THE UNIVERSITY OF DUBLIN
TRINITY COLLEGE
SCHOOL OF MEDICINE

PROGRAMME STUDY GUIDE

2nd Medical Year Study Guide 2013/2014
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Mission Statement

The mission of the School of Medicine at TCD is to facilitate and provide Medical Education to the highest international standards; to train clinicians who are equipped to fulfill their professional roles in a caring, competent and patient centered manner; to produce individuals who through critical thinking and outstanding professional and ethical standards will become leaders in their field of practice.

The School aims to be a leading research-intensive institution that fosters life-long learning in its graduates in preparation for post-graduate training. It aims to integrate its educational obligations with other missions for high-quality patient care, research excellence and new knowledge generation.

The School embraces an ethos of social responsibility, accountability, public service and community involvement, and is dedicated to meeting the health care needs of the wider community by training doctors to practice medicine with integrity, and a deep understanding of the impact of psycho-social influences and inequity on health and disease.

Professional Behaviour and Fitness to Practice

The School of Medicine at Trinity College Dublin must ensure that students abide by a number of School, College and professional regulations. These regulations are cognisant of your position as a medical student and future medical practitioner. While the School strives to strike a balance between creating a collegial atmosphere and these requirements, we are bound to meet a number of legal requirements in order to ensure your degree is recognized by national and international professional accreditation bodies.

Your professional behavior must at all times be appropriate with regard to confidentiality, attendance and behaviour towards patients and colleagues. Students will be required to sign the Undergraduate Medical Student Professional Practice Agreement, a declaration of professional conduct and ‘fitness to practice’ to signify that they have read and understood the relevant guidelines and policies e.g. Confidentiality, Medical Council Ethical Guide, Attendance etc.

Medical Absences

In the case of absence due to medical reasons, a medical certificate must be submitted to the Medical Student Executive Officer in the School Office, Biomedical Science Institute as soon as possible after illness, ideally within 3 days.

If you miss an examination due to Medical Reasons, you should notify the School. You should also, in the cases of medical absences from an examination, contact your tutor should you wish to seek Permission to Defer from the Senior Lecturer.

Social Media

Students on the Medicine course should be mindful that they represent Medicine at Trinity College at all times including while engaged in social media. All rules regarding the code of conduct, professional behaviour, confidentiality and fitness to practice must be adhered to on social media and students found in breach of this may be disciplined accordingly.
YEAR 2 MEDICINE

Phase 2
This phase extends over two years and is designed to:
• Continue and expand the generic skills development with emphasis on the professional aspects
• Emphasise critical thinking and foster insight into the essential role of research in healthcare including aspects of molecular medicine and genetics
• Commence the development of non-invasive clinical skills at the individual (history taking and physical examination) and community (health promotion) level
• Introduce students to disease processes and to global as well as national aspects of disease control
• Focus on professional development by exploration of the legal, moral, ethical and economic aspects of safe effective medical practice

YEAR 2 MODULES
There are seven modules in the 2nd Medical year accruing 60 credits in total.

The seven modules are:

MD2007: Molecular & Translational Medicine
MD2008: Clinical Biochemistry
MD2009: Principles of Pharmacology and Practical Scientific Research
MD2010: Head and Neck Anatomy
MD2006: Neurosciences
MD2004: Aetiology, Mechanisms of Disease
MD2005: Fundamentals of Clinical and Professional Practice
MOLECULAR & TRANSLATIONAL MEDICINE

Details
ECTS Weighting  5
Semester/Term Taught Term 1
Contact Hours: 29 lectures

Module Co-ordinator
Professor Yuri Volkov

Lecturers
The following Professors of Trinity College contribute to the module: Richard Anney, Andrew Bowie, Paul Browne, Veronica Campbell, Cara Martin, Kevin Mitchell, Derek Morris, Paula Murphy, Ross Murphy, Maureen O’Sullivan, Orla Shells, Paul Spiers, Yuri Volkov, Henry Windle.

Lectures are given by a number of academic and clinical specialists with prominent expertise in their areas. The students will also be provided with an opportunity to carry out small group projects on the grounds of the biomedical research facilities of Trinity College’s Institute of Molecular Medicine, at St. James’s Hospital Campus. Additional tutorials dealing with specific aspects of Molecular Medicine can be arranged by request. Self-study hours are expected to be determined individually by the students. If required, the students will be provided with additional explanatory comments and self-study resources by the lecturers in their relevant subjects.

Module Overview

Rationale and Aims
Recent years have witnessed a rapid accumulation of knowledge in the molecular basis of human diseases, giving rise to Molecular and Translational Medicine as a discipline which provides an insight into the development mechanisms of pathological processes at molecular level. Molecular Medicine continuously supplies new powerful tools for diagnostics, therapeutic drug development, ethiotropic and pathogenetic treatment of a wide range of ailments, including some which were previously considered incurable. Medical graduates with a good knowledge of Molecular Medicine have the potential to significantly improve current diagnostic and therapeutic routines, and may form strong liaisons between hospitals, diagnostic labs, biomedical research institutions, and the pharmaceutical industry, for the ultimate benefit of patients’ treatment. This module is aimed at providing medical students with powerful knowledge in the molecular mechanisms of human disease development and related cutting-edge diagnostic tools. The module is designed for second year medical students (Senior Freshman), and represents an integral component of the Trinity College undergraduate medical curriculum. Attendance of the module and examinations are mandatory for all students. The Molecular and Translational Medicine module constitutes a part of the Foundation Scholarship Examinations in Medicine.

The lecturers aim to help students gain a thorough understanding of the following:
• Integration of molecular and cellular biology in relation to human diseases
• Operation of the human genome at a molecular level, particularly in relation to the mechanisms of disease development
• Molecular mechanisms of human development and its disorders
• Molecular basis of common human malignancies (cancer)
• Molecular mechanisms of human host and microbial pathogens interactions
• Contemporary technologies for analysis of human molecular and cellular functions and their disregulation in disease
• Applications of these technologies in clinical practice
• Use of knowledge on the molecular basis of human disease for the development of novel therapies, including pharmacological agents or gene therapy

Learning Outcomes
The overall objective of this module is to empower students with the knowledge of the essential aspects of molecular mechanisms of disease development, and to enable them to apply this information in a clinical environment for improved diagnostic approaches and better treatment of the patients.

On successful completion of this module, the students should be able to:
• Identify the molecular mechanisms involved in human development, developmental abnormalities, tissue damage, regeneration and recognize stem cell applications in this context;
• Describe the fundamental molecular mechanisms of cell communications and key intracellular processes underlying inflammatory diseases and human host defense responses;
• Explain the genetic and environmental factors involved in the development of cancer and haematological malignancies (leukaemia) and understand the key stages of cancer development and progression;
• Explain how structural and functional analysis of molecules can be applied to the generation of novel drugs and design of new therapies, including gene delivery and gene therapy;
• Explain the molecular processes underlying common psychiatric disorders;
• Discuss how contemporary molecular medicine technologies can be applied for the development of new diagnostic methods and molecular approaches for therapeutic intervention.

Methods of Teaching and Learning
The module is taught for the duration of one academic term as a series of lectures dealing with a wide scope of topics. It is designed to implement the knowledge accumulated by the students in parallel modules (Anatomy, Clinical Biochemistry and Molecular Immunology, Microbiology and Pharmacology) for a better understanding of molecular mechanisms of human disease and contemporary approaches to their treatment.

Several lectures of the module are focused on the basic molecular mechanisms of human development, intracellular communications and signaling, as well as molecular, cell and tissue damage and regeneration. The fundamental knowledge accumulated from these lectures is subsequently applied for in-depth understanding of the molecular aspects of disease-related breakdowns in molecular functions in the context of translation of this knowledge into clinical practice. The lectures cover such specific topics as molecular basis of inflammation, cancer, leukemia and psychiatric disorders, all of which refer to clinical patient-related information. The students are also empowered with cutting-edge technological approaches to diagnostics and therapy, including nanomedicine, molecular imaging and medical proteomics.

Due to a wide scope of topics covered by the module, the students are expected to fully use the taught lecture material and engage in active studying of the suggested reading resources. On specific topics, particularly relevant to the translational aspects of molecular medicine, students should expose themselves to the relevant original research and clinical publications available through the biomedical databases and library collections.
Assessment

Summative
The students are assessed via a written examination which consists of two parts. Part A constitutes 30% of the overall mark, and offers an essay type question (which can be chosen from the list). Part B consists of 7 short “either/or” type questions, which constitute 10% each (total 70%). These cover the diverse scope of theoretical material of the module and include brief clinical case studies, and must all be attempted.

Formative
Informal assessments (as a brief questionnaire or computer-assisted response collection) may be implemented on some specific topics, in order to provide efficient feedback from the students to the lecturers and is aimed at timely evaluation of the knowledge level achieved in the class. Feedback will be provided to the students either immediately (computer-assisted format) or upon analysis of the questionnaire responses.

Evaluation
The Molecular and Translational Medicine module is relatively novel to the medical curriculum; it has emerged along with the evolution of contemporary medical sciences. The module components are therefore dynamically adjusted each year to cater for the best education of future clinicians. The changes reflect new and emerging trends in biomedical and clinical sciences and practice, as well as active feedback received from the students.

Key Texts
The cell: a molecular approach (Cooper)
Developmental Biology (Gilbert)
Molecular cell biology (Lodish et al.)
Molecular biology of the cell (Alberts et al.).
Encyclopedia of molecular cell biology and molecular medicine (Meyers)
Molecular Medicine (Trent)
Essentials of Human Embryology (Larsen)
Introduction to Molecular Medicine (Ross)
An Introduction to Molecular Medicine and Gene Therapy (Kresina)

Module Content

Module Details
Molecular basis of development and molecular embryology (2 lectures)
Lecturer: Prof. Paula Murphy
Summary of the topics covered:

Neural development (2 lectures)  Lecturer: Prof. Kevin Mitchell
Summary of the topics covered:
Molecular processes affecting development of the cerebral cortex and their defects. Specific features of nervous system development in comparison to other tissues. Role of selective gene expression, encoded proteins and their associations. Control of cell migration in the cerebral cortex. Mouse mutant models and

**Molecular mechanisms of cell damage and regeneration; stem cells origin and applications (2 lectures)**

**Lecturer:** Prof. Veronica Campbell

**Summary of the topics covered:**

**Molecular mechanisms of cell interactions, leukocyte migration and recirculation**

(4 lectures) **Lecturer:** Prof. Yuri Volkov

**Summary of the topics covered:**

**Cell signaling and transcriptional regulation of inflammation (2 lectures)**

**Lecturer:** Prof. Andrew Bowie

**Summary of the topics covered:**
Molecular mediators of inflammation. The role of Toll-like receptors and nucleotide-binding oligomerisation domain proteins in infection and inflammation. IL-1 as a factor affecting gene expression. NFkB and inflammatory process development. Tumour necrosis factor and caspases in inflammation.

**Molecular mechanisms of cancer and leukaemia (7 lectures)**

**Lecturers:** Prof. Paul Browne, Prof. Maureen O'Sullivan, Prof. Orla Sheils, Prof. Cara Martin

**Summary of the topics covered:**


and cancer – potential biochemical mechanisms. The mechanisms whereby viruses cause cancer. What viruses tell us about the cell cycle. Viruses and the inflammation - cancer sequence.


Haematological malignancies. Genetic abnormalities associated with blood cell malignancies. BCR-ABL and AML1 genes in leukaemia.

**Molecular basis of cardiovascular diseases (2 lectures)**

**Lecturer:** Prof. Ross Murphy  
**Summary of the topics covered:**  
Genetic factors and lifestyle in the development of cardiovascular disease. DNA damage, oxidative stress and chronic inflammation as main pathogenic determinants of cardiovascular pathology. Molecular basis of vascular stress response and damage, atherosclerosis and hypoxia. Molecular mechanisms of heart tissue damage and regeneration. Stem cells, adhesion molecules and small molecule based therapeutic approaches.

