions

**SUMMARY OF HOURS**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Workshops</th>
<th>Case studies</th>
<th>Total contact</th>
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</table>
ADVANCED DRUG DELIVERY
Year 4 (Senior Sophister)  
Course Code: PH4004

Staff of the School of Pharmacy & Pharmaceutical Sciences: Assoc. Prof. C. Ehrhardt (CE), Prof. A. M. Healy (AMH), Asst. Prof. D. D’Arcy (DD), Assoc. Prof. L. Tajber (LT), Prof. M.J. Meegan (MM), Assoc. Prof. T. Grimes (TG)

Coordinator: Assoc. Professor Carsten Ehrhardt

AIMS: To provide an overview on advanced drug delivery strategies, alternative routes of drug absorption for local and systemic delivery, including nucleic acid delivery. To familiarise the students with the anatomical and (patho)physiological particularities of those pathways, and in vitro models mimicking the respective biological barriers. To give an introduction to molecular pharmaceutics, including drug transporter biology and metabolic enzymes.

LEARNING OUTCOMES: On successful completion of this module, the student will be able to:
- Appreciate the impact of drug transporters and metabolic enzymes on limiting/enhancing drug bioavailability.
- Recall alternative routes of systemic drug delivery.
- Recall of the anatomical and (patho)physiological particularities of epithelial barriers of the skin, gastrointestinal tract and respiratory system.
- Appreciate basic principles of nucleic acid therapy and delivery.
- Recall the use of advanced polymers in drug delivery science.
- Recall the biopharmaceutical, formulation and manufacturing aspects of advanced delivery systems.
- Describe approaches to design and manufacture of modified release delivery systems.
- Explain the concept of clinical pharmaceutics and use examples to relate formulation characteristics with patient clinical characteristics.

PRE-REQUISITES: Pharmaceutical Biotechnology I-II, Physiology, JF-, SF-, JS-Pharmacology

COURSE OUTLINE:

| LECTURER | 1-2 Design of modified release drug delivery systems | DD |
|          | 3-4 Clinical Pharmaceutics | DD/TG |
|          | 5-6 Advanced polymers, polymers as drug carrier systems | MM |
|          | 7-9 Particle manufacture in the design of advanced solid dosage forms | LT |
|          | 10 Anti-sense technology | MM |
|          | 11-14 Gene therapy | CE |
|          | 15 In vitro methods for drug absorption studies | CE |
|          | 16-17 Drug disposition after oral administration | CE |
|          | 18-19 Drug transporters and efflux pumps | CE |
|          | 20-22 Transdermal drug delivery | CE |
|          | 23-24 Ocular drug delivery | CE |
|          | 25-26 Nasal drug delivery | CE |
|          | 27-28 Pulmonary drug delivery | CE |
|          | 29-32 Inhalation aerosols | AMH |

DIRECTED READING (selection from the following)
- Martin’s Physical Pharmacy and Pharmaceutical Sciences, PJ Sinko, 6th Ed., LWW, 2010
- Biopharmaceutics Applications in Drug Development, R Krishna and L Yu (Eds.), Springer, 2007

ASSESSMENT
Written theory paper: 2 hours; MCQs (negative marking [+1/-0.25]) and short answer questions.

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Total contact</th>
<th>Guided study</th>
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</table>
PHARMACOKINETICS, PHARMACODYNAMICS, BIOPHARMACEUTICS AND DRUG METABOLISM

Year 4 (Senior Sophister)

Course Code: PH4005

Staff of the School of Pharmacy & Pharmaceutical Sciences: Prof. M. J. Meegan (MM), Asst. Prof D. D’Arcy (DD)

Coordinator: Asst. Professor Deirdre D’Arcy

AIMS: To provide a course on pharmacokinetics with its implications for the design and usage of medicines.

PRE-REQUISITES: Introductory Pharmaceutics (PH1004), SF and JS modules in Pharmaceutics & Pharmaceutical technology, Pharmaceutical Chemistry and Pharmacology

LEARNING OUTCOMES:

**Learning outcomes PH4005A.** On successful completion of this module the student will be able to:
- Explain the rationale for employing different pharmacokinetic models to interpret biopharmaceutical data
- Employ appropriate pharmacokinetic equations to calculate basic pharmacokinetic parameters when presented with appropriate data
- Describe basic approaches to pharmacodynamic modelling

**Learning outcomes PH4005B.** On successful completion of this module the student will be able to:
- Describe methods used to investigate and determine bioavailability and bioequivalence
- Interpret the relevance of biopharmaceutical aspects of a drug or dosage form in a physiological context

**Learning outcomes PH4005C.** On successful completion of this module the student will be able to:
- Relate the principles of pharmacokinetics to the role of the pharmacist in provision of patient care
- Identify common clinical situations where therapeutic drug monitoring principles should be applied
- Apply provided empirical pharmacokinetic equations to selected clinical scenarios to optimise dosing regimens with an emphasis on clinical outcomes.

**Learning outcomes PH4005D.** On successful completion of this module the student will be able to:
- Describe the common metabolic processes of drugs
- Predict the metabolic products formed by drugs
- Discuss the role of metabolism in the modern drug discovery process

**COURSE OUTLINE**

**LECTURES**

<table>
<thead>
<tr>
<th>Unit PH4005A: Basic Pharmacokinetics</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction 1 compartment bolus</td>
<td>DD</td>
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<tr>
<td>2. AUC trapezoidal rule, clearance</td>
<td>DD</td>
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<tr>
<td>3. 1 compartment infusion and multiple dosing</td>
<td>DD</td>
</tr>
<tr>
<td>4. Extravascular 1 compartment single dose and multi-dose</td>
<td>DD</td>
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<tr>
<td>5. Amount absorbed versus time plots: Wagner-Nelson method</td>
<td>DD</td>
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<tr>
<td>6. Two compartment model. Bolus IV injection</td>
<td>DD</td>
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<tr>
<td>7. Physiological modeling and NCA</td>
<td>DD</td>
</tr>
<tr>
<td>8. Pharmacokinetics concepts continue</td>
<td>DD</td>
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<tr>
<td>9. Pharmacodynamics</td>
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</table>
Unit PH4005B: Biopharmaceutics
10 Bioavailability determination DD
11 Dissolution, bioequivalence and BCS; generic bioequivalence in context, biosimilars DD
12 Design of bioequivalence studies DD
13 In vitro in vivo correlation DD
14 Biowaivers and measuring dissolution profiles DD
15 Effects of food on absorption DD

Unit PH4005C: Clinical Pharmacokinetics
16 Introduction to clinical pharmacokinetics DD
17 Role of renal function in pharmacokinetics DD
18 Worked examples - Digoxin DD
19 Role of hepatic function in pharmacokinetics- clearance and interactions DD
20 Role of hepatic function in pharmacokinetics- hepatic disease and PK DD
21 Worked examples- theophylline DD
22 Anti-epileptics and non-linear pharmacokinetics-clinical applications DD
23 Effects of ageing on pharmacokinetics, breastfeeding. DD

Unit PH4005D: Drug Metabolism
24 The process of drug Metabolism and ADME; metabolic enzymes MM
25 Phase I metabolism of drugs; the role of cytochrome P450; MM
26 Phase II metabolism of drugs; conjugation and detoxification MM
27 Metabolism studies in drug design and development MM

PRACTICAL CLASSES (3 HOURS EACH)
1 Basic Pharmacokinetics and Biopharmaceutics 1
2 Basic Pharmacokinetics and Biopharmaceutics 2
3 Basic Pharmacokinetics and Biopharmaceutics 3
4 Clinical Pharmacokinetics 1
5 Clinical Pharmacokinetics 2

TUTORIALS – One Tutorial on Pharmacokinetics (DD)

DIRECTED READING
Basic Pharmacokinetics, Jambhekar and Breen, Pharmaceutical Press 2009
Also selected papers and regulatory guidance documents which will be available via the blackboard PH4005 module page.

Other suggested supportive information sources
Clinical pharmacokinetics, Concepts and Applications, Rowland and Tozer, LWW. 4th ed 2011
Winter, M.E. Basic Clinical Pharmacokinetics. 5th Edition. Lippincott Williams & Wilkins.
Waiver of In Vivo Bioavailability and Bioequivalence Studies for Immediate-Release Solid Oral Dosage Forms Based on a Biopharmaceutics Classification System; http://www.fda.gov/cder/guidance/3618find.htm
Chi-Yuan Wu and Leslie Z. Benet; Predicting Drug Disposition via Application of BCS; Pharm. Res. 22:11-23; 2005
Doc. Ref.: CPMP/EWP/QWP/1401/98 Rev. 1/ Corr **
FDA – Guidance for industry: Bioavailability and bioequivalence studies for orally administered drug products- general considerations
FDA-Guidance for Industry-Dissolution testing of immediate release solid oral dosage forms (CDER 1997)
FDA-Guidance for Industry-Extended Release oral dosage forms: development, evaluation and application of in vitro in vivo correlations
FDA-Guidance for Industry-SUPAC-MR: modified release solid oral dosage forms
FDA-Guidance for Industry-SUPAC-IR: Immediate release solid oral dosage forms
EMEA-Note for guidance on quality of modified release products: A Oral dosage forms B Transdermal dosage forms Section 1 (Quality)


**ASSESSMENT**

Theory written paper: 2 hours: MCQs, short answer questions and 1 essay question  
Weighting: 80% of total marks

Continuous assessment of practical work  
Weighting: 20% of total marks

**SUMMARY OF HOURS**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practicals</th>
<th>Tutorials</th>
<th>Total contact</th>
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</table>

NB. Students are expected to satisfy the examiners in both written and practical examination components. The pass mark for the module is 40%. Students who obtain an overall mark of less than 40% will be required to sit the Supplemental examinations. Students who fail to satisfy the annual exam (i.e. less than 40% in the annual examination), but who obtain 40% or more overall in this module will be returned as a qualified fail (QF) and will be required to take a supplemental examination in the written examination only. Students who fail to satisfy the continuous assessment component (i.e., less than 40% in the continuous assessment component) of the module but who obtain a 40% or better overall in this module will be returned as a qualified fail (QF) and will be required to fulfil the continuous assessment component requirements.
Staff of the School of Pharmacy & Pharmaceutical Sciences: Assoc. Prof. M. Henman (MH), Asst. Prof. S. Ryder (SR), Assoc. Prof. C. Roche (CR), Assoc. Prof. T. Grimes (TG)
Teacher-practitioners and allied staff: Ms. K. Rossi (KR), Ms. N. McMahon (NMcM), Ms. E. Deasy (ED)
External contributors: Ms. C. Keane (CK).

Coordinator: Asst. Professor Sheila Ryder

AIMS: To bring together key topics in pharmacy practice and to provide the range of understanding and practical knowledge necessary for the student both to practise satisfactorily under present circumstances and to respond to changes in the requirements of the health service and the profession.

PRE-REQUISITES: See general pre-requisites for Senior Sophister year (page 67). This module is not available for selection by one-year international students. In order to satisfy ECTS credit requirements, a one-year international student undertaking the Senior Sophister year may replace module PH4006 with a 'Broad Curriculum' module. (See http://www.tcd.ie/Broad_Curriculum/) However, in such circumstances, the international student must take care to select a replacement module that does not give rise to timetable clashes with the Senior Sophister pharmacy modules that he/she is taking.

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Critically discuss the provisions of IMB/HPRA legislation, medicinal products legislation, the Pharmacy Act and Pharmaceutical Society of Ireland rules/guidance, the law governing family planning and methylated spirits, and relevant EU legislation.
- Integrate changes in legislation covered earlier in the degree course with his/her existing knowledge, and critically discuss their content and implications for pharmacy practice.
- Systematically collect, interpret and apply knowledge about patients, their conditions and their medicines, in order to provide and justify treatment recommendations and patient counselling, in a diverse range of patient case studies [more complex cases, requiring students to draw on a broader knowledge base, than those in preceding modules].
- Supply medicines in accordance with mock prescriptions and other appropriate documents, identifying and managing the legal, clinical, administrative, ethical, professional and communication problems that are presented or that may arise after dispensing [more complex cases, requiring students to draw on a broader knowledge base, than those in preceding modules].
- Critically evaluate the ethical concepts underpinning professional dilemma scenarios, differentiate between professional and unprofessional action options, discuss the likely intentions underpinning questionable behaviours by pharmacists, and engage in collaborative learning, team work and group decision-making through a profession-specific dilemma.

COURSE OUTLINE:
Note: Due to timetabling constraints, the sequence of classes may differ from that below.

LECTURES (18 hours)  
<table>
<thead>
<tr>
<th></th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Feedback. Competencies, reflective practice and continuing professional development</td>
</tr>
<tr>
<td>2-7</td>
<td>Medicinal Products legislation and IMB/HPRA legislation</td>
</tr>
<tr>
<td>8-12</td>
<td>Pharmacy Act, PSI Rules/guidance, EU legislation</td>
</tr>
<tr>
<td>13</td>
<td>Family planning legislation, methylated spirits legislation</td>
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<tr>
<td>14-15</td>
<td>Legislation update</td>
</tr>
<tr>
<td>16-17</td>
<td>Review and integration of legislation</td>
</tr>
<tr>
<td>18</td>
<td>Ethics: Introduction to Intermediate Concept Measures (ICMs)</td>
</tr>
</tbody>
</table>

PRACTICAL CLASSES / WORKSHOPS (16 hours)  
Dispensing and patient care 4.1: Review (2h)  
Dispensing and patient care 4.2: Review (2h)  
Dispensing and patient care 4.3: Review (2h)  
Dispensing and patient care 4.4: Review (hospital) (2h)  
Dispensing and patient care 4.5: Review (2h)  
Pharmacy practice mock practical test (1h timetabled; test duration: 50 mins)
Ethics and professionalism: ICMs and the professional reasoning process (2h)  CR
Ethics and professionalism: Intentions and influences (1h)  CR
Ethics and professionalism: Exit DIT-2, competencies and CPD (2h)  CR

**TUTORIALS (7 hours)**

- Dispensing and patient care 4.1 feedback  SR/KR/CR/TG
- Dispensing and patient care 4.2 feedback  SR/KR/CR/TG
- Dispensing and patient care 4.3 feedback  SR/KR/CR/TG
- Dispensing and patient care 4.4 feedback  SR/KR/CR/TG
- Dispensing and patient care 4.5 feedback  SR/KR/CR/TG
- Dispensing and patient care 4.6 feedback and open questions  SR/KR/CR/TG

**CLINICAL ATTACHMENT (3 hours)**

Clinical skills hospital attachment: medication history taking  MH/TG/ED/CK/NMcM

**WORK EXPERIENCE (140 hours, undertaken during a four week full-time period)**

During the summer vacation between the Junior Sophister and Senior Sophister years, each student is required to undertake 140 hours of practice experience in a community or hospital pharmacy setting during a four week full-time period, i.e. the work experience is expected to take the form of four standard 5-day working weeks. Its satisfactory completion must be signed off by a registered pharmacist in the workplace, and the student must complete a structured work experience report. Where agreed in advance with the Director of Undergraduate Teaching and Learning and the co-ordinators of modules PH4006 and PH4012, a student undertaking his/her final year research project (module PH4012) during the summer vacation may undertake the work experience component during the first four weeks of the Sophister Michaelmas teaching term that are normally reserved for the research project. The student’s report and pharmacist’s declaration associated with the work experience component must be submitted by a specified date early in the Senior Sophister academic year, and they form part of the assessment for module PH4006, where they will be graded as satisfactory/unsatisfactory.

