



Biomed Online Learning

CPD prospectus

www.gre.ac.uk/biomed



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Introduction

The Biomed Online Learning modules were developed by a consortium of 16 NHS Trusts, the Health Protection Agency and the University of Greenwich.

The modules are at FHEQ level 7 (Master's) and have been designed to provide healthcare professionals with expertise in key areas where there is greatest need for additional training.

The programme is managed by a steering group made up of consortium members, and development of new modules is ongoing.

The modules below are now available:

- Advanced Human Genetics
- Analysis of Nucleic Acids
- Blood Transfusion
- Diagnosis of Breast Cancer
- Governance and Risk Management
- Implementing Advanced Quality Management
- Lung Disease
- Management of Healthcare Associated Infection
- Point of Care Testing
- Quality Systems Management
- Renal Disease
- Robotics and Automation

The full outlines of each of the modules are given later in this prospectus. The outline includes the learning outcomes and assessment structure. Each module has a number of assessed activities that have been designed to provide students with the opportunity to demonstrate whether or not they have achieved FHEQ level 7 (Master's) in their learning.

How the modules are delivered

There are two intakes for the Biomed Online Learning modules per year - April and October. The module timetable lasts for 12 weeks.

Students work in small tutor groups of around 10-12 students with an online tutor who is an expert in the field.

At the start of each module students are invited to a half-day introductory session where they meet their tutor and fellow students, and learn how to navigate their course. This is normally held on a Saturday afternoon at Greenwich Maritime campus (the Old Royal Naval College). Details of the location can be found at <http://www.gre.ac.uk/about/greenwich/greenwich>

After the introductory session students have a week to get used to the course before beginning the guided timetable. Students can access your course via a password protected site from anywhere there is an internet connection. This means that you can work on your course from home or at work, although you will need to check that your workplace firewall allows you access.

Once the course begins, students follow the timetable to work through the course material and complete the activities set. Your tutor is available by email within the course, and you can communicate with your tutor group via the discussion board. Tutor groups meet for an online chat session once a week at a time convenient to the group. This is normally on a weekday evening so you will need access to a home computer. Students are also encouraged to use the chat tool amongst themselves for informal real-time discussions.

At the end of the course there is a final workshop for all modules except Implementing Advanced Quality Management and Renal Disease. At this final workshop students give a short presentation to their tutor group. Students enjoy coming together at the end the 12 weeks to meet up again and share feedback on how they have found the course.

Please note that Implementing Advanced Quality Management has a workshop halfway through the course, and Renal Disease has an online exam.

Pre-requisites

Internet

You will need an Internet-linked computer in order to communicate with your tutor and with your fellow students. In addition, the courses make extensive use of information available on the Internet. As chat sessions are usually on weekday evenings you will find it very useful to have access to a home computer.

The course materials have been tested with Internet Explorer, Netscape, Firefox and Safari.

Microsoft Office

Some course materials are provided in Word format or Excel format. The use of PowerPoint is recommended for those courses that require presentations to be made. It is suggested, therefore, that you should have access to the Microsoft Office suite of programs.

Students taking Biomed Online Learning modules are registered with the University of Greenwich and are able to make use of its facilities, including the University Library.

The University has a service to provide library services for off-campus users – OSCARS. You can use this service to borrow books from the library. These will be posted out to you. You are responsible for returning them safely. You can find information about this at <http://www.gre.ac.uk/offices/ils/Admin/oscars>

Who should participate

The Biomed Online Learning modules are aimed at employees across the health sector. You may already have a qualification in a science such as biology, biochemistry, chemistry or pharmacy at a range of levels from HNC or BSc to PhD. The courses are at FHEQ level 7 (Master's).

Student support

While students are taking their online modules their online tutor will be the first point of call for any difficulties that may arise. The Biomed Administration Manager is also available outside the course for students to contact on any matter. There may be occasions where it is necessary to discuss extensions or deferrals to a later intake. The Administration Manager will assist with this process, providing the necessary documentation and ensuring that a satisfactory solution is reached for all parties.

What you gain

As well as gaining the knowledge and skills identified in the course outlines later in this prospectus, there are formal awards attached to the Biomed Online Learning modules.

All of the Biomed Online Learning modules are credited by the IBMS for 100 CPD points.

Decisions on students' results are made by the University examination board (in April for the October intake, and September for the April intake).

On successful completion, students are awarded 30 FHEQ level 7 (Master's) credits by the University of Greenwich and 100 CPD points from the IBMS.

Students are sent their University and IBMS certificates by post.

Fees

Information about fees is available on the Biomed website at <http://w3.gre.ac.uk/biomed/fees.html>

If you wish to check whether your workplace is part of the Biomed consortium, please contact the Admin Manager at biomed@gre.ac.uk

Fees for the individual modules are invoiced approximately one month prior to the intake start. If it would be helpful to be invoiced sooner, please let us know and this can be arranged.

How to book

To reserve a place on a module, please use the reservation form available on the Biomed website at <http://w3.gre.ac.uk/biomed/application.html>

This should be emailed to the Biomed Admin Manager to provisionally book a place. You will be emailed a confirmation once this is received.

To confirm your place please complete the full application form and post it to the Biomed Admin Manager at the address given on the form. If this is your first Biomed module you will also need to supply a passport size photograph.

Once you have confirmed your booking you will receive information by email concerning the course start.

Full MSc in Biomedical Science (online)

Completion of four online modules, plus a workplace based project, makes up a full MSc in Biomedical Science (online). This is an IBMS accredited MSc.

You can take a number of modules (up to 3) and then apply to transfer to the full MSc.

Alternatively you can apply for the MSc at the outset. If you wish to consider this option, please be in touch with the Biomed Admin Manager at biomed@gre.ac.uk and look at the MSc handbook on the Biomed website at <http://w3.gre.ac.uk/biomed/msc.html>

Students have up to 6 years to complete all elements of the MSc.

Contact information

For more information, please contact the Biomed Admin Manager at:

Email: biomed@gre.ac.uk

Phone: 020 8331 9978

Post: Grey Building, Southwood Site
University of Greenwich
Avery Hill Road
Eltham
London SE9 2UG

Biomed website address: www.gre.ac.uk/biomed

The full outlines for each Biomed Online Learning module follow.

ADVANCED HUMAN GENETICS

Code: GENE1003	School: Science
Course Title: Gene Structure & Function	Course Coordinator: Prof PJ Harvey
Level: 7 (Master's)	Credits: 30
Department: Life Sciences	Pre-requisites: BSc or equivalent

Aims

The aims of this course are to:

- Appreciate the overall complexity of genomes in humans and other organisms and the nature of coding and non-coding sequences
- Understand the nature of genetic variation in humans
- Be able to interpret genetic changes and predict their clinical outcome

Learning Outcomes:

On completion of the course students will be able to:

1. Demonstrate in-depth understanding of normal process of protein production from DNA and how this can go wrong to cause mutation.
2. Analyse, synthesise and summarise information, particularly with respect to interpretation of DNA sequence in terms of genetic code and protein production, manipulation of DNA sequence and analysis of pedigrees
3. Demonstrate an in-depth understanding of how mutations act to cause clinical conditions.
4. Critically discuss current issues in molecular genetics

Skills Learning Outcomes:

5. Perform literature-based research and evaluation using the Internet as a communication tool as well as to find and evaluate relevant information relating to molecular genetics.
6. Effectively communicate information using suitable presentation and communication skills
7. Produce reports according to professional standards, materials for public presentations and to use and navigate the functions of 'my WebCT', explore the WebCT tools facility and create a web page
8. Exhibit competency in the use of URLs to access information on molecular biology and genetics and the use of clinical and genomic databases.
9. Identify and use appropriate databases for human gene analysis.

Indicative content:

Introduction to WebCT

- Use and navigate the functions of myWebCT
- Explore the WebCT tools
- Create a web page

Topic 1. Structure of a gene, Parts 1 and 2

- Recognise the structure of nucleic acids and the steps from DNA to protein
- Appreciate the differences between prokaryotes and eukaryotes
- Describe the principles of gene regulation

Topic 2. Genes in the Genome

- Be familiar with the history and outcomes of the human genome project

- Use a range of databases to gain information about the human genome and human genetic disorders
 - Appreciate the different classes of non-coding DNA in the genome
- Topic 3. DNA to RNA to protein Parts 1 and 2*
- Describe features of eukaryotic gene structure
 - Understand the production and processing of RNA during protein synthesis
 - Demonstrate an understanding of the genetic code
- Topic 4. Inheritance*
- Recognise the major patterns of inheritance in humans
 - Determine carrier probabilities and recurrence risks for the different pedigrees
- Topic 5. Low penetrance genes*
- Appreciate the differences between linkage and association
 - Research and present the genetic basis of a common genetic disorder
- Topic 6. How genes go wrong*
- Classify mutations depending on their outcome
 - Appreciate the differing effects mutations can have in the cell
 - Demonstrate an understanding of the nomenclature of mutations
 - Develop a critical appraisal of which gene changes are pathogenic
- Topic 7. Genotype to phenotype*
- Appreciate how genes may interact and compensate in causing a phenotype
 - Understand how mutations in different steps of protein synthesis may alter the clinical phenotype
 - Understand exceptional mechanisms such as methylation and triplet repeat expansion
- Topic 8. Cancer Genetics*
- Differentiate between the different genetic contributions to cancer
 - Recognise the different mechanisms by which genes can cause cancer
 - Understand how cells become tumorigenic

Learning and Teaching Activities:

Learning and teaching activities are designed to develop and promote independent, supported learning in a web-based environment. Activities focus on linking work-based practice to new approaches and applications of techniques, in addition to understanding and critical analysis of current knowledge.

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 1.1: Quiz : Components of RNA and DNA</i>	LO2
<i>Activity 1.2: Quiz: Nucleic acid sequences</i>	LO2
<i>Activity 1.3 : Intron-exon structure (group work)</i>	LO2,8, 6
<i>Activity 1.4 :Mitochondrial DNA (group work)</i>	LO5, 7
<i>Activity 1.5: Chromatin Power point presentation</i>	LO2, 5, 6
<i>Activity 2.1 : CpG frequency Group work</i>	LO2, 6, 7, 8
<i>Activity 2.2 : Watch: Nobel lecture: Olfactory receptor genes</i>	LO7
<i>Activity 2.3 : Use of databases Group activity</i>	LO1, 2, 3, 5, 6, 7
<i>Activity 2.4: Intron-exon structure Group activity</i>	LO2, 7, 8
<i>Activity 3.1: Quiz: Eukaryotic gene structure</i>	LO2
<i>Activity 3.2: Characterising a promoter Group activity</i>	LO2, 4, 6, 7, 8
<i>Activity 3.3 : Recognising introns Group activity</i>	LO2, 6, 7
<i>Activity 3.4: Alternative transcripts</i>	LO2, 6, 7
<i>Activity 3.5: Quiz: Reading frames and the genetic code</i>	LO2

<i>Activity 4.1: Inheritance</i>	LO2, 3, 6
<i>Activity 4.2: Revise your knowledge of meiosis</i>	LO5
<i>Activity 4.3 : Carrier frequency Self assessed</i>	LO2
<i>Activity 4.4 : Dominant inheritance Group discussion</i>	LO2, 3, 6
<i>Activity 4.5: X-linked inheritance Group discussion</i>	LO2, 3
<i>Activity 4.6: The Romanovs Reading and on line exercise</i>	LO5, 7
<i>Activity 6.1: Quiz: Causes of phenylketonuria</i>	LO1, 3
<i>Activity 6.2: Quiz: Nomenclature of Human Mutations</i>	LO1, 2, 8
<i>Activity 6.3: Quiz: Loss or gain of function</i>	LO1, 2, 3
<i>Activity 6.4: Quiz: Types of mutation</i>	LO1, 2
<i>Activity 6.5: nonsense-mediated mRNA decay</i>	LO4, 5, 6
<i>Activity 6.6 : Power Point presentation Are these variants disease causing</i>	LO3, 4, 5, 6
Assessed <i>Activity 6.7 : Report 'Deciding whether a sequence change is pathogenic'</i>	LO3, 4, 5, 6
<i>Activity 7.1: Guided reading</i>	LO1
<i>Activity 7.2 : Using Geneclinics</i>	LO3, 7
<i>Activity 7.3: Duchenne vs Becker muscular dystrophy</i>	LO1, 3
<i>Activity 7.4: Phenotype of cystic fibrosis mutations</i>	LO1, 2, 3
<i>Activity 8.1: Watch DVD about cancer genetics family</i>	LO3, 5
<i>Activity 8.2 (assessed): PowerPoint Presentation</i>	LO1, 3, 4, 5, 6
<i>Activity 8.3 (assessed): Self-evaluation quiz</i>	LO1, 2, 3, 4, 6, 7

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Report		35	50%	1000	Deciding whether a sequence change is pathogenic LO 01 – 09
PowerPoint presentation		50	50%	< 2000 words	Review attempts to understand the genes behind asthma, diabetes or a named disorder 6-10 PowerPoint slides; Presenter's briefing notes LO 01 – 09
Discussion postings & self-evaluation quiz	√	15	50%		6 postings to the course using Discussion and Presentation Tools Reflection and evaluation on the quality of the postings LO 01 – 04, 06, 07

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

ISBN Number	Author	Date	Title	Publisher
1859962025	Strachan & Read	1999	Human Molecular Genetics 2 (Available on the NCBI Bookshelf via the internet)	Bios Scientific Publishers Ltd
0815340729	Alberts, Johnson, Lewis, Raff, Roberts, Walter	2002	Molecular Biology of the Cell (Available on the NCBI Bookshelf via the internet)	Garland Science
Available on the internet	MJ Farabee		Online Biology Book http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookTOC.html	

ANALYSIS OF NUCLEIC ACIDS

Code: GENE1002	School: Science
Course Title: Analysis of Nucleic Acids	Course coordinators: Prof PJ Harvey
Credits: 30	Level: 7 (Master's)
Department: Life Sciences	Pre-requisites: BSc (Hons) or equivalent

Aims:

- To provide a general understanding of the principles of molecular genetics
- To provide an overview of key methods in molecular biology
- To develop a critical appreciation of techniques used in the analysis of nucleic acids.