**Anti-inflammatory anti anti-cancer drugs (2 lectures)**

**Lecturer:** Prof. Paul Spiers  
**Summary of the topics covered:**  

**Nanomedicine and molecular imaging (2 lectures)**

**Lecturer:** Prof. Yuri Volkov  
**Summary of the topics covered:**  
Contemporary approaches to biomedical studies at molecular level. Tools used for visualisation of intracellular processes. Nanomedicine, nanotechnologies and novel diagnostic and drug delivery systems. High content analysis in drug development and screening.

**Medical proteomics (2 lectures)**

**Lecturer:** Prof. Henry Windle  
**Summary of the topics covered:**  

**Molecular basis of psychiatric disorders (2 lectures)**

**Lecturers:** Prof. Derek Morris, Prof. Richard Anney  
**Summary of the topics covered:**  
Psychiatric diseases as complex genetic disorders. Mutations in DNA and molecular genetics of psychiatric disorders. Endophenotypes in the analysis of psychiatric diseases. Linkage and association studies. Molecular mechanisms in aetiology of ADHD. Applications of molecular genetics in diagnostics of psychiatric diseases. Mouse models of ADHD. Dopaminergic hypothesis in ADHD. Treatment approaches and their link to research in ADHD.
CLINICAL BIOCHEMISTRY

Details
ECTS Weighting 5
Semester/Term Taught Term 1
Contact Hours: lectures

Module Co-ordinator
Professor Richie Porter

Lecturers
Dr Richard K. Porter, Dr Roger Preston, Dr Joseph Carroll, Dr Gerard Boran, Dr Thomas Smith, Dr John Jackson, Professor Con Feighery, Dr Jacinta Kelly, Dr Derek Doherty

Module Overview

Rationale and Aims
The purpose of the module is to enable the students to understand and interpret core aspects of “clinical biochemistry” and immunology that they will encounter in the course of their careers as medical doctors. Prerequisites include knowledge of the fundamentals of biochemistry. The module is mandatory. The lecture is there to facilitate understanding of the modules provided.

This module integrates the students’ knowledge of cellular metabolism and cell biology into the medical dimension of human physiology and pathology.

Introduction (Porter 1 lecture)
Coagulation (Preston 6 lectures)
Extracellular matrix (Carroll 4 lectures)
Clinical Endocrinology (Boran 8 lectures)
Clinical Biochemistry (Smith 7 lectures)
Immunology (Doherty/Feighery/Kelly/Wallace 12 lectures)
Molecular mechanisms of metabolic diseases (Porter 4 lectures)

Module Assessment
Module coordinators and lecturers can be contacted with any reasonable requests about the module, the student’s progress and the examinations at any time during the year.

• The Examination in “Clinical Biochemistry” will be at the end of Semester 1.
• One 3 hour paper two sections:
  • Section A: Essay questions do 2 from 5
  • Section B: Clinical questions do 3 from 6 (immunology/endocrinology/clinical biochemistry)
• Section A accounts for 25%; section B accounts for 75%
• “Pass/Fail” and “Distinction” viva voce examinations in Hilary term.
  • Venue: School of Biochemistry. Date to be finalised.

Key Texts
The lecturers will indicate the relevant texts for each module.

Resources
Details of teaching materials can be accessed at the School of Biochemistry and Immunology website at the following link: http://www.tcd.ie/Biochemistry/courses/meds.php
Evaluation

A lecturer based feedback form is distributed to students. The data is collated, plotted and analyzed evaluations are given to the lecturers.

Module Content

Module Details

The Extracellular Matrix: Dr. Joe Carroll (4 lectures)

1. The extracellular matrix: overview of composition; collagen, elastin and glucosaminoglycans; collagen-amino acid composition, biosynthesis, post-translation modification and processing, formation of fibres and alternative structures (particularly type IV), genetic defects in collagen structure and exon splicing
2. Glycosaminoglycans: classification, synthesis and properties; genetic disorders of glycosaminoglycan metabolism
3. Calcification: dietary calcium and absorption; structure of crystalline bone; vitamin D metabolism and calcium transport; regulators of osteoclast and osteoblast activity; parathyroid hormone and phosphate metabolism; regulation of calcium homeostasis; factors affecting the determination of calcium concentration
4. Molecules involved in cell adhesion: fibronectin and its binding to cells, collagen and glycosaminoglycans, influences of the cell-cycle and metastasis; cell communication with the morphogenesis and proliferation; laminin, its high affinity for type IV collagen and role in epithelial cell function.

Learning Objectives

The objective of this short module is to gain understanding of the extracellular macromolecular structures which are present in all tissues. These molecules (collagen, elastin and glycosaminoglycans) determine the texture, rigidity, fluidity, strength, shape, elasticity of the tissues and serve as barriers against infection. The glycosaminoglycans influence the calcification of tissues. The extracellular matrix binds via Fibronectin to cells and forms a direct line of communication to the nucleus; Alterations to the extracellular matrix leads to changes to a cells morphology and biochemistry. Genetic diseases of the extracellular matrix have profound effects on growth, learning, sight, etc. We will also examine how Calcium homeostasis is regulated.

Blood Coagulation: Dr. Roger Preston (6 lectures)

Lecture 1 - Overview of haemostasis
Lecture 2 - Primary haemostasis
Lecture 3 - The coagulation cascade
Lecture 4 - Regulation of coagulation
Lecture 5 - Fibrinolysis
Lecture 6 - Coagulation and inflammation

Learning Objectives

1) Describe normal haemostatic mechanisms including the interaction of vessel wall, platelets and clotting factors
2) Describe the initiation and regulation of coagulation cascade
3) Discuss the clinical relevance of normal haemostasis
4) Understand the molecular basis of fibrin clot formation and subsequent dissolution.
5) Describe the central role played by endothelial cells in regulation of haemostasis in vivo

Clinical Endocrinology Dr. Gerard Boran (8 lectures)


8. **Special topic in endocrinology.** B-type natriuretic peptides (BNP) and the diagnosis of heart failure.


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**Learning Objectives**

1. To understand the basic principles underlying the laboratory biochemical investigation of common problems in clinical endocrinology

2. To know about the uses and limitations of common laboratory endocrine investigations

3. To be able to interpret simple case vignettes covering common endocrine problems

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**Clinical Biochemistry - Dr. Tom Smith (7 lectures)**


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**Learning Objectives**

At the end of this series of lectures students will have a basic understanding of the main core areas of Clinical Biochemistry. They will be in a position to understand and explain from a biochemical and
pathophysiological point of view derangements in water, electrolyte, lipid, enzyme, acid base and renal function. Case interpretation by integration of clinical and biochemical data is a fundamental learning objective and students will be provided with the information to logically derive diagnoses and suggest patient management and treatment options in the areas covered.

**Fundamental Immunology (Doherty/Feighery/Kelly/Wallace – 12 lectures)**

1. **Introduction to the Immune System in Health and Disease – Derek Doherty**
   - Infectious disease; immune-mediated disease; immune deficiencies; inflammation; innate and adaptive immunity; cells, tissues and molecules of the immune system; immune regulation, immunisation, immunotherapy

2. **Cells and Tissues of the Immune System – Derek Doherty**
   - Arterial, venous and lymphatic circulation; types of tissues; blood cells; neutrophils; eosinophils; basophils; mast cells; monocytes; macrophages; dendritic cells; B cells; T cells; natural killer cells; bone marrow; thymus; bursa; spleen; lymph nodes; appendix; antibodies; cytokines.

3. **Innate Immunity and Inflammation – Derek Doherty**
   - Defense barriers; pathogen recognition receptors; phagocytosis; inflammation; cell adhesion; diapedesis; chemotaxis; cytokines; cell killing; degranulation; introduction to antigen presentation, inflammatory disease

4. **Antibodies – Derek Doherty**
   - Discovery, structure and function of antibodies; generation of antibody diversity; antibody isotypes; generation of antibodies; antibodies in medicine; antibody deficiencies; opsonisation; complement activation.

5. **Antigen Recognition by the Adaptive Immune System – Con Feighery**
   - T cells; B cells; T cell receptor; major histocompatibility complex; receptor diversity; antigen specificity; clonal selection and expansion; primary and secondary immune responses, memory cells, B and T cell activation, vaccination.

6. **The Major Histocompatibility Complex - Con Feighery**
   - MHC class I and class II molecules: cytoplasmic and vesicular antigens; antigen degradation, binding to MHC and presentation; MHC genomics and polymorphism; MHC and disease susceptibility; transplantation; tissue typing.

7. **Antigen Processing and Presentation – Jacinta Kelly**
   - Antigen-presenting cells; pathways of antigen processing and presentation; cross presentation; T cell activation.

8. **T Cell Activation and Function – Derek Doherty**
   - CD4 and CD8 T cells; T cell development and selection; naïve and effector T cells; T cell activation; costimulation; cytokines; effector T cell differentiation; cytotoxic T cells; helper T cell subsets.

9. **The adaptive immune system – Derek Doherty**
   - Helper T cell subsets; cytokines; cytotoxicity; macrophage activation; B cell activation; antibody production; immune regulation and tolerance; T cell-mediated disease

10. **Allergy and Immunodeficiency – Eleanor Wallace**
    - Hypersensitivity types and mechanisms; allergies; immunodeficiencies; diagnosis and treatment; case studies.

11. **Autoimmunity – Eleanor Wallace**
    - Organ-specific and systemic autoimmune diseases; aetiology and pathogenesis using examples of T cell-mediated and antibody-mediated autoimmune diseases in humans; diagnosis and treatment; case studies.

12. **The Immune Response to Infection – Derek Doherty**
    - Different types of pathogens; overview of innate and adaptive immune responses to viruses, bacteria and parasites; evasion and subversion of host immune responses by pathogens; vaccines and immunotherapies

**Learning Objectives:**

- To understand how the immune system deals with viruses, bacteria, parasites and tumours
- To understand the cellular and molecular mechanisms of innate and adaptive immunity
• To understand the mechanisms by which the immune system can cause disease
• To appreciate the potential of immunisation and immunotherapy for diseases in humans

Metabolic diseases (4 lectures)
Definition, current diagnostic criteria and classification of diabetes mellitus.

Lecture 1: Introduction to diabetes mellitus (Porter)
Pathophysiology and clinical and biochemical characteristics of type 1 and type 2 diabetes mellitus. Epidemiological data regarding increasing prevalence and incidence of both main types of diabetes and obesity. Interplay between obesity, metabolic syndrome and type 2 diabetes. Stages of glucose intolerance and the main preventive strategies for developing diabetes in individuals at risk. Complications in patients with type 2 diabetes and how we can reduce their risk.

Lecture 2: Cellular and molecular mechanism of diabetes mellitus (Porter)
Physiology of insulin secretion and its action at cellular level. Examples of monogenic forms of diabetes will be used to illustrate the effects of disrupting insulin secretion and action at various levels. Genetic background of type 1 and type 2 diabetes. Immune processes occurring in pathophysiology of type 1 diabetes and the role of HLA antigens. Molecular mechanisms leading to the development of microvascular complications.

Learning objectives:
1. Define diabetes mellitus and discuss current classification and diagnostic criteria
2. Characterise the main differences between type 1 and 2 diabetes
3. Discuss genetic background and main differences in genetic susceptibility for type 1 and type 2 diabetes
4. Describe immune processes occurring in type 1 diabetes and the role of HLA antigens
5. Describe the interplay between obesity, insulin resistance and type 2 diabetes

References:
1. "Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications." Report of WHO Consultation. This is a link to where it can be downloaded: http://whqlibdoc.who.int/hq/1999/WHO_NCD_NCS_99.2.pdf
2. www.easd.org
3. www.diabetes.org

Lecture 3: Introduction to Obesity and Control of appetite (Porter)
We are going to discuss the definitions/measures, epidemiology, complications and treatment of obesity. We also will discuss the central regulation of calorie intake. We will mention co-morbidities associated with obesity. We will focus on neuroendocrine control of eating (the role of leptin etc.).