**ASSESSMENT**

*Each component must be passed*

<table>
<thead>
<tr>
<th>Component</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written examination (pharmacy law and professional requirements): 2 hours</td>
<td>70% of module marks</td>
</tr>
<tr>
<td>Section A - 2 essay/extended response questions. Section B - 50 MCQs (negative marking, +1/-0.25). All questions are compulsory and students must independently pass both Section A and Section B. Note: Questions on this examination may draw upon material related to pharmacy law and professional requirements from any module of the B.Sc. (Pharm.) programme (all years).</td>
<td></td>
</tr>
<tr>
<td>Pharmacy law and professional requirements: guided study activities</td>
<td>5% of module marks</td>
</tr>
<tr>
<td>Dispensing and patient care worksheets; minimum 60% in each worksheet. Note: Cases in the worksheets may draw upon material from any module of the B.Sc. (Pharm.) programme (all subjects, all years).</td>
<td>7% of module marks</td>
</tr>
<tr>
<td>Pharmacy practice practical test (2 hours, 5 cases, no choice); minimum 60% and no level 1 errors.</td>
<td>3% of module marks</td>
</tr>
<tr>
<td>Level 1 error: Automatic failure of the entire test, irrespective of the marks awarded.</td>
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</tr>
<tr>
<td>Level 2 error: Zero marks for the question in which the error is made.</td>
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<tr>
<td>Level 3 error: Deduction of 41% of the maximum marks available for the question in which the error is made.</td>
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<tr>
<td>Level 4 error: Deduction of 20% of the maximum marks available for the question in which the error is made.</td>
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<tr>
<td>Level 5 error: Deduction of 10% of the maximum marks available for the question in which the error is made.</td>
<td></td>
</tr>
<tr>
<td>Level 6 error: Deduction of 5% of the maximum marks available for the question in which the error is made.</td>
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</tr>
<tr>
<td>Note: Cases in the practical test may draw upon material from any module of the B.Sc. (Pharm.) programme (all subjects, all years).</td>
<td></td>
</tr>
<tr>
<td>Clinical attachment, including case presentation – satisfactory/unsatisfactory</td>
<td>---</td>
</tr>
<tr>
<td>Ethics and professionalism assessments</td>
<td>15% of module marks</td>
</tr>
</tbody>
</table>
Reflective continuing professional development e-portfolio – satisfactory/unsatisfactory

Work experience [140 hours during a four week full-time period in summer vacation between J5 and S5 years]: student’s report and pharmacist’s declaration – satisfactory/unsatisfactory

SUMMARY OF HOURS (excludes work experience)

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practicals/workshops/ clinical attachment</th>
<th>Tutorials</th>
<th>Total contact</th>
<th>Practical reports</th>
<th>Guided study</th>
<th>TOTAL</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>18</td>
<td>19</td>
<td>7</td>
<td>44</td>
<td>15</td>
<td>66</td>
<td>125</td>
<td>5</td>
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</tbody>
</table>

**Pass mark, plagiarism**
The pass mark for examinations and assessments is 40% except where otherwise indicated. See ‘Assessment’ above. Students should note that College penalties for plagiarism apply to both examinations and continuous assessment.

**Late work**
Continuous assessment exercises for this module must be presented for evaluation by the specified date(s). They must be presented to a designated member of staff in the manner requested (e.g., in person/by email/through the virtual learning environment), and signed in on the form for this purpose where applicable. Work submitted late will not be assessed unless a valid reason is provided, and permission for late submission should be obtained in advance of the submission deadline from the staff member responsible for the continuous assessment component. Where late work with a valid excuse is accepted for assessment, a penalty may be applied (deduction of up to 60% of the maximum marks available for the component) with the effect that marks for the late work will not normally exceed the pass mark.

**Missed classes/assessments**
In common with other modules for the pharmacy degree, attendance at all scheduled classes for this module is compulsory. A student who is unable to attend a class for any reason must notify his/her tutor of the reason for absence without delay, and present certification as appropriate. However, all continuous assessment components must be completed even if the student is absent for a valid reason. It is the student’s responsibility to obtain details of the assessment for the missed class(es) from the relevant staff member without delay, and to complete it on a self-study basis. The deadline for submission of the completed assessment to the relevant staff member is five days from the student’s return to College (return date notified to staff member by tutor, based on certification as appropriate) unless otherwise agreed in advance with the relevant staff member. Where feedback on the assessment has already been provided to the class prior to submission, a penalty may be applied (deduction of up to 60% of the maximum marks available for the assessment), with the effect that marks for the assessment will not normally exceed the pass mark. See above for late submissions.

**Progression to graduation, supplementals**
Students must satisfy the examiners in each component of the module independently. A student may be returned as a ‘qualified fail’ (QF) and refused permission to progress to graduation with his/her class until he/she has satisfied the examiners in all components of the module. This may necessitate sitting a supplemental examination and/or repetition/(re)submission of one or more continuous assessment components (including submission of one or more alternative exercises that have been set to replace failed/missed continuous assessment components). In such circumstances, the marks available for the supplemental examination may be capped at the pass mark, while penalties may be applied to practical tests and/or other continuous assessment components (deduction of up to 60% of the maximum marks available for the relevant element(s)), with the effect that marks for such elements will not normally exceed the pass mark. This is separate from, and in addition to, any penalties imposed for level 1 to level 6 errors in the pharmacy practice practical test. (See ‘Assessment’ above.)

**Non-satisfactory reports**
Students who have not fulfilled the module requirements with regard to attendance and/or coursework may be reported to the Senior Lecturer as non-satisfactory for one or more terms. Students reported as non-satisfactory for the Michaelmas and Hilary terms may be refused permission to take their annual examinations and may be required by the Senior Lecturer to repeat the year.

**Compensation**
Because of the importance accorded to this aspect of the course by the PSI, who accredit the degree, it is not possible to compensate in this module.

**Professional dress code**
Students are required to dress appropriately and behave in a professional manner for elements of the course entailing attendance at external facilities (professional experience in pharmacies, case review in hospitals, health service facilities etc.).
Staff of the School of Pharmacy & Pharmaceutical Sciences: Assoc. Prof. M. Henman (MH); Assoc. Prof. T. Grimes (TG), Assoc. Prof. C. Roche (CR)

Teacher-practitioners and allied staff: Ms. K. Rossi (KR); Ms. E. Deasy (ED); Dr. C. McCrystal (CMC)

External contributors: Mr. T. Delaney (TD); Dr. E. Relihan (ER); Ms. B. Flood (BF); Mr. S. Egan (SE); S. Kennedy (SK); Chronic Pain Ireland (CPI); Irish Cancer Society (ICS); Diabetes Ireland (DI); Ms. A. Nolan (AN); Mr. B. Dooley (BD); Dr. K. O’Donnell (KOD); A. M. Coleman (AMC); Ms. K. Meade (KM); Pharmaceutical Society of Ireland (PSI); Dr Lorraine Horgan (LH); Royal College of Surgeons in Ireland (RCSI); G. Morely (GM); Dr. M. Ryan (MR); Ms. C. Keane (CK), Dr. K. O’Connor (KOC)

Coordinator: Assoc. Prof Martin Henman

This module is divided into five units.

AIMS: To bring together key topics in the Practice of Pharmacy and provide the range of understanding and practical knowledge necessary for the student to practise satisfactorily under present circumstances and to respond to changes in the requirements of the health service and the profession.

PRE-REQUISITES: Completion of Pharmacy Practice III (PH3006)

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Explain the roles and responsibilities of the Pharmacy Regulator and the implications of the Pharmacy Act 2007 for public safety and the development of the profession of pharmacy.
- Understand the principles of management science and discuss how they may be applied to pharmacy practice.
- Discuss the factors governing the financial control of a business and be able to analyse the financial statement of a business applying those factors.
- Discuss the value of a systematic approach to service introduction and delivery in pharmacy, justify the need for audit of service provision in pharmacy practice and evaluate available audit tools.
- Appreciate the views of external stakeholders on the roles and responsibilities of pharmacists and pharmacy in the provision of health services and the care of patients.
- Understand Irish Health Service policy and Medicines policy and review how they may influence pharmacy practice.
- Understand the principles of communications skills and demonstrate the application of those skills to pharmacy practice.
- Systematically collect, interpret and apply knowledge in order to make and justify treatment recommendations and patient counselling, individually and in groups, in patient case studies comprising a range of conditions and classes of medicines set in the context of various health care settings.
- Understand the relationship between pharmaceutical care, evidence-based practice and patient care outcomes.
- Demonstrate a knowledge of the methods used to manage the provision of medicines and discuss the principles of medication safety in the context of patient safety.
- Understand the principles of Programme Development and Health Services Research.
- Demonstrate the ability to search and retrieve literature of all types, to paraphrase the arguments and evidence retrieved, to evaluate material in a critical fashion and to argue a personal view based upon that evaluation, and to present a dissertation following the conventions of academic writing.
- Understand and apply the skills particular to one of the three main branches of pharmacy - community, hospital or industrial pharmacy to common problem types faced in those branches of practice.
UNIT PH4007A: Social pharmacy and population health

LECTURES (25 hours)

1 Introduction to Practice of Pharmacy Course and Context of Practice MH
2-7 Communications Skills 1-6 MH
8 Sociology and Health Sciences MH
9 Psychology and Health Psychology MH
10 Biomedical model of health and illness MH
11 Biopsychosocial model of health and illness MH
12 Patient Compliance and Concordance CR
13 Health Care Professional Compliance CR
14 Health Behaviour change CR
15 Motivational Interviewing CR
16 Health promotion KR
17 Health education KR
18-21 Evidence-based pharmacy practice 1-4 TG
22-23 Medicines management and safety 1-2 TG
24 Medicines management and safety 3 TD (Ext)
25 Medicines management and safety 4 ER (Ext)

PRACTICALS (3 hours)

Communication skills KR

UNIT PH4007B: Pharmaceutical care and clinical skills

LECTURES (2 hours)

1 Vulnerable patients in health care BF (Ext)
2 Antimicrobial resistance and pharmacists’ role in antimicrobial stewardship SE (Ext)

SEMINARS (26 hours)

Health Promotion & Health Service Policy (2 hours) SK (Ext)
Health Promotion programmes in Community Pharmacy Practice (2 hours) KR
Disease screening & Standards of Practice in Pharmacy Practice (2 hours) CR
Pharmaceutical Care – patient support groups 1 (2 hours) CPI (Ext)
Pharmaceutical Care – patient support groups 2 (2 hours) ICS(Ext)
Pharmaceutical Care – patient support groups 3 (2 hours) DI (Ext)
Pharmaceutical Care & Therapeutics 1 (2 hours) TG
Pharmaceutical Care & Therapeutics 2 (2 hours) TG
Pharmaceutical Care & Therapeutics 3 (2 hours) TG
Pharmaceutical Care & Therapeutics 4 (2 hours) TG
Pharmaceutical Care & Therapeutics 5 (2 hours) TG
Pharmaceutical Care & Therapeutics 6 (2 hours) TG
Pharmaceutical Care & Therapeutics 7 (2 hours) TG

COMPUTER-AIDED LEARNING (CAL)

CaseInteract Assignments JD (Ext)

UNIT PH4007C: Pharmaceutical policy and strategic management

LECTURES (20 hours)

1-6 Management Science applied to Pharmacy AN (Ext)
7-9 Business Management skills in pharmacy CMcC
10 Drug Distribution in Ireland GM (Ext)
11 Pharmaceutical Industry in Ireland AN (Ext)
12 Irish Medicines Board – Marketing authorisations in Ireland and the EU BD (Ext)
13 Irish Medicines Board – Compliance KOD (Ext)
14 Irish Medicines Board – Pharmacovigilance AMC (Ext)
15 Antimicrobial Stewardship: policies and practice SE (Ext)
16 Health Service: HSE Policies & Programmes KM (Ext)
17 PSI & the National Pharmacy Internship Programme PSI (Ext)
18 National Pharmacy Internship Programme RCSI (Ext)

80
UNIT PH4007D: Pharmacy practice electives (Hilary Term)

**SEMINARS (9 hours)**

| Community pharmacy elective (small group – 9 hours) | Community Pharmacy 1 | KR |
| Community Pharmacy 2 | KR |
| Community Pharmacy 3 | KR |

| Hospital pharmacy elective (small group – 9 hours) | Hospital Pharmacy 1 | ED |
| Hospital Pharmacy 2 | ED |
| Hospital Pharmacy 3 | ED |

| Industrial pharmacy elective (small group – 9 hours) | Industrial Pharmacy 1 | KOC |
| Industrial Pharmacy 2 | KOC |
| Industrial Pharmacy 3 | KOC |

**UNIT PH4007E: Dissertation**

Dissertation Seminar: Health Informatics & Evidence-based literature review (3h) MH

Dissertation (5,000 word minimum essay) literature review and critical analysis of topic linked to Elective choice i.e., Community, Hospital or Industrial Pharmacy (65h) Guided study

**ASSESSMENT**

Each component must be passed. **Weighting**

Written examination: 3 hours. 5 essay questions 60% of overall grade

- Section A (PH4007A, PH4007B, and PH4007C): 4 questions out of 6.
- Section B (PH4007D): 1 question out of 3. There is one question per elective.

Dissertation (PH4007E) 35% of overall grade

Communication skills – role play and reflection (PH4007A) satisfactory/unsatisfactory

Coursework in *Pharmaceutical Care & Therapeutics* (PH4007B) 5% of overall grade

**SUMMARY OF HOURS**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practicals</th>
<th>Seminars</th>
<th>Total contact</th>
<th>Practical reports</th>
<th>Guided study (incl. CAL)</th>
<th>TOTAL</th>
<th>ECTS</th>
</tr>
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<tbody>
<tr>
<td>47</td>
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<td>38</td>
<td>88</td>
<td>3</td>
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</table>

Students should note that College penalties for plagiarism apply to both examinations and continuous assessment.

A specific requirement of the course is that continuous assessment exercises must be presented for evaluation by the specified date(s). They must be presented to a designated member of staff and signed in on the form for this purpose. Work submitted late will not be assessed unless a valid reason is provided.

1 Students must satisfy the examiners in all practical components of Units PH4007A and PH4007B. However, the marks obtained do not contribute towards the overall Practice of Pharmacy grade for the year with the exception of coursework in *Pharmaceutical Care and Therapeutics* (see above).

A student may be returned as a ‘qualified fail’ (QF) and refused permission to progress with their class until they have satisfied the examiners in each component of the course.

**NB: Professional Dress Code**

Students are required to dress appropriately and behave in a professional manner for elements of the course entailing attendance at external facilities (professional experience in pharmacies, case review in hospitals, health service facilities, etc.)