Learning Outcomes:

On completion of this course, students will be able to:

1. Demonstrate critical ability in the understanding of eukaryotic and prokaryotic mutation and their relevance to human health and disease;
2. Critically appraise suitable methods in molecular biology;
3. Demonstrate a critical awareness of current methods for mutation detection and their applications.

Skills Outcomes:

4. Use the Internet as a communication tool as well as a tool to find and evaluate relevant information;
5. Produce reports according to professional standards;
6. Produce materials for public presentations

Indicative Content:

Intro to WebCT

- Use and navigate the functions of MyWebCT
- Explore the WebCT tools
- Create a web page

Introduction to molecular genetics

- Use URLs to access information on molecular biology and genetic mutations
- Recognise the mechanisms by which mutations occur

Mutation

- Differentiate between different mutation classes and the methods available for their detection.

Methods

- Appreciate that nucleic acids can be isolated from a wide variety of materials
- Use restriction enzymes to cleave specified sequences of DNA
- Differentiate between Northern and Southern blotting and understand when they are used
- Demonstrate a critical awareness of the role of hybridisation in molecular biology including the labelling of probes to detect complementary nucleic acid sequences
- Design primers for a specific polymerase chain reaction (PCR) reaction and be aware of the key role of PCR in the revolution in molecular genetics

DNA sequencing

- Use DNA databases to identify a DNA sequence

- Appreciate the role of DNA sequencing techniques in the understanding of primary gene structure

Advanced PCR

- Appreciate the contribution of PCR to contemporary advances in biomedical science laboratories.
- Identify carriers for specific genetic conditions and diagnose trisomy in amniotic fluid

Techniques for Mutation Scanning

- Differentiate between mutation scanning and mutation detection.
- Understand the principles of mutation scanning methods and the various techniques available
- Develop a critical appraisal of different mutation scanning methods and determine when each should be used.

Learning and Teaching Activities:

Two face-to-face workshops together with recommended text reading, online reading, 'quizzes', individual and group work exercises.

Teaching and learning activities will be aimed at

- Practical skills associated with communicating in and managing an online environment
- The production of web pages using html
- Accessing relevant and appropriate data and databases online
- Practical exercises relating to the manipulation and analysis of DNA sequences
- Testing understanding of the principles of a technique
- Troubleshooting, when a technique goes wrong
- Designing tests to detect nucleic acid sequences

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 1: Introductions</i>	LO4
<i>Activity 2: DNA - historical perspective</i>	LO4, 6
<i>Activity 3: Genetic Disorders</i>	LO1, 4, 6
<i>Activity 4: The Human Genome Project</i>	LO3, 4
<i>Activity 5: Bacterial Genomes Quiz</i>	LO2, 4
<i>Activity 6: Fundamentals of Genetics Quiz</i>	LO1, 4
<i>Activity 7: Drawing a phylogenetic tree</i>	LO2, 4
<i>Activity 8: Group work: Mutations</i>	LO1, 4, 6
<i>Activity 9: Sequences</i>	LO1
<i>Activity 10: Fragile X</i>	LO1, 4
<i>Activity 11: Quiz</i>	LO1
<i>Activity 12: Discussion Nucleic acid stabilities</i>	LO5
<i>Activity 13: Restriction endonucleases</i>	LO3, 4
<i>Activity 14: T_m</i>	LO3
<i>Activity 15: Restriction enzyme digests</i>	LO2, 3
<i>Activity 16: Primers and templates</i>	LO3
<i>Activity 17: PCR reactions</i>	LO3
<i>Activity 18: Analysis of a PCR based method of analysis in your hospital</i>	LO2, 3
<i>Activity 19: Further applications of PCR-based methods in your hospital</i>	LO2, 3

Activity 20: (assessed report) PCR in the Clinical Diagnostic Lab:	LO1, 2, 3, 5
Activity 21: Real-time PCR	LO2, 3, 6
Activity 22: Reading a manual sequencing gel	LO1, 2
Activity 23: SSCP analysis	LO1, 2, 3
Activity 24: DGGE analysis	LO1, 2, 3
Activity 25: Case reports: pseudochondroplasia (COMP analysis)	LO1, 4, 5
Activity 26: ARMs: Identification of cystic fibrosis mutations	LO1, 2, 3
Activity 27: ASOs	LO1, 2, 3
Activity 28: RFLP	LO1, 2, 3
Activity 29: Deletions	LO1, 3
Activity 30: Microsatellite markers for prenatal diagnosis	LO1, 2, 3
Activity 31: (Assessed). PowerPoint presentation	LO1, 2, 3, LO4, 6

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Written critical appraisal		35	50%	1000	Written report in the style of a publication on a specific mutation detection technique LO 01, 02, 03, 05
Powerpoint presentation and presenter's briefing notes		50	50%		6-10 PowerPoint slides on mutation detection in a named speciality or laboratory or disease; Presenter's briefing notes LO 01, 02, 03, 06
Critical contributions / postings	√	15	50%		Critical contributions using the communication tools for the course and reflection and self-evaluation (six contributions) LO 01-04

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

ISBN No	Author	Date	Title	Publisher
0815341849	T Strachan and AP Read	2003	Human Molecular Genetics 3	BIOS

The second edition is available as an e-book at <http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowTOC&rid=hmg.TOC&deph=1>

It is also expected that students will make use journals as an information resource.

BLOOD TRANSFUSION

Code: OMED1247	School: Science
Course Title: Blood Transfusion	Course coordinators: Prof PJ Harvey
Credits: 30	Level: 7 (Master's)
Department: Life Sciences	Pre-requisites: BSc or equivalent

Aims:

To provide a knowledge and understanding of the scientific basis of Transfusion Science and the laboratory operation of Blood Transfusion in the provision of a Blood Transfusion service.

Learning Outcomes:

On completion of this module, students will:

1. Understand the current guidelines and legislation in order to satisfy the Health and Safety of the public and to fulfill the standards set by the Medicines and Healthcare products Regulatory Agency (MHRA).
2. Be aware of the roles of the different people involved in the provision of a Blood Transfusion service and the educational requirements of all staff involved in the service provision.
3. Know the process of reporting incidents in Blood Transfusion and the legislation in place to cover errors and incidents.
4. Demonstrate knowledge of the different blood group antigen systems and the investigation of allo- and auto- antibodies directed against these antigens.
5. Critically evaluate the therapeutic use of blood products
6. Evaluate the importance of blood stock management, maximum blood order schedules, and the application of alternative strategies to blood transfusion.

Skills Learning Outcomes

On completion of this module, students will:

1. Perform a literature-based research and evaluation using the internet as a tool to find and evaluate relevant information.
2. Effectively communicate information using suitable presentation and communication skills.
3. Produce reports according to professional standards using appropriate ICT tools; including WebCT.
4. Perform effectively within a team environment and recognize and utilize other people's contributions in groups discussion and provide valued input into group discussions
5. Demonstrate self direction and clarity in approaching tasks and assignments

Content:

The course material is organized into seven topics:

- Blood Group Serology
- The Role of the Blood Service
- Blood Husbandry (Management and Conservation)
- Blood Transfusion Management
- Education, Training and Competency
- Legislation, Standards and Guidelines
- Governance in Blood Transfusion

Learning and Teaching Activities:

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 1: Using WebCT/Introductions</i>	LO9, 8, 10
<i>Activity 1.1: ABO Quiz</i>	LO4, 9
<i>Activity 1.2 : Geneotypes and Phenotypes</i>	LO4, 7, 8, 9, 10, 11
<i>Activity 1.3 : Antibodies</i>	LO4, 8, 9, 10, 11
<i>Activity 1.4 : Validate a new blood grouping analyser</i>	LO4, 8, 9, 10, 11
<i>Activity 2.1 : Maximum Surgical Blood Order Schedule (MSBOS)</i> (assessed)	LO6, 7, 8, 9, 11
<i>Activity 2.2 : Donor screening requirements</i>	LO2, 7, 8, 11
<i>Activity 2.3: Acceptable blood groups</i>	LO5, 7, 10, 11
<i>Activity 2.4 : Directed donation</i>	LO2, 7, 10, 11
<i>Activity 3.1 Largest users of red cells</i>	LO6, 7, 10, 11
<i>Activity 3.2 Reading</i>	LO6, 7, 10, 11
<i>Activity 3.3 Major blood components</i>	LO5, 7, 9, 10, 11
<i>Activity 3.4 Maximum Blood order Schedule</i>	LO5, 7, 9, 10, 11
<i>Activity 3.5 How long blood units are allocated for</i>	LO6, 7, 9, 10, 11
<i>Activity 3.6 Policies, procedures and cell salvage and pre operative clinics</i> (assessed)	LO6, 7, 9, 8, 10, 11
<i>Activity 4.1 Reading</i>	LO2, 7, 8, 10, 11
<i>Activity 4.2 Hospital Transfusion Committee and Hospital Transfusion Team meeting</i>	LO2, 7, 8, 10, 11
<i>Activity 4.3 Role and key responsibilities</i>	LO2, 7, 8, 10, 11
<i>Activity 4.4 Webquest</i>	LO2, 7, 8, 10, 11
<i>Activity 4.5 Emergency and major incident planning</i>	LO2, 7, 8, 10, 11
<i>Activity 5.1 Training needs analysis</i>	LO2, 7, 8, 10, 11
<i>Activity 5.2 How training is delivered</i>	LO2, 7, 8, 10, 11
<i>Activity 5.3 Competency Assessment</i>	LO2, 7, 8, 10, 11
<i>Activity 6.1 Reading</i>	LO1, 7, 8, 10, 11
<i>Activity 6.2 Blood Safety & Quality Regulations</i>	LO1, 7, 8, 10, 11
<i>Activity 6.3 Blood Safety and Quality Regulations</i> (assessed)	LO1, 7, 8, 9, 10, 11
<i>Activity 6.4 Blood transfusion practice and management</i>	LO1, 7, 8, 10, 11
<i>Activity 7.1 Risk Management</i>	LO3, 7, 8, 10, 11
<i>Activity 7.2 Reading</i>	LO3, 7, 8, 10, 11
<i>Activity 7.3 Improving quality in the delivery of a blood transfusion service</i>	LO5, 7, 8, 10, 11
<i>Activity 7.4 Reading</i>	LO5, 7, 8, 10, 11
<i>Activity 7.5 Powerpoint Presentation</i> (assessed)	LO5, 7, 8, 9, 10, 11
<i>Activity 7.6 Self-evaluation Quiz</i> (assessed)	LO9, 8, 10

Assessment Details:

Methods of Assessment	Please identify the LAST item of assessment that a student sits with a tick	Weighting %	Minimum Pass Mark %	Word Length	Outline Details
Critical report suitable for publication		20	50		Critically review your hospital's surgical blood order schedule (SBOS) and suggest alterations and the arguments behind your alterations, and suggest alternatives. LO6
Short report		15	50		Write an action plan describing which policies, procedures and services you think your trust needs to introduce to achieve the goals set out in the National Blood Conservation Strategy and how they can be implemented. LO2
An article written in the same style as in a named peer-reviewed journal. Presentation and grammar, analysis of rationale and impact, discussion and original views on streamlining		20	50	1500-2000 words max	Analyse the rationale for the production of the Blood Safety and Quality Regulations and the impacts that implementing these changes will have on blood transfusion in the UK. Include discussion of the other standards that govern blood transfusion and their rationales, identify commonalities or conflicts. Give a view on how best to streamline regulation of blood transfusion services. LO1-3
PowerPoint presentation and Presenter's notes.		25	50		PowerPoint™ presentation of a named policy, covering its aims, what the policy strives to achieve, and the evidence base for it. LO4-5
Minimum six meaningful contributions to discussions and thought provoking answers to quiz	√	20	50		Self-evaluation of own and others postings to the discussion board. Insightful analysis of discussion topic, Demonstrate ability to discriminate between ideas and provide follow up postings with thoughtful and insightful analysis. LO1-6

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

The Blood Transfusion course uses no specific indicative texts. There are a number of general transfusion texts recommended within the course and it builds on online lessons, current online links and participant input and interaction. A representative sample of online links provided for 2008 is shown below:

AABB	http://www.aabb.org/content/
Better Blood Transfusion	http://www.learnbloodtransfusion.org.uk/
Blood Stocks Management Scheme	http://www.bloodstocks.co.uk/
BSCH Guidelines	http://www.bcschguidelines.com/pdf/pregnancy_070606.pdf
BSI Standards	http://www.standardsuk.com/
DDR user guides	http://www.blood.co.uk/hospitals/library/user_guides/index.asp
Handbook of Transfusion Medicine	http://www.transfusionguidelines.org.uk/index.asp?publication=htm
NHS Blood and Transport	http://www.blood.co.uk/hospitals/library/user_guides/index.asp
The Blood Safety and Quality (Amendment) Regulations 2006	http://www.opsi.gov.uk/SI/si2006/20062013.htm

DIAGNOSIS OF BREAST CANCER

Code: ANAT1011	School: Science
Course Title: Diagnosis of Breast Cancer	Course Coordinator: Prof PJ Harvey
Level: 7 (Master's)	Credits: 30
Department: Life Sciences	Pre-requisites: BSc or equivalent

Introduction and Rationale

There have been many advances in the understanding of breast cancer in recent years together with an increase in the diagnostic tools available to the histopathologist in order to aid diagnosis. This course aims to provide the student with an understanding of the techniques involved in the diagnosis of breast cancer (particularly pathology), including recent advances. In addition, the student will be introduced to the classification of breast disease, particularly breast cancer, and the prognostic value of histological data.

Aims:

To provide students with an understanding of:

- Breast disease
- Relevant histological techniques
- The importance of various methods used to diagnose breast disease
- Some of the roles of genetics and molecular biology in breast cancer development and diagnosis

Learning Outcomes:

1. On completion of this course, students will be able to:
2. Demonstrate a critical understanding of the nomenclature and histopathological features of benign and malignant breast disease
3. Demonstrate a critical appreciation of current methods of breast cancer diagnosis and their background
4. Understand principles of the genetic basis of breast cancer

Skills Outcomes:

5. Use the Internet as a communication tool as well as a tool to find and evaluate relevant information
6. Produce reports according to professional standards
7. Produce materials for public presentations

Indicative Content:

Intro to WebCT; Use / navigate the functions of my WebCT; Explore WebCT tools; Create a web page

Introduction:

- Normal breast development, anatomy and histology
- Epidemiology, risk factors and carcinogenesis of breast cancer
- Methods of detection of breast cancer including clinical signs and imaging

Pathology of Breast Cancer:

- Handling of breast specimens, histological techniques
- Benign breast disease
- Breast cancer types and nomenclature
- Metastasis

Multidisciplinary Approach to Diagnosis:

- Diagnostic techniques including imaging, Fine Needle Aspiration (FNA) and Wide bore needle biopsies (WBN) (or Core Biopsies)

Specialist Diagnostic Techniques I:

- Immunohistochemical methods
- HER2 (*c-erbB-2*)
- Oestrogen receptors
- Progesterone receptors
- Other breast cancer associated proteins and technologies

Specialist Diagnostic Techniques II:

- Molecular biology of cancer
- Laboratory methods
- p53 and breast cancer
- Genes & breast cancer including BRCA1 and BRCA2

Learning and Teaching Activities:

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 1: Getting to know each other</i>	LO4, 6
<i>Activity 2: Normal Histology of the Breast</i>	LO1, 5
<i>Activity 3: Arrange to attend your local breast cancer MDM in week 5</i>	LO1, 2
<i>Activity 4: (assessed) Pathology MCQ</i>	LO1
<i>Activity 5: Attend your local breast cancer MDM</i>	LO1, LO2
<i>Activity 6: (assessed). Timed Essay</i>	LO2, 1, 3
<i>Activity 7: (assessed) Make sure you are able to complete the timed quiz on immunohistochemical techniques</i>	LO2
<i>Activity 8: "Fill in the blanks"</i>	LO3
<i>Activity 9: Web-Quest</i>	LO3
<i>Activity 10: (Assessed): Powerpoint Presentation on molecular biology methods</i>	LO3,1, 5, 6, 4
<i>Activity 11: (Assessed) self-evaluation quiz on communications skills</i>	LO4

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Words Length	Outline Details
MCQ		30	50%		Pathology of breast cancer
Timed Essay		25	50%		Timed Essay on Core biopsy and FNA LO 01, 02
Test		15	50%		Timed quiz on immunohistochemical techniques LO 01 - 03
PowerPoint slides; Presenter's briefing notes		15	50%	Briefing notes > 2000 words	Presentation on molecular biology methods: 6-10 slides LO 02, 05, 06
Postings	√	15	50%		6 critically-argued public postings to the course using discussion and presentation tools Reflection and evaluation on the quality of the postings LO 01 – 04

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

ISBN No	Author	Date	Title	Publisher
0198548540	Franks LM & Teich NM (Eds)	1997	Introduction to the Cellular and Molecular Biology of Cancer 3 rd Ed	Oxford University Press
044303723x	Elston CW & Ellis IO (Eds)	1997	Systemic Pathology. The Breast 3 rd Ed	Churchill Livingstone

This course makes extensive use of the CD-Rom library BreakIT.

Journals:

This course will encourage the student to read current articles from research journals on Breast Cancer. The following articles are recommended as a starting point:

Morrow M Gradishar W (2002). Breast Cancer. British Medical Journal 324;410-14

Key TJ Verkasalo, P.K. Banks, E. (2001). Epidemiology of Breast Cancer. The Lancet Oncology: 2; 133-40

Ingvarsson S (1999) Molecular Genetics of Breast Cancer Progression. Seminars in Cancer Biology 9; 277-88

Litherland J (2001). The Role of Needle Biopsy in the Diagnosis of Breast Lesions. The Breast 10; 383-7

Philpotts LE (2001) Controversies in Core-Needle Breast Biopsy. Seminars in Roentgenology 36; 270-83

Elston CW & Ellis IO (1991). Pathological Prognostic Factors in Breast Cancer. I. The value of histological grade in breast cancer: experience from a large study with long-term follow-up. Histopathology 19; 403-10

Cunnick GH, Jiang WG, Gomez KF, Mansel, RE (2002) Lymphangiogenesis and Breast Cancer Metastasis. Histol Histopathology 17; 863-70

Barnes, D.M. and Hanby, A.M. (2001). Oestrogen and Progesterone Receptors in Breast Cancer: Past, Present and Future. Histopathology 38; 271-4

Yarden, Y. (2002) Biology of HER2 and its Importance in Breast Cancer. Oncology 61 (Suppl 2); 1-13

Rampaul, R. S. Pinder, S.E. Gullick, W.J. Robertson, J.F.R. Ellis, I.O (2002): HER-2 in Breast Cancer - Methods of Detection, Clinical Significance and Future Prospects for Treatment. Critical reviews in Oncology/Hematology 43; 231-44

Gasco, M. Shami, S. Crook, T. (2002): The p53 Pathway in Breast Cancer. Breast Cancer Research 4; 70-76

Lewis, F. Maughan, N.J. Smith, V. Hillan, K. Quirke, P. (2001) Unlocking the Archive - Gene Expression in Paraffin-Embedded tissue. Journal of Pathology 195; 66-71

Bubendorf, L. Nocito, A. Moch, H. Sauter, G. (2001) Tissue Microarray (TMA) Technology: Miniaturized Pathology Archives for High-throughput In situ studies. Journal of Pathology 195; 72-9

Cunnick, G.H. Jiang, W.G. Gomez, K.F. Mansel, R.E. (2002) Lymphangiogenesis and Breast Cancer Metastasis. Histol histopathology 17; 863-70

Useful website addresses include:

www.cancerscreening.nhs.uk/breastscreen	The NHS Breast Screening Programme
www.cancerresearchuk.org	Cancer Research UK
www.imaginis.com/breasthealth	Imaginis -Sponsored by Siemens
www.marathon.csee.usf.edu/mammography	University of Florida Digital Mammography Database
http://seer.cancer.gov/	NCI's Surveillance, Epidemiology & End Results

GOVERNANCE AND RISK MANAGEMENT

Code: BUSI1512	School: Science
Course Title: Governance and Risk Management	Course Coordinator: Prof PJ Harvey
Level: 7 (Master's)	Credits: 30
Department: Life Sciences	Pre-requisites: BSc degree or equivalent

Aims:

The main aims of the course are to provide an understanding of:

- a culture of governance and how this operates in an organisation
- the interrelatedness of governance and risk management
- the elements of governance and risk management systems and their practical application in an organisation
- how to implement risk management tools in order to establish and / or participate in proactive governance programmes

Learning Outcomes:

On completion of the module students should have shown evidence of being able to:

1. demonstrate a critical insight and comprehensive understanding of the concept of governance, the scope of its applicability and how governance is managed practically in an organisation
2. demonstrate a critical awareness of the current standards and legislation that the organisation must meet in relation to governance and risk and discuss how the organisation achieves those standards
3. develop a practical toolkit for assessing, managing and reducing risks, ensuring business continuity and investigating incidents and complaints and implementing remedial, corrective and preventive actions
4. explore and critically evaluate the discipline of risk management and to demonstrate how this contributes to the health and safety culture of an organisation

Skills Learning Outcomes:

On completion of this module, students will be able to:

5. produce formal reports according to professional standards and effectively communicate them using appropriate presentation skills and ICT tools
6. demonstrate self direction and clarity in approaching tasks and assignments

Content:

Two face-to-face workshops

- Workshop 1: introduction to the course, the ICT Platform and your tutor.
- Workshop 2: (date to be arranged)

Guided online study which is structured in six topics (after this introduction):

Topic 1: What is Governance?

- What are governance & risk management?
- Establishing a Culture of Governance

- Aspects of Risk & Governance
- Introduction to Standards and Guidelines
- Regulators and Inspectors

Topic 2: A Culture of Governance

- A Culture of Governance
- Organisational structures / responsibilities
- Board assurance framework
- Managing complaints

Topic 3: The Human Element

- Risk Management: Human Errors
- What is risk management?
- Human errors - active and latent failures - system failures
- Understanding the risk management process: Airline industry –a model of best practice?
- Safety in the workplace
- Risk management in healthcare: how is it achieved?

Topic 4: Legal Aspects of Risk Management

- The Law: legislation and reporting
- Accessing Legislation
- Key UK Legislation
- Making and Keeping the Workplace Safe
- European Union Directives
- Authorities and Agencies

Topic 5: Statutory Reporting

- Statutory Reporting and the Monitoring of Risk
- Mitigating the risk
- Key lines of Enquiry (KLOE)

Topic 6: Risk Management in Practice: the tools

- Introduction: Tools for Risk Management
- Risk assessment
- Grading a Risk
- Types of Risk Assessment
- Incident reporting procedures
- Root cause analysis tool
- Report writing and Action Plan (Corrective/Preventive Actions)
- Assurance

Topic 7: Final Report

- Powerpoint presentation
- Public contributions to the course

Learning and Teaching Activities:

The learning and teaching activities are designed to be progressive and promote independent, supported learning in a web-based environment. The activities focus on linking work-based practice to current models and theoretical approaches to risk management and governance.