Lecture 4: Cellular and Molecular Mechanisms of Obesity (Porter)
Molecular basis (genetics) of obesity. Leptin and obesity. Monogenic obesity syndromes (Leptin, MC4R, PC1, POMC and others). Common forms of obesity. Genome-wide association studies (GWAS) as a powerful approach to study genetics of complex diseases (including common forms of obesity).

Learning objectives:
1. Discuss causes of obesity
2. Describe the neuroendocrine control of eating
3. Discuss the central regulation of calorie intake
4. Discuss the known genetic background of obesity

References:
All standard textbooks in Internal (General) Medicine contain sections re obesity.
Principles of Pharmacology and Practical Scientific Research MD2009

Details

ECTS Weighting  10
Semester/Term Taught  All year
Contact Hours:  Lectures: 46 hours
Tutorials: 6 hours
Computer Lab: 9 hours
Practicals: 9 hours
Research Projects: 100 hours

Module Co-ordinator

Professor Paul Spiers

Module Overview

Rationale and Aims

This mandatory course is aimed at developing knowledge and understanding of the pharmacological basis of therapeutics in order that the student will gain a critical and intelligent insight into the scientific underpinnings of drug use and abuse. The course comprises a series of lectures, tutorials and student practicals. In addition, students undertake a research project over a 14-week period during which they generate and analyse their own data, with a view to learning scientific method and reasoning. This usually involves study design, generating personal data, quality control, statistical evaluation, interpretation of results and presentation to an audience by poster. Students must also demonstrate the ability to evaluate literature in the form of submitting a short research paper based upon their project.

Learning Outcomes:

- Display an understanding of the terminology used to describe basic pharmacologic principles and drug classification.
- Explain the basic pharmacokinetic principles governing uptake, distribution, metabolism and elimination of drugs.
- Describe and explain pharmacodynamic concepts of drug-receptor interaction to accurately predict drug responses at all levels of biological organization.
- Demonstrate an understanding of the basic mechanisms of drug-induced toxicity and drug interactions.
- Describe the effects exerted by major drug groups on cells, tissues, organ systems, and patients and be able to explain the mechanisms underlying these effects at various levels of biological organization.
- Show an understanding of the basic mechanisms involved in modification of drug responses by disease and genetics.
- Utilize appropriate research approaches (e.g. laboratory, database and literature sources) to investigate a research question and present it as a short paper.
**Module Content:**
- Fundamental Principles
- Principles of Autonomic Pharmacology
- Principles of Cardiovascular Pharmacology
- Principles of Endocrine Pharmacology
- Principles of Immune Pharmacology
- Gastro-Intestinal Pharmacology
- Principles of Toxicology
- Clinical Pharmacology

**Methods of Teaching & Learning:**
Current teaching practices employ a range of strategies to encourage student engagement and facilitate an inclusive curriculum. These include:
1. Computer assisted learning packages
2. Case based scenarios in lectures
3. Hands on laboratory practicals and workshop
4. Structured case based tutorials
5. Table Quiz
6. Research projects

**Assessment:**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Semester 1 Examination</td>
<td>30%</td>
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<tr>
<td>Semester 2 Examination</td>
<td>54%</td>
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<tr>
<td>Research Project</td>
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The **Supplemental Examination** is worth 100%.

**Sample questions:** Available on the Trinity web site: [http://www.tcd.ie/Local/Exam_Papers/index.html](http://www.tcd.ie/Local/Exam_Papers/index.html)

**Recommended Reading List:**
Head & Neck Anatomy MD2010

Details

ECTS Weighting 5
Semester/Term Taught Term1

Module Co-ordinator
Dr Nicholas Mahony

Module Learning Aims:
This module provides detailed instruction on the gross anatomy of the head and neck and its embryologic development. It is intended for students of Medicine, for whom it is mandatory. The module supports the academic programme of the School of Medicine.

Learning Outcomes:
On successful completion of this module the student should be able to:
- Recognise, describe and classify bones and joints of the head and neck
- Recognise and describe the gross structure and functions of its muscles and nerves of the region
- Recognise and describe its visceral and endocrine structures
- Recognise and describe the organs of the special senses
- Recognise and describe its blood supply and lymphatic drainage
- Recognise and describe the radiologic features of the head and neck
- Describe the development of the head and neck and related congenital abnormalities
- Apply anatomical knowledge to explain the pathogenesis and natural history of common clinical disorders of the region

Module Content:
- The cervical vertebrae and skull, with their joints and ligaments
- The muscles and nerves of the region, in functional groups
- The visceral and endocrine structures of the head and neck
- The organs of the special senses (vision, hearing, taste)
- The arteries, veins and lymphatics of the region
- Radiology of the head and neck
- Embryologic development of the cervical and craniofacial regions
- Clinical applications of anatomy of the region

Methods of Teaching & Learning:
Teaching delivery is primarily through lectures and practical classes, in which all students are required to participate. The first 2 hours of practical class will be focused on routine class based dissections; the final hour is allocated to project work and small group learning. Attendance is compulsory for all classes, a practical class attendance register is made at random times in all practical classes, in all cases of absence from practical class for medical reasons a sick certificate is required.

Assessment:

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<tbody>
<tr>
<td>Table Project</td>
<td>20%</td>
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<tr>
<td>Anatomy Practical Examination</td>
<td>40%</td>
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<tr>
<td>Written Examination at Michaelmas</td>
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</table>
Pass Criteria
In order to pass, students must achieve an overall mark of 50% and satisfy attendance criteria (it is not necessary to pass any of the individual elements). Students with an overall mark of 45% - <50% will be invited to attend a viva examination with the External Examiner in Anatomy during the annual examination period at the end of Hilary term. Subject to a satisfactory performance, the External Examiner may raise the mark to 50%. Students with an overall mark of less than 45%, or those with an overall mark of 45% - <50% but who do not satisfy the External Examiner, will be required to sit the Supplemental Examination.

Supplemental Examination
The Supplemental Examination is held in August/September.
Marks from the Practical Examination and Table Project are not carried forward.
The format of the Supplemental Examination and the standard to pass are exactly the same as those of the Annual Examination (see above), however the repeat practical examination will consist of a 10 minute viva examination with a member of the Anatomy department staff and the weighting of overall marks is different because the Table Project marks are omitted.

Overall Weighting of Supplemental exam:

<table>
<thead>
<tr>
<th>Practical Examination</th>
<th>50%</th>
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<tr>
<td>Essay Paper</td>
<td>50%</td>
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Please note:
Any student with an overall mark between 44.5-50% in the supplemental examination will be invited to a viva voce examination with the External Examiner. Students who fail the Supplemental Examination will be required to repeat the year.

Evaluation
Students will be provided with a questionnaire at the end of the module to allow feedback. Among other items there will be a section on suggestions for future improvement of the module. The questionnaire will be filled in anonymously and submitted to the Course Coordinator.

Recommended Reading List:
A main textbook, anatomy atlas and embryology textbook from the following:

**Main Textbooks**
Last’s Anatomy: Sinnatamby: Churchill Livingstone
Gray’s Anatomy for Students: Drake, Vogl and Mitchell: Elsevier

**Atlases**
Atlas of Human Anatomy: Netter: CIBA-Geigy

**Embryology**
Langman’s Medical Embryology: Sadler: Williams & Wilkins

**Reference**
Gray’s Anatomy: Williams et al: Longman
Essentials of Human Embryology; Larsen
Neurosciences MD2006

Details
ECTS Weighting  15
Semester/Term Taught Term 2

Module Co-ordinators
Prof Michael Rowan, Dept of Pharmacology & Therapeutics Tel: 896 1567, mrowan@tcd.ie, Dr Nick Mahony, Dept of Anatomy Tel: 8961182, njmahony@tcd.ie

Lecturers
Lecturers in the disciplines of anatomy, biochemistry, pharmacology and therapeutics, physiology and psychiatry all participate in lectures. Other teachers from within College and associated hospitals, in neurology for example, will also be involved.

Module Overview

Rationale and Aims
The overall aim is to consider all aspects of the nervous system, from biophysics to behavior, in health and disease. In view of the complexity of the nervous system the subject is taught in a multidisciplinary and interdisciplinary manner. Approaches taken include molecular, biochemical biophysical, cellular, genetic, physiological, pharmacological, structural, behavioral and psychological. The Psychiatry/Psychology component gives special emphasis to covering topics across the ages.

It is important that students try to study the different aspects of the thematic areas in an integrated way. Related topics in Molecular Medicine and Pharmacology are also relevant to gain a good understanding of Neuroscience.

Thematic areas covered include:
- Nervous System Development
- Cellular and Molecular Neuroscience: Synaptic and Ionic Mechanisms
- Neurodegeneration: Common mechanisms
- Sensory Systems: Central Sensory / Perceptual pathways and Information Processing
- Behavioural & Cognitive neuroscience: Cognition and Language / Speech
- Motor Systems: Central Motor Pathways and Control
- General Topography of the Nervous System
- Regulatory Systems: CNS Arousal / Activation Mechanisms
- Regulatory Systems: Affect (Motivation and Emotion)

Learning Outcomes

**Neuroanatomy**
On successful completion of this module the student should be able to:
- Recognise and describe the major subdivisions of the central nervous system (CNS)
- Recognise and describe the ventricular system and the production, circulation, absorption and role of cerebrospinal fluid
- Recognise and describe the structures associated with sensory and motor systems and their connections
- Recognise and describe the structures associated with language and their connections

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• Recognise and describe the limbic system and its connections
• Recognise and classify cranial and spinal nerves and their connections
• Recognise and describe the blood supply of the CNS
• Apply anatomical knowledge to explain the normal function of the CNS
• Apply anatomical knowledge to explain the pathogenesis and natural history of common clinical disorders of the CNS

**Neurochemistry**
• A description of the cell types in the brain and common techniques that enable chemicals with neurotransmitter-like properties to be identified
• The criteria that need to be satisfied in order for a chemical to be classified as a neurotransmitter
• A knowledge of the biogenic amines (acetylcholine, dopamine, noradrenaline, adrenaline, serotonin) and the properties that allow them to be classified as neurotransmitters
• A knowledge of glutamate and GABA and the properties that allow them to be classified as neurotransmitters
• A knowledge of atypical neurotransmitters (NO, CO, D-serine, neuropeptides, purines) and the properties that allow them to be classified as neurotransmitters
• The role that apoptotic and necrotic cell death play in neurodevelopment and neurodegeneration.

**Neuropharmacology**
• Describe and evaluate the scientific basis of current and novel pharmacological approaches to the treatment of neurological and psychiatric illnesses, including drug efficacy and major side effects
• Assess the pharmacological evidence for the involvement of different mechanisms in normal and abnormal functioning of the nervous system
• Define efficacy goals and differences between different classes and sub-classes of centrally acting drugs including:
  - Hypnotics, sedatives and anxiolytics
  - General and local anaesthetics, anticonvulsants
  - Narcotic and non-narcotic analgesics
  - Antipsychotic and antidepressants
• Relate the different effects of classes of CNS drugs to their sites and mechanisms of action.
• Distinguish acute and chronic effects of CNS active drugs and the basis of physical and psychological dependence.

**Methods of Teaching and Learning**
This module consists of lectures, practicals and interactive workshops.

**Module Assessment**

**Written Papers**

**Paper 1** (2.5 hours):
Physiology (Answer one essay question from a choice of two), Pharmacology (Answer one essay question from a choice of two), Biochemistry (Answer one essay question from a choice of two),

**Paper 2** (2 hours):
Psychiatry (25 EMQs)
Neuroanatomy (40 MCQs in 1 hour; Single best answer type)
**Neuroanatomy Practical Examination:** This is a station based exam with 2 viva voce stations (one-to-one interview) with a member of Staff of the Department and three ‘spot’ stations.