This module cannot be compensated.
ADDICTION PHARMACY & INTEGRATED PHARMACY SKILLS
Year 4 (Senior Sophister)                                               Course Code: PH4008

Staff of the School of Pharmacy & Pharmaceutical Sciences: Asst. Prof. F. Boylan (FB), Assoc. Prof. A. Harkin (AH),
Assoc. Prof. J. Gilmer (JG), Dr. D. Corrigan (DC), Assoc. Prof. C. Roche (CR), Asst. Prof. M.J. Santos-Martinez (MS).
(Additional staff and postgraduates contribute to Unit PH4008B.)
Teacher-Practitioner: Ms. K. Rossi (KR)
External Contributors: Dr. M. Woods (MW), Mr. J. Bourke (JB), Dr. D. O’Driscoll (DOD)

Coordinators:  Asst. Professor Fabio Boylan (PH4008A)
               Assoc. Professor Cicely Roche (PH4008B)

This module consists of two separate units.

PH4008A: Addiction Pharmacy
AIMS: To provide the student with an understanding of the nature, extent and causes of problem drug-taking in
Ireland in order that they can undertake professional activities as pharmacists in the prevention and treatment of
drug dependence and other drug-related problems.

PH4008B: Integrated Pharmacy Skills
AIMS: To provide opportunity for students to experience satisfactory completion of OSCE stations under
examination conditions.

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
• Discuss the complexity of a drug taking problem.
• Describe neurochemical and psychopharmacological aspects of drug abuse.
• Discuss psychosocial aspects of drug abuse.
• Describe the role of the pharmacist in smoking cessation as well techniques available for same.
• Describe the main sources of drugs, and describe the pathophysiology of the major drug types.
• Discuss the National Drug Strategy and the role of the pharmacist in addressing Drug Misuse.
• Discuss the controls and protocols relating to the supply of methadone.
• Reflect on the experience of an OSCE workshop provided to mirror examination conditions.
• Peer review fellow-students’ completion of OSCE stations in facilitated workshops.
• Demonstrate competency in OSCE station completion under examination conditions.

COURSE OUTLINE

PH4008A: Addiction Pharmacy

LECTURES

<table>
<thead>
<tr>
<th></th>
<th>Lectures</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>Pharmaceutical Chemistry of the opioids, related peptides and receptors.</td>
<td>JG</td>
</tr>
<tr>
<td>4-6</td>
<td>Molecular and Cellular Mechanisms of Addiction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ethanol Abuse, Dependence and Withdrawal. Alcoholism pharmacotherapy</td>
<td></td>
</tr>
<tr>
<td>7-9</td>
<td>Therapeutics for the treatment of cocaine and opiate addictions</td>
<td>AH</td>
</tr>
<tr>
<td>10-11</td>
<td>Cannabis, phyto cannabinoids and pathophysiology of cannabis.</td>
<td>FB</td>
</tr>
<tr>
<td>12</td>
<td>Pharmacology of smoking cessation</td>
<td>MS</td>
</tr>
</tbody>
</table>

WORKSHOPS AND SEMINARS (16 hours)

1. Overview of the role of the pharmacist within the National Drug Strategy – 2 hours. DC (CR)
2. Role of the pharmacist in preventing and addressing drug misuse – 2 hours. CR
3. Psychosocial aspects of problem drug taking. 2 hours. MW
4. Role of the pharmacist in smoking cessation – 2 hours. KS/CR
5. The Methadone Protocol in practice – 2 hours DOD
6. Brief interventions – skills development – 2 hours MW
7. Role of the pharmacist in harm reduction & team peer review session. – 2 hours JB/CR
LABORATORY CLASSES (6 hours total)
Identification of Drugs of Abuse I-Cannabis
Identification of Drugs of Abuse II-Narcotics

DIRECTED READING
Wills S. Drugs of Abuse 2nd Edn, Pharmaceutical Press, London 2005
Ward J. et al. Role of maintenance treatment in opioid dependence. Lancet, 1999; 221-6 (Available on line)

ASSESSMENT

<table>
<thead>
<tr>
<th>Written Paper (2 hours): Consists of 2 sections.</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A: 3 Essay-type questions (answer 2 of 3) – 70%</td>
<td>60% of the total</td>
</tr>
<tr>
<td>Section B: 10 MCQs (negative marking to apply [+1/-0.25]) – 30%</td>
<td></td>
</tr>
<tr>
<td>Seminar/Workshop reports</td>
<td>15% of the total</td>
</tr>
<tr>
<td>Group wiki</td>
<td>15% of the total</td>
</tr>
<tr>
<td>Lab Class Reports</td>
<td>10% of the total</td>
</tr>
</tbody>
</table>

N.B. Students are expected to satisfy the examiners each of the following: written examination, seminar/work reports and group wiki components of PH4008A. The pass mark for each component is 40%. Students who obtain an overall mark of less than 40% in these components will be required to sit the supplemental examination and/or resubmit coursework. Students who fail to satisfy the written requirement (i.e. less than 40%) of the annual examination, but who obtain 40% or better for this module will be returned as ‘qualified fail’ (QF) and will be required to take a supplemental examination in the written examination only.

PH4008B: Integrated Pharmacy Skills

LECTURE
1. Integrated Pharmacy Skills: Objective Structured Clinical Examination CR

WORKSHOPS AND SEMINARS
1. Introductory workshop including ‘practice’ OSCE and reflection (2 hours) CR & others
2. OSCE workshop including peer review (2 hours) CR
3. OSCE workbook SDL review seminar (1 hour) CR
4. OSCE exam preparation seminar (1 hour) CR

ASSESSMENT
Evaluation by OSCE Satisfactory/Unsatisfactory

International Erasmus Students are not expected to do the OSCEs component of this module. They will be required to do an alternative assignment in order to obtain the 5 ECTS for PH4008.

SUMMARY OF HOURS

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Seminars/Workshops</th>
<th>Practicals</th>
<th>Total contact</th>
<th>Practical reports</th>
<th>Guided study</th>
<th>TOTAL</th>
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<tr>
<td>PH4008A</td>
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<td>6</td>
<td>41</td>
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<td>125</td>
</tr>
</tbody>
</table>

PH4008A and PH4008B must be passed independently. This module cannot be compensated.
Staff of the School of Pharmacy & Pharmaceutical Sciences: Assoc. Prof A. Harkin (AH)

Coordinator: Assoc. Professor Andrew Harkin (AH)

AIMS: To teach the principles of neuropharmacology and drug therapies for disorders of the central nervous system.

PRE-REQUISITES: SF and JS Pharmacology modules

LEARNING OUTCOMES: On successful completion of this module the student will be able to:

- Discuss the diagnostic criteria and symptom presentation, biological basis and drug treatment of affective and anxiety disorders, insomnia, schizophrenia, drug dependence, pain, epilepsy, Parkinson’s and Alzheimer’s disease.
- Describe the mechanisms of action and clinical uses of local and general anaesthetic drugs.
- Identify the pharmacokinetic characteristics and adverse effects associated with antidepressant, mood stabilising, anxiolytic, hypnotic, analgesic, anaesthetic, anticonvulsant, anti-Parkinsonian and cognitive enhancing drugs.
- Discuss the neurobiological theory of CNS disorders and neurobiological adaptation to psychotropic drugs.
- Assess and evaluate recent advances in the drug treatment of CNS disorders and provide an up to date insight into CNS drug development.

COURSE OUTLINE

LECTURES (AH)

1,2 Depression (2 lectures)
3 Antidepressants
4 Mood stabilizers - Lithium
5 Anxiety disorders
6 Anxiolytics
7 Hypnotics
8 Schizophrenia
9,10 Antipsychotics (2 lectures)
11 Neuropharmacology of addiction and drug dependence – reward circuitry
12 Anaesthetics (Local)
13 Anaesthetics (General)
14 Neuropharmacology of addiction and drug dependence – drugs of abuse
15 Epilepsy
16,17 Anticonvulsant drugs (2 lectures)
18 Pain – nociception, spinal and supra spinal pain pathways
19,20 Narcotic analgesics and Other CNS acting analgesics (2 lectures)
21 Parkinson’s disease
22 Anti-Parkinsonian drugs
23 Alzheimer’s disease
24 Drug treatment of Alzheimer’s disease
25 Brain ischemia and neuroprotection

TUTORIALS (4 x 2 hour) with Pharmaceutical Care and Clinical Skills (PH4007)

Tutorial 1: Pharmacotherapy of depression: focus on factors affecting choice of SSRI
Tutorial 2: Clinical use of analgesic drugs – choosing the right analgesic
Tutorial 3: Pharmacological strategies for the treatment of stroke
Tutorial 4: Neuropharmacology course review
DIRECTED READING
Brody's Human Pharmacology: Molecular to Clinical (4th Ed.) by K.P. Minneman
The Biochemical Basis of Neuropharmacology (8th Ed.) by J.R. Cooper, F.E. Bloom, R.H. Roth
Molecular Neuropharmacology: A Foundation for Clinical Neuroscience (2nd Ed.) by E.J. Nestler, S.E. Hyman, R. Malenka
Fundamentals of Psychopharmacology (3rd Ed.) by B. Leonard

ASSESSMENT:
Written Examination: 2 hours
Part 1, answer 3 questions out of 4 60% of total marks
Part 2, 20 multiple choice questions, negative marking scheme 40% of total marks

SUMMARY OF HOURS

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<td>115</td>
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</table>
MALINNG DISEASE, IMMUNOPHARMACOLOGY & PHARMACOLOGY OF THE EYE
Year 4 (Senior Sophister) Course Code: PH4011

Staff of the School of Pharmacy & Pharmaceutical Sciences: Assist. Prof. C. Medina (CM), Assoc. Prof. L. O’Driscoll (LOD), Prof. M. Radomski, (MR), Assoc. Prof. M. Henman (MH), Assoc. Prof. N. Frankish (NF)

Coordinator: Assist. Prof. Carlos Medina

AIMS: The student will acquire knowledge of the health sciences relevant to the use of drugs and medicines in the treatment of malignancy, and immunological disorders. The student will acquire knowledge of the pharmacological factors relevant to the pharmaceutical care of patients with selected conditions.

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
- Demonstrate the ability to recognise cancer symptoms
- Discuss the prevention of most frequent types of cancer in Ireland
- Discuss the principles of the chemotherapy of cancer and the approaches used to maximise efficacy
- Explain how side effects of cytotoxic drugs may be minimised
- Apply principles of palliative care when appropriate
- Explain the abnormal functioning of the immune system
- Describe the actions and uses of immunomodulators
- Describe the basic anatomy and physiology of skin and eyes
- Recognise skin and ocular symptoms
- Differentiate between eczema and psoriasis
- Describe the mechanism of action of the different drugs used for the treatment of skin and ocular disorders
- Advise and counsel patients with skin and ocular symptoms and make appropriate responses to presented symptoms

PRE-REQUISITES: SF and JS Pharmacology modules

The module is comprised of two Units:

UNIT PH4011A: TREATMENT OF MALIGNANT DISEASE

LECTURES
1. Cancer Pathogenesis LOD
2. General Principles of action of cytotoxic drugs CM
3. Types of cancer: Solids and non-solids CM
4. Main type of solid cancers in Ireland CM
5. Alkylating agents LOD
6. Anti-tumour antibiotics LOD
7. Antimetabolites LOD
8. Plant derivatives LOD
9. Hormone therapy CM
10. Biological response modifiers CM
11. Treatment of side effects of Chemotherapy CM
12. Palliative Care CM
13. Cancer Research CM

UNIT PH4011B: IMMUNOPHARMACOLOGY

LECTURES
1. Drug hypersensitivity MR
2. Treatment of drug hypersensitivity MR
3. Immunosuppression MR
4. Immunotolerance MR
5. Immunostimulation MR
6. Dermatopharmacology I MH
7. Dermatopharmacology II MH
8. Eczema
9. Psoriasis
10. Ocular Pharmacology I
11. Ocular Pharmacology II
12. Ocular Pharmacology III
13. Drug interactions I
14. Drug interactions II
15. Drug interactions III
16. Course assessment and review

SEMINARS/TUTORIALS
Mechanisms and adverse effects of immunomodulators in transplantation
Cancer chemotherapy
Combination drug treatment in eczema and psoriasis

ASSESSMENT:
Written Examination: 2 hours
Part 1, answer 3 questions out of 4
Part 2, 20 multiple choice questions, negative marking scheme

SUMMARY OF HOURS

<table>
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<th>Lectures</th>
<th>Seminars/ Tutorials</th>
<th>Total contact</th>
<th>Guided study</th>
<th>TOTAL</th>
<th>ECTS</th>
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Staff of the School of Pharmacy & Pharmaceutical Sciences: Academic staff will supervise projects and participate in the panels which will assess the write-ups and presentations.

Project Coordinators: Asst. Professor Carlos Medina / Asst. Professor Astrid Sasse

LEARNING OUTCOMES: On successful completion of this module the student will be able to:
- Explain the background to the chosen research area
- With individual support from an academic supervisor formulate the hypothesis to be addressed and select the means by which it is to be tested
- Generate and/or retrieve data and analyse it appropriately
- Demonstrate research skills relevant to their chosen area of research
- Plan and carry out practical work carefully and to a high standard
- Evaluate their research findings in the context of the current understanding of that area of research, and to do so in a balanced and concise way
- Prepare a report of the project in the form of (i) a well organised and well argued report and (ii) an oral presentation, demonstrating comprehensive understanding and critical interpretation of methodologies and data to set the research in context.

COURSE OUTLINE: Project options will be published at the beginning of September. Students will rank fifteen favourite projects. Projects will be allocated according to preference and overall result in the JS year. Projects will take place in the first four weeks of Michaelmas Term. The four weeks will include both research and a large portion of the write-up. First drafts of the write-up are expected at the end of the four-week period (23rd October). Deadline for final write up is Monday, 16th November. Each student will be required to give an oral presentation to the panel on their project which will be 10 minutes plus 5 minutes for questions to a panel of 3 academics (not including the project supervisor) in week 14, 15 or 16 (Tuesday).

Project write-up: 5,000-10,000 words - higher end for non-lab-based and lower end for lab-based projects.

Video Link to further information: https://www.youtube.com/watch?v=13ckzra_NoY&feature=youtu.be

ASSESSMENT

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<th>Project Supervisor</th>
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<td>Attendance, commitment and engagement with project work</td>
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<td>Practical work</td>
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<td>Project write-up</td>
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<td>Reference material employed for the project</td>
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<td>Analysis of data</td>
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<td>Conclusion and recommendations</td>
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<td>Reference material employed for the project</td>
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<td>Conclusion and recommendations</td>
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<td>Oral Presentation &amp; Discussion (50% of panel mark)</td>
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SUMMARY OF HOURS

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<th>Practical write-up</th>
<th>Guided study</th>
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Students may undertake an internal or external research project during the summer in between SF and JS or JS and SS years. Where approved in advance with the Director of Undergraduate Teaching and Learning, a student may use data acquired during a summer research project for PH4012. Such students will be assigned to an internal project supervisor by the Director of Undergraduate Teaching and Learning and are expected to submit a project write-up and make an oral presentation of their research to a panel as all other SS students. Students who have undertaken the research project during the summer in between JS and SS year may undertake the work experience component of PH4006 during the first four weeks of the Senior Sophister Michaelmas teaching term that are normally reserved for the research project.
1.- INTRODUCTION

This document is intended to provide guidance on student fitness to practise procedures in the School of Pharmacy and Pharmaceutical Sciences, TCD, according to the Trinity College Dublin Fitness to Practise Policy. Pharmacy students, in common with other health professional students, have certain privileges and responsibilities different from those of other students. Because of this, different standards of professional conduct are expected of them.