The activities include: practice-based work, development work to produce case studies; web-based research and literature searches; and group activities involving e-discussion and real-time communication on-line.. The activities are both formative and summative with feedback representing an important element to develop and improve student learning. Feedback via formative and summative activities is an important part of student learning.

The knowledge and understanding outcomes are delivered and acquired from the interactive learning materials supported by self assessment, reference texts, directed reading, discussion conferencing, and web-based resources. Students work independently with the teaching materials and are encouraged to participate in on-line chat and develop and challenge their ideas via the discussion board. Tutor support is also provided through two day schools. Feedback on activities and assignments provides individual tuition and guidance.

Cognitive skills are promoted in the teaching materials via a range of activities including self assessment and practice-based work. Students are encouraged to use each other for support and the chat and discussion board provide an environment for interaction bringing students and their tutor together for critical discussion and reflection. Feedback aids the development of cognitive outcomes

Practical and professional skills and generic skills are promoted throughout the course and are integral to, and embedded within the activities.

Activity 1.0: Introductions	LO 6
Activity 1.1: Course Portfolio	LO 3
Activity 1.2: Webquest for governance definitions	LO 1
Activity 1.3: Webquest on risk assessment	LO 4
Activity 1.4: Review of "Essential standards of quality and safety"	LO 1, 2
Activity 1.5: International Governance	LO 1
Activity 1.6: Tissue Scandal	LO 2,4,5
Activity 2.1: Board assurance framework	LO 1, 3, 4
Activity 2.2: Commitment to risk management	LO 2, 4.
Activity 2.3: Committees & key personnel	LO 1,3, 4,
Activity 2.4: Committee in action	LO 1, 3, 4
Activity 2.5: Organisational complaints management	LO 1, 2
Activity 2.6: (Assessed) Report	LO 1, 4, 5
Activity 3.1: Do you think that lessons of the airline industry can be applied to healthcare?	LO 4
Activity 3.2: How is risk management achieved? (Self-assessment Quiz)	

Activity 4.1: Part 1: Understanding Written Law	LO 2
Activity 4.2: Part 2: Accessing Laws	LO 2
Activity 4.3 Data Protection Act	LO 1,2,3
Activity 4.4 Freedom of Information Act	LO 1,2,3
Activity 4.5: Hazard Symbol Challenge Quiz	LO 3
Activity 4.6: Review of Law and Standards	LO 1, 2,3
Activity 4.7: Identifying the Advisors	LO 1,3,4
Activity 4.8: Free Advice from the HSE	LO 2, 3
Activity 5.1: MHRA Reporting	LO 2,3,4
Activity 5.2: Very Serious Incidents: Reporting Procedures	LO 2.3.4
Activity 5.3: Statutory Reporting of other significant incidents	LO 1, 2
Activity 5.4: Understanding Liability Cover & NHSLA	LO 2,3
Activity 5.5: Revision	LO 1, 2,3
Activity 6.1: A simple risk assessment	LO 2, 3
Activity 6.2: Risk Assessment Templates	LO 1,3
Activity 6.3: Substance Inventory of cleaning products	LO 2,3
Activity 6.4: Manual Handling Risk Assessment	LO 2, 3
Activity 6.5: Incident reporting	LO 1,2,3
Activity 6.6: Analysing information	LO 3
Activity 6.7: Monitoring the actions	LO 2,3
Activity 6.8: Shadowing an incident investigator	LO 1,2,3
Activity 6.9: (Assessed) Root cause analysis	LO 3,4,5
Activity 7.1: (Assessed) Final Report PowerPoint™ presentation	LO 3,5
Activity 7.2: (Assessed) Public contributions to the course	LO 1,6

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Word Length	Outline Details
Report		30	50 %		<p>Activity 2.6 - Identify one incident or complaint or claim that your department was involved with. Track it through the committee reporting structure (look at minutes). Write a report covering the following:</p> <ul style="list-style-type: none"> • Where did it stop? • Was it resolved at this level? • How did your organisation learn from this incident/ complaint/claim? • How does the learning flow back down to departmental level? <p>Critique the process of information flow - how could this be improved? (Compare to other organisations' structures posted in activity 2.3).</p> <p>LO 1, 4, 5</p>
Formal report – Root cause analysis		25	50%		<p>Activity 6.9 - Using a recent incident from your organisation</p> <ul style="list-style-type: none"> • Undertake a root cause analysis of the incident. • Critique the risk grading of the incident. • Suggest corrective & preventive actions and regrade the incident.

					<ul style="list-style-type: none"> Write a report (using organisational incident investigation report template or template in NLRs NPSA toolkit) LO 3,4,5
PowerPoint presentation and Presenter's notes.		30	50%		Activity 7.1 - PowerPoint™ presentation: Consider a “disaster” that could occur at your workplace (fire, flood, power loss, computer failure, severe staff shortage due to epidemic illness or inability to get to work due to weather conditions etc). Risk assess the effects of this “disaster” on your service and the impact to others of the loss of your service. What preventive measures (if any) are possible to: <ul style="list-style-type: none"> reduce the risk of the disaster occurring reduce the impact of the disaster What control measures will you put in place to be able to continue to provide a service during the disaster? What governance will exist to monitor the effectiveness of your implemented controls during the disaster? LO 3,5
Minimum six meaningful contributions to discussions and thought provoking answers to quiz	√	15	50%		Activity 7.2 - Self-evaluation of own and others postings to the discussion board. Insightful analysis of discussion topic, Demonstrate ability to discriminate between ideas and provide follow up postings with thoughtful and insightful analysis. LO 1, 2, 4, 6

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

The Governance and Risk Management module uses no specific indicative texts. It builds on online lessons, current online links and participant input and interaction. A representative sample of online links provided for 2010 is shown below:

Department of Health Clinical Governance

<http://www.dh.gov.uk/en/Publichealth/Patientsafety/Clinicalgovernance/index.htm>

Office of Government Commerce (OGC)

http://www.ogc.gov.uk/delivery_lifecycle_governance.asp

National Information Governance Board for Health and Social Care

<http://www.nigb.nhs.uk/>

Care Quality Commission <http://www.cqc.org.uk/>

NHS National Patient Safety Agency <http://www.npsa.nhs.uk/>

NHS National Institute for Health and Clinical Excellence <http://www.nice.org.uk/>

Medicines and Healthcare products Regulatory Agency (MHRA)
<http://www.mhra.gov.uk/index.htm>

Journals

The course makes reference to relevant peer-review literature, such as:

British Medical Journal; Mar 18, 2000; 320, 7237; Education and debate: Human error: Models and management - James Reason: Research Library pg. 768

Health Care Risk Report - The leading resource for patient safety and risk

Quality and Safety in Healthcare 2008; 17: 314: Aviation is not the only industry: healthcare could look wider for lessons on patient safety.

IMPLEMENTING ADVANCED QUALITY MANAGEMENT

Code: BUSI1222	School: Science
Course Title: Implementing Advanced Quality Management	Course Coordinator: Prof PJ Harvey
Level: 7 (Master's)	Credits: 30
Department: Life Sciences	Pre-requisites: BSc degree or equivalent

Aims:

This is a professional course that aims to enable you to:

- Organise, co-ordinate and manage quality systems in the laboratory
- Support and train others in quality processes and systems

Learning Outcomes:

Knowledge and understanding

As a result of successfully completing the course, the learner will be able to:

1. Demonstrate an advanced ability to plan, organise and manage a quality management system
2. Demonstrate an in-depth understanding of the position of the improvement cycle within QMS and use methods to identify and implement areas for improvement
3. Exhibit competency in the delivery of training in QMS

Skills Learning Outcomes

4. Set quality objectives, plan, monitor performance, support and train, in order to successfully integrate a quality management system
5. Perform effectively within a team environment, and recognise and utilise other people's contributions in group processes; perform team delegation, development and management within an environment where change occurs
6. Plan and manage your own professional development
7. Communicate effectively, using a range of media, including preparing strategic plans and reports; including listening to, negotiating with, and persuading and influencing others
8. Demonstrate self-direction and clarity in tackling and solving problems
9. Act autonomously in planning and implementing tasks at a professional level
10. Use WebCT and the internet to support learning and work

Indicative content:

Welcome and introduction to the course

Topic 1:

- Personal development planning – skills and processes
- Analysis of a quality manager's job description
- Self assessment of generic and management skills
- Personal development planning

Topic 2:

- Organising and integrating a quality management system in your laboratory
- The process-based approach to quality management systems
- The different processes involved in a quality management system
- Standards and accreditation
- Approaches and methods to integrate processes of a quality management system and documentary evidence required to meet compliance

- Development of a strategy to implement QMS including project management methods to organise and co-ordinate the work

Topic 3:

- Making change happen
- The process of evaluation as part of QMS
- Managing evaluation activities
- The management and control of documents
- The process of continual improvement as part of QMS
- Approaches to managing change
- Identifying areas for improvement through different processes
- Models of change
- Developing a case for improvement

Topic 4:

- Working together
- Working as team leader and team member
- How to develop and support groups
- Establishing and maintaining co-operative working relationships
- Developing people: coaching
- Running effective meetings
- Training others
- Designing and running workshops

Topic 5:

- Putting it all together
- Consolidation review and reflection of personal development
- Consolidation, review and reflection of quality management knowledge and skills

Learning and Teaching Activities:

The learning and teaching activities are designed to be progressive and promote independent, supported learning in a web-based environment, WebCT. The activities focus on linking work-based practise to current models and theoretical approaches to managing quality in the laboratory.

The activities include: practise-based work, development work to produce case studies; web-based research and literature searches; and group activities involving e-discussion and on-line chat. The activities are both formative and summative with feedback representing an important element to develop and improve student learning. Feedback via formative and summative activities is an important part of student learning.

The knowledge and understanding outcomes are delivered and acquired from the interactive learning materials supported by self assessment, reference texts, directed reading, discussion conferencing, and web-based resources. Students work independently with the teaching materials and are encouraged to participate in on-line chat and develop and challenge their ideas via the discussion board. Tutor support is also provided through two day schools. Feedback on activities and assignments provides individual tuition and guidance.

Cognitive skills are promoted in the teaching materials via a range of activities including self assessment and practice-based work. Students are encouraged to use each other for support and the chat and discussion board provide an environment for interaction bringing students and their tutor together for critical discussion and reflection. Feedback aids the development of cognitive outcomes.

Practical and professional skills and generic skills are promoted throughout the course and are integral to, and embedded within the activities.