**Distribution of Marks**
- Paper 1: Physiology (20%), Pharmacology (20%), Biochemistry (20%)
- Paper 2: Psychiatry (20%), Neuroanatomy (10% paper, 10% practical)
- Overall Total: 100%

**Key Texts**
Some aspects of this unit are dealt with in the recommended texts for Anatomy, Biochemistry, Physiology and Pharmacology (Rang et al). Other specific reading may be recommended during the module.

**Neuroanatomy**
A textbook and an anatomy atlas are essential. Pick one of each from the list below:

- Clinical Neuroanatomy and related Neuroscience: FitzGerald and Folan-Curran; W B Saunders
- Neuroanatomy - An Illustrated Colour Text: Crossman & Neary; Churchill Livingstone

**Atlases**
- Atlas of Anatomy: Gilroy, MacPherson, Ross; Thieme
- Atlas of Human Anatomy: Netter; CIBA-Geigy

**Reference**
Principles of Neural Science: Kandel, Schwartz and Jessel [Ed]; McGraw Hill

**Neurochemistry:**
There is no small book on the subject that can be recommended. The standard textbooks (e.g., Voet & Voet) contain a chapter on neurochemistry, which should give you most of what you need to supplement the lectures. The list below is for those who want to find out much more.


*Neuroscience (2nd edition)* by Purves, Augustine, Fitzpatrick and Katz. Available for free online through the PubMed website


**Some Web Sites**
Some of these can be quite fun and informative, if you have some time to spare.
Module Details

LECTURES

WEEK 1

(Biochemistry) Cell-types in the brain and their functions.

(Anatomy) Introduction: CNS development
Ectodermal origin of the neural plate, neural folds and neural tube; Formation of brain and spinal cord; Alar and basal plates; Motor and sensory neurons; Rhombencephalon (myelencephalon and metencephalon), mesencephalon and prosencephalon (diencephalon and telencephalon); Formation of the medulla, pons, midbrain, cerebellum, basal ganglia, thalamus, hypothalamus, pituitary and the cerebral hemispheres; Development of the ventricular system.

(Physiology) Revision of synaptic transmission, synaptic plasticity of glutamatergic transmission
- general properties of synaptic transmission
- general properties of neurotransmitter receptors, including ionic and metabotrophic receptors
- ionotrophic transmitter channels, including generation of fast synaptic potentials and properties of ionic-receptor channels, including nicotinic acetylcholine receptors, glutamate AMPA receptors, glutamate NMDAR receptors and GABAergic receptors
- long-term potentiation of synaptic transmission
- metabotrophic transmitter channels, including generation of slow synaptic potentials and properties of metabotrophic-receptor channels

(Anatomy) Cerebral hemispheres: topography
Meninges; Sulci; Gyri; Frontal, parietal, temporal, occipital and limbic lobes; Inferior aspect of brain; Insula; Cortical areas (Brodmann); Primary motor cortex; Premotor cortex; Supplementary motor area; Primary sensory cortex; Auditory cortex and language areas; Visual cortex; Association cortex; Commissural, projection and association fibres; Structural aspects; laminar organisation of the cerebral cortex; Isocortex and neocortex.

(Physiology) Revision of synaptic transmission, synaptic plasticity of glutamatergic transmission, continued.


(Psychiatry) Brain and Mind - An overview of the whole module and the integration of brain and mind.

What we know about the interaction between brain processes and mental states. The interactions between the physical and the mental and between biological and psychological.

(Psychiatry) Cognitive development I
Piaget’s theory as the main theory of cognitive development, how theories of development might inform clinical work, Intelligence and its measurement, the concept of IQ and its advantages and limitations.

(Biochemistry) Acetylcholine neurotransmission. NMJ. Docking proteins and evidence from botulimus and tetanus toxins. Stimulation of release by chemical, neurotoxic, ionic and electrical means. Mechanisms and control of release - the role of calcium ions and of phosphorylation events.

(Anatomy) Ventricles and CSF
Lateral ventricle: Central part, with frontal, occipital and temporal horns; interventricular foramen; relationship with caudate nucleus, septum pellucidum, corpus callosum, fornix, thalamus, forceps major, calcar avis, amygdala, hippocampus and tela choroidea. Third ventricle: Relationship with the fornix, corpus callosum, thalamus and interthalamic adhesion, hypothalamus, anterior commissure, lamina terminalis, optic chiasm, posterior commissure, pineal gland, cerebral aqueduct and tela choroidea. Interpeduncular fossa: Tuber cinereum, infundibulum, pituitary gland, mamillary bodies, posterior perforated substance. Fourth ventricle: Lateral boundaries, roof and floor; lateral and dorsal recesses; Median aperture (of Magendie), lateral apertures (of Luschka); Median sulcus, medial eminences, sulcus limitans; Superior fovea, facial colliculus, locus coeruless, striae medullares (taeniae), inferior fovea; Hypoglossal triangle (trigone), vagal triangle, vestibular area, auditory tubercle. CSF Pathways

(Physiology) Revision of synaptic transmission, synaptic plasticity of glutamatergic transmission, continued.

WEEK 2
(Pharmacology) Drugs and synaptic transmission I
Psycho- and Neuro-pharmacology,
Classifications of drugs acting on the central nervous system
Blood-brain barrier to drugs.
State-dependence of drug action and effects. Placebo effect.
Arousal continuum. Mood continuum.
Neurotransmission and sites of drug action.
Targets for drugs at the CNS synapse –excitatory and inhibitory circuitry.
Pre- and post-synaptic interference (positive or negative) with receptors / effectors, synthesis, storage, release, reuptake / transporters and degradation.
Drugs acting at synapses: Amino acid receptors including glutamate, GABA and glycine. Subtypes of amino acid receptors and selective drugs.

(Biochemistry) Aminergic Transmission 1. Synthesis of catecholamines and serotonin; properties of the enzymes involved, nature and control of these processes and the effects of drugs. Post-synaptic events, metabotropic and ionotropic receptor biochemistry and the roles of second messengers. Trace amines. False transmitters. Catabolism-vesicle competition.

(Anatomy) The thalamus and geniculate bodies
Anatomic subdivision into lateral (dorsal and ventral tiers), mediodorsal and anterior groups of nuclei; Functional subdivision into specific, non-specific and association nuclei; Thalamic peduncles (radiations) and their connections.

(Physiology) Introduction to the functioning of the CNS. Techniques used to study functioning of the nervous system -techniques and uses of monitoring and stimulating population brain activation, including fMRI, real time fMRI, Squid, optical imaging, electroencephalogram, sensory evoked scalp potentials

(Pharmacology) Drugs and synaptic transmission II
Drugs and synaptic transmission continued.

(Anatomy) The internal capsule; the basal ganglia
Internal capsule: Location and relations; anterior limb, genu, posterior limb retrolentiform and sublentiform parts; Fibre groupings (Anterior, superior, posterior and lateral thalamic radiations; Pontocerebellar fibres; Corticonuclear and corticospinal fibres); Blood supply; Correlations with clinical syndromes following stroke. Basal Nuclei (Ganglia): Caudate nucleus, putamen, lentiform nucleus, globus pallidus, substantia nigra, subthalamic nucleus and the nucleus accumbens; Connections and basic circuits; Hypokinesia, hyperkinesia, tremor and rigidity; Information from clinical disorders such as Parkinson’s Disease, Huntington’s chorea and hemiballismus.

(Physiology) Introduction to the functioning of the CNS. Techniques used to study functioning of the nervous system continued.

(Psychiatry) Cognitive development II
Emotional intelligence, a popular concept in recent years; the evidence to support the concept. The development of social cognition is discussed, for example empathy, self-control etc., and how these are related to the concept of emotional intelligence.

(Psychiatry) The Psychology of Memory
Normal memory and forgetting, the effects of stress and psychological state on memory. False memories.

(Biochemistry) The amino-acid transmitters (glutamate, GABA and glycine).

(Anatomy) Ascending pathways
Spinal ganglia; Modalities of sensation and their segregation; Posterior grey horn; Laminae of Rexed; Clarke's thoracic nucleus; Spinothalamic pathway; Posterior column/ medial lemniscal pathway; Spinoreticular tract; Spino-olivary tract; Spinotectal tract; Posterior spinocerebellar and cuneocerebellar tracts; Anterior spinocerebellar and rostral spinocerebellar tracts; Dissociated anaesthesia; Brown-Séquard syndrome.

(Physiology) Introduction to the functioning of the CNS. Techniques used to study functioning of the nervous system continued.

WEEK 3
(Pharmacology) Local Anaesthetics
General properties of local anaesthetics, their pharmacokinetics, pharmacodynamics and actions on various body systems.
Factors affecting differential nerve sensitivity including use-dependent block. Side effects of local anaesthetics and those associated with accompanying use of vasoconstrictors. Amides and ester classification.
Methods / routes of administration.

(Biochemistry) Some other transmitters
Hypoxia and ischaemia responses - excitotoxic and re-perfusion damage. Formation, functions and possible toxicity of NO. Possible functions of D-serine. CO. Other possible retrograde messengers.

(Anatomy) Descending pathways
Anatomy of anterior grey horn; Tonic and phasic alpha-motor neurons; Renshaw cells; Spinal reflexes; Corticospinal tract; reticulospinal, vestibulospinal, tectospinal and olivospinal tracts; Raphespinal tract, aminergic pathways and central autonomic pathway; Upper and lower motor neuron lesions; Stroke; Transection of the cord; Anterior poliomyelitis; Motor Neuron Disease;

(Physiology) Visual physiology – the retina, lower and higher areas of the visual cortex -the retina. Photoreceptors and generation of sensory receptor potentials -processing of visual information in retina, especially by ganglion cells. -processing of visual information in visual areas of occipital lobe and in higher visual areas in temporal and parietal lobe. -receptive fields in different visual areas.

(Pharmacology) General Anaesthetics I
Definitions. Aims and stages of general anaesthesia – Guedel’s signs.
Inhalational anaesthetics – advantages and disadvantages: Nitrous oxide (analgesia), halothane, sevoflurane.
Minimum alveolar concentration (MAC) and factors influencing it.

Intravenous anaesthetics – advantages and disadvantages:
Ultra short acting barbiturates: thiopentone.
Nonbarbiturates: ketamine, propofol, neurosteroids.
Sites and mechanisms of action.
Adverse effects, pharmacokinetics and drug interactions. Malignant hyperthermia.
Balanced anaesthesia, conscious sedation. Peri-anaesthetic drugs
Centrally and peripherally acting spasmyotics. Sites and mechanisms of action.
Propabide, diazepam, baclofen, tizanidine, dantrolene.

(Anatomy) The visual pathways
Retinal layers, photoreceptors, bipolar cells, ganglion cells, horizontal cells and amacrine cells; macula lutea, fovea and optic disk; Central visual pathway, including the optic nerve, chiasma and tract, lateral geniculate nucleus and geniculo-calcine tract; Visual cortex and its blood supply; Visual association cortex; Visual reflexes; Lesions of the visual pathways.

(Physiology) Visual physiology – the retina, lower and higher areas of the visual cortex continued.

(Biochemistry) Purinergic and other putative neurotransmitters. Neuropeptides
Common neurodegenerative mechanisms. Protein aggregation diseases (PD, AD, HD). Apoptosis/Necrosis.

(Psychiatry) Genetic aspects of personality and mental illness
Basic principles of behavioral genetics, major and minor genes, twin and adoption studies, interactions between genes and the environment, genetic aspects of psychiatric disorders and behavioral traits, quantitative traits, recent developments in the molecular genetics of psychiatric disorders.