The framework governing fitness to practise cases is placed on a firm footing in College by the 2010 Statutes and Schedules, College Fitness to Practise Policy, the College Calendar, School Fitness to Practise Policies, Codes of Conduct for Schools and relevant Health Service Providers and other College Policies (e.g. Disciplinary Policy, Garda Vetting Policy).

The framework governing fitness to practise cases is conceived in section 5 of the Chapter on Student Conduct and Capacity in the 2010 Statutes and the procedural detail is described in Schedule 5 to that Chapter. This is supplemented by the College Fitness to Practise Policy which

“...so far as is possible (is) to be read together (with the Statutes and Schedules) as one document...however...in cases of conflict or inconsistency between the Policy on the one hand, and the Statutes and Schedules on the other, the latter shall prevail.”

Student Conduct

Students of the School of Pharmacy and Pharmaceutical Sciences, Trinity College Dublin are expected, both while on practice experience* and in the classroom and laboratories, to demonstrate a high standard of professional behaviour. While on practice experience, students are required to comply with the Code of Conduct for Pharmacy students of the School of Pharmacy and Pharmaceutical Sciences, with the disciplinary rules of the practice experience provider where the practice experience is located and with the regulations of Trinity College Dublin relating to student conduct. When on practice experience students are reminded that patients and client’s interests and safety take precedence over students’ education.

Students who have been found unfit to practise may be prevented from progressing to the fifth (M.Pharm.) year of the Pharmacy (Integrated) programme.

*NOTE: For the purposes of this document the term “practice experience” is taken to mean any of the following, undertaken by the student as part of his/her course of studies and/or during the time in which he/she is a registered student of the University:

• Period of practice placement in a pharmacy, health service provider or other establishment, which is (primarily) arranged by the University
• Period of work experience in a pharmacy, health service provider or other establishment which is (primarily) arranged by the student
• Visit to a community pharmacy, hospital pharmacy, industry or any other establishment, whether arranged by the student or the University

2.- STATUTORY REQUIREMENTS

2.1 Requirement for Schools to formulate policy and constitute Committees

Section 2(1) of Schedule 5 of the 2010 Statutes states:

(1) Each School in which fitness to practise matters can normally arise should

   a) formulate a policy relating to such matters and
   b) constitute a Fitness to Practise Committee...

School Pharmacy and Pharmaceutical Sciences Fitness to Practise Committee – Committee members

The School Committee shall consist of three members of staff designated by the Faculty Executive and one of the members shall be appointed by the Faculty Executive to act as chair. Two members will be from the School of Pharmacy and Pharmaceutical Sciences, one of whom must teach in Practice of Pharmacy. The third member should be from another School outside the Faculty with fitness to practise requirements. Where the Faculty Executive deems it appropriate, one of the School members may be substituted by a staff member of the establishment where the student was on practice experience. For the avoidance of doubt, it should be noted that members of the School Fitness to Practise Committee do not act in any representative capacity but rather are required to bring their own individual judgment to bear on the question of whether the student complies with the School's fitness to practise requirements. A member of the School's administrative staff may be in attendance at meetings of the School Fitness to Practise Committee for the purpose of recording decisions made by such Committee. In dealing with a concern regarding a student's fitness to practise, the School Fitness to Practise Committee shall follow the procedures set out in Schedule 5 of the Chapter on Student Conduct and Capacity in the 2010 Statutes, entitled 'Fitness to Practise'. Section 2(5) of that Schedule provides that the "School [Fitness to Practise] Committee shall determine its own procedures and shall perform its functions with due enquiry"

The number of people required for a meeting of the School Fitness to Practise Committee to be quorate shall be 50% of the membership plus one.

Substitution may be permitted if a Committee becomes temporarily or permanently inquorate. If such a situation should arise in the context of a permanent substitution, the new member(s) should be given an opportunity to read the transcripts of previous hearings. Remaining Committee members shall not hear evidence twice due to the substitution of a Committee member.
2.2 Requirement for the College to constitute a Fitness to Practise Committee

Section 4 of Schedule 5 of the 2010 Statutes states:

(1) There shall be a College Fitness to Practise Committee

(2) The membership of the College Committee shall be determined by Council, subject to the approval of Board.

The College Fitness to Practise Policy outlines the composition of the College Fitness to Practise Committee. Section 4(4) of Schedule 5 confirms that an appeal to the College Fitness to Practise Committee is a full rehearing.

2.3 Due enquiry and natural justice

The College Fitness to Practise Policy notes the statutory requirement contained in Schedule 5 of the Chapter on Student Conduct and Capacity in the 2010 Statutes that both the College Fitness to Practise Committee and the School Fitness to Practise Committee “shall determine (their) own procedures and perform (their) functions with due enquiry”.

The Policy further notes the definition of ‘due enquiry’ in s. 17(1) of the Introduction Chapter to the 2010 Statutes as meaning “diligent, proper and impartial investigation or consideration as the case may be, subject to principles of natural and constitutional justice and fair procedures.”

3. PROCEDURES

3.1 Dealing with the complaint at first instance

Where a member of College staff or practice-based staff or other appropriate individual has a concern regarding a student's fitness to practice, s/he should refer the student's case, in the first instance, to the relevant Director of Teaching and Learning (Undergraduate or Postgraduate, in accordance with the student’s standing), this function having been delegated to the Directors by the Head of School. In cases where there may be actual/perceived conflict of interest (e.g. where the Director is the student’s tutor, where the Director was the original complainant or where he/she was otherwise involved in the case) the Head of School must resume this function or delegate it to another appropriate office holder within the School.

The Director must discuss the case with the Junior Dean, having first checked to see whether the School has a record of the student being registered with the Disability Service. Where there is no such record, the Director must request the student’s tutor or postgraduate advisor to meet with the student to encourage disclosure of any undisclosed disability. If the student has a disability\(^1\), the Director must discuss the case with the Junior Dean and the Disability Officer (whether or not the student is registered with the Disability Service). Following this consultation, the Director/Junior Dean must decide which process (Fitness to Practise or other) to apply. In making this decision, the Director/Junior Dean must first consider whether the concern could fall under disciplinary cases, matters of student mental ill health or other health concerns or Garda vetting cases. The College Policy clearly outlines that these three categories should not in the first instance be dealt with under the fitness to practise procedures.

\(^1\) Disability refers to instances where the student or the Disability Service with the consent of the student has disclosed the disability to the School
At this point, the DUTL/Junior Dean should also consider whether it is necessary to temporarily suspend a student (see Section 3.4 below, power to suspend).

In particular, the student should be notified beforehand in writing of the School's concerns in relation to his/her ability to comply with fitness to practise requirements. The student is entitled to be present at the hearing when those concerns are presented to the School Fitness to Practise Committee. The student's tutor (or, in the case of a student registered on a postgraduate course, a postgraduate student advisor) or any other person of the student's choice may represent the student; and the student and any such representative shall be given full opportunity to be heard on the matter before the School Fitness to Practise Committee. In particular, the student or his/her representative is entitled to question the representative of the School on the case made against the student. The representative of the party referring the case to the School Fitness to Practise Committee is equally entitled to be present at the hearing when the student's response to the concerns raised is presented and is entitled to question the student on this response.

Where the School Fitness to Practise Committee decides that the concern is well founded, it may take any of the actions set out in section 3 of Schedule 5 (see Section 4.5 below on decisions of the School Fitness to Practice Committee). The School Fitness to Practise Committee shall also notify the parties of the right of appeal to the College Fitness to Practise Committee.

3.2 Common issues that may arise which, in the first instance, are not normally handled as fitness to practise matters

Fitness to practise matters should not normally be dealt with as matters of discipline, but there will be some exceptional cases where this will be necessary, either in whole or in part. Where it is decided that a case or a part thereof should be treated as a disciplinary matter, the case shall be dealt with in accordance with College's disciplinary procedures as set out in Schedule 2 to the Chapter on Student Conduct and Capacity in the 2010 Statutes.

The following describes a number of possible issues relating to the fitness of a student to practice. It comprises a non-exhaustive summary, and is for guidance only; the School should deal with each case individually.

a) Plagiarism

In the General Regulations of the College Calendar, it is stated that “the University considers plagiarism to be a major offence, and subject to the disciplinary procedures of the University”. Cases of plagiarism should therefore generally be dealt with under the regulations outlined in the College Calendar and not under the Fitness to Practise Policy.

b) Poor conduct (general)

Poor conduct should be dealt with using the disciplinary procedures, rather than the Fitness to Practise Policy. The type of conduct that invokes the College Disciplinary Procedures is clearly described in Part 1 of Schedule 2 of the Chapter on Student Conduct and Capacity in the 2010 Statutes and includes, but is not limited to:
(1) Activity which brings the College into disrepute

(2) Misconduct in relation to examinations, libraries and the use of other College facilities, services and accommodation

(3) Disruption of the normal operation of activities within the College

(4) Harassment or misbehaviour on College property or in dealings with others

Part 2 also clearly covers attempts to breach College regulations, and states that any breaches or attempted breaches of the criminal law should also be dealt with under the disciplinary procedures.

If a criminal investigation is being conducted at the same time as a fitness to practise investigation, the fitness to practise investigation must be paused pending the outcome of the criminal investigation.

c) Garda vetting cases

Fitness to practise cases that arise as a result of Garda vetting of a student shall be dealt with in accordance with the Garda Vetting Policy and Procedures for Undergraduate and Postgraduate Students, 2009. This reads:

“Students on courses with clinical or other professional placements may be required to undergo Garda vetting procedures prior to commencing placements. If, as a result of the outcome of the Garda vetting procedures, a student is deemed unsuitable to attend clinical or other professional placement, he/she may be required to withdraw from his/her course.”

TCD uses the Garda Siochana (Garda Central Vetting Unit (GCVU)) which, where applicable, may liaise with the Police Service of Northern Ireland vetting service to assess the suitability of applicants (“Applicants”) for admission to such Programmes. Garda Vetting includes Police Vetting in respect of other jurisdictions. Students who have resided outside Ireland for a consecutive period of 6 months or more will be required to provide police clearance documentation from the country in which they resided at the time of registration.

d) Students with disabilities

The College policy states that ‘if a student has a disability, and there are concerns over fitness to practise, section 4 of Schedule 1 of the Chapter on Student Conduct and Capacity in the 2010 Statutes, entitled ‘Student Discipline’ shall apply, and the guidelines outlined therein should be followed prior to any fitness to practise hearing’.

Section 4 of the College Fitness to Practise Policy refers to the need to provide reasonable accommodation to students with disabilities. If a student with disabilities has been provided with reasonable accommodation which enables him/her to participate fully in his/her programme and there are still concerns about the student’s ability to practise elements of his/her course, the case shall be dealt with under section 3 of the College Fitness to Practice Policy (the normal procedures), in the same way as any other student on the course.

To ensure that the School of Pharmacy has fulfilled its requirements under section 4 of the College Policy, the School will endeavour to work with the student, the College Disability Service and the relevant practice-based staff. In particular, the School will endeavour to ensure that the practice-based staff are aware of College policies in relation to students with disabilities and the role of the Disability Service.
It is the duty of the School to ensure that they have complied with Section 4 of the College Policy. However, the College Calendar further provides that

“if the student does not engage with the reasonable accommodations process… and concerns remain in relation to the student’s fitness to participate in professional placements, the case shall be dealt with in accordance with (the normal procedures)”

If the School refers a student to the Disability Service, they should inform the student that a failure to engage with the process may adversely affect the student in the event that a fitness to practise issue arises.

e) Student Mental Ill Health and other health concerns

In some cases, fitness to practise issues may derive in the first instance, in whole or in part, from a student’s mental ill health or some other health concerns. In these cases, the matter should not in the first instance be dealt with under the Fitness to Practise Policy, but under Schedule 3 of the Chapter on Student Conduct and Capacity of the 2010 Statutes.

If concerns about a student’s mental health or some other health concerns arise at the same time as a fitness to practise investigation but the concerns are not related to the fitness to practise concerns, the fitness to practise investigation must be paused until the issues related to the student’s mental health are resolved.

3.3 Other fitness to practise cases

Fitness to practise cases that do not constitute disciplinary offences should be referred by the Junior Dean, Director or other person to whom this function has been delegated, as the case may be, to the School Fitness to Practise Committee, subject to the proviso that where it is known that the case involves a student with a disability (whether or not the student is registered with the Disability Service), the School must comply with the guidelines set out in section 4 of Schedule 1 of the Chapter on Student Conduct and Capacity in the 2010 Statutes, entitled ‘Student Discipline’ before the case can be referred to the School Fitness to Practise Committee. The Director must request the student’s tutor or postgraduate advisor to ascertain whether the student has a disability, whether disclosed or hitherto undisclosed. Where a fitness to practise issue arises in other contexts before other committees, such as in the course of an academic appeal being pursued by a student, Course Office based Court of First Appeal, School based Court of First Appeal, Faculty based Court of First Appeal, the Academic Appeals Committee, the Graduate Studies Committee, and the like, then each such other committee shall have a discretion to refer that issue to the relevant School Fitness to Practise Committee if this is considered a more appropriate way of dealing with the matter.

The following describes a number of possible breaches of the Code of Conduct for Pharmacy Students of the School of Pharmacy and Pharmaceutical Sciences and/or the disciplinary rules of a practice experience provider that could result in referral to the School FTP Committee. This list is indicative rather than exhaustive:

1. The demonstration of irresponsible behaviour e.g. through persistent and frequent absences without explanation or prior notice, and/or persistent and frequent late attendance or failure to record attendance sheets as required. **
2. The demonstration of persistent unprofessional behaviour e.g. through rudeness, swearing, inappropriate remarks, slovenly or unclean appearance. **
3. The demonstration of unprofessional behaviour in speaking to/dealing with patients/clients;
4. Appearing in the practice experience establishment under the influence of alcohol or drugs;
5. Breaking confidentiality of a patient/client;
6. Inappropriate/abusive behaviour towards a patient/client;
7. Altering records of any kind without permission, or forging another person’s signature;
8. Misuse of drugs in the classroom or college;
9. Malicious damage to practice experience provider’s property;
10. Malicious damage to practice experience provider’s reputation;
11. Demonstration of disrespect for the Pharmacy Regulator (PSI) or the profession;
12. Unsafe practice with due recognition of the student’s stage in the programme
13. Health concerns and lack of insight or management of these concerns: failure to seek appropriate medical treatment or other support; failure to follow medical advice or care plans, including monitoring and reviews, in relation to maintaining fitness to practise; failure to recognise limits and abilities or lack of insight into health concerns; treatment-resistant conditions, which might impair fitness to practice

** It is understood that an initial transgression under the headings of 1 and 2 above may be dealt with by the most relevant person in the practice experience provider, usually by giving advice/censure. Repeated transgressions following such advice, however, may be reported to the relevant Director of Teaching and Learning.