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 0.1:</i> Getting to know each other	LO10
<i>Activity 1.1:</i> A look at your job description	LO6, 8
<i>Activity 1.2:</i> Skills workout	LO6
<i>Activity 1.3:</i> (assessed) A personal development plan	LO6, 7, 8, 9, 10
<i>Activity 2.1:</i> Whose job is it anyway?	LO1, 4
<i>Activity 2.2:</i> A strategy for QMS implementation	LO1, 4, 7, 9
<i>Activity 2.3:</i> (assessed): A strategy for implementing a quality system and an evaluation of communication skills	LO1, 4, 6, 7, 9, 10
<i>Activity 3.1:</i> Managing non compliances	LO1, 8
<i>Activity 3.2:</i> Translating information into action	LO1, 2, 4, 8
<i>Activity 3.3</i> (assessed): Implementing and measuring change	LO1, 2, 4, 7, 9
<i>Activity 4.1:</i> Working as team leader	LO5, 6
<i>Activity 4.2:</i> Planning a workshop	LO3, 5, 7
<i>Activity 4.3</i> (assessed): A training workshop	LO 3, 5, 7, 8, 9
<i>Activity 5.1</i> (assessed): Implementing QMS in your laboratory	LO1, 2, 4, 6, 7, 8, 9, 10

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Written strategy, discussion and negotiation and use of feedback (activity 2.3)		25%	50%		A proposal for QMS implementation and an evaluation of communication skills (1500 words max) LO 01 02, 04 - 10
Presentation of written case, collection & presentation of evidence, information handling (activity 3.3)		25%	50%		Implementing and measuring an aspect of change – looking at continual improvement (2000 words max) LO 01 - 10
Practice-based , planning, running and evaluating a workshop (activity 4.3)		25%	50%		A training workshop LO 01 -09
Consolidation activity, critical reflection on own and other's discussion postings, review of progress, action planning, PDP (activity 5.1)	√	25%	50%		Implementing QMS in your laboratory, evidencing discussion postings and critical reflection on own and other's postings and presentation of PDP (1000 words max) LO 01 – 10

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

ISBN Number	Author	Date	Title	Publisher
ISBN 0902429396	David Burnett	2002	A Practical Guide to Accreditation in Laboratory Medicine	ACB Venture Publications
ISBN 0749267666	Sheila Tyler	2004	The Manager's Good Study Guide	The Open University
	Valerie Iles and Kim Sunderland		Managing Change in the NHS and Managing Change in the NHS: Organisational Change www.sdo.lshtm.co.uk	

LUNG DISEASE

Code: ANAT1009	School: Science
Course Title: Lung Disease	Course Coordinators: Prof PJ Harvey
Level: 7 (Master's)	Credits: 30
Department: Life Sciences	Pre-requisites: BSc degree or equivalent

Introduction and Rationale

Pulmonary pathology is the basis for lung disease, and clinical manifestations and complications are a direct result of pulmonary pathology. This course will provide an invaluable insight into pulmonary disease processes for doctors and medical students, nurses, physiotherapists, researchers and pharmacologists with a special interest in lung disease. From a different perspective, many aetiological agents may produce pathogenesis effects that result in pulmonary pathology. The course would therefore be immensely helpful for epidemiologists, legal professionals with an interest in industrial lung diseases, and physiologists. Finally, biomedical scientists and allied health care professionals would greatly benefit in understanding pulmonary pathology, including the close inter-relationship between aetiology, pathogenesis, and complications in contributing to the overall histopathological features and rationale for special investigations.

Aims:

The course aims to provide essential information complimented by numerous histopathological images of respiratory pathology, congenital and childhood respiratory pathology, and adult respiratory pathology. This will include a classification of disease categories, aetiology, pathogenesis and histopathology. Reference will be made to relevant further investigations, disease progression and outcomes.

Learning Outcomes:

On successful completion of this course, students will be able to:

1. Recognize the aetiological processes and appropriate risk factors of pulmonary pathology;
2. Comprehend pathogenetic mechanisms whereby aetiological factors and relevant risk factors contribute to histopathological processes of disease;
3. Critically assess and evaluate histopathological features of respiratory disease;
4. Critically assess appropriate investigative tools, disease progression and outcomes;
5. Critically evaluate the findings of a small scale enquiry and formulate an innovative proposal.

Skills Outcomes:

6. Use the Internet as a communication tool as well as a tool to find and evaluate relevant information
7. Produce reports according to professional standards
8. Produce materials for public presentations

Indicative Content:

Intro to WebCT; use / navigate functions of my WebCT; explore the WebCT tools; create a web page

Introduction

Overview on the anatomy, physiology, and embryology of the lung. This will provide a background to relevant pathological disorders of the lung, and their pathogenesis.

Congenital Diseases

The congenital diseases of the lung will be examined systematically and in-depth, and include: macroscopic features, microscopic features, and relevant pathophysiology. Diseases include: pulmonary agenesis or hypoplasia, bronchopulmonary abnormalities, pulmonary abnormalities, mucus secretion abnormalities, pulmonary vessel abnormalities, respiratory distress syndrome in the newborn, and idiopathic.

Obstructive Airways Disease

A detailed analysis of obstructive airways disease will be presented. This will include the aetiology, pathogenesis, macroscopic and microscopic appearance of the disease processes, and potential complications that may be clinically manifested. Examples will be drawn from: emphysema, acute bronchitis, chronic bronchitis, asthma.

Bronchiectasis, and atelectasis vs collapse

Pneumonia

The different forms of pneumonia will be categorised and examined. This will include

- Aetiological factors and pathogenesis of the disease processes,
- Relevant macroscopic and microscopic appearances, and
- Complications that may be clinically manifested.

Disease types include:

- Acute Bacterial Pneumonia
- Aspiration Pneumonia
- Viral Pneumonia
- Chronic Bacterial Pneumonia
- Non - Infective Pneumonia
- Mycoplasma and Rickettsial Infections
- Pulmonary Mycoses
- Protozoa
- Helminths

Interstitial Lung Disease

This complex and evolving subject will be systematically evaluated and categorised.

The aetiology, pathogenesis, macroscopic and microscopic features, and complications of the disease processes will be presented. Mention will be made of controversial areas, particularly concerning aetiology and pathogenetic mechanisms. Known causes will include:

- Infections
- Chronic Occupational Disease Diffuse Alveolar Damage
- Chronic Occupational Diseases
- Diffuse Alveolar Damage
- Iatrogenic causes

Unknown Causes will include:

- Interstitial Pneumonias
- Connective Tissue Diseases
- Sarcoidosis
- Pulmonary Langerhans Cell Histiocytosis
- Alveolar Proteinosis
- Eosinophilic Pneumonia
- Goodpasture's Disease
- Lymphangioleiomyomatosis
- Idiopathic Pulmonary Haemosiderosis

- Idiopathic Pulmonary Fibrosis

Vasculitis and Vascular Disorders

A detailed overview and analysis of vasculitis disorders will be systematically evaluated. This will include the aetiology, pathogenesis, macroscopic and microscopic features of the disease processes.

Disease types:

- Large Vessel Vasculitis
- Medium Size Vessel Vasculitis
- Small Vessel Vasculitis
- ANCA-associated
- Immune Complex-associated
- Paraneoplastic Small Vessel Vasculitis
- Lymphoproliferative Disorders
- Pulmonary Hypertension
- Pulmonary Infarction

Pulmonary Infiltrates with Eosinophilia

This complex and evolving subject will be systematically evaluated and categorised. The aetiology, pathogenesis, macroscopic and microscopic features and complications of the disease process will be presented. Mention will be made of

- Controversial areas, particularly concerning aetiology and pathogenesis.
- The plethora of different disease processes that can produce pulmonary infiltrates with eosinophilia will be explored, and correlated with relevant pathological entities in other chapters of this course.

Neoplasms of the Lung

The neoplasms of the lung will be analysed including the concepts of benign, malignant and secondary tumours. The aetiology, precursor lesions, macroscopic and microscopic features, and spread will be described. Finally, evaluation of the clinical options in sampling for diagnostic material and patterns of immunocytochemistry for diagnosis shall be analysed.

- Benign Tumours / Malignant Tumours
- Primary Tumours
 - Squamous Cell Carcinoma
 - Adenocarcinomas
 - Neuroendocrine neoplasia
 - Large Cell Carcinoma
 - Adenosquamous Carcinoma
 - Other Primary Tumours
- Secondary Tumours

The Pleura

The macroscopic and microscopic disease entities of pleura will be examined, including aetiological factors. For malignant tumours of the pleura:

- Pleural Effusion
- Pneumothorax
- Pleural Plaques
- Pleural Tumours: Benign / Malignant / Metastatic

Learning and Teaching Activities:

The student will be invited to explore and to evaluate the subject material through a comprehensive array of continuously-assessed open-ended structured questions backed by analysis of relevant publications. Frequent guided online discussions will

encourage students to develop their understanding on how relevant aetiological factors lead to pathogenetic mechanisms, and how these mechanisms result in demonstrable histopathologic disease processes.

Assessments will also be made through a comprehensive 'quiz' of closed-ended questions.

Formulation of ideas, presentation and written skills will be assessed.

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 1: Getting to know each other</i>	LO6
<i>Activity 2: Critical postings to the Discussion Room</i>	LO1, 2, 5, 6
<i>Activity 3a: Critical postings to the Discussion Room</i>	LO1
<i>Activity 3b : meet in the Chatroom for question time</i>	LO1, 2, 5
<i>Activity 4 : Critical postings to the Discussion Room</i>	LO2, 3, 5, 6
<i>Activity 5 : Critical postings and debate in the Discussion Room</i>	LO3, 4, 5, 6
<i>Activity 6: (Assessed) Short report posted to Assignments</i>	LO3, 4, 5, 6, 7
<i>Activity 7 : Critical postings and debate in the Discussion Room</i>	LO4, 5, 6
<i>Activity 8 : Critical postings and debate in the Discussion Room</i>	LO3, 4, 5, 6
<i>Activity 9 : Critical postings and debate in the Discussion Room</i>	LO3, 4, 5, 6
<i>Activity 10 : (Assessed) PowerPoint presentation and notes</i>	LO1, 2, 3, 4, 8
<i>Activity 11: (Assessed) Online Quiz</i>	LO1, 2, 3, 4
<i>Activity 12: (Assessed) Self-evaluation quiz on communications skills</i>	LO1, 2, 3, 4, 5

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Test: activity 6		10	50%		(eg on Pneumonia):
Report: activity 8		15	50%	1000	Summarise the causes, pathogenesis and pathology of 3 named diseases The report must be of publication standard (for a named professional journal). LO 01 - 03, 07
Powerpoint Presentation and presenter's briefing notes		20	50%		6-10 slides on a given theme. eg: 'How would you evaluate the different types of interstitial lung diseases histologically?' or 'Malignant cells are found in the pleural fluid. How would you investigate the tumour cell type and origin?' LO 03, 04, 07, 08
Test Activity 14		20	50%		Respiratory diseases LO 01 - 04
Critical postings Activity 1 & 15	√	35	50%	At least 6 postings	selected from a list of themes, posted using Discussion and Presentation Tools, Reflection and critical evaluation of the quality of the postings LO 01 - 06

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

Any one of the following books is suitable for the entire course. Most hospital/university libraries stock these texts and many hospital departments and/or staff will also have copies. Background reading will expand on the course text to help develop the necessary understanding of the course content.

ISBN No	Author	Date	Title	Publisher
072167335x	Cotran RS, Kumar V & Collins T	1999	Robbins' Pathologic Basis of Disease 6 th Ed	Saunders
0443073341	Underwood JCE	2004	General and Systemic Pathology	Churchill Livingstone
0723431604	Stevens A & Lowe J	2000	Pathology 2 nd Ed	Mosby
0721692745	Kumar V, Cotran RS & Robbins SL	2003	Robbins' Basic Pathology 7 th Ed	Saunders
0323013422	Rosai J (Ed)	2004	Roasi and Ackerman's Surgical Pathology	Mosby

Journals and Web-links

Students are encouraged to support their learning with reading from relevant journals and to make use of extensive use of data available electronically on the Internet. Many of the latter are provided as hyperlinks in individual topics. Exemplars are given below:

- NCBI -Entrez Search and Retrieval system <http://www.ncbi.nlm.nih.gov/Entrez/>
- The Internet Pathology Laboratory for Medical Education: <http://library.med.utah.edu/WebPath/>
- The Weill Education Center, Cornell University Medical College: <http://www.med.cornell.edu/education/>
- Immunopathology by Robert C. Mellors, M.D., Ph.D. http://www.medpath.info/MainContent/Immunopathology/Immuno_04.html

MANAGEMENT OF HEALTHCARE ASSOCIATED INFECTION

Code: MICR1004	School: Science
Course Title: Management of Healthcare Associated Infection	Course Coordinator: Prof PJ Harvey
Level: 7 (Master's)	Credits: 30
Department: Life & Sports Sciences	Pre-requisites: BSc degree or equivalent

Introduction and Rationale

The profile of healthcare associated infection and the related topic of antimicrobial resistance, has never been higher. This course aims to introduce the student to the fascinating rubric of interactions between the patient, the microbes and the factors in the healthcare environment that can result in an increased risk of healthcare associated infection. It will also provide an understanding of the role of the infection control team in preventing and controlling these infections and of how standards of infection prevention are becoming a very useful litmus test for assessing the quality of patient care for the whole healthcare organisation.

Aims:

To provide an overview of the causes of healthcare associated infection, sources and means of transmission, the principles of prevention, including disinfection and sterilisation and the management facets of infection prevention.