(Biochemistry) Brain growth & development

(Anatomy) The cerebellum
Gross anatomy: Median vermis, right and left hemispheres; Anterior, posterior and floculonodular lobes; Lobules and folia
Functional subdivisions: Vestibulocerebellum (Archeocerebellum), Spinocerebellum (Palaecerebellum), Pontocerebellum (Neocerebellum)
Nuclei: Fastigial nucleus, Nucleus interpositus (globose and emboliform nuclei), Dentate nucleus
Cortical structure and cell types: Granular layer; Granular cells, receiving mossy fibres from all sources except the ION, Golgi cells Piriform layer; Purkinje cells, receiving parallel fibres from the granular cells and climbing fibres from the ION Molecular layer; Stellate and basket cells, receiving parallel fibres and synapsing on Purkinje cells, Afferent (A) and efferent (E) connections: Superior peduncle: Anterior spinocerebellar tract (A); Tectocerebellar tract (A); Rubro-cerebellar tract (A); Trigeminal afferents (A); Dentato-rubro-thalamic tract (E); Uncinate fasciculus (E) Middle cerebellar peduncle: Cortico-ponto-cerebellar tract (A); Inferior cerebellar peduncle: Posterior spinocerebellar tract (A); Cuneocerebellar tract (A); Rostral spinocerebellar tracts (A); Reticulocerebellar tract (A&E); Vestibulocerebellar tracts (A&E); Olivocerebellar tract (A); Functional aspects and applied anatomy: Overall function of the cerebellum in planning and co-ordinating movement; its role in learning new movements, Ataxia, intention tremor, dysmetria, dysdiadochokinesis, scanning speech, nystagmus, hypotonia, gait abnormalities, etc; Effects of midline versus lateral lesions of the cerebellum.

(Physiology) Visual physiology – the retina, lower and higher areas of the visual cortex continued.

WEEK 4
(Pharmacology) General Anaesthetics II
General Anaesthetics I continued.

(Psychiatry) Introduction to Neurology. An introduction to the main neurological disorders including seizure disorders, motor disorders and multiple sclerosis.

(Anatomy) The blood supply of the brain
Vertebral and carotid arteries; Circle of Willis; Cortical and central branches; Territories of the anterior, middle and posterior cerebral arteries; Vertebro-basilar branches; Venous drainage of the brain; Arterial occlusion and haemorrhage.

(Pharmacology) Narcotic analgesics

(About) The brain-stem: topography
Midbrain; Crus cerebri and interpeduncular fossa, substantia nigra, red nucleus, superior and inferior colliculi, cerebral aqueduct, periaqueductal grey matter, central tegmental tract, superior cerebellar peduncles and their decussation. Pons; Basilar pons, corticopontine and corticospinal fibres, pontine nuclei, transverse fibres of the pontocerebellar pathway entering the middle cerebellar peduncles, medial lemniscus, spinal lemniscus, trigeminothalamic tract, lateral lemniscus, central tegmental tract, nuclei and roots of the trigeminal nerve. Medulla; Pyramids and their decussation, olives, gracile and cuneate tubercles and fasciculi.

Sites of emergence of cranial nerves III - XII: Blood supply of the brainstem.
Corticospinal pathway; Cortico-ponto-cerebellar pathway; Cortico-rubro-olivo-cerebellar pathway; Dentato-rubro-thalamic-cortical pathway.

(Physiology) Somatosensory physiology. Processing of pain and non-pain sensory stimuli in the CNS
-introduction to sensory processing in the CNS
-principles of non-pain somatosensory processing, including pathways and areas of CNS involved in processing non-pain stimuli
-physiological mechanisms of processing somatosensory stimuli, including somatotopic maps spatiotemporal processing, divergence, convergence, ascending versus descending processing.

-pain processing, including pathways and areas of CNS involved in processing pain stimuli
-physiological mechanisms of processing pain stimuli
-endogenous mechanisms of analgesia, involvement of pathways and specific transmitters
-electrically induced analgesia, phantom pain, central pain syndrome.

(Psychiatry) Functional and structural imaging in Neuropsychiatry. A guide to the main approaches to neuroimaging in research and clinical practice.

(Psychiatry) Epilepsy. Describing the aetiology, diagnosis and treatment of epilepsy.

(Pharmacology) Non-narcotic analgesics
Compound analgesic preparations. Other agents. Pharmacokinetics.

(About) The brain-stem: nuclei and tracts
Nuclei of cranial nerves III - XII:
General somatic efferent: III, IV, VI, XII
General somatic afferent: Sensory nuclei of V (Spinal, Pontine & Mesencephalic)
Special somatic afferent: Cochlear and vestibular nuclei
General visceral efferent: E-W (III), Superior & inferior salivatory nuclei (VII, IX), Dorsal motor nucleus of X, Cardioinhibitory nucleus (X)
Special visceral efferent: Motor nucleus of V, Motor nucleus of VII
Nucleus ambiguus (IX, X & XI) Spinal nucleus of XI
General visceral afferent: Commisural Nucleus  Special visceral afferent:
Nucleus of the solitary tract
Nuclei of pathways ascending from spinal cord: Nucleus gracilis, nucleus cuneatus
Nuclei of pathways to and from the cerebellum: Accessory cuneate nucleus, Inferior olivary nucleus, Pontine nuclei; Red nucleus

(Physiology) Somatosensory physiology. Processing of pain and non-pain sensory stimuli in the CNS continued.

WEEK 5
(Pharmacology) Antidepressants and mood-stabilising drugs
Types of antidepressant drugs. Therapeutic and toxic effects
Modes of acute and delayed actions.
Tricyclics, MAO inhibitors (including RIMA), SSRIs, SNRIs. Novel agents.
Mania. Lithium and other agents. Therapeutic and toxic actions

(Anatomy) The spinal cord and its blood supply
General topography and features of the spinal cord; Extent; Cervical and lumbar swellings; Meninges; Anterior median fissure, posterior median sulcus; Central canal; Anterolateral and posterolateral sulci; Grey and white matter; Anterior and posterior commissures; Cell types; Blood supply of spinal cord;
(Physiology) Movement physiology. Motor area of the CNS including primary motor cortex, premotor cortical areas, basal ganglia and cerebellum.
-introduction to physiology of brain motor areas
-primary motor cortex, including motor maps, columnar organisation and brain/machine interface for initiating movement
-cerebellum –physiology and involvement in motor control and learning
-basal ganglia –physiology and involvement in motor control and learning, Physiological changes in Parkinson’s disease and alleviation by deep brain stimulation
-premotor cortical areas. Physiology and involvement in motor control.
-frontal cortex and free will of movement

(Pharmacology) Neuroleptics
Neurolepsis and antipsychotic effects. Types, actions (dopaminergic pathways and receptor subtypes, 5-HT) and effects. Neuroleptanalgesia. Motor and endocrine side effects. Atypical agents. Chlorpromazine, haloperidol, sulpiride, thioridazine, risperidone, clozapine)
(Anatomy) Hearing and balance
Brief review of cochlea and vestibular apparatus. Central Auditory Pathway: Cochlear neural connections; Cochlear nuclei; Trapezoid body; Superior olivary nucleus [SON]; Lateral lemniscus; Inferior colliculus; Inferior brachium; Medial geniculate nucleus; Primary auditory cortex; Auditory reflexes; Descending auditory pathways; Deafness. Vestibular nuclear connections; Vestibular nuclei; Lateral and medial vestibulospinal tracts; Medial longitudinal fasciculus; Vestibulospinal and vestibulo-ocular reflexes; Vestibulocortical pathway; Vestibulocerebellar connections; Nystagmus; Unilateral and bilateral vestibular disease; Menière’s disease.
(Physiology) Movement physiology continued.

(Psychiatry) Normal ageing and neurodegeneration. Normal brain ageing. The main neurodegenerative disorders including the dementias.

(Psychiatry) Neuroimmunology. A clinical perspective on neuroimmunological disorders including multiple sclerosis.

(Pharmacology) Anticonvulsants
Classification of seizures according to drug sensitivity.
Convulsant drugs and animal models.

Sodium channel block. Phenytoin, carbamazepine.
Calcium channel block. Ethosuxamide, trimethadione.
GABA-ergic agents. Gabapentin, vigabatrin, tiagabine, phenobarbitone, clonazepam.


(Anatomy) Language centers; aphasias
History of the development of our current ideas about language; Brief review of the auditory and visual pathways to the primary sensory cortex; Wernicke's area; Supramarginal gyrus and arcuate fasciculus; Broca's area and its projections to the primary motor cortex; Cortical connections to Wernicke's and Broca's areas; Visual association cortex and the angular gyrus; pathways involved in reading aloud; Wernicke's aphasia; Broca's aphasia; Global aphasia; Transcortical aphasias; Anomia; Alexia with and without agraphia; Dyslexia; Kana and Kanji; Aprosodia.

(Physiology) Movement physiology continued

WEEK 6

(Pharmacology) Drug dependence and psychotropic drugs of abuse I
Psychological and physical dependence, tolerance. Withdrawal syndromes.
Agents: Opiates; CNS depressants (including ethanol), amphetamine, MDMA and cocaine; psychotomimetics, cannabinoids, anticholinergic deliriants, nicotine, caffeine. Patterns of abuse and dependence.
Mechanisms (including reward pathways).
Pharmacological treatments including disulfiram, clonidine, naltrexone, acamprosate, methadone, diazepam.

(Physiology) Sleep physiology and disorders, physiology of addiction, function of prefrontal cortical areas
-sleep, including changes in EEG, role of transmitters, sleep disorders
-mechanisms of short-term working memory and long-term memory
-memory deficits
-the reward motor circuit, anatomy of circuit, role of dopamine and associative learning, addiction
-role of different areas of prefrontal cortex, including dorsolateral prefrontal cortex, orbitofrontal cortex, ventromedial prefrontal cortex and insula
-physiological mechanisms underlying consciousness

(Anatomy) The limbic system
Olfactory pathway; Olfactory nerves; Olfactory bulb and tract; Olfactory striae; Primary olfactory cortex; Anosmia. Septal area; Cingulate and parahippocampal gyri; Hippocampal formation; Amygdaloid nucleus; Mammillary bodies; Anterior thalamic nucleus; Papez' circuit; Afferent and efferent connections; Functional aspects; Memory; Drive-related behaviour; Temporal lobe epilepsy; Klüver-Bucy syndrome.

(Pharmacology) Drug dependence and psychotropic drugs of abuse II.
Drug dependence continued.

(Anatomy) The autonomic nervous system
General organisation of the autonomic nervous system; Hypothalamus; Sympathetic and parasympathetic systems; Enteric system; Visceral afferent and efferent pathways; Visceral vs. somatic pain

(Physiology) Sleep physiology and disorders, physiology of addiction, function of prefrontal cortical areas continued


(Pharmacology) Anxiolytic and sedative/hypnotics

(Anatomy) Anatomical basis of clinical signs
A general review of the CNS to show how a knowledge of neuroanatomy assists in clinical neurological diagnosis; Numerous examples.

(Physiology) Sleep physiology and disorders, physiology of addiction, function of prefrontal cortical areas continued

(Psychiatry) The development of personality. The definition of personality, personality development during childhood and adolescences.

(Psychiatry) The Psychology of stress and coping.
The psychophysiology of arousal, individual vulnerability to psychosomatic symptoms and hysteria in relation to personality, the environment and the mind-body interface.

(Psychiatry) Psychosis
This lecture deals with the biological basis of psychotic disorders. This covers the neuroanatomical and neurochemical basis of these disorders and the rationale for current treatments.

(Psychiatry) Neurobiology of Mood
The different biochemical theories of depression are dealt with and our current understanding of how antidepressants actually work is discussed.

(Psychiatry) The neurobiology of memory. The mechanisms underlying different aspects of memory function. Synaptic plasticity and long term potentiation.

(Psychiatry) Autism & related disorders
The aetiology of autism. Information processing and social cognition in autism.

**Interdepartmental Neuroscience Workshops**

Five inter-departmental workshops are held during the term on topics of clinical interest. The primary aim of these workshops is to provide students with the opportunity to critically discuss neurobiological aspects of topics such as Alzheimer’s disease, Parkinson’s disease, depression and ischaemic brain damage/ stroke. A series of short (~10 minute) presentations by members of staff provide a focus of discussion for each workshop.


