LONDON SOUTH BANK UNIVERSITY

Proteomics & Genomics

SMK-3-322

Please see associated blackboard site

Faculty of Engineering, Science and the Built Environment

2010/11

Level 6

become what you want to be

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1. UNIT DETAILS

Unit Title:	Proteomics & Genomics
Unit Level:	6
Unit Reference Number:	SMK-3-322
Credit Value:	1 Credit = 15 CATS Points
Student Study Hours:	150
Contact Hours:	36
Private Study Hours:	114
Pre-requisite Learning (If applicable):	Biomolecules or equivalent
Co-requisite Units (If applicable):	None
Course(s):	Bioscience programme
Year and Semester	Year 3, Semester 1
Unit Coordinator:	Dr. Acord
UC Contact Details (Tel, Email, Room)	X7922, acordj@lsbu.ac.uk
Subject Area:	Bioscience & Food
Summary of Assessment Method:	Exam, Coursework

2. SHORT DESCRIPTION

This unit has three themes – (i) Genes (including genome composition, gene identification and the effects of gene silencing), (ii) Genomics (including mapping, sequencing & assembly, coding region identification, genome projects & model genomes) and (iii) Analysis of protein sequences (including an introduction to databases, information networks, the World Wide Web, sequence alignment, structural and/or functional motif recognition, estimation of significance, etc.).

3. AIMS OF THE UNIT

- To provide an introduction to the areas of proteomics and genomics and their applications in the field of academia, health science and industry.
- To provide an introduction to bioinformatics, including key areas in genomics, and protein sequence analysis.
- To provide analytical and practical experience by means of a computer practical based on genomic DNA sequencing and analysis.
- To provide the opportunity to interpret primary experimental data and present results in the form of a presentation and short written paper.

4. LEARNING OUTCOMES

Knowledge and Understanding

- Understand the concepts of genes, genetic elements and genome composition.
- Become familiar with current approaches to nucleic acid and protein sequence analysis.

- Extended their skills in data interpretation and have understood the often-conflicting concepts of mathematical and biological significance.

Intellectual Skills

- Discuss the human genome and proteome projects and their ramifications in health and disease.

- Understand bioinformatics, proteomics and genomics.

Practical Skills

- There will be two computer-based practical classes in which the student will analyse both primary DNA and protein sequence information using a series of bioinformatics tools.

Transferable Skills

- Use and search complex databases.

- Advanced and topical scientific methodology and concepts.

- Presentation skills.

5. ASSESSMENT OF THE UNIT

Assessment will be by 60% final unseen examination and 40% for coursework, comprising both a presentation and also a problem set based on the bioinformatics classes. The pass mark is 40%.
The coursework presentation element will be an oral presentation (followed by questions and discussion) of a case study on a primary research paper from the field of proteomics and genomics (details of the papers can be found on the blackboard site). It is probable that each case study will be presented by a small team who will collaborate to give different aspects of the topic. The aim of the presentation is to communicate a useful case study for the benefit of the other students, and in a way that both reinforces course material and might help examination performance. A one page individually written 'Abstract' of the presentation will also be required from each student. This should include the main educational points that are presented.
The Unit Leader will mark the presentation using the marking scheme:

- Quality and clarity of the presentation 25%
- Scientific accuracy and proficiency 25%
- Team work and overall usefulness 25%
- Abstract 25%

6. FEEDBACK

Feedback will normally be given to students 15 working days after the submission of an assignment.

7. INTRODUCTION TO STUDYING THE UNIT

Overview of the Main Content

The structure, function and evolution of the human genome. Strategies for large scale sequencing projects. Human disease genes. Expression. Bioinformatics for the analysis of sequence data; approaches for determining gene expression patterns and functions. Analysing protein sequences. Proteins in disease. Analysis of protein-protein interactions. The proteome, the transcriptome, the interactome.

Overview of Types of Classes

The unit is presented over 12 weeks in a series of lectures (2-3 hours per week) with student presentations in week 12.

Importance of Student Self-Managed Learning Time

The remaining time (114 hours) is self managed learning time for your background reading, completing any assignments and preparation for presentations. This time is necessary for reinforcing the lectures and investigating the database resources. Examination questions will include material that we expect you to cover during this time.

Employability

Employability is enhanced by the key transferable skills imparted by the practical component. Bioinformatics and genomics are a rapidly growing field in both the health sciences and pharmaceutical industry. An understanding of these techniques will provide the skills essential for employment in the health/bioscience field.

8. THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

Week 1: PCR and Sequencing – a review.
PCR, qPCR, RT-PCR and sequencing technologies.

Week 2: Mapping Genomes.
Physical and genetic maps.

Week 3: The Human Genome Project.
How the human genome was sequenced and what it has told us.

Week 4: Understanding How a Genome Functions.
The transcriptome, the proteome and beyond.

Week 5: Gene Identification.

Determining gene function by mutation, deletion, etc.

Week 6: Bioinformatics I.
Analysing DNA sequences.

Week 7: Bioinformatics II.
Analysing protein sequences.

Week 8: Gene Silencing.
RNAi. Chromatin modification. ChIP.

Week9: Finding Human Disease Genes.
SNP's and the HapMap project.

Week 10: The Genetic Basis of Cancer.

Week 11: Functional Genomics.
Analysis of genes and proteins using high-throughput techniques.

Week12: Student Presentations.

9. LEARNING RESOURCES

Core Materials

Brown, T. A. (2007) *Genomes 3*. Garland Science.

Watson, J. D., *et al* (2007) *Recombinant DNA Genes and Genomes – A Short Course*. 3rd Edition. CSHL Press.

Optional Materials

Reece, R. J. (2004) *Analysis of Genes and Genomes.* Wiley.

Watson, J. D., *et al* (2008) *Molecular Biology of the Gene.* 6th Edition. Pearson.

Lesk, A (2008) *Introduction to Bioinformatics.* 3rd Edition. Oxford University Press.

Lesk, A (2007) *Introduction to Genomics*. 1st Edition. Oxford University Press.

NOTES

The blackboard site for this unit contains both essential information for the completion of the unit and also other optional material that may aid the student in their understanding of this subject. Students are expected to regularly check the blackboard site. It is also the student's responsibility to inform the unit leader if they do not have access to the site.