Learning Outcomes:

On completion of this course, students will be able to:

1. Demonstrate current knowledge of the spread and prevention of healthcare associated infection in clinical practice
2. Perform risk assessments and critically discuss what is involved in investigating outbreaks and the interruption of transmission;
3. Implement correct principles of infection prevention, to improve quality and the contribution of external bodies to this process;
4. Critically appraise and discuss the concepts and processes of disinfection and sterilisation, recognising what they achieve and where they can and should be applied.
5. Evaluate various change management theories in relation to the prevention of healthcare associated infection.
6. Integrate current knowledge into practice by drawing on the expertise of infection prevention specialists.
7. Consolidate and extend knowledge and understanding of research within the specialist subject of infection prevention.
8. Demonstrate an ability to organise and convey thoughts and ideas on infection prevention through oral presentation

Skills Outcomes:

9. Use the Internet as a communication tool and as a tool to find and evaluate relevant information
10. Produce reports according to professional standards
11. Produce materials for public presentations.

Indicative Content:

Introduction to WebCT

- Use and navigate the functions of my WebCT
- Explore the WebCT tools

Current affairs in infection prevention

Potential and current threats and solutions; the role of national strategy and how politics and economics affect disease control locally and internationally.

Investigation, prevention and control of healthcare associated infection.

Significant microorganisms relevant to healthcare associated infection; their important properties relevant to pathogenesis, prevention and control. The various infections they cause their sources and routes of transmission.

Prevention of healthcare associated infection

Various types of infection; controlling an outbreak of infection; case study

Principles of infection prevention

Healthcare environmental hygiene; hand hygiene; use of personal protective equipment the use and disposal of sharps

Change management and its importance in the healthcare setting

Essentials of successful change; change agent; engaging the managers or leaders in order to make successful change.

Disinfection & sterilisation

The methods of decontamination of equipment, the environment, patient's skin and mucosa and healthcare workers' hands; the relative advantages and applications of different disinfection and sterilisation methods.

Management of healthcare associated infection: the infection control team.

The multidisciplinary role of the infection control team in the prevention and control of infection, how this has developed over time, how it identifies problems, initiates actions based on evidence, follows up issues and how it critically considers the ways in which infection control knowledge is disseminated and integrated into practice.

Learning and Teaching Activities:

The course will provide essential information and direct the student to relevant related material on-line and in the literature. Additionally the course builds on online lessons, current online links and participant input and interaction. Case examples will be used to illustrate the diagnostic process.

Student-centred activities include web-quests; self-assessment quizzes; case studies and local research on relevant topics in the workplace (investigation of the role of the infection control nurse and/or infection control teams); exercises in presentation and written skills.

These activities will enable the student to reflect on the different topics, explore their inter-relationships, critically evaluate findings of their reading and interactions with healthcare workers in their organisation and others on their course and to formulate possible solutions to any bottlenecks or issues that they uncover during the course.

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 1.1: Getting to know each other</i>	LO5
<i>Activity 2.1: Discuss current themes in infection control – discussion room</i>	LO1
<i>Activity 2.2: Discuss current themes in infection control on an international level</i>	LO1
<i>Activity 2.3: Discuss current infection threats</i>	LO1

<i>Activity 3.1: Develop an aide memoir</i>	LO1
<i>Activity 3.2: Interactive Group work for HAI pathogens using presentation tools</i>	LO1
<i>Activity 4.1: Clostridium difficile Case Study (Discussion Room)</i>	LO1
<i>Activity 4.2: Quiz</i>	LO1
<i>Activity 5.1: Hand hygiene 6 step on the job (Post to Discussions)</i>	LO1
<i>Activity 5.2: (Assessed) Quiz on standard precautions</i>	LO1
<i>Activity 6.1: Exchange an experience of the occurrence of change in discussions</i>	LO2
<i>Activity 6.2: Identify practice or environment that needs changing</i>	LO2
<i>Activity 7.1: Quiz</i>	LO1
<i>Activity 7.2: Observations on workplace practice - report to discussions</i>	LO4
<i>Activity 7.3: (Assessed). Abstract (<250 words) on principles and application of disinfection and sterilisation</i>	LO4
<i>Activity 8.1: The Infection Control Team and Infection Control Management</i>	
<i>Arrange to spend at least two hours shadowing the Infection Control Nurse and post details of your findings to the Discussion Room</i>	LO3
<i>Activity 8.2 : (Assessed). Report</i>	LO2, 6
<i>Activity 8.3: (Assessed). PowerPoint presentation</i>	LO1, 7
<i>Activity 8.4 : (Assessed) self-evaluation quiz on communications skills</i>	LO5

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quiz		10%	50%		Infection Prevention LO 01, 04
Abstract		15%	50%		Differences between sterilisation & disinfection. LO 04, 09, 10
Report		30%	50%	1,500 - 2,000	What are the main priorities in your organisation regards infection control and how will these minimise the risk of infection to patients, staff and visitors. LO 01 – 08, 10
PowerPoint slides, Presenter's briefing notes		30%	50%	<250 words	Given unlimited resources, what interventions would you take to limit the spread of a named micro-organism. LO 01 – 09, 11
Critically-argued postings	√	15%	50%		postings to the course using Discussion and Presentation Tools Reflection and evaluation on the quality of the postings LO 01 – 09

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

ISBN No	Author	Date	Title	Publisher
0702027618	Wilson J	2006	Infection Control in Clinical Practice 3 rd Ed	Baillière Tindall
1405126426	Ayliffe GAJ, Coates D & Hoffman PN	2004	Chemical disinfection in hospitals, 3 rd Ed	Oxford: Blackwell Publishing

The course builds on online lessons, current online links and participant input and interaction.

A representative sample of online links provided for 2008 is shown below:

Clean Safe Care NHS

<http://www.clean-safe-care.nhs.uk/public/default.aspx?level=1&load=HomeNews>

Department of Health, England: Going Faster Further; Implementing the Saving Lives Delivery Programme

http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4134547

Eurosurveillance <http://www.eurosurveillance.org/ew/2007/070111.asp>

Getting Ahead of the Curve - A Strategy for Infectious Diseases

http://www.dh.gov.uk/en/Consultations/Closedconsultations/DH_4016942

Health Protection Agency: <http://www.hpa.org.uk/>

Health Protection Scotland: Compliance with Hand Hygiene Audit Report October 2007

<http://www.hps.scot.nhs.uk/news/spdetail.aspx?id=131>

Healthcare Commission England: Outbreak Investigation

http://www.healthcarecommission.org.uk/newsandevents/pressreleases.cfm?cit_id=5875&FAArea1=customWidgets.content_view_1&usecache=false

Institute for Healthcare Improvement: Improving Hand Hygiene

<http://www.ihl.org/IHI/Topics/CriticalCare/IntensiveCare/Tools/HowtoGuideImprovingHandHygiene.htm>

National Electronic Library of Infection

http://www.neli.org.uk/IntegratedCRD.nsf/NeLI_Home1?OpenForm

The Scottish Ministerial Healthcare Associated Infection (HAI) Task Force

<http://www.scotland.gov.uk/Topics/Health/NHS-Scotland/19529/2005>

World Health Organisation: Clean Care is Safer Care <http://www.who.int/gpsc/en/>

POINT OF CARE TESTING

Code: OMED1129	School: Science
Course Title: Point of Care Testing	Course coordinators: Prof PJ Harvey
Level: 7 (Master's)	Credits: 30
Department: Life Sciences	Pre-requisites: BSc degree or equivalent

Introduction and Rationale

Biomedical laboratories, and the Pathology Services in particular, have become the subject of major modernisation proposals (eg. *Strategic Directions for the Modernisation of Pathology Services, 2/4/2001, NHS Executive, London*). These proposals recognise the need for centralised laboratory services supported by laboratory information management systems and semi- and full automation robotics to cope with the predicted increasing demand from GPs for routine tests of low complexity. Technological advances that will make it increasingly feasible to do many tests at the bedside or outpatient clinic, as well as to perform more specialised tests associated with molecular biology and DNA testing. POCT is thus a rapidly expanding area in both the range of investigations available and the complexity of the service to be provided.

Aims:

To provide an overview of Point-of-Care Testing (POCT) for analyses associated with the traditional Pathology disciplines. This would include the rationale for selection and organisation of a POCT solution, what POCT is available and how to acquire the resultant data.

Learning Outcomes:

On completion of this course, students will be able to:

1. critically select, organise and manage a POCT solution within a hospital environment or primary care setting: use this understanding to prepare an innovative proposal for acquisition of a POCT solution;
2. Demonstrate an awareness of the variety of POCT analyses available for both primary and secondary care. Have a detailed knowledge of the analytical principles of these analyses: use this knowledge to critically evaluate the clinical usefulness of POCT solutions and their limitations;
3. Be able to demonstrate an awareness and understanding, in the context of POCT, of the concepts of electronic data acquisition, record management and connectivity. Have detailed knowledge of and be able to critically assess the relevant industry protocols developed for this.

Skills Outcomes:

4. Use the Internet as a communication tool as well as a tool to find and evaluate relevant information
5. Produce reports according to professional standards
6. Produce materials for public presentations

Indicative Content:

Intro to WebCT

- Use and navigate the functions of my WebCT
- Explore the WebCT tools
- Create a web page

A description of POCT as a diagnostic tool:

This will include why POCT should be used and its advantages, disadvantages and limitations. The concept of test clusters. How to select, organise and manage a POCT solution with particular reference to recent Medical Devices Agency bulletins.

What tests can be done in a POCT setting:

The range of analyses employed within traditional categories (Biochemistry, Haematology and Microbiology) and clinically centred test clusters (Diabetes, Critical care, Cardiac care, Drug investigations). Where and why they are used. Whether they are suitable or not for their potential use. What the basic analytical principle of these analyses is.

Data acquisition in POCT:

The rationale for data acquisition, in particular electronic acquisition. A brief description of connectivity and interconnectivity. Options for positive patient identification of results, electronic transfer of results to a central record and the development of industry standards to facilitate this.

Learning and Teaching Activities:

The course will provide information and direct the student to relevant related material on-line and in the literature. Student-centred activities will be primarily, personal research through appropriate academic and technical literature, on-line resources and local workplace documentation. Evaluation of learning outcomes will be through a series of activities consisting of assessed and non-assessed short reports, participation in topic-specific web discussions and design of an assessed POCT presentation. Five activities will be assessed.

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 1: Getting to know each other</i>	LO4
<i>Activity 2: Point of Care Testing Web Search</i>	LO4
<i>Activity 3: What is POCT?</i>	LO1
<i>Activity 4: Devices with analytical principles</i>	LO2, 1
<i>Activity 5: (assessed) Prepare a publishable management briefing document which identifies and analyses named beneficial POCT outcomes (500 words)</i>	LO1, 2, 5
<i>Activity 6: Five POCT solutions for use in Primary Care</i>	LO1, 2, 4
<i>Activity 7: Construct a Diabetic POCT test cluster</i>	LO1, 2, 4, 5
<i>Activity 8: Evaluate a POCT Policy</i>	LO2, 4
<i>Activity 9: Construct a report on POCT</i>	LO1, 2, 5
<i>Activity 10: the chemical reactions of Stix Tests</i>	LO2
<i>Activity 11: the Principles of Operation of Biochemical Tests</i>	LO2
<i>Activity 12: the Principles of Operation of Measurement Electrodes</i>	LO2
<i>Activity 13: the merits/demerits of Blood Gas Analysers</i>	LO1, 2, 4
<i>Activity 14: Work in pairs on an article posted to discussions,</i>	LO2, 4
<i>Activity 15: (assessed) short report (1000 words) for a named professional journal on either a POCT analyser for Cholesterol or POCT for DAU</i>	LO1, 2
<i>Activity 16: Basic Principles of six Coagulometers</i>	LO1, 2
<i>Activity 17: Analytical Principle of Malarial Parasites Test</i>	LO1, 2, 4
<i>Activity 18: A POC Test for an Infectious Disease</i>	LO1, 2, 4
<i>Activity 19: (assessed) Short Report (no more than 2000 words) on</i>	

<i>POCT in Hospital or Pharmacy</i>	LO1, 2
<i>Activity 20: Construct a table of Company, Data Management System and POCT Devices</i>	LO3, 4
<i>Activity 21: CIC Draft Specifications</i>	LO3, 4
<i>Activity 22: (assessed) POCT Presentation slides and briefing notes</i>	LO1, 2, 6
<i>Activity 23: (assessed) self-evaluation quiz on communications skills</i>	LO1, 2, 3, 4

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Report		15	50%	500	Publishable management briefing document identifying and analyzing beneficial POCT outcomes LO 01, 05
Report for named journal		20	50%	1,000	<i>either</i> on analytical principles, technical limitations and operational management of POCT cholesterol testing and the validity of doing so <i>or</i> critical review of the potential benefits and limitations of POCT for drugs of abuse. LO 02, 05
Report		20	50%	<2000	<i>either</i> a critical evaluation of POCT tests used in student's hospital <i>or</i> summarise POCT applications in a local major pharmacy. LO 02, 05
Powerpoint slides with briefing notes		30	50%	2,000	What is POCT? What POCT analyses are available? Why is there a need for connectivity? LO 02, 03, 06
6 critical postings	√	15	50%		selected from a list of themes, posted using Discussion and Presentation tools; Reflection and evaluation of the quality of the postings. LO 01 - 04

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

The course will utilise WebCT online information, current online links and participant input and interaction. Students will also be encouraged to read articles published in referred journals. The course will also make extensive use of selected reading from Crook, M (1999) Handbook of Near Patient Testing. Greenwich Medical Media Ltd. ISBN 1900151243.