Aetiology & Mechanisms of Disease MD2004

Details
ECTS Weighting  10
Semester/Term Taught Hilary & Trinity Terms
Contact Hours: Microbiology and Parasitology Lectures: 27 hours
Microbiology Practicals: 12 hours
Pathology Lectures: 23 hours

Module Co-ordinators
Microbiology: Dr Stephen Smith, Pathology: Prof Orla Sheils

Module Overview
Module Learning Aims:
Microbiology: The main purpose of this module is to acquaint the student with the major groups of pathogenic microbes, to relate these organisms with particular diseases and to describe methods to control these microbes. Thus, at the end of this module, students will be able to relate diseases to specific pathogens – i.e. to define the aetiology of a disease. Furthermore, the student will gain an understanding of how disease is caused at a cellular and molecular level – i.e. what is the mechanism of the disease causation. Using knowledge of the microbe (and its lifestyle) the student will be introduced to the areas of disinfection, sterilization, antimicrobial therapy and disease prevention by vaccination. An understanding of the principles of laboratory diagnosis will also be acquired. This will be important, for clinical years and beyond, to understand the strengths and limitations of lab diagnosis. A firm grounding in these areas is an absolute essential prerequisite for complete understanding of the clinical microbiology module which is delivered in year 3. The microbiological aspects of AETIOLOGY, MECHANISMS OF DISEASE are aimed at students who have had no formal training in graduate level microbiology. This module is mandatory.

Pathology: This module is an introduction to general pathology. Its purpose is to enable students familiarise themselves with pathological processes as they pertain to general disease pathways. It is intended to provide a foundation and form a bridging tool between basic science and clinical practice. The module will provide a basic groundwork upon which systemic pathology will be taught in the ensuing year(s). Attendance at teaching sessions is mandatory and the module will be assessed in a hurdle examination - failure to pass will prevent a student proceeding to the next year.

Learning Outcomes:
• Connect specific microbial pathogens with particular disease states and vice versa
• Define and demonstrate how microorganisms cause disease at a cellular and molecular level
• Propose means and methods required to control microbial pathogens and parasites
• Specify the key elements needed to conclusively identify a microbial pathogen
• Manipulate bacteria and fungi in the laboratory at a basic level
• Define and explain different forms of cell injury and their consequences
• Appreciate disease progression at cellular and tissue levels.
• Describe the mechanistic basis of disease.
• Characterise and differentiate the biology of normal and cancer cell growth at gross, microscopic and molecular levels.
• Communicate the acquired expertise in seminars, meetings, and other scholarly activities such as written reports and/or with engagement in professional practice.

Module Content:
Microbiology:
- Bacterial, fungal and viral structure and function.
- Control of microbes and microbial disease.
- Medically important Gram negative bacteria.
- Gram positive bacteria of clinical importance.
- Fungal Infections
- Viral diseases
- Laboratory diagnosis

Pathology:
The module will explain the principles of general pathology, focusing upon Aetiology and cause, Pathogenesis, Morphologic Changes, Functional Derangements, and Clinical Significance.

Examples of topics to be addressed include:
- Cell injury
  - Causes
  - Types
  - Responses
- Cell Death
  - Necrosis
  - Apoptosis
- Cellular Adaptations
- Intracellular accumulations and Ageing
- Acute and Chronic inflammation
- Healing
- Haemodynamic Disorders:
- Thrombosis and Shock
- Genetic Disorders
- Diseases of immunity
- Neoplasia

Methods of Teaching & Learning:
**Microbiology:** In year 2 the microbiology module is “organism-based” whereas in year 3 the module becomes “disease focused”; to this end the major groupings of pathogenic organisms are introduced in year 2. This strategy ensures that a student is adequately prepared for year 3. Interactive classes, based on multiple choice questions and the use of Quizdom clickers, will be used to help the student determine their level of knowledge. The didactic lectures given in Microbiology will also interdigitate with a series of practical classes. These practical classes emphasize the major facets of microbiology; observation, microscopy, laboratory diagnosis and control of microbes.

**Pathology:** The teaching strategy essentially involves didactic lectures. However, informal interaction is usual and students are expected to participate in question-and-answer and problem solving sessions. The module is intended to introduce the study of structural and functional abnormalities that are expressed as diseases of organs and systems.

Assessment:

<table>
<thead>
<tr>
<th>Annual Examinations - Microbiology</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Examinations - Pathology</td>
<td>50%</td>
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</tbody>
</table>
Recommended Reading List:

**Microbiology**

**Or**

Both of the above texts are in colour and have on-line access at: [www.studentconsult.com](http://www.studentconsult.com)

Some students prefer this book: Clinical Microbiology made Ridiculously Simple, Edition 3 (Paperback), Gladwin and Tattler.

**Pathology**
WebPath®: [http://medlib.med.utah.edu/WebPath/webpath.html](http://medlib.med.utah.edu/WebPath/webpath.html)
The Virtual Slide Box: [http://www.path.uiowa.edu/virtualslidebox](http://www.path.uiowa.edu/virtualslidebox)
The Virtual Microscope: [http://vmic.unibas.ch/index.html 45](http://vmic.unibas.ch/index.html 45)

**Text books:**
Underwood: General and Systematic Pathology 4th edition ISBN 0443073341 · Paperback 856 Pages Churchill Livingstone · Published July 2004

**MICROBIOLOGY SAFETY IN THE HOSPITAL**

Each individual is responsible for his/her own safety and that of others, whether patient or staff. Most safety precautions are common-sense. Hand washing is of utmost importance – wash your hands **before** and **after** attending each patient.

Ensure that you are immunised against infectious diseases such as polio, rubella, TB and Hepatitis B.

You must observe strictly the guidelines set out for the management of patients with hepatitis, or who are suspected of suffering from hepatitis. In such cases, it is essential that body fluids, especially blood, are carefully handled and that needles and syringes are correctly disposed of.

Each ward has been provided with guidelines for the isolation and management of infective diseases. Also available are policies concerning the use of antimicrobials and disinfectants, the maintenance of closed urinary drainage and i.v. catheterisation. Consult these documents and abide by the policies contained in them.
Fundamentals of Clinical & Professional Practice MD2005

Details
ECTS Weighting  10
Semester/Term Taught All year
Contact Hours: Tuesdays: 9am to 4pm

Module Co-ordinators
Clare Whelan

Module Learning Aims:
The Year 2 Introduction to Clinical Practice and Clinical Skills module is mandatory and aims to introduce students to the basic elements of clinical practice so that students can maximise their learning opportunities as they proceed through the clinical undergraduate years.
- To develop clinical skills essential for the delivery of a safe effective service to patients. Students learn a range of practical skills including taking a clinical history, performing an examination and interpreting simple investigations
- To focus directly on the range of skills necessary to ensure that students have rational and empathetic interactions with patients, in particular excellent communication skills
- To assist the development of the student as a member of a multidisciplinary health care team

Learning Objectives:
At the end of year 2 clinical skills module students should be able to:
- Take a comprehensive clinical history
- Perform a systematic and thorough clinical examination
- Summarising and presenting their findings, facilitating discussion of the important aspects of each case.
- Demonstrate an understanding of basic routine tests and investigations in common practice such as: CXR, ECG, Blood profiles
- Demonstrate an understanding of Clinical Skills and demonstrate each practical skill on simulated models in the Clinical Skills Laboratory.
- Demonstrate knowledge of importance of medical professionalism such as: Multidisciplinary team working, Communication skills, Patient safety

Methods of Teaching & Learning:
- Small group teaching sessions
- Didactic module material
- Procedural demonstration
- Individual practice repetitions

Assessment:
- Presently students are required to submit a log book as a mandatory record of attendance, participation and achievement of essential activities
- End of year summative assessment is in the form of an Objective Structured Clinical Examination (OSCE) which incorporates a series of practical and written stations. The pass mark is reference based and is common with OSCE examinations
- Failure of supplemental OSCE is a barrier to progression into 3rd year (N15 University of Dublin Calendar)
Recommended Reading List:


Resources
- Dedicated Clinical Skills Tutors.
- Clinical Skills Laboratories equipped with simulators, manikins and practice models.
- Practical classroom skills sessions are supported with written evidence based reading materials.
- Dedicated Clinical Skills Web site

Module Content:

- Systems based bedside Clinical Examination
- Shadowing the allied health professionals of the multidisciplinary team
- Communication Skills training
- OPD exposure
- History taking, preparation and case presentations
- Series of seminars e.g. Patient Safety, Hand Washing, Wound Care Practical Classroom Skills Content
- Ethics debates
- ECG interpretation and Xray interpretation tutorials.
- Practical Classroom Skills
  - Vital Sign assessment
  - Basic life support - Adult
  - Wound assessment, cleansing and use of local anaesthetics.
  - Simple interrupted suture
  - Intravenous cannulation
  - Principles of point of care testing using urine and blood glucose monitoring as examples
  - Phlebotomy
  - Examination of the Eye - Fundoscopy,
  - Examination of the Ear – Auroscopy
MODULE 7B: FUNDAMENTALS OF PROFESSIONAL AND CLINICAL PRACTICE: MEDICAL ETHICS

Details
Contact Hours: 6 Lectures, Ethics Debates (1 session per student group. Groups follow clinical skills groupings, Venue: Tallaght Hospital Clinical Skills Area and Naas Hospital.)

Rationale and Aims
This module aims to deepen your study of medical ethics by adapting the theories, principles and skills of deliberation introduced in the first year to a more extensive discussion of issues of ethical concern in clinical practice and biomedical science.

Lecturers
Dr. Ruth Pilkington (ruth.pilkington@tcd.ie);

Key Texts
N.B. Please do not purchase all of these texts. They are available to review in the library where you can decide which one(s) best suits you as a resource(s).

Learning Outcomes
At the end of this module student should be:
- Proficient in the application of the major concepts and theories of medical ethics in discussions of care and treatment decisions
- Have developed the skill of recognizing, evaluating, and constructing ethical arguments on more than one side of an ethical issue
- Possess a clear understanding of the ethical significance of confidentiality, truth-telling and fiduciary duty in the doctor-patient relationship and some of the challenges inherent in these principles
- Understand the key terms and appreciate the major themes that have emerged with regard to the moral dimensions of advances in medical and bio-technology
- Have begun to develop an advanced understanding of the key ethical questions that pertain to medical decisions at the beginning and the end of life
- Have developed an understanding of the historical context and meaning of the ethical principles underlying human biomedical / scientific research

Methods of Teaching and Learning
The Year Two Medical Ethics module comprises both large group lectures and small group Ethics debates.

A. LECTURES:
You will have six lectures where group discussion will be encouraged during the otherwise traditional large group lecture format as well as ‘questions from the floor’, and weekly reading assignments/guidance will be provided beforehand where appropriate.
Lecture Details

In this module we will be extending our study of moral theory and the principles and core concepts of medical ethics by applying methods of ethical analysis to a number of issues central to the doctor-patient relationship as well as broader topics in clinical practice and the biomedical sciences. Topics will include confidentiality, consent, the ethics of assisted reproduction, and medical ethics at end of life. We will also consider a number of schools of thought which attempt to present approaches to healthcare ethics that address what is sometimes seen as an over-theoretical or abstracting tendency in the principles-based approach to medical ethics. Key here shall be readings and discussion of the so-called ‘ethic of care’, the ethics of communication, and narrative ethics. In this module, regularly and where appropriate, we will aim to strike a balance between the traditional lecture format and group discussion. Weekly reading assignments/guidance may be given where appropriate but none of these will be excessive, only what would be essential for your meaningful engagement with the module. The topics of the lectures are as follows:

Lecture 1&2: The Ethics of Research
These lectures present the powerful historical context for the development of modern research principles in biomedical research on humans, and an understanding of the current international norms in research ethics, introducing the role of these principles in research trials, touching on the primary ethical issues relevant in addition to children and incompetent adults as research patients, and consider the ethical challenges pertaining to research in the developing world.