### 3.4 Powers to suspend

Where student behaviour threatens the well-being of patients, students or staff, the Director or an appropriate member of the work experience-based staff (preceptor pharmacists who supervise and assess pharmacy students in the workplace) has the power to suspend the student with immediate effect (section 2(4) of Schedule 5 of the Chapter on Student Conduct and Capacity in the 2010 Statutes, entitled ‘Fitness to Practise’). This is in addition to the powers of the School Fitness to Practise Committee and the College Fitness to Practise Committee pursuant to section 3 of the Schedule to recommend the suspension of a student. Moreover, these powers are without prejudice to other powers to suspend students in other circumstances, such as the power of the Junior Dean under Schedule 3 to the Chapter on Student Conduct and Capacity to suspend a student with mental health difficulties where the student constitutes a clear and reasonably imminent danger to himself/herself or to others.
4. CONDUCTING A FULL INVESTIGATION

4.1 Initial investigation of issues of concern regarding fitness to practice

1. When there is an alleged issue of fitness to practice regarding student conduct while the student is on practice experience, that cannot be dealt with through local mechanisms, the student’s supervisor in the practice experience establishment may contact the relevant Director of Teaching and Learning in the School of Pharmacy and Pharmaceutical Sciences outlining these concerns in writing and providing relevant written evidence.

2. It is acknowledged that, in the case of serious concerns about conduct or alleged breach of the Code or of the practice experience establishment rules, it may be necessary for the practice experience provider to take action, including temporary suspension from practice if required, pending the decision of the School Fitness to Practise Committee.

3. When there is alleged concern regarding a student’s conduct arising from assessment, assignments, or while the student is attending classroom teaching, laboratories and/or examinations in College, the relevant staff member should contact the relevant Director of Teaching and Learning in the School of Pharmacy and Pharmaceutical Sciences outlining these concerns in writing and providing relevant evidence. For disciplinary matters, School staff may also refer directly to the Junior Dean. In the case of serious concerns about the student’s conduct or risk of self harm or harm to others, it may be necessary to suspend the student temporarily from the classroom.

4.2 Collection of evidence

Where fitness to practise concerns arises, they shall be referred in the first instance to the relevant Director of Teaching and Learning in the School of Pharmacy and Pharmaceutical Sciences (a function which has been delegated to the Directors by the Head of School, and which may be delegated to another appropriate office holder in the School if there is any actual/perceived conflict of interest). The Director shall therefore normally be the investigator. The Investigator should not be a member of the School Fitness to Practise Committee. He/she may act as the representative of the School of Pharmacy during the hearing.

The Investigator should collect evidence related to the incident which has triggered the procedure and general information about the student’s past progress on the course which relates to the investigation. This evidence should be circulated to the student in advance of the hearing so that he/she is aware of the case against him/her. The School Fitness to Practise Committee should give the student an opportunity to make submissions in writing, but this should not preclude the student from raising additional arguments in the hearing in response to representation from the School of Pharmacy and Pharmaceutical Sciences.

The student and representative should be informed of their entitlement to collect evidence to support their case, and the School of Pharmacy/College should assist the student in obtaining any such evidence.

The collection of evidence should be done in a timely and diligent manner.
4.3 Timely investigation

Any issues that arise should be investigated in a timely manner and should avoid unnecessary delays, especially where this delay will prejudice the student. This includes delays in notifying the student of concerns. The need to complete the investigation in a timely manner must be balanced against the need to investigate the matter diligently.

1. Upon the referral of a fitness to practise issue to the Director, he/she or the person to whom the investigation has been delegated should endeavour to investigate the issue in a timely and diligent manner.

2. Once the Director or the person to whom the investigation has been delegated has determined that the matter should be referred to the School Fitness to Practise Committee, the student must be notified of these arrangements within five working days.

3. A student and tutor or postgraduate advisor should be notified of a requirement to present to a fitness to practise hearing, the nature of the allegation and the time and place of the hearing at least five working days in advance of the hearing.

4. The notification may contain a summary of the allegations of the case against the student if the School is unable to present the full details of the case against him/her at that time.

5. The School of Pharmacy and Pharmaceutical Sciences must have fully prepared its case within five working days of the student receiving notification of the concerns. The School may request the Chair for an extension on this time period, which shall in any case be no more than five working days. In determining whether to grant this extension, the Chair should have regard to all the circumstances of the case, including the complexity of the issues, the time period that the allegations cover and the severity of consequences for the student.

6. The student and representative should have prior sight of full details of the case at least five working days in advance of the hearing to allow him/her an appropriate period of time to prepare their case. Papers received late should not be taken into account without the consent of the student.

7. A student or representative may request of the Chair an extension on this time period, which shall in any case be no more than five working days. In determining whether to grant this extension, the Chair should have regard to all the circumstances of the case, including the complexity of the issues, the time period that the allegations cover and the severity of consequences for the student.

8. Written submissions from a student should be submitted to the Chairperson or secretary by 9am on the working day before the hearing.

9. The decision of the School Fitness to Practise Committee should be communicated in writing to the student within five working days.
4.4 The hearing

1. The secretary, on behalf of the Committee, shall notify all parties of the names and roles of the attendees, including representatives and witnesses (if applicable).

2. At the start of the hearing, the Chair of the Committee will introduce the members of the Committee, explain the role of the Committee and outline the running order of the proceedings and the onus and the standard of proof.

3. The onus of proof shall be on the School of Pharmacy and Pharmaceutical Sciences to prove that a student is not fit to practise, and the standard of proof shall be the civil standard of proof; i.e. whether on the balance of probabilities the student is or is not fit to practise.

4. The School representative will make the case for the School, including the hearing of witnesses if applicable. The student or representative will have the opportunity of questioning the School representative and/or witnesses on any evidence that has been put forward.

5. The Chairperson may invite members of the Committee to ask questions or seek further clarification in relation to the specific allegation.

6. The student or representative will make the case for the student, including the hearing of witnesses if applicable. The School representative will have the opportunity of questioning the student or representative and/or witnesses on any evidence that has been put forward.

7. The Committee shall consider the evidence with regard to
   a) The need to safeguard vulnerable groups
   b) Child protection and safety
   c) Public protection and safety
   d) Professional codes of conduct
   e) The student’s academic progress on the programme
   f) Any potential risk to the College, staff, students or other individuals
   g) The standards required in the core competencies of concern outlined by the School, where applicable

8. The Committee shall not take into account evidence that was not made available to both parties during the course of the investigation or hearing.

9. The Committee shall reach a decision and make recommendations based on all the available evidence.

10. In the absence of a unanimous verdict, the decision of the majority shall prevail. In the case of an even split, the Chair of the Committee shall have a second and casting vote. The secretary, while in attendance, will not have a vote or take part in any decision making.

11. A summary note recording the decisions and recommendations relating to the case presented to the Committee will be produced and made available to the student. This will include reasons for the decision. Verbatim minutes will not be recorded.

12. The Chair of the Committee should inform both the student and representative in writing about the outcome of the hearing, the reasons for the decision and any relevant rights of appeal. The
communication should be neutral and refrain from commenting on the likelihood of success at appeal, and should take place within five working days of the hearing.

13. The secretary should ensure that the relevant College staff and offices are notified of the Committee’s decision where appropriate, e.g. for the maintenance of the student record.

4.5 Decisions of the School Fitness to Practise Committee

1. Where the Committee decides that concerns relating to a student’s fitness to practise are well founded, it may take any of the following actions:
   (a) caution the student in relation to the matter;
   (b) recommend that the student be required to undergo testing in respect of suspected drug or alcohol misuse;
   (c) recommend that the student be required to undergo a medical examination or assessment, which may include psychiatric assessment;
   (d) recommend that the student withdraw from the course;
   (e) recommend that the student be suspended from the course;
   (f) following consultation with the Senior Lecturer (in the case of undergraduate students) or the Dean of Graduate Studies (in the case of postgraduate students), require the student to complete such academic exercise, including a placement, as shall be prescribed by the Committee; or
   (g) refer the matter or any aspect thereof to the Dean of Students to be dealt with pursuant to any other Schedule to the Chapter on Student Conduct and Capacity in the 2010 Consolidated Statutes.

2. (a) In the case of undergraduate students, recommendations pursuant to sub-section 1(b)-(e) shall be made to the Senior Lecturer.
   (b) In the case of postgraduate students, recommendations pursuant to sub-section 1(b)-(e) shall be made to the Dean of Graduate Studies.
   (c) Such recommendations shall not take effect until they are approved by the Senior Lecturer or the Dean of Graduate Studies, as the case may be.

3. Students
   (a) who fail to comply with an approved recommendation made pursuant to sub-section 1(b) or (c),
   (b) whose tests pursuant to sub-section 1(b) confirm drug or alcohol misuse, or
   (c) who are assessed pursuant to sub-section 1(c) to be unfit to continue with their studies or to be unable or unsuitable to participate in their courses of study to the standard required by College, may be required by the Committee either to withdraw from their courses of study or to go off-books until such time as they submit a letter - from an appropriately qualified person as defined by sub-section 1 of the Certification Section - to the Committee certifying that they are fit to proceed with their courses of study.

4. Students who have been suspended pursuant to sub-section 1(d) shall not be re-admitted until such time as they submit a letter - from an appropriately qualified person as defined by sub-section 1(a) of the Certification Section - to the Committee certifying that they are fit to proceed with their courses of study.

5. Where a test or examination or assessment is required pursuant to the terms of this section, the Committee shall nominate an appropriately qualified person as defined by sub-section 1(b) of the Assessment Section to undertake it.
4.6 Appeals

An appeal against the decision of the School Fitness to Practise Committee may be taken to the College Fitness to Practise Committee by either party to the original decision. The College Fitness to Practise Committee shall consist of a chairperson who is a practising lawyer, two members of staff drawn from disciplines that have fitness to practice requirements and two external (i.e., non-staff) members, one of whom shall be drawn from the discipline of pharmacy (practising pharmacist from outside College) and the other of whom shall be a lay person. The secretary to the College Fitness to Practise Committee who shall be appointed by Board shall not be a member of the Committee but shall attend in full all meetings of the Committee for record keeping and administrative purposes.

According to section 4(3) of Schedule 5, a party wishing to appeal against a decision of a School Fitness to Practise Committee shall, "within fifteen days of the date on which the decision has been communicated to the parties", notify the secretary to the College Committee in writing of his/her intention to appeal, and section 17(1) of the Introduction Chapter to the 2010 Statutes explains that "day" in this context "includes any day of the Academic Year, and excludes Saturdays, Sundays and public holidays". When the secretary to the College Committee has been so notified of an intention to appeal, s/he shall request the chairperson of the School Fitness to Practise Committee to forward a note of that Committee's decision to the secretary of the College Fitness to Practise Committee. The party taking the appeal shall, within a further 15 days (as above defined) from serving notice of the intention to appeal, provide the secretary to the College Committee with a written statement of the grounds of appeal. The secretary to the Committee shall provide this statement to the other party to the appeal, requesting a written response for consideration by the College Fitness to Practise Committee. The Committee may consider any other documents submitted by either party to the original decision in advance of the hearing, provided such documents are also provided to the other party as soon as practicable after their provision to the secretary. At the hearing, the College Committee may admit any evidence it deems relevant.

In dealing with an appeal, the College Fitness to Practise Committee shall follow the procedures set out in section 4 of Schedule 5 of the Chapter on Student Conduct and Capacity in the 2010 Statutes, entitled ‘Fitness to Practise’. The student shall have the same rights and entitlements before the College Fitness to Practise Committee as s/he enjoyed before the School Fitness to Practise Committee.
Where a member of College staff/practice-based staff/other appropriate individual has a concern regarding a student's fitness to practice

Member of staff refers student case to the relevant Director

Directors check for record of disability within the School. Where there is no such record, the Director must request the student's tutor or postgraduate advisor to meet with the student to encourage disclosure of any undisclosed disability

If a student has a disability, the Director consults with the Junior Dean and the Disability Officer

If a student does not have a disability, the Director consults with the Junior Dean

The Director/Junior Dean must first consider whether the concern could fall under disciplinary cases or some other procedures

Fitness to practise

If a student has a disability, section 4 of Schedule 1 of the Chapter on Student Conduct and Capacity in the 2010 Statutes shall apply

Student mental ill health/health concerns dealt with accordance with Schedule 2 to Chapter on Student Conduct in 2010 Statutes

Garda Vetting dealt with in accordance with Garda Vetting policy & procedures for UG & PG 2009

Disciplinary cases

Case referred to the School Fitness to Practise Committee

An appeal against the decision of the School Fitness to Practise Committee may be taken to the College Fitness to Practise Committee which should follow the procedures set out in section 4 of Schedule 5 of the Chapter on Student Conduct and Capacity in the 2010 Statutes.
CODE OF CONDUCT

You are preparing to enter a profession which carries certain expectations and requirements. Membership of a healthcare profession requires the highest standards of professional and ethical conduct. During your education and training you are also obliged to abide by a set of standards. The Code of Conduct (“the Code”) outlines the defined standards and the principles by which you must abide in the academic, clinical and professional environment. You must formally agree to abide by the Code. Every student is personally responsible under the code for his/her own acts or omissions. Compliance with these standards is considered as evidence of fitness to practise.

The Code is based on six core principles:

1. Your primary concern must be to maintain and improve the health, wellbeing, care and safety of patients.

2. Develop your professional competence, skills and standing so as to bring health gain and value to the community and society.

3. Be honest and trustworthy and show respect for others.

4. Conduct yourself in a manner which enhances the service provided to society and which will maintain the good name of your profession.

5. Maintain your professional knowledge and competence.

6. Be aware of your obligations under the Code of Conduct and do not do anything which constitutes a breach of the Code.

The Higher Education Institution with which you are registered as a student (referred to in this Code as “College”) takes seriously any breach of the Code. If your behaviour fails to meet the standards outlined in the Code, the matter may be referred in accordance with the Higher Education Institution's relevant policies and regulations. Decisions will be made on a case by case basis and will be judged by reference to the principles set out in the Code.

The following information is to direct you on the proper use of the Code in terms of your relationships and interactions with staff, fellow students, placement tutors, patients, carers, and other individuals with whom you come into contact.
Principle 1

- Your primary concern must be to maintain and improve the health, wellbeing, care and safety of patients.

Throughout your education and training you are required to develop knowledge, skills, attitudes and values intrinsic to your practise as a competent healthcare professional. As part of your course you will engage with patients and gain knowledge and experience in the clinical and professional setting. Even when you are not in direct contact with patients, you must make the health, well-being and safety of patients your main concern. All other principles must be read in light of this first principle.

As a student you must:

1.1 Always bear in mind your future role as a healthcare professional when studying. This applies equally to all aspects of your education and training.
   1.1.1 Take responsibility for your work, studies and behaviour.
   1.2.1 Apply your learning for the maximum benefit of patients.
   1.2.2 Behave in a trustworthy and professional manner.