Students will be referred for supplemental reading to:

Principles and Practice of Point of Care Testing. Editor: Gerald J. Kost. 2002. Lippincott Williams & Wilkins. ISBN 0 7817 3156 9.

Indicative Journal Articles and web-links as follows:

Management of *In Vitro* Diagnostic Medical Devices. MDA Device Bulletin DB2002(02). March 2002.

Management & Use of IVD Point of Care Test Devices. MDA Device Bulletin DB2002(03). March 2002.

Near to Patient or Point of Care Testing Guidelines. Joint Working Group on Quality Assurance. January 1999.

Price CP. Point of Care Testing. BMJ 2001; 322 1285-1288

Crook MA. Near Patient testing and Pathology in the New Millennium. J Clin Pathol 2000; 53: 27-30

A representative sample of online links is shown below:

<http://www.medical-devices.gov.uk/>

<http://www.pointofcare.net/>

<http://www.bmj.com/>

<http://www.dh.gov.uk/en/Healthcare/NationalServiceFrameworks/Diabetes/index.htm>

QUALITY SYSTEMS MANAGEMENT

Code: OMED1128	School: Science
Course Title: Quality Systems Management	Course Coordinators: Prof PJ Harvey
Level: 7 (Master's)	Credits: 30
Department: Life Sciences	Pre-requisites: BSc degree or equivalent

Introduction and rationale

With the increasing emphasis on accountability within the public sector, and the requirement to satisfy a number of national and international standards assessed by different accreditation bodies, it is imperative that organisations adopt a systematic approach to quality management. Hitherto, emphasis on achieving accreditation has meant that concepts of quality and quality systems in general have received less attention. However a properly managed quality system can form the framework to address many accreditation issues, as well as providing real opportunities for reducing error and fostering a culture of continual improvement.

Aims:

- To provide an understanding of the principles of quality systems and of the requirements of relevant accreditation standards;
- Develop an understanding of how to set up an internal audit programme and perform an internal audit;
- To provide an understanding of the importance of customer liaison and the skills to determine the level of customer satisfaction;
- To provide students with an understanding of the principles of continual improvement and with the skills for implementing a continual improvement programme within their organisation

Learning Outcomes:

On completion of this course, students will be able to:

1. Demonstrate a critical understanding of the meaning of quality in terms of the products and / or services provided by their organisation;
2. Make effective use of statistical process control (SPC) to help control and analyse processes;
3. Interpret and critically evaluate data obtained from internal quality assessment and external quality assessment programmes;
4. Set up an internal quality audit programme; prepare audit checklists; perform internal quality audits; raise non-compliance notes and implement corrective actions;
5. Perform a customer survey.

Skills Outcomes:

6. Use the Internet as a communication tool as well as a tool to find and evaluate relevant information
7. Produce reports according to professional standards
8. Produce materials for public presentations

Indicative Content:

Use and navigate the functions of my WebCT; explore WebCT tools and create a web page

The meaning of quality:

Quality features of products and services provided by own organisation; Quality policies; Measurable objectives for an organization;

Quality assurance:

- The meaning and importance of quality assurance; The value of flow chart(s) to depict major processes of an organisation; critical control points and their management; The benefits of internal quality control (IQC), internal quality assessment (IQA) and external quality assessment (EQA); Brief introduction to statistical analysis of quantitative internal quality control data using Westgard rules
- Accreditation: Accreditation standards, e.g., CPA, ISO 17025, ISO 9001 and their requirements.

The Audit Process:

- *Internal quality audit:* internal audits and their benefits; how to set up an audit programme; the requirements of an internal auditing system; conducting an audit
- *Non-compliance notes:* the purpose of non-compliance notes; documentation of non-compliances; resolution and closure of non-compliances; root cause analysis and appropriate corrective actions
- *Audit checklists:* Preparation of checklists

Continual improvement:

The meaning of continual improvement; Quality Improvement Notes to implement improvements

The audit report: Customer liaison and satisfaction

The importance of liaising with customers to learn of their requirements and of their level of satisfaction with the service provided. The customer service strategy: techniques to improve customer liaison, to determine customers' requirements and their level of satisfaction; customer survey; strategies to raise the level of customer satisfaction

Learning and Teaching Activities:

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 1: Getting to know each other</i>	L10
<i>Activity 2: Take notes in WebCT to document characteristics of a DVD player which might be important to a purchaser. Define all the quality features in a laboratory result. Have discussion with other students</i>	LO1, 10
<i>Activity 3: (assessed). Prepare and submit a quality policy of publishable standard for your laboratory</i>	LO2, 12
<i>Activity 4:(assessed) Produce a flow chart showing all the steps involved in the process of supplying a result and risk analysis</i>	LO3, 4, 12
<i>Activity 5: (assessed): Production of a Shewhart chart</i>	LO5, 12
<i>Activity 6: Discussion posting of no more than 500 words highlighting</i>	

<i>the differences between IQA and EQA</i>	LO6, 10, 12
<i>Activity 7: 500 word posting describing why you think a management review meeting is important for the effective running of an organisation</i>	LO7, 10, 12
<i>Activity 8: Accreditation case study discussion</i>	LO7, 10, 12
<i>Activity 9: From eight examples of non-compliances given, select four and suggest appropriate remedial action and further corrective action to eliminate root causes</i>	LO4,7,10,12
<i>Activity 10 (assessed presentation): Production of audit check lists and audit reports</i>	LO4,7,8,12, 13
<i>Activity 11(assessed): Customer Survey</i>	LO7,9,10,12, 13

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Report		10%	50%		Production of a quality policy for a laboratory. This must be of publishable standard. LO 01, 06, 07
Risk analysis		10%	50%		Activities to include production of a flow chart of major processes, identification of risks and a demonstration of an understanding how they are controlled LO 01 -02, 06, 07
Data collection & analysis		10%	50%		Data collection & analysis: production of a publishable Shewhart chart to demonstrate an understanding of statistical process control (SPC) LO 02, 03, 06, 07
Execution and report of a horizontal and vertical audit		40%	50%		Activities to include: preparation of an audit checklist; execution of an internal quality audit; production of non-compliance and quality improvement notes, an audit report; root cause analysis of non-compliances and suggestions for appropriate corrective actions. Production of a PowerPoint presentation. LO 01, 04, 06, 08
Report		20%	50%		A customer survey performed by the candidate entitled 'Customer Service'. The report must outline methods used, give results and a critical analysis of the data and present reasoned conclusions. LO 01, 05, 07
Postings	√	10%	50%		At least 6 public postings made to the course and reflection and critical evaluation on their quality LO 01 - 08

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

ISBN No	Author	Date	Title	Publisher
0902429205	Burnett D	1996	Understanding accreditation in laboratory medicine	ACB Venture Publications
	Snell JJS, Brown DBJ & Roberts C (Eds)		Quality Assurance - Principles and Practice in the Microbiology Laboratory 2 nd Ed	Public Health Laboratory Service
			A Guide for the adoption of ISO 9001:2000 in healthcare	The Process Practice

Useful website addresses include:

Clinical Pathology Accreditation (CPA)	www.cpa-uk.co.uk
Institute of Quality Assurance	www.iqa.org
Australian Accreditation Body / Publications	http://www.health.gov.au/internet/wcms/Publishing.nsf/Content/health-npaac-publication.htm
UKAS	www.ukas.com
International Laboratory Accreditation Cooperation (ILAC)	www.ilac.org
BSI homepage	www.bsi-global.com
Westgard QC website	http://www.westgard.com/
Useful guidance on ISO 9001:2000	http://www.activa-uk.com/home.htm
International Standards Organisation	www.iso.ch/iso/en/ISOOnline.frontpage

RENAL DISEASE

Code: ANAT1010	School: Science
Course Title: Renal Disease	Course Coordinators: Prof PJ Harvey
Level: 7 (Master's)	Credits: 30
Department: Life Sciences	Pre-requisites: BSc degree or equivalent

Introduction

Adequate renal function is vital to the well-being of the body and renal failure is a common cause of morbidity and mortality. The kidney is a complex organ with numerous functions that impinge on the metabolism of the body and the functions of other major organs. Consequently, there are many different diseases that can affect the kidney and these involve many different pathological processes. The study of renal disease is therefore a useful tool in the understanding of basic pathological processes as well as an important means of investigating and subsequently treating debilitating and dangerous human diseases.

Aims:

- To provide to provide an overview of the function of the kidney and of how this alters in renal disease.
- To provide a detailed overview of the pathology of renal diseases and how they are classified.

Learning Outcomes:

On completion of this course, students will be able to:

1. Demonstrate an understanding and be able to explain the changes that occur in renal failure and their effects on the body;
2. Have a detailed knowledge of the classification and pathology of diseases of the glomeruli, the renal tubulo-interstitium, the renal vasculature, and of the developmental disorders of the kidney;
3. Have a detailed knowledge of the classification of benign and malignant tumours of the kidney;
4. Critically evaluate findings of case studies, based on a demonstratable awareness of appropriate investigative tools, and to formulate innovative proposals.

Skills Outcomes:

5. Use the Internet as a communication tool as well as a tool to find and evaluate relevant information
6. Produce reports according to professional standards

Indicative Content:

Intro to WebCT; use / navigate functions of 'my WebCT'; explore the WebCT tools; create a web page

The normal kidney

An introduction to the subject covering the anatomy and physiology of the normal kidney. It includes information on the laboratory techniques used in the investigation of renal disease. (This topic requires completion before the other topics are revealed).

Renal failure

An introduction to the classification and consequences of renal failure. It includes detailed information on the signs and symptoms of renal failure and why they occur.

Glomerulonephritis

A detailed overview of the classification of these diseases of the glomeruli. It includes the macroscopical and microscopical changes that occur in the kidney in these disease processes.

Glomerular diseases excluding glomerulonephritis

A detailed overview of diabetes mellitus and amyloidosis; the two glomerular diseases that are not part of the spectrum of glomerulonephritis. It includes the macroscopical and microscopical changes that occur in the kidney and other major organs.

Tubulointerstitial diseases

A detailed overview of the classification of these diseases that involve both the tubules and the interstitium of the kidney. It includes the macroscopical and microscopical changes that occur in the kidney in these disease processes.

Vascular diseases

A detailed overview of the classification of these diseases that involve the vessels of the kidney. It includes the macroscopical and microscopical changes that occur in the kidney in these diseases.

Developmental disorders of the kidney

An introduction to general concepts of embryological development and the specifics of renal development. A detailed overview of the classification of developmental disorders that can occur in the kidney. It includes the macroscopical and microscopical changes that occur in the kidney in these disorders.

Tumours of the kidney

An introduction to general concepts of neoplasia. A detailed overview of the classification of renal tumours. It includes the macroscopical and microscopical appearances of the important renal tumours.

Learning and Teaching Activities:

The course will provide essential information and direct the student to relevant related material online and in textbooks. Student-centred activities include self-assessment quizzes linked to each module. Regular chat room and message-posting sessions with the tutor will be available. Knowledge and written skills will be assessed via a mid-course essay and a final exam.