Lecture 3: The Ethics of Reproductive Medicine
This lecture introduces a selection of the central ethical concerns in three areas: abortion, maternal-fetal relationships, and assisted reproduction and explores the concept of reproductive choice.

Lecture 4: Ethics at the End of Life
This lecture provides an overview of the ethics relevant to end of life clinical decision making. We explore three principles that are central to end of life decisions: sanctity of life; the moral distinction between foresight and intention (the doctrine of double effect); and the moral distinction between acts and omissions.

Lecture 5 & 6: Ethics of Genetics
These lectures provides an introduction to the central ethical questions pertaining to advancements in genetic science and cloning technologies. A number of areas are considered, including: genetic information, genetic testing, reproductive choice, gene therapy, and cloning.

Resources

Please use the library for further reading on Medical / Biomedical Ethics topics as well as the online electronic journals from the www.tcd.ie/Library/ website. It should be noted that there are a number of dedicated medical / biomedical ethics journals, some which are a useful resource for students including: Journal of Medical Ethics (JME), Bioethics, American Journal of Bioethics, Theoretical Medicine & Bioethics, etc. In addition many of the general medical journals such as the British Medical Journal (BMJ), The Lancet and the New England Journal of Medicine (NEJM) also carry very many useful articles on the subject, particularly when a topic is under debate or scrutiny in the public forum.

Assessment

The ethics module in second year may be assessed by OSCE at the end of the second term. In addition, please remember that full participation in the debates and attendance at lectures are pre-requisites to passing the module.
SCHOLARSHIPS

Benefits

Award of scholarship entitles a student to:
• free Commons,
• free accommodation in college during the nine months of the formal teaching year,
• reduction in fees and a stipend.

These benefits may be held for up to four years, provided that the awardee remains a registered student.

Eligibility to sit

In view of the prestige and the practical benefits of obtaining Scholarship, the School of Medicine would like to see all students who have a realistic expectation of succeeding sitting for the examination. The process is non-competitive, so an individual’s chance of succeeding is not altered by the number of other candidates. All students may enter but, realistically, students who have not achieved high marks in the course to date are not likely to succeed.

We recommend students achieving consistent First Year marks of 65% or above to sit the examination. We encourage students to talk with their tutors before making a final decision. Students who are interested in sitting should contact the Medical School Office at an early date and must give notice of their intention to take the examination on the prescribed form, available from the Senior Lecturer’s Office, by the date specified in the Calendar. If they wish to withdraw their application, they are asked to do so at least two weeks before the first day of the Hilary examination period.

ALL students from Senior Freshman to Final Year may attempt Scholarship. Students who attempted Scholarship previously but were unsuccessful are eligible to try again.

Examination procedure

Assessment for Foundation Scholarship (Medicine) will be based solely on the Scholarship paper, without any contribution from annual examinations or in-course assessment. Assessment will be by written examinations, as follows:

Scholarship papers

There will be three papers, with a special topic common to all.
The Special Topic for 2013-14 is Chronic Obstructive Pulmonary Disease

<table>
<thead>
<tr>
<th>Paper</th>
<th>Paper length</th>
<th>Topics covered</th>
<th>Exam Weighting (% of paper)</th>
<th>Overall Weighting (% of Scholarship Exam)</th>
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<tr>
<td>Paper 1</td>
<td>3 hours</td>
<td>Anatomy</td>
<td>50</td>
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<tr>
<td></td>
<td></td>
<td>Physiology</td>
<td>50</td>
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<tr>
<td>Paper 2</td>
<td>3 hours</td>
<td>Biochemistry</td>
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<td>18.5</td>
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<td></td>
<td></td>
<td>Molecular Medicine</td>
<td>50</td>
<td>18.5</td>
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</tbody>
</table>
There will be two questions on each paper, one from each discipline. Some disciplines may decide to offer a choice (for example, do A or B). All questions will be weighted equally, with the exception of the question on Ethics, which is worth fewer marks than those from other disciplines.

**Criteria**

An overall average mark of at least 70% is required for recommendation for Scholarship.

**Guidelines**

Guidelines and special reading lists from each discipline will be available in the second week of term. Please be aware that a reading list is intended as a starting point, not a prescription for success and that candidates may need to read more widely.

**Scholarship Information Session**

A general information session on the Scholarship examination in Medicine will be held in one of the lecture theatres in TBSI early in Michaelmas term. Students will have an opportunity to raise queries with the exam coordinators at this session. Information on the date, time and venue of the information session is to be confirmed, and will be circulated in due course.
DISTINCTIONS

First Medical Year

**Distinction in Physiology**

Students achieving an overall mark of 75% or more in the physiology component of both Human Form & Function modules will be eligible for a *Distinction in Physiology*, subject to a successful viva voce examination with the external examiner.

Second Medical Year

**Distinction in Anatomy**

Students achieving an overall mark of 75% in anatomy, calculated as the average of the marks of the first and second medical years, will be eligible for a *Distinction in Anatomy*, subject to a successful viva voce examination with the external examiner.

**Distinction in Biochemistry**

Students achieving an overall mark of 75% in Biochemistry, calculated as two-thirds of the marks of the first medical year plus one-third of those of the second medical year, will be eligible for a *Distinction in Biochemistry*, subject to a successful viva voce examination with the external examiner.

Prizes and Awards

A large number of prizes and awards are available to students of Trinity College. A full list may be found in the Calendar at [http://www.tcd.ie/calendar/assets/pdf/prizesawards.pdf](http://www.tcd.ie/calendar/assets/pdf/prizesawards.pdf).

For ease of reference, below is a summary of those of the first and second medical years.

**First Medical Year**

- **Andrew Francis Dixon Prize**
  This prize was founded in 1946 by a gift from a former student of the School of Physic in memory of Andrew Francis Dixon, University Professor of Anatomy 1903-36. It is awarded annually to the best student of anatomy in the first medical year. Value, €64.

**Second Medical Year**

- **Walter Rennison Book Prize**
  This prize was founded in 1971 by a bequest from G. G. Rennison in memory of his brother Walter Rennison. It is awarded annually to the second year medical student who is placed highest in anatomy. The book(s) selected shall be in use during the medical course in Trinity College. Value, €115.

- **Daniel John Cunningham Memorial Medal**
  This prize was founded in 1909 by subscription in memory of Daniel John Cunningham, University Professor of Anatomy 1883-1903. A bronze medal is awarded to the best student in anatomy, taking the first and second medical years into account, provided the student has been not longer than two years in the School of Medicine. The *Cunningham Medal* is awarded to the student with highest distinction in anatomy as determined by the internal and external examiners.

- **William Robert Fearon Medal**
  This award was founded in 1976 by a bequest from Dr Brian Spencer in memory of William Robert Fearon, Professor of Biochemistry 1934-59. A bronze medal is awarded annually to the best student in biochemistry on the basis of studies in the first and second years provided that the student has been in the School of Medicine not longer than two years. The *Fearon Medal* is awarded to the student with highest distinction in biochemistry as determined by the internal and external examiners.

- **John Mallet Purser Medal**
  This award was founded in 1899 by subscription to mark the twenty-fifth year of tenure of the King’s Professorship of the Institutes of Medicine by John Mallet Purser. A bronze medal is awarded annually to the best student in physiology and biochemistry in the first medical year.
GENERAL INFORMATION

Student Information System (SITS) – Access Via my.tcd.ie

All communications from College will be sent to you via your online portal which will give you access to an ‘intray’ of your messages. You will also be able to view your examinations timetables online – Medicine students must still use the timetables circulated to them from the School. All fee invoices/payments, student levies and commencement fees will be issued online and all payments will be carried out online. You will be able to view your personal details in the new system – some sections of which you will be able to edit yourself. Up until now, all examination results were published online by the Examinations Office at http://www.tcd.ie/vpcao/examinations.php – in future, it is planned that your results will also be communicated to you via the online portal. Future plans for the new system include online module registration and ongoing provision of module assessment results.

As this is a new way of doing things in Trinity, full user helpline facilities, including emergency contact details, will be available from when you register to guide you through these new processes and to answer any queries that you may have.

Blackboard

Blackboard is a learning management system (LMS): lecture material is available online. This is structured in a modular form: each module you are enrolled in has a presence on Blackboard. The module’s structure is decided by the lecturer. You can access your modules by logging onto https://mymodule.tcd.ie. Enter your college username and password to log in.

Textbooks

Medical textbooks generally are very expensive to buy new in Ireland. If you have the opportunity to buy new books abroad, do so. Second-hand books are often available from the Student Union Bookshop or from students who have finished this section of their course. However, beware of buying an old edition of a text, since the pagination at least will have changed and perhaps the contents also. Also, be cautious about disposing of your own books as you move on through the course. In particular, most students find it very valuable to be able to consult textbooks on anatomy, biochemistry and physiology during their clinical years and beyond. As well, you will be asked questions bearing on these disciplines in the clinical year of the course. Recommended texts for the various components of the Junior Freshman Year may be found in each module section.

OFFICIAL STUDENT DOCUMENTATION REQUESTS

Official student documentation can be requested from the Medical Student Executive Officer in the School of Medicine Office, 1st Floor Biomedical Sciences Institute.

Requests can be made in person at the school office or by email using the student request form; requests will not be taken over the phone.

Please give a minimum of 5 working days when requesting documentation.

Academic Transcripts: An official academic transcript showing your final published grade and mark for each academic year.

Student Status Letter: A letter certifying that you are a TCD student, the year of study you are in and your academic standing. https://medicine.tcd.ie/local/students/doc.php
EXEMPTIONS

Students may apply for exemptions from various disciplines based on previous qualifications. They may be exempted from course work only, or from course work and examinations.

Procedure
In order to apply for exemptions students must return a “Student Module Exemption Form” to the Medical School office before Friday, 11th October 2013. Exemptions cannot be approved after this date. You will be required to submit full transcripts, a copy of a relevant academic qualification and evidence of a primary degree in the subject from which you are seeking the exemption.

Students seeking exemptions must note the following:

• In order to receive an exemption a student must be eligible to obtain an exemption for the entire module. For example you can no longer seek an exemption in one of the subject areas covered in a module. This has to do with assessment requirements and the fact that the School can only return a mark for an entire module.
• Students whom are repeating the year are not generally eligible for exemptions unless it was agreed upon as part of your Academic Appeal to the Senior Lecturer.
• The coursework being used for exemption should be worth, at minimum, an equivalent amount of credits.
• Learning that has taken place more than 5-years ago will likely not be approved due to the distance and the likelihood of advances in the topic.
• The School reserves the right to contact an institution to verify information provided.
• If you think you may wish to seek ECFMG Certification at any point in your life, you should read the details available through http://www.ecfmg.org/certification/index.html
• An official transcript with your details and dates of relevant learning along with formal syllabus/syllabi for relevant modules would be considered as appropriate supporting evidence.
• Please note the School does not have access to transcripts that were provided to College as part of your application process, so you will need to provide these.
• In instances where a student is utilizing postgraduate learning and/or research for justification for an exemption a copy of your abstract should be included as well as a recommendation from your supervisor.
• Students who wish to obtain certification through the US Educational Commission for Foreign Medical Graduates (ECFMG) should be aware that for the purpose of ECFMG Certification, credits earned on or after January 1, 2008 that are transferred to the medical school that awarded or will award an applicant’s medical degrees must meet all of the following criteria:
  o Credits must be transferred from one IMED-listed school to another IMED-listed medical school.
  o Credits must be for courses taken at one medical school within seven years of the date of graduation at the medical school that accepts the transferred courses
  o Credits must be for courses that were passed at the medical school at which the course was taken

Students who wish to apply for Exemptions may collect the forms from the School of Medicine Office, TBSI or print them Blackboard.
PLAGIARISM

The following text is an extract from the College Calendar 2011 - 2012 (general regulations and information, pages H18 – H19) and should be borne in mind by all students:

"Plagiarism is interpreted by the University as the act of presenting the work of others as one’s own work, without acknowledgement. Plagiarism is considered as academically fraudulent, and an offence against University discipline. The University considers plagiarism to be a major offence, and subject to the disciplinary procedures of the University. 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.