1.2 Ensure that your beliefs and actions do not compromise patient care.
   1.2.1 Recognise and respect the rights of patients.
   1.2.2 Never discriminate on the basis of gender, religion, age, civil status and family status, disability, sexual orientation, race ethnicity, or membership of the Travelling community.
   1.2.3 Be prepared to undertake physical examination of patients if appropriate.
   1.2.4 Adhere to the dress codes of the College, clinical and professional environment (clinical and professional placements).

1.3 Never knowingly allow your judgment to be influenced by personal interests.
   1.3.1 Do not abuse the trust of a patient and maintain proper professional boundaries, especially with children and vulnerable adults.
   1.3.2 Do not make decisions for personal interest or gain that in any way may adversely affect the health and welfare of patients and the public.

1.4 Never knowingly mislead others.
   1.4.1 You should introduce yourself by name to patients and always make it clear to patients and the public that you are a student and not a qualified healthcare professional.
   1.4.2 You must never recommend a medical treatment or course of action to anyone unsupervised.
   1.4.3 You should never misrepresent data or information that could adversely affect the health and welfare of patients and the public.

1.5 Never compromise patient care.
   1.5.1 Raise concerns as soon as possible with an appropriate member of staff if you believe that patient safety or care could be compromised.
   1.5.2 Be prepared to challenge the judgement of others if you have reason to believe that their decisions could compromise safety of care.
Principle 2

- Develop your professional competence, skills and standing so as to bring health gain and value to the community and society.

It is your responsibility to acquire all necessary knowledge, skills, values, attitudes and behaviours to become a competent practitioner and not impede other students in acquiring the same knowledge and skills. This should guide you in your academic education, training and during clinical and professional placements.

As a student you must:

2.1 Take responsibility for your learning.
   2.1.1 Use every opportunity to learn. Attend classes. Be punctual. Be contactable. Plan and use your time effectively.
   2.1.2 Reflect on feedback about your performance and respond constructively.
   2.1.3 Make informed decisions.

2.2 Engage constructively in assessment.
   2.2.1 Complete and submit your course work on time.
   2.2.2 Appropriately reference the academic work of others.
   2.2.3 Never misrepresent data, coursework or information that could result in the awarding of a grade not reflective of your competence.

2.3 Recognise and stay within the limits of your competence.
   2.3.1 Recognise your limitations and ask for help, where and when appropriate.
Principle 3

- **Be honest and trustworthy and show respect for others.** Demonstrating respect for the dignity, views and rights of others is fundamental in forming and maintaining appropriate relationships with academic staff, fellow students, placement tutors, patients, carers, and other individuals with whom you come into contact. All health professionals must be guided by their primary responsibility to act in the best interests of their patient without influence of any personal consideration. The patient-health professional relationship is a privileged one and is based on trust and professionalism which are enshrined in the ethical principles of beneficence, non-maleficence, autonomy and justice.

**As a student you must:**

3.1 Act in the best interest of the patient and contribute to the safety of patients.

3.2 Accept and agree to be bound by the ethical principle of autonomy.
   3.2.1 Obtain consent from the patient before you interview or examine him or her. The patient should be offered a chaperone as appropriate. In the case of a minor patient, obtain the consent of the parent or legal guardian before you interview or examine the minor patient.
   3.2.2 Respect the patient’s right to refuse health care or to take part in teaching.

3.3 Preserve the confidentiality of the patient at all times. This includes personal data that is in their clinical records as well as information they disclose to you during a consultation.
   3.3.1 Do not share medical information with anyone except those health care professionals involved in the care of the patient.
   3.3.2 Make sure that patients, or anyone close to them, cannot be identified outside the clinical setting or protected virtual learning environment. This includes conversations and discussions on social networking sites, texts or e-mails, recordings of interviews or assignments on e.g. smart-phones and/or YouTube, and pictorial records, e.g., photographs and/or video clips.
   3.3.4 Recognise the circumstances when confidential information may be disclosed without consent.

3.4 Accept and agree to be bound by the ethical principle of justice.
   3.4.1 Recognise and respect the rights of the patient to fair treatment and care.

3.5 Be honest and trustworthy.
   3.5.1 Identify yourself truthfully.
   3.5.2 Represent your qualifications, position and abilities honestly on all applications.
   3.5.3 Do not knowingly mislead others
   3.5.4 Be truthful in verbal and written communications
   3.5.5 Use research and laboratory data honestly and ethically, seeking permission to use data as required.
   3.5.6 Ensure any funds you are responsible for are used for the purpose they are intended.
   3.5.7 Decline gifts from the pharmaceutical, medical device or biotechnology industries.
   3.5.8 Do not plagiarise.
   3.5.9 Be truthful in all your interactions with staff in both the College and in professional placements.
Principle 4

- Conduct yourself in a manner which enhances the service provided to society and which will maintain the good name of your College and profession.

The public trusts healthcare professionals. As a student, and throughout your career, you must justify that trust by acting with integrity and professionalism. You should be aware of the importance of looking after your own health and how it impacts on you and your professional responsibilities. You need to develop skills to work on a multidisciplinary team to deliver a high standard of care and ensure patient safety. You need to be able to work effectively with patients, staff, colleagues and healthcare professionals.

As a student you must:

4.1 Recognise the importance of self-care and take responsibility for your own health, especially if it may impact negatively on other people.
   4.1.1 Seek prompt and appropriate professional advice about your general wellbeing, i.e. your physical or mental health, or substance use or other issues which may impact on your ability to complete your studies or interact with patients, staff or colleagues.
   4.1.2 Inform appropriate staff if there is anything that could impair your ability to study or to practise as a professional.
   4.1.3 Inform appropriate staff if you are being affected by a major life event e.g. bereavement that may impair your ability to practise as a professional.
   4.1.4 Inform appropriate staff if you have, to your knowledge, any disability or medical condition that might affect your ability or role as a future healthcare professional, or that might put patients at risk.
   4.1.5 Inform appropriate staff if you take medicines that may impair your judgment and impact on the safety of others.
   4.1.6 Respect the confidentiality of your colleagues but appropriately disclose information of concern to include information regarding 4.1.1 above as relevant to your colleagues.

4.2 Learn how to work in partnership with others in College, on professional placement, and with patients and their carers in the management of their treatment and care.
   4.2.1 Recognise the expertise of healthcare professionals.
   4.2.2 Respect the knowledge and skills of those involved in your education.
   4.2.3 Be aware of the limitations of your knowledge and skills.

4.3 Treat others politely with consideration and respect.
   4.3.1 Recognise diversity and respect the cultural differences, values and beliefs of others.
   4.3.2 Refrain from behaviour that includes intimidation, foul language, threats of violence or retaliation.
   4.3.3 Listen to, and respect, the opinions of others and be non-judgemental in your attitudes toward them.

4.4 Learn how to communicate effectively.
   4.4.1 Ensure you have adequate English Language skills.
   4.4.2 Learn how to listen to patients and their carers and communicate effectively with them in a way they can understand.
   4.4.3 Learn how to communicate effectively with others including academic staff, placement tutors and other healthcare professionals.
Principle 5

- **Maintain your professional knowledge and competence**

At all stages of your professional journey you must take responsibility for ensuring your knowledge and skills are up-to-date and that you maintain your competence. You have engaged in a career of lifelong learning and teaching.

**As a student you must:**

5.1 Commit to developing, and continuously improving, your professional knowledge and competence.

5.2 Learn from experience and grow from the knowledge gained from errors to avoid repeating them.

5.3 Ensure that you are aware of continuing professional development requirements.

Principle 6

- **Be aware of your obligations under the Code of Conduct and do not do anything which constitutes a breach of the Code.**

It is the responsibility of all students to make every reasonable effort to ensure that everything they do conforms with the principles laid down in the Code of Conduct.

**As a student you must:**

6.1 Ensure you are aware, apply and adhere to the principles of the Code of Conduct.
   6.1.1 Promote and support the principles of the Code of Conduct by example.
   6.1.2 Refrain from any activity that would negatively affect the reputation of the College, or your intended profession.
   6.1.3 Report breaches of the Code of Conduct to the appropriate person (e.g. Head of School, member of staff in College or on placements).

6.2 Obey the law.
   6.2.1 Inform an appropriate member of staff immediately if you are the subject of any criminal legal proceedings.

6.3 Comply with College Policies, Rules and Regulations, and those of other organisations linked to your studies.
   6.3.1 Respect all College, and clinical and professional placement policies, procedures and property. Never willingly cause damage to such property, remove property from the premises in which it is located, or make use of property for personal reasons.
   6.3.2 Ensure that you are contactable.
   6.3.3 Supply accurate information in response to lawful requests and update that information as necessary.
   6.3.4 Cooperate with honesty and openness in formal investigations about you or others.

6.4 Comply with health and safety requirements.
   6.4.1 Comply with the College’s health requirements and health policies.
   6.4.2 Comply with the College’s, clinical and professional placements’ safety requirements, including dress code and other safety requirements.
This code was guided by the following professional standards:


Guidelines for Medical School on Ethical Standards and Behaviour appropriate for Medical Students (2011) Irish Medical Council

Guide to Professional Conduct and Ethics for Registered Medical Practitioners (2009) Irish Medical Council


We acknowledge the prior permission of Mr Damian Day of the Royal Pharmaceutical Society of Great Britain (RPSGB) to reproduce extracts from the Code of Conduct for Pharmacy Students, written by the RPSGB and adopted by the General Pharmaceutical Council of Great Britain.
EXAMINATION & PROGRESSION REGULATIONS - ACADEMIC YEAR 2015-16
THE SCHOOL OF PHARMACY & PHARMACEUTICAL SCIENCES

BSc. (Pharm.)

A General College Regulations shall apply as set out in the University Calendar, Part 2, Undergraduate Degrees and Diplomas in the chapter ‘General regulations and information’: http://www.tcd.ie/calendar/

Particular attention is drawn to the following:

A1 ILLNESS AT EXAMINATIONS

University Calendar 2015-16, Part 2, General regulation and information, Academic Progress §§33-35:

33 There are two University examination sessions: annual and supplemental. The dates of these examination sessions are given in the Calendar PART I - ALMANACK. Examinations should be confined to these two examination sessions. However, if and when approved by the University Council, certain courses, normally professional, are permitted to hold examinations outside of the standard academic year structure and, in particular, outside of the two University examination sessions. Furthermore, in individual cases, examinations outside these two sessions will only be permitted pursuant to §37. Students are, in the first instance, required to present for examination at the annual session for their class. Students who are unable to complete their examinations at the annual or supplemental session due to illness, disability, or other grave cause beyond their control may apply through their tutor to the Senior Lecturer for permission to repeat the year.

34 Where an examination has been completed, subsequent withdrawal is not permitted. Students who have successfully completed an examination and are qualified to rise with their year are not permitted to repeat the examination.

35 Students who consider that illness may prevent them from attending an examination (or any part thereof) should consult their medical advisor and request a medical certificate for an appropriate period. If a certificate is granted, it must be presented to the student’s tutor within three days of the beginning of the period of absence from the examination. The tutor must immediately forward the certificate to the Senior Lecturer. Medical certificates must state that the student is unfit to sit examinations. Medical certificates will not be accepted in explanation for poor performance.

(a) Where a student becomes ill prior to the commencement of the annual examination, they may seek permission through their tutor from the Senior Lecturer to withdraw and take the supplemental examination in that year.

(b) Where illness prevents a student from completing any part of the annual examination and they withdraw from the examination, permission may be given for a supplemental examination to be taken in that year.

(c) Where illness occurs during the writing of an examination paper, it should be reported immediately to the chief invigilator. The student will then be escorted to the College Health Centre. Every effort will be made to assist the student to complete the writing of the examination paper.

Students who consider that other grave cause beyond their control may prevent them from attending an examination (or any part thereof) should consult their tutor who should make representations immediately to the Senior Lecturer that permission be granted for absence from the examination.

Regulations (a) and (b) also apply in the case of absence from annual examinations due to other grave cause beyond a student’s control. Regulations (a) and (b) apply only to examinations which are non-final non-degree examinations. However, regulations (a) and (b) apply in all years of those professional courses which permit supplemental examinations in final or degree years.

A2 CONDUCT OF EXAMINATIONS

Candidates for examinations are forbidden to bring books, notes, mobile phones, tablets, laptops or media players with them into an examination hall, to copy from or exchange information with other candidates or in any way make use of information improperly obtained, see University Calendar, Part 2, General regulation and information, Conduct of Examinations, §§43-49. Such actions are regarded as serious offences (see University Calendar, Part 2, General regulation and information, III Conduct and College regulations, §4, for which a
student may be expelled from the University. Students must not leave the examination hall before the time specified for the examination has elapsed, except by leave of the invigilator. Examinations or other exercises which are part of continuous assessment are subject to the same rules as other College examinations. Where submitted work is part of a procedure of assessment, plagiarism is similarly regarded as a serious offence and is liable to similar penalties.

A3 USE OF CALCULATORS IN EXAMINATIONS
Electronic calculators are permitted in certain examinations provided that they are battery operated, pocket sized, silent in operation and are not capable of using previously recorded programmes. The College does not supply calculators. The operation of calculators is entirely the responsibility of the students. No allowance is made for errors or omissions arising from the malfunction of calculators or the misuse of calculators by students. Calculators may not be passed from one candidate to another during examinations. It is essential that the stages of numerical work, including intermediate answers, be written clearly to demonstrate knowledge of the problems and their solutions.

A4 APPEALS
Students may appeal through their Tutors to the School of Pharmacy & Pharmaceutical Sciences Court of First Appeal in the first instance and thereafter to the Academic Appeals Committee, see University Calendar 2015-16, Part 2, General regulation and information, Academic Progress §§33-35.

A5 ACADEMIC PROGRESS
A student may not repeat any academic year more than once and may not repeat more than two academic years, except by special permission of the University Council.

To rise with their class students must:

(i) Attend satisfactorily the lectures given in the modules of their course in each term as required by the University Council and the School of Pharmacy & Pharmaceutical Sciences regulations;
(ii) Perform and complete all laboratory work including project work and dissertations to the satisfaction of the Head of the School or module coordinator concerned; and
(iii) Pass, in accordance with the School of Pharmacy & Pharmaceutical Sciences regulations, the prescribed examinations (including practical tests, continuous assessment components and work experience).

Students undertaking the Junior Freshman year in 2015/16, and thereafter, are required to successfully complete the entire Pharmacy (Integrated) programme (B.Sc. (Pharm.) and M.Pharm. degree courses) within eight years of starting the B.Sc. (Pharm.) course in order to be eligible for the award of Master in Pharmacy. In exceptional circumstances, this period may be extended by one year.

As the new curriculum is introduced year-by-year, students permitted to repeat a course year will be required to undertake the new curriculum if the old curriculum has been phased out in the year they are repeating. Likewise, students returning to the course, having spent a permitted period of time off-books, will undertake the new curriculum if the old curriculum has been phased out in the course year to which they are returning. All such students may be required to take additional modules or exercises, as prescribed by the Head of School, to ensure they are qualified to proceed further.