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 1: Introductions. Learn to use the Mail, Discussion, Chat, Presentations and Calendar tools within the WebCT environment</i>	LO5
<i>Activity 2: Complete the self-assessment MCQ in Topic 1</i>	LO1, 5
<i>Activity 3: Complete the self-assessment MCQ in Topic 2</i>	LO1, 2, 5
<i>Activity 4: Complete the self-assessment MCQ in Topic 3</i>	LO1, 2, 4, 5
<i>Activity 5: Post any questions you have for your tutor</i>	LO5
<i>Activity 6: Complete the self-assessment MCQ in Topic 4</i>	LO1, 2, 5
<i>Activity 7: (assessed). Start essay entitled 'The nephrotic syndrome'.</i>	LO1, 2, 4, 5,6
<i>Activity 8: Complete the self-assessment MCQ in Topic 5</i>	LO1, 2, 5
<i>Activity 9: Take part in chat session re the renal module</i>	LO5, 6
<i>Activity 10: Complete the self-assessment MCQ in Topic 6</i>	LO1, 2, 4, 5

Activity 11: Complete and submit essay (see activity 7)	LO5, 6
Activity 12: Complete the self-assessment MCQ in Topic 7	LO1, 2, 4, 5
Activity 13: Prepare for the course exam at the end of week 12	LO1, 2, 3, 4,5
Activity 14: Put any revision questions to your tutor in an open mail Message	LO5
Activity 15: Complete the self-assessment MCQ in Topic 8	LO3, 5
Activity 16: (assessed) . Carry out the timed exam in the presence of the named invigilator	LO1, 2, 3, 4
Activity 17: (assessed) Self-evaluation quiz on communications skills	LO1, 2, 3, 4,5

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Essay		40	50%	2000	On eg 'The nephrotic syndrome' written following the guidelines of a named professional publication: submit by the end of week 6 LO 01 – 03, 05 - 06
Examination		40	50%	3 hours	Comprising MCQ's, short answer questions & case-based reports carried out in the presence of a named, approved invigilator at the end of week 8 LO 01 – 04
Postings	√	20	50%		At least 6 postings to the course using Discussion and Presentation Tools: Reflection and evaluation on the quality of the postings LO 01 – 06

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

Any one of the following books is suitable for the entire course. All other necessary material is available as hyperlinks within the related module. Most hospital/university libraries will stock these texts and many hospital departments and/or staff will also have copies. Such background reading will expand on the course text to aid an understanding of the course content.

Indicative Texts:

ISBN No	Author	Date	Title	Publisher
072167335x	Cotran RS, Kumar V & Collins T	1998	Robbins' Pathologic Basis of Disease. 6 th Ed	Saunders
0443073341	Underwood JCE	2004	General and Systemic Pathology 4 th Ed	Churchill Livingstone
0721692745	Kumar V, Cotran RS and Robbins SL	2003	Robbins' Basic Pathology 7 th Ed	Saunders
0723431604	Stevens A & Lowe J	2000	Pathology 2 nd Ed	Mosby

Web-links

Many of these are used within the topics to expand on information given, and are available there as hyperlinks.

<http://medstat.med.utah.edu/WebPath/webpath.html> - MENU

This is the best internet pathology website, and provides image databases and tutorials, many of which are hyperlinked within the appropriate topics in the course content.

http://edcenter.med.cornell.edu/CUMC_PathNotes/Neoplasia/Neoplasia_TOC.html

http://edcenter.med.cornell.edu/CUMC_PathNotes/Immunopathology/Immuno_04.html

The two relevant documents, on neoplasia and amyloidosis respectively, from this internet pathology website, both used in the course content.

<http://radiology.uchc.edu/NAV/MSKidney.HTM>

Another good website for pathology images, used in the topic on renal tumours

ROBOTICS AND AUTOMATION

Code: CHEM1060	School: Science
Course Title: Robotics and Automation	Course Coordinators: Prof PJ Harvey
Level: 7 (Master's)	Credits: 30
Department: Life Sciences	Pre-requisites: BSc degree or equivalent

Introduction and aims:

Major developments in automation and robotics have been triggered as a result of analytical breakthroughs in the use of non-radioactive labels and immunometric techniques, and these have had a profound affect on the way that clinical chemistry laboratories operate. Robotic components are more robust and reliable and computer control has led to the much better control of processes so that timing, incubation temperatures, addition of reagents and measurement of signals is highly precise. However whilst robotics and automation have many potential benefits for the laboratory, the ability to be able to make most use of these requires skills in understanding all the steps in processing a sample; identifying which steps can be automated; identifying where the greatest benefits will lie; and understanding how to introduce the steps in a prioritised order into the laboratory.

This course has been created to equip students with the necessary tools to develop an in-depth perspective of the operation and management of an automated laboratory and help them through the process of choosing and purchasing automated systems and robotics.

Learning Outcomes:

On completion of this course, a learner will be able to:

1. Have an appreciation of the range of robotic systems currently available for all pathologies;
2. Know the companies that provide automated and robotic systems;
3. Have an appreciation of the planning process for purchasing automated and robotic systems;
4. Have an appreciation of the planning process for the installation of automated and robotic systems;
5. Know how to evaluate the efficiency of automated and robotic systems;
6. Understand the limitations of automated and robotic systems;
7. Some idea of how things could develop in the future.

Skills Outcomes:

7. Use the Internet as a communication tool as well as a tool to find and evaluate relevant information
8. Produce reports according to professional standards
9. Produce materials for public presentations

Content:

Introduction to WebCT

- Use and navigate the functions of myWebCT
- Explore the WebCT tools
- Create a web page

Topic 1. Introduction

- Introduction: Defining robotics and Automation

- History of robotics and automation

Topic 2. Automation Basics 1

- Automation in Chemistry
- Tube systems (assessed quiz)
- The sample cycle

Topic 3. Automation Basics 2

- Assessing workflow
- Assessing turn around time (assessed)

Topic 4. Automation Basics 3

- Automation in your laboratory
- Automation in Haematology
- Sharing our automation

Topic 5. Automation Basics 4

- Pre-analytical systems
- Automation in Microbiology
- Automation in Histopathology
- Molecular biology

Topic 6. The planning process

- The Business Case for a pre-analytical system
- Examining the business case - Are we impressed?
- Getting committees together
- The tendering process
- Project planning
- Preparing the data
- A decision at last (assessed)

Topic 7. Total Laboratory Automation

- Total Laboratory Automation (TLA) Systems
- Strengths and Weakness of TLA
- A short list for TLA
- Preparing a project plan
- Installation (assessed)
- Evaluating the system

Topic 8. Communication

- Communication (Keeping everyone informed)
- Working with companies

Topic 9. Finals

- Final quiz
- Final tests

Learning and Teaching Activities:

Learning and teaching activities and how they contribute to the course learning outcomes:

<i>Activity 1: Introductions</i>	L08, 9, 10
<i>Activity 1.2: Automation in your laboratory</i>	L01, 2, 6
<i>Activity 2.1: Automation in Chemistry</i>	L01, 2, 6, 7
<i>Activity 2.2: Tube systems (assessed quiz)</i>	L06, 7
<i>Activity 2.3: The sample cycle</i>	L05, 6, 9, 10
<i>Activity 3.1: Assessing workflow</i>	L05, 6
<i>Activity 3.2: Assessing turn around time (assessed)</i>	L05, 6, 9, 10
<i>Activity 4.1: Automation in Haematology</i>	L01, 2, 6, 7
<i>Activity 4.2: Sharing our automation</i>	L01, 2, 6, 8
<i>Activity 4.3: History of robotics and automation</i>	L01, 2, 6
<i>Activity 5.1: Pre-analytical systems (MHRA - Quiz 1 - assessed)</i>	L01, 2, 5, 6
<i>Activity 5.2: Automation in Microbiology</i>	L01, 2, 5, 6, 7
<i>Activity 5.3: Automation in Histopathology</i>	L01, 2, 5, 6, 7
<i>Activity 5.4: Molecular biology</i>	L01, 2, 5, 6, 7
<i>Activity 6.1: The Business Case for a pre-analytical system</i>	L01, 2, 3, 4, 8, 9, 10
<i>Activity 6.2: Examining the business case - Are we impressed?</i>	L03, 5, 6
<i>Activity 6.3: Getting committees together</i>	L03, 4, 6, 8, 9, 10
<i>Activity 6.4: The tendering process</i>	L01, 2, 3, 4
<i>Activity 6.5: Project planning</i>	L01, 2, 3, 4, 5, 6, 8, 9, 10
<i>Activity 6.6: Preparing the data</i>	L03, 4, 5, 8, 9, 10
<i>Activity 6.7: Assessed Activity: Prepare document arguing for short list</i>	L01, 2, 3, 4, 5, 8, 9, 10
<i>Activity 7.1: Total Laboratory Automation (TLA) Systems</i>	L01, 2, 6, 7, 8
<i>Activity 7.2: Strengths and Weakness of TLA</i>	L01, 5, 6
<i>Activity 7.3: A short list for TLA</i>	L01, 5, 6, 8, 9, 10
<i>Activity 7.4: Preparing a project plan</i>	L01, 2, 3, 4, 5, 6, 8, 9, 10
<i>Activity 7.5: Installation (assessed)</i>	L03, 4, 5, 8, 9, 10
<i>Activity 7.6: Evaluating the system</i>	L05, 6, 8, 9, 10
<i>Activity 8.1: Communication (Keeping everyone informed)</i>	L03, 4, 8, 9, 10
<i>Activity 8.2: Working with companies</i>	L02, 6, 8, 9, 10
<i>Activity 9.1: Robotics the future</i>	L01, 6, 7
<i>Activity 9.2: What are my thoughts for the future?</i>	L01, 6, 7
<i>Activity 10.1: Final Quiz (assessed)</i>	L01, 2, 3, 4, 5, 6, 7, 8, 9, 10
<i>Activity 10.2: PowerPoint presentation - (assessed)</i>	L01, 2, 3, 4, 5, 6, 7, 8, 9, 10
<i>Activity 10.3: Self-evaluation quiz (assessed) - linked to discussion postings</i>	L01, 2, 3, 4, 5, 6, 7, 8, 9, 10

Assessment Details:

Methods of Assessment	Last item of assessment	Weighting %	Minimum Pass Mark	Word Length	Outline Details
Business case		40	50%	~2000	Logical, critical analysis of business case, project plans, and turn around times LO 01 – 06
Postings to discussions	√	10	50%		Minimum 6 postings to the course discussion. Reflection and evaluation on the quality of postings LO 01 - 05
Course Quizzes		10	50%		LO 01
Final quiz		10	50%		Quiz covering all course aspects LO 01 – 04
Presentation		30	50%		15 minute Powerpoint presentation on options for introducing a robotic system in place of a current combined manual reception LO 01 - 07

Is the student required to pass ALL elements of assessment in order to pass the course?	NO
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Indicative Texts:

Author	Date	Title	Publisher
Bissell G and Petersen JR (eds)	1998	Automated integration of clinical laboratories	American Association of Clinical Chemistry, Washington
Swaminathan R and Wheeler MJ.	2000	Robotics into the millennium. Journal of Clinical Pathology; 53 : 22-26.	
Young DS	2000	Laboratory automation: Smart strategies and practical applications. Clinical Chemistry; 46 : 740-745.	
Middleton S	2000	Developing an automation concept that is right for your laboratory. Clinical Chemistry; 46 : 757-763	
Markin RS, Whalen SA	2000	Laboratory automation: trajectory, technology and tactics. Clinical Chemistry; 46 : 764-771.	
Graves S, Holman B, Felder RA	2000	Modular robotic workcell for coagulation analysis. Clinical Chemistry; 46 : 772-777	
Orsulak PJ.	2000	Stand-alone automated solutions can enhance laboratory operations. Clinical Chemistry; 46 : 778-783.	
Wing AK .	2000	Laboratory automation and optimisation: the role of architecture. Clinical Chemistry; 46 : 784-791.	

Holman JW et al.	2002	Evaluation of an automated preanalytical robotic workstation at two academic health centres. <i>Clinical Chemistry</i> ; 48 : 540-548.	
Piggott C, Halloran S, Cox K, Frowen C, Thomas M, Wheeler M.	2003	Automated pre-analytical sample processing systems. MHRA03024	
Sarkozi L, Simson E, Ramanathan L.	2003	The effects of total laboratory automation on the management of a clinical chemistry laboratory. Retrospective analysis of 36 years. <i>Clinica Chimica Acta</i> ; 329 : 89-94.	
Wheeler MJ.		Robotics and Automation: a personal view. <i>Annals of Clinical Biochemistry</i> (in press).	
James C Boyd and Charles D Hawker:	2006	Automation in the Clinical Laboratory (pages 265 to 297). <i>Tietz Textbook of Clinical Chemistry and Molecular Diagnostics</i> (eds CA Burtis, ER Ashwood and DE Bruns) 4th edition.	Elsevier