Plagiarism can arise from actions such as: General regulations and information Calendar 2011-12 H19
(a) copying another student’s work;
(b) enlisting another person or persons to complete an assignment on the student’s behalf;
(c) quoting directly, without acknowledgement, from books, articles or other sources, either in printed, recorded or electronic format;
(d) paraphrasing, without acknowledgement, the writings of other authors.

Examples (c) and (d) 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. Students should 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, work submitted which is the product of collusion with other students may be considered to be plagiarism. It is clearly understood that all members of the academic community use and build on the work of others. It is commonly accepted also, however, that we build on the work of others in an open and explicit manner, and with due acknowledgement. Many cases of plagiarism that arise could be avoided by following some simple guidelines:

(i) Any material used in a piece of work, of any form, that is not the original thought of the author should be fully referenced in the work and attributed to its source. The material should either be quoted directly or paraphrased. Either way, an explicit citation of the work referred to should be provided, in the text, in a footnote, or both. Not to do so is to commit plagiarism.
(ii) When taking notes from any source it is very important to record the precise words or ideas that are being used and their precise sources.
(iii) While the Internet often offers a wider range of possibilities for researching particular themes, it also requires particular attention to be paid to the distinction between one’s own work and the work of others. Particular care should be taken to keep track of the source of the electronic information obtained from the Internet or other electronic sources and ensure that it is explicitly and correctly acknowledged.

It is the responsibility of the author of any work to ensure that he/she does not commit 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 should include, in their handbooks or other literature given to students, advice on the appropriate methodology for the kind of work that students will be expected to undertake.

If plagiarism as referred to above is suspected, in the first instance, the head of school, or designate, will write to the student, and the student’s tutor advising them of the concerns raised and inviting them to attend an informal meeting with the head of school, or 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 the student to attend. If the student does not in this manner agree to the director of teaching and learning (undergraduate) may also attend the meeting as appropriate. As an alternative to their tutor, students may nominate a representative from the Students’ Union to accompany them to the meeting. General regulations and information H20 Calendar 2011-12 attend such a meeting, the head of school, 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.

If the head of school, 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 §82 above must state their agreement in writing to the head of school, or designate. If the facts of the case are in dispute, or if the head of school, 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.

If the offence can be dealt with under the summary procedure, the head of school, or designate, will recommend to the Senior Lecturer one of the following penalties:

(a) that the piece of work in question receives a reduced mark, or a mark of zero; or
(b) if satisfactory completion of the piece of work is deemed essential for the student to rise with his/her year or to proceed to the award of a degree, the student may be required to re-submit the work.

However the student may not receive more than the minimum pass mark applicable to the piece of work on satisfactory re-submission.

Provided that the appropriate procedure has been followed and all parties in §82 above are in agreement with the proposed penalty, the Senior Lecturer may approve the penalty and notify the Junior Dean accordingly. The Junior Dean may nevertheless implement the procedures as referred to under CONDUCT AND COLLEGE REGULATIONS §2.”
VIVA Policy

- Students will be called to viva **only** if they are:
  - close to pass or
  - close to a higher honours grade where appropriate

- Students are generally notified of VIVA attendance a day before the actual VIVA.

- VIVA questions may cover any aspect of the material from the module for that academic year.

- Students can **not** be marked down in the viva

- There will be **no** mark awarded for the viva, only a move to a higher grade

- An external examiner should have oversight of the viva process and a note should be written on all students who fail and are not brought up to the pass grade at the Viva.

- Students who perform very badly in the written or clinical exam and who cannot pass irrespective of their Viva Voce performance should **NOT** be called for a Viva.

- The department at a later date may interview them.

- A short report on each student’s performance at viva must be maintained in case of FOI requests
PERSONAL INJURY PROCEDURE

Practical Schedule

Please read carefully the information below concerning safety in the laboratory and in the clinical situation.

Safety in the Laboratory

- Make yourself aware of the emergency exits from the laboratory
- In the event of evacuation specific instructions will be given

Many cultures used in the laboratory are potentially pathogenic. It is therefore vital that good safe laboratory practice and aseptic technique should become second nature to the student. It is good practice to follow the same safety rules irrespective of the degree of hazard involved.

- You are required to own and wear a Howie style laboratory coat (sold in the Student’s Union Shop) at all practical sessions. Failure to do so will exclude you from the practical session. The coat must be buttoned up at all times. This is to protect your normal clothes from contamination and damage. This must not be worn on the wards or elsewhere.

- No smoking, eating or drinking is permitted in the laboratory.

- If you spill cultures report the fact immediately to a demonstrator, who will give you further instructions.

- All materials should be handled so that there is no inadvertent contamination of the environment or yourself. For example, wet preparations of bacteria on sides and used pipettes should be submerged in disinfectant immediately after use to prevent contamination on the bench. Do not work with bacterial cultures or chemicals over a laboratory manual or notebook.

- Do not rush around or carry sharp items around the laboratory. At any sign of misconduct you will be asked to leave the laboratory.

- Always leave the bench clean and tidy. Always remember that in shared laboratory areas other students will be using the bench and their safety should not be put at risk.

- Always wash hands with Hibiscrub before leaving the laboratory. Dry them thoroughly with a paper towel.

- Report any accident/incident, even if trivial, to a demonstrator.
Sources of Support and Help in College

- **Student Counselling Service** – 3rd Floor, 7-9 South Leinster Street, Tel: 896 1407, or email: student-counselling@tcd.ie. Emergency appointments are available. (Entrance to the Service via College Campus adjacent to the Creche). This service is confidential and free to students.

- **Chaplains** – House 27, chaplaincy@tcd.ie. Tel: Paddy Gleeson and Peter Sexton: 896 1260, Darren McCallig: 896 1402; Julian Hamilton: 896 1901. 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. [http://www.tcd.ie/Chaplaincy/](http://www.tcd.ie/Chaplaincy/)

- **College Health Service** – House 47 (beside the rugby pitch), Tel: 896 1556. Appointments may be made in person or by telephone. This service is free to most students. [http://www.tcd.ie/College_Health](http://www.tcd.ie/College_Health)

- **College Tutors and Senior Tutor’s Office**, House 27. Tel: 896 2551. stosec@tcd.ie. You can find your tutor’s name and contact number on the Student Information System: [http://isservices.tcd.ie/portal](http://isservices.tcd.ie/portal)

- **Niteline** - A confidential help-line for students run by students is available during term-time, by telephone between 9pm and 2.30am from Thursday to Sunday at 1800 793 793.

- **Student 2 Student** - A group of Trinity students trained in listening and support skills who are available for face-to-face supportive chats. Confidential, free, and flexible. Email: peer@tcd.ie, phone: 896 2438.

**Student 2 Student**

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’ll 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 contact with you throughout your first year and invite you to events on and off campus. They’ll 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 a coffee and a chat. S2S is supported by the Senior Tutor’s Office and the Student Counseling Service. [http://student2student.tcd.ie](http://student2student.tcd.ie), E-mail: student2student@tcd.ie, Phone: + 353 1 896 2438

**Trinity College Students Union**

[www.tcdsu.org](http://www.tcdsu.org)

The services that the Union provides include a Welfare and Education drop-in service, where students can look for help and advice on pretty much any issue affecting them, no matter how large or small. The Union also runs two shops on campus, in House 6 and at the Hamilton Building. A student travel card can be purchased in House 6 that entitles the bearer to cheaper student-rate travel and discounts in several shops. The Union also has a bookshop in House 6 and can give out small interest free loans if you’re stuck. The JCR, located in Goldsmith Hall is another service provided by the SU which offers low cost food with a relaxed atmosphere.

Education Officer – Phone: (01) 6468 439 Email: education@tcdsu.org

Welfare Officer – Phone: (01) 6468 437 Email: welfare@tcdsu.org

The details for executive officers & school conveners can be found at [http://www.tcdsu.org/info/executive-officers](http://www.tcdsu.org/info/executive-officers)

**Disability Services**

The Disability Service promotes the needs of students with disabilities in Trinity by providing advice, support and academic accommodations in partnership with students and academic disciplines. It provides
advice and information to applicants, makes referrals, and advises academic and administrative staff on issues pertaining to barrier free access and disability related issues.
Contact: disab@tcd.ie Tel: 01 896 3111

Bullying and Sexual Harassment
The College and affiliate Teaching Hospitals have strict policies and procedures in relation to bullying and sexual harassment. Details are available via the following links:

Trinity College Dublin Dignity and Respect policy
http://www.tcd.ie/about/policies/respect.php#studbroch

Tallaght Hospital, St James’s Hospital, Naas Hospital, St Patrick’s Hospital Dignity at Work Policy
http://www.medicine.tcd.ie/education/dignity/

Skills4Study Campus
Getting started
skills4studycampus is an online resource offering e-learning modules on: Writing skills; Referencing and understanding plagiarism; Reading and note-making; 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. Based on The Study Skills Handbook, skills4studycampus is available 24 hours a day, 7 days a week.

How do you access it?
- Activate your TCD student username and password that you were given at registration.
- Visit: http://www.tcd.ie/local/
- You will need to use your TCD username and password to access the Local homepage.
- Click on the skills4studycampus link at the bottom right hand side of the page.
- Go to ‘First time accessing the resource?’ at the bottom of the screen, and click on the link to register.
- Complete the registration form.
- You will receive an email from skills4studycampus confirming your details.
- You must always log in via www.tcd.ie/local

When you first access the resource, we recommend that you sign-up for the student newsletter from the creators of skills4studycampus, offering tips, advice, and competitions.

From the list on the left of the homepage, we recommend that you choose the most appealing module for you and take the diagnostic test. (Most students start with Reading and note-making.) This will identify which parts of the module are most useful to you. From there, simply explore the resource one page at a time. The activities are designed to appeal to a variety of learning styles, if you prefer to listen to material rather then reading it, click on the audio icon at the top-left of the screen.

Getting ready for academic study
Before registration and orientation week in Trinity, you can try out skills4study campus. The first section of the introductory module ‘Getting ready for academic study’ is freely available and it is not necessary for you to be registered in Trinity http://www.palgrave.com/skills4studycampustaster/An_introduction.html We also recommend that you explore subject specific resources and study tips at http://www.palgrave.com/skills4study/

Questions?
Many common questions are answered within the resource by following the ‘Help and FAQs’ link at the top right-hand corner of the screen. If you have any other questions, please contact alison.doyle@tcd.ie
KEEP CALM & CONTACT YOUR TUTOR

The School of Medicine Office is happy to support you throughout your studies. Your tutor is also here to help you during your time at College.

Your tutor is the person to go to if, for example:
- You are ever worried about any aspect of your personal or College life.
- You are unwell or require extra support during examinations or if you arrive late for an examination.
- Your academic work is being affected for any reason.
- You are worried or unsure about your studies, course or simply being at College.
- You wish to file an Academic Appeal.
- If you wish to take a year out.
- You are experiencing financial hardship or need financial assistance.
- You need to talk to someone who can point you in the right direction or refer you to the best people to help you.

Talk to your Tutor – they won’t mind – it’s what they do.
Friday 1st November

Take to the streets to support:

Targeted Cancer Therapy, SJH Medicine for the Elderly, AMNCH
The Burns Unit, SJH
Trinity Access Programme

Street Collection, Campus Games, Talent Show, Night Out, Med Cup and much more!

Email: medday@csc.tcd.ie  Website: tcdmedday.com  Facebook: Trinity Med Day  Twitter: @TrinityMedDay