B1 JUNIOR FRESHMAN STUDENTS
To be successful at examinations, a student will normally be required to pass each module, totaling 60 ECTS. However, the Court of Examiners may allow compensation provided that the student has obtained (and is returned with) an overall average of at least Grade III and provided that the student has

(i) passed modules totaling 55 ECTS and achieve a minimum mark of 40 per cent in the failed module or
(ii) passed modules totaling 50 ECTS and achieve a minimum mark of 45 per cent in the failed module or modules

Compensation will not be allowed where a student is returned as “qualified fail” (QF) in any module.
The following modules cannot be compensated:

**JUNIOR FRESHMAN***
- PH1101 Organic and inorganic chemistry for pharmacy
- PH1102 Physical Pharmacy I
- PH1103 Pharmaceutical Analysis I
- PH1104 Introduction to Pharmaceutics & Formulations
- PH1105 Mathematical methods and pharmaceutical calculations
- PH1106 Practice of Pharmacy I

* Modules not listed may still have compulsory components.

**B2 SENIOR FRESHMAN AND JUNIOR SOPHISTER STUDENTS**
To be successful at examinations, a student will normally be required to pass each module, totaling 60 ECTS. However, the Court of Examiners may allow compensation provided that the student has obtained (and is returned with) an overall average of at least Grade III and provided that the student has

(i) passed modules totaling 55 ECTS and achieve a minimum mark of 30 per cent in the failed module or

(ii) passed modules totaling 50 ECTS and achieve a minimum mark of 35 per cent in the failed module or modules

Compensation will not be allowed where a student is returned as “qualified fail” (QF) in any module.

The following modules cannot be compensated:

**SENIOR FRESHMAN***
- PH2001 Pharmaceutical Properties of Materials Used in Medicines
- PH2002 Physical Pharmacy II
- PH2003 Isolation, Separation & Analysis of Substances Used in Medicines
- PH2004 Formulation & Pharmaceutical Technology
- PH2005 Microbiology and Biochemistry
- PH2006 Practice of Pharmacy II
- PH2007 Professional Development & Career Planning
- PH2008 Pharmaceutical Biotechnology I

**JUNIOR SOPHISTER***
- PH3002 Medicinal & Pharmaceutical Chemistry III
- PH3004 Sterile Products
- PH3006 Practice of Pharmacy III
- PH3009 Endocrine & Reproductive Pharmacology and Veterinary Pharmacy
- PH3010 Respiratory & Gastrointestinal Pharmacology
- PH3011 Blood, Cardiovascular & Renal Pharmacology

* Modules not listed may still have compulsory components.

Students who fail to satisfy the examiners at the annual examination must present for a supplemental examination at the beginning of Michaelmas Term. There is no fee for the supplemental examination.

Students who are unsuccessful at the annual examination will normally be given credit for those modules in which they were successful, and will be examined in the supplemental examinations only in those modules in which they are unsuccessful.

Students who are unsuccessful at both an annual and supplemental examination and who have made a serious attempt or have a valid reason for their absence may repeat the year. Repetition requires full attendance at lectures and such other courses as may be prescribed by the Head of the School of Pharmacy & Pharmaceutical Sciences.
Students who have passed the Junior Sophister examination may have the ordinary degree of B.A. conferred if they do not choose to proceed to the Senior Sophister year or if they have failed the SS year. Except by permission of the University Council, on the recommendation of the court of examiners, the ordinary degree of B.A. may be conferred only on candidates who have spent at least three years in the University.

Students may not repeat any academic year more than once within the degree programme and may not repeat more than two academic years within the degree programme, except by special permission of the University Council.

C  **SENIOR SOPHISTER - B.SC. (PHARM.) DEGREE EXAMINATION**

A student will normally be required to pass each module, totaling 60 ECTS. However, the Court of Examiners may allow compensation, provided that all modules have been taken in a single sitting and provided that the student has obtained (and is returned with) an overall average of at least Grade III and provided that the student has

(i) passed modules totaling 55 ECTS and achieve a minimum mark of 30 per cent in the failed module or

(ii) passed modules totaling 50 ECTS and achieve a minimum mark of 35 per cent in the failed module or modules

Compensation will not be allowed where a student is returned as “qualified fail” (QF) in any module.

Compensation in Practice of Pharmacy is precluded by the accreditation criteria of the Pharmaceutical Society of Ireland.

The following modules cannot be compensated:

<table>
<thead>
<tr>
<th>Code</th>
<th>Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH4002</td>
<td>Medicinal and Pharmaceutical Chemistry IV</td>
</tr>
<tr>
<td>PH4005</td>
<td>Pharmacokinetics, Pharmacodynamics, Biopharmaceutics &amp; Drug Metabolism</td>
</tr>
<tr>
<td>PH4006</td>
<td>Practice of Pharmacy IV-1</td>
</tr>
<tr>
<td>PH4007</td>
<td>Practice of Pharmacy IV-2 (including electives)</td>
</tr>
<tr>
<td>PH4008</td>
<td>Addiction Pharmacy &amp; Integrated Pharmacy Skills</td>
</tr>
</tbody>
</table>

Modules not listed may still have compulsory components.

Students who are unsuccessful at the annual degree examination will normally be given credit for those modules in which they were successful, and if presenting for a supplemental examination, will be examined only in those modules in which they were unsuccessful.

In order to qualify for the award of the degree, students are required to pass the degree examination, and associated coursework and assessments, in their entirety within eighteen months from the date on which they first became eligible to present for the degree examination.

Students who are unsuccessful at both the annual and supplemental examinations must apply to the School of Pharmacy & Pharmaceutical Sciences Court of First Appeal in the first instance and thereafter to the Academic Appeals Committee for permission to repeat the year. Repetition requires full attendance at lectures and such other courses as may be prescribed by the Head of School.

**VIVA VOCE EXAMINATIONS**

Senior Sophister students may be asked to attend a Viva Voce examination. Accordingly, students must be available for such examinations when the External Examiners are visiting the School. Dates for Viva examinations are published as soon as they are known. However, students should note that Viva lists are unlikely to be available until a few days before the actual Viva.

D **PHARMACY LAW, ETHICS AND PROFESSIONALISM**

The Pharmaceutical Society of Ireland require, as part of the Interim Accreditation Standards for the Level 8 Bachelor Degree (2012), that success in a formal examination of pharmacy law and a summative assessment
of ethics and professionalism in the final year shall be a condition for the award of the degree. This is assessed as part of PH4006.

**E CALCULATION OF ANNUAL EXAMINATION & FINAL DEGREE GRADES**

For annual grades - individual module weightings will be based on ECTS (e.g., a 10 ECTS module would normally represent 1/6 or a 5 ECTS module would normally represent 1/12 of the annual result).

**E1 INCOMING JF STUDENTS 2015-16:**

To rise with the year, students must achieve a credit weighted average mark of 50 per cent or higher for the year and accumulate 60 credits by passing all modules outright or through passing by compensation, where permitted.

The degree grades are as follows:

<table>
<thead>
<tr>
<th>Class Honours</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class Honours</td>
<td>70%+</td>
</tr>
<tr>
<td>Second Class Honours Division 1</td>
<td>60-69%</td>
</tr>
<tr>
<td>Second Class Honours Division 2</td>
<td>50-59%</td>
</tr>
<tr>
<td>Pass</td>
<td>40-49%</td>
</tr>
</tbody>
</table>

**E2 CONTINUING SF, JS AND SS STUDENTS:**

To rise with the year, students must achieve a credit weighted average mark of 40 per cent or higher for the year and accumulate 60 credits by passing all modules outright or through passing by compensation, where permitted.

The degree grades are as follows:

<table>
<thead>
<tr>
<th>Class Honours</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class Honours</td>
<td>70%+</td>
</tr>
<tr>
<td>Second Class Honours Division 1</td>
<td>60-69%</td>
</tr>
<tr>
<td>Second Class Honours Division 2</td>
<td>50-59%</td>
</tr>
<tr>
<td>Pass</td>
<td>40-49%</td>
</tr>
</tbody>
</table>

**E3 INCOMING JF STUDENTS 2015-16 AND CONTINUING SF STUDENTS:**

**Penalties:** Marks for repeated continuous assessment components during term-time or late submission of course work may incur penalties.

**Supplemental Examination Session:** In the Freshmen years, on passing the year in the supplemental examination session, marks will not be capped and the end-of-year result will be recorded as ‘pass at supplemental’ (JF and SF year only).

In the Sophister years where marks count towards the degree, marks for a supplemental examination and/or repeated continuous assessment component(s) will be capped at the pass mark.

**B.SC. (PHARM) DEGREE**

In calculating the final degree mark the following proportions will be observed:

- 65% of the final mark will be awarded will be based on the overall mark in the SS year
- 35% of the final mark will be awarded will be based on the overall mark in the JS year

**E4 CONTINUING JS AND SS STUDENTS:**

**Penalties:** Marks for repeated continuous assessment components during term-time or late submission of course work may incur penalties.

**Supplemental Examination Session:** On passing the year in the supplemental examination session, marks for a supplemental examination and/or repeated continuous assessment component(s) will be capped at the pass mark, since all years count towards the degree.

**B.SC. (PHARM) DEGREE**

In calculating the final degree mark the following proportions will be observed:

- 50% of the final mark will be awarded on work examined in the SS year
- 25% of the final mark will be awarded on work examined in the JS year
- 15% of the final mark will be awarded on work examined in the SF year
- 10% of the final mark will be awarded on work examined in the JF year
Plagiarism

University Calendar [http://www.tcd.ie/calendar/](http://www.tcd.ie/calendar/) , Part 2, General regulations and information, §§82-91:

82 General

It is clearly understood that all members of the academic community use and build on the work and ideas of others. It is commonly accepted also, however, that we build on the work and ideas of others in an open and explicit manner, and with due acknowledgement.

Plagiarism is the act of presenting the work or ideas of others as one’s own, without due acknowledgement.

Plagiarism can arise from deliberate actions and also through careless thinking and/or methodology. The offence lies not in the attitude or intention of the perpetrator, but in the action and in its consequences.

It is the responsibility of the author of any work to ensure that he/she does not commit plagiarism.

Plagiarism is considered to be academically fraudulent, and an offence against academic integrity that is subject to the disciplinary procedures of the University.

83 Examples of Plagiarism

Plagiarism can arise from actions such as:

(a) copying another student’s work;
(b) enlisting another person or persons to complete an assignment on the student’s behalf;
(c) procuring, whether with payment or otherwise, the work or ideas of another;
(d) quoting directly, without acknowledgement, from books, articles or other sources, either in printed, recorded or electronic format, including websites and social media;
(e) paraphrasing, without acknowledgement, the writings of other authors.

Examples (d) and (e) in particular can arise through careless thinking and/or methodology where students:

(i) fail to distinguish between their own ideas and those of others;
(ii) fail to take proper notes during preliminary research and therefore lose track of the sources from which the notes were drawn;
(iii) fail to distinguish between information which needs no acknowledgement because it is firmly in the public domain, and information which might be widely known, but which nevertheless requires some sort of acknowledgement;
(iv) come across a distinctive methodology or idea and fail to record its source.

All the above serve only as examples and are not exhaustive.

84 Plagiarism in the context of group work

Students should normally submit work done in co-operation with other students only when it is done with the full knowledge and permission of the lecturer concerned. Without this, submitting work which is the product of collusion with other students may be considered to be plagiarism.

When work is submitted as the result of a group project, it is the responsibility of all students in the group to ensure, so far as is possible, that no work submitted by the group is plagiarised.

85 Self plagiarism

No work can normally be submitted for more than one assessment for credit. Resubmitting the same work for more than one assessment for credit is normally considered self-plagiarism.

86 Avoiding plagiarism

Students should ensure the integrity of their work by seeking advice from their lecturers, tutor or supervisor on avoiding plagiarism. All schools and departments must include, in their handbooks or other literature given to students, guidelines on the appropriate methodology for the kind of work that students will be expected to undertake. In addition, a general set of guidelines for students on avoiding plagiarism is available on [http://tcd-ie.libguides.com/plagiarism](http://tcd-ie.libguides.com/plagiarism).
87 If plagiarism as referred to in §82 above is suspected, in the first instance, the Director of Teaching and Learning (Undergraduate), or their designate, will write to the student, and the student’s tutor advising them of the concerns raised. The student and tutor (as an alternative to the tutor, students may nominate a representative from the Students’ Union) will be invited to attend an informal meeting with the Director of Teaching and Learning (Undergraduate), or their designate, and the lecturer concerned, in order to put their suspicions to the student and give the student the opportunity to respond. The student will be requested to respond in writing stating his/her agreement to attend such a meeting and confirming on which of the suggested dates and times it will be possible for them to attend. If the student does not in this manner agree to attend such a meeting, the Director of Teaching and Learning (Undergraduate), or designate, may refer the case directly to the Junior Dean, who will interview the student and may implement the procedures as referred to under conduct and college regulations §2.

88 If the Director of Teaching and Learning (Undergraduate), or designate, forms the view that plagiarism has taken place, he/she must decide if the offence can be dealt with under the summary procedure set out below. In order for this summary procedure to be followed, all parties attending the informal meeting as noted in §87 above must state their agreement in writing to the Director of Teaching and Learning (Undergraduate), or designate. If the facts of the case are in dispute, or if the Director of Teaching and Learning (Undergraduate), or designate, feels that the penalties provided for under the summary procedure below are inappropriate given the circumstances of the case, he/she will refer the case directly to the Junior Dean, who will interview the student and may implement the procedures as referred to under conduct and college regulations §2.

89 If the offence can be dealt with under the summary procedure, the Director of Teaching and Learning (Undergraduate), or designate, will recommend one of the following penalties:

(a) Level 1: Student receives an informal verbal warning. The piece of work in question is inadmissible. The student is required to rephrase and correctly reference all plagiarised elements. Other content should not be altered. The resubmitted work will be assessed and marked without penalty;

(b) Level 2: Student receives a formal written warning. The piece of work in question is inadmissible. The student is required to rephrase and correctly reference all plagiarised elements. Other content should not be altered. The resubmitted work will receive a reduced or capped mark depending on the seriousness/extent of plagiarism;

(c) Level 3: Student receives a formal written warning. The piece of work in question is inadmissible. There is no opportunity for resubmission.

90 Provided that the appropriate procedure has been followed and all parties in §87 above are in agreement with the proposed penalty, the Director of Teaching and Learning (Undergraduate) should in the case of a Level 1 offence, inform the course director and where appropriate the course office. In the case of a Level 2 or Level 3 offence, the Senior Lecturer must be notified and requested to approve the recommended penalty. The Senior Lecturer will inform the Junior Dean accordingly. The Junior Dean may nevertheless implement the procedures as referred to under conduct and college regulations §2.

91 If the case cannot normally be dealt with under the summary procedures, it is deemed to be a Level 4 offence and will be referred directly to the Junior Dean. Nothing provided for under the summary procedure diminishes or prejudices the disciplinary powers of the Junior Dean under the 2010 Consolidated Statutes.
The University of Dublin Calendar refers to various levels of plagiarism. What constitutes plagiarism at a particular level, and the consequences of being found to have committed plagiarism at that level, are detailed below. Nothing provided for under the summary procedure diminishes or prejudices the disciplinary powers of the Junior Dean under the 2010 Consolidated Statutes.

<table>
<thead>
<tr>
<th>Level</th>
<th>Range of Penalties</th>
<th>Characteristics of Offence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>You receive an informal verbal warning from the Director of Undergraduate Teaching and Learning</td>
<td>You have little previous exposure to the norms and conventions of different types of academic work (essays, reports, group or individual projects, dissertations, presentations, etc.) or you bring different cultural assumptions to your work.</td>
</tr>
<tr>
<td></td>
<td>The piece of work in question is inadmissible. You are required to rephrase and reference correctly all plagiarised elements. Other content should not be altered. The resubmitted work will be assessed and marked without penalty</td>
<td>Your work* demonstrates one or more of the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Poor use and/or understanding of referencing conventions, including how to present direct quotations;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Poor understanding of how to acknowledge sources of direct and indirect quotations;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Poor paraphrasing skills;</td>
</tr>
<tr>
<td></td>
<td>Level 1 Plagiarism is not deemed to be academic misconduct</td>
<td>- Lack of recognition of the boundary between material in the public domain which does not require acknowledgement and that which does;</td>
</tr>
<tr>
<td></td>
<td>You receive a formal written warning from the Head of School</td>
<td>- Poor understanding that borrowing the language of another author for stylistic purposes constitutes plagiarism.</td>
</tr>
<tr>
<td></td>
<td>The piece of work in question is inadmissible. You are required to rephrase and reference correctly all plagiarised elements. Other content should not be altered. The resubmitted work will receive a reduced or capped mark depending on the seriousness/extent of plagiarism</td>
<td>Generally, only small amounts of material (text, graph, computer code, images, etc.) are unacknowledged. If more substantial amounts are involved, the offence should be classified as Level 2 or 3 plagiarism.</td>
</tr>
<tr>
<td>Level 2</td>
<td>You receive a formal written warning from the Head of School</td>
<td>Level 2 Plagiarism occurs when you should have been aware of what constitutes plagiarism.</td>
</tr>
<tr>
<td></td>
<td>The piece of work in question is inadmissible. You are required to rephrase and reference correctly all plagiarised elements. Other content should not be altered. The resubmitted work will receive a reduced or capped mark depending on the seriousness/extent of plagiarism</td>
<td>Your work* demonstrates one or more of the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Failure to utilise referencing conventions, including the use of direct quotations;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Failure to acknowledge public and private domain sources;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Paraphrasing without appropriate recognition;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Sections copied from other sources and presented as your own;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Borrowing the language of another author for stylistic purposes, knowing that it is incorrect to do so.</td>
</tr>
<tr>
<td></td>
<td>Level 2 Plagiarism is considered as academic misconduct</td>
<td></td>
</tr>
<tr>
<td>Level 3</td>
<td>You receive a formal written warning from the Head of School</td>
<td>Level 3 Plagiarism occurs when you should have been aware of what constitutes plagiarism.</td>
</tr>
<tr>
<td></td>
<td>The piece of work in question is inadmissible. There is no opportunity for resubmission</td>
<td>Your work* demonstrates one or more of the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- It contains elements of another student’s work, even if they gave you permission to use their work;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- You have submitted, on more than one occasion for credit, a correctly cited and referenced assignment from your own research. This work may have been submitted either in whole</td>
</tr>
<tr>
<td>Level 3 Plagiarism is considered as academic misconduct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or in part, for separate marks in a different module or in previous years;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Substantial sections copied from other sources and presented as your own;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• It borrows, substantially, material and/or language from a source without correct acknowledgement;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• It makes extensive use of synonyms instead of the author’s original voice, but keeps to the same structure and meaning of the original work;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• It contains fabricated referencing, is without referencing or citation, or lacks, to a large degree, appropriate citation and/or referencing.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Level 4 |
|-----------------
| Case referred to the Junior Dean for disciplinary procedures |
| Level 4 plagiarism cannot normally be dealt with under summary procedures (Levels 1-3 above). The following constitute examples of Level 4 plagiarism: |
| • You have previously committed plagiarism and this is a repeat offence; |
| • You have sought, bought or commissioned work with the intention of representing it as your own work; |
| • You have improperly enlisted editorial input, e.g., engaging a paid proof reader, having a language assignment edited by a native speaker where language competence is being assessed; |
| • Your submitted assignment is identical to another student’s work, even if they gave you permission to use their work. |

*The term 'work' refers to individual or group work*
GUIDELINES ON MARKING

YEAR 2 (FRESHMAN YEAR)

Guidelines on awarding grades for essays and examination answers in the freshmen years

<table>
<thead>
<tr>
<th>Class</th>
<th>Mark Range</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>70-100</td>
<td>Full understanding of concepts coupled with excellent knowledge of subject. Evidence of extra reading. A structured answer. Minor lapses of content or presentations tolerated at lower end of range.</td>
</tr>
<tr>
<td>II-1</td>
<td>60-69</td>
<td>Good understanding of concepts supported by broad knowledge of subject. A lapse of content or several lapses of detail are tolerated at lower end of range.</td>
</tr>
<tr>
<td>II-2</td>
<td>50-59</td>
<td>Understands basic concepts and has sound knowledge of subject. Suffers from more than one substantial omission, error or misunderstanding.</td>
</tr>
<tr>
<td>III</td>
<td>40-49</td>
<td>Limited understanding and knowledge of subject. Answer often lacks structure and suffers from omissions, errors and misunderstandings. Overall, a poor but adequate answer, or marginally adequate at bottom end of range.</td>
</tr>
<tr>
<td>F-1</td>
<td>30-39</td>
<td>Basic understanding and knowledge of subject is very poor. While some items of sound material may be presented the answer is inadequate.</td>
</tr>
<tr>
<td>F-2</td>
<td>0-29</td>
<td>Lacks understanding with little knowledge of subject. Answer contains few items related to question with many serious errors. Could also be taken as a response to the misinterpretation of the question.</td>
</tr>
</tbody>
</table>
### GUIDELINES ON MARKING

#### YEAR 3 & 4 (SOPHISTER YEARS) AND SCHOLARSHIP EXAM

Guidelines on awarding grades for essays and examination answers in the Sophister years and the Scholarship examination

<table>
<thead>
<tr>
<th>Class</th>
<th>Mark Range</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>90-100</td>
<td><strong>IDEAL ANSWER;</strong> showing insight and originality and wide knowledge. Logical, accurate and concise presentation. Evidence of reading and thought beyond course content. Contains particularly apt examples. Links materials from lectures, practicals and seminars where appropriate.</td>
</tr>
<tr>
<td>II-1</td>
<td>80-89</td>
<td><strong>OUTSTANDING ANSWER;</strong> falls short of the 'ideal answer either on aspects of presentation or on evidence of reading and thought beyond the course. Examples, layout and details are all sound.</td>
</tr>
<tr>
<td>II-2</td>
<td>70-79</td>
<td><strong>MAINLY OUTSTANDING ANSWER;</strong> falls short on presentation and reading or thought beyond the course, but retains insight and originality typical of first class work.</td>
</tr>
<tr>
<td>II-1</td>
<td>65-69</td>
<td><strong>VERY COMPREHENSIVE ANSWER;</strong> good understanding of concepts supported by broad knowledge of subject. Notable for synthesis of information rather than originality. Sometimes with evidence of outside reading. Mostly accurate and logical with appropriate examples. Occasionally a lapse in detail.</td>
</tr>
<tr>
<td>II-2</td>
<td>60-64</td>
<td><strong>LESS COMPREHENSIVE ANSWER;</strong> mostly confined to good recall of coursework. Some synthesis of information or ideas. Accurate and logical within a limited scope. Some lapses in detail tolerated.</td>
</tr>
<tr>
<td>II-2</td>
<td>55-59</td>
<td><strong>SOUND BUT INCOMPLETE ANSWER;</strong> based on coursework alone but suffers from a significant omission, error or misunderstanding. Usually lacks synthesis of information or ideas. Mainly logical and accurate within its limited scope and with lapses in detail.</td>
</tr>
<tr>
<td>II-2</td>
<td>50-54</td>
<td><strong>INCOMPLETE ANSWER;</strong> suffers from significant omissions, errors and misunderstandings, but still with understanding of main concepts and showing sound knowledge. Several lapses in detail.</td>
</tr>
<tr>
<td>III</td>
<td>45-49</td>
<td><strong>WEAK ANSWER;</strong> limited understanding and knowledge of subject. Serious omissions, errors and misunderstandings, so that answer is no more than adequate.</td>
</tr>
<tr>
<td>III</td>
<td>40-44</td>
<td><strong>VERY WEAK ANSWER;</strong> a poor answer, lacking substances but giving some relevant information. Information given may not be in context or well explained, but will contain passages and words, which indicate a marginally adequate understanding.</td>
</tr>
<tr>
<td>F-1</td>
<td>30-39</td>
<td><strong>MARGINAL FAIL;</strong> inadequate answer, with no substance or understanding, but with a vague knowledge relevant to the question.</td>
</tr>
<tr>
<td>F-2</td>
<td>0-29</td>
<td><strong>FAILURE;</strong> Lacks understanding with little knowledge of subject. Answer contains few items related to question with many serious errors. Could also be taken as a response to the misinterpretation of the question.</td>
</tr>
</tbody>
</table>
### Guidelines for Students at Examinations

#### General
1. The onus lies on each student to establish the dates, times and venues of their own examinations. No timetable or reminder will be sent to individual students by any office.
2. An examination number is required for all undergraduate anonymously marked annual and supplemental examinations. A new anonymous examination number will be issued at the start of each academic year. Students must check their anonymous exam number on their personal portal page at [my.tcd.ie](https://my.tcd.ie) prior to the commencement of each examination session.
3. You are expected to familiarise yourself with the location of every examination venue to which you have been assigned.
4. Mobile phones, or other electronic or communication devices, are not permitted in examination venues - if a phone rings or an alarm on a phone is heard, or it is discovered in any other way in the venue it will be confiscated. Confiscated materials may be retrieved from the Junior Dean’s Office, East Theatre (Monday-Thursday, 5.00 am – 1.00 pm only) on payment of a €35 fine per item. This fine is non-negotiable, and no appeals will be accepted by the Junior Dean or any of his assistants.
5. Students must follow the instructions given by the invigilators in a co-operative and respectful manner.

#### Before entering the Examination Venue
6. Find your seat number on the seating list displayed outside and read the accompanying notices.
7. Leave your personal belongings, including bags, coats, hats, etc. at the designated place within or nearby your examination venue. cloakrooms are available in the Arts and Hamilton Buildings for the safe-keeping of your personal belongings.
8. You will not be admitted to the examination after the first half-hour, and will not be allowed to leave during the last half-hour. If you arrive after the first half-hour, contact your College Tutor or his/her replacement as a matter of urgency. If your tutor is not available, contact the Senior Tutor’s Office.

#### While in an Examination Venue
9. Once you have entered a venue, complete SILENCE must be maintained at all times.
10. Each student must be in possession of their student ID card for each examination session. You should place your student ID card on the right hand side of your desk for the duration of each examination.
11. A ‘Clean Desk’ policy applies for all formal examinations. In addition to pens, pencils, rulers, student ID card, etc. only materials permitted for an examination may be placed on the desk. Invigilators will be instructed to request students to remove any non-permitted items from their desk. Pencil cases and calculator covers are not permitted. Students are advised that random pocket searches may be conducted during an examination session. Upon request, students should remove all items from their pockets for scrutiny by an invigilator. Failure to empty pockets when requested is considered a disciplinary offence and will be referred to the Junior Dean.
12. Your attention is drawn to the “CONDUCT OF EXAMINATIONS” notice.

#### During an Examination Session
13. You should check the title of the paper on your desk to ensure that it is the correct examination paper for your course, and read carefully all the instructions given.
14. You are not allowed start your examination until instructed to do so by the invigilators. Please use any spare time at the start to fill in your answerbook cover(s), remembering to complete the section at the bottom right-hand corner as requested before sealing the flap on every anonymous booklet used. Write legibly in ink – pencils are only allowed for OMR forms.
15. You will be advised of the time thirty minutes and ten minutes before the end of the examination.
16. If you wish to leave the examination venue at any stage during the examination you must be escorted by an Invigilator. If necessary you will be accompanied to a bathroom by an Invigilator.
17. If you wish to leave before the end of the examination you must hand your booklet(s) to an Invigilator and ensure you hand up everything you wish to have marked.
18. If you are taken ill just before an examination and are unable to sit it, immediately contact your tutor or his/her replacement. If your tutor is unavailable, contact the Senior Tutor’s Office. If you feel unwell during your examination, please inform an Invigilator - you will be asked if you wish to go to the College Health Centre and will be accompanied by an Invigilator.
19. Smoking breaks are not allowed during examination sessions.
20. Dictionaries and Programmable calculators are not permitted at examinations.

#### On completion of an Examination Session
21. You will be advised that:
   - you must immediately stop writing and hand up your booklets when instructed to do so by an Invigilator;
   - you should ensure that all of your answerbooks are labelled correctly with your examination number (where appropriate), seat number and all other required information;
   - it is your responsibility to hand in everything you wish to have marked by ensuring all materials are fastened securely with a treasury tag;
   - you must remain in your seat until all scripts have been collected;
   - you must not remove from the examination venue answer books, rough work, or other materials supplied.

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1 While every effort will be made to give due notice of major changes, the College reserves the right to amend the examination timetable.

[https://www.tcd.ie/academicregistry/exams/assets/local/guideexam.pdf](https://www.tcd.ie/academicregistry/exams/assets/local/guideexam.pdf)
CONDUCT OF EXAMINATIONS

Except as provided for below, candidates for examination are forbidden during an examination to do or to attempt to do, any of the following: to have in their possession or consult or use any books, papers, notes, memoranda, mobile phones or written or electronic material of any nature, or to copy from or exchange information with other persons, or in any way to make use of any information improperly obtained.

Where the examination is of such a nature that materials are provided to the candidates, or where the candidates are allowed by the rules of that examination to have materials in their possession, then candidates may of course make use of such materials, but only of such materials, and the general prohibition above continues to apply in respect of any and all other materials.

Where candidates have the prior written permission of the examiner(s), of the Dean of Undergraduate Studies (Senior Lecturer) or the Dean of Postgraduate Studies, or of the Disability Officer, to have materials in their possession during an examination, then candidates may of course make use of such materials, but only of such materials, and the general prohibition above continues to apply in respect of any and all other materials.

Where candidates are allowed to bring personal belongings into the examination venues upon condition that such belongings are stored in an area – such as the back of the venue – away from the area in which the candidates are sitting their examinations, then candidates may bring personal belongings into the hall, provided that they are placed in the indicated area and are not returned to by the candidates until they have finished their examinations and are leaving the hall.

Any breach of this regulation is regarded as a major offence for which a student may be expelled from the University.

Students must not leave the hall before the time specified for the examination has elapsed, except by leave of the invigilator.

Examinations or other exercises which are part of continuous assessment are subject to the same rules as other College examinations. Where submitted work is part of a procedure of assessment, plagiarism is similarly regarded as a major offence and is liable to similar penalties.

https://www.tcd.ie/academicregistry/exams/assets/local/guideexam.pdf