London South Bank University

Module Guide

Genes, Genomes & Beyond

FBS-6-307

Applied Science

2012-13

Level 6

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1. MODULE DETAILS

Module Title:	Genes, Genomes & Beyond
Module Level:	6
Module Reference Number:	FBS-6-307
Credit Value:	1 Credit (15 CATS points)
Student Study Hours:	150
Contact Hours:	36
Private Study Hours:	114
Course(s):	Bioscience Programme
Year and Semester	2012-13, Semester 2
Module Coordinator:	Dr. Acord
MC Contact Details (Tel, Email, Room)	02078157922, acordj@lsbu.ac.uk, B140
Subject Area:	Bioscience
Summary of Assessment Method:	40% Coursework, 60% Exam

2. SHORT DESCRIPTION

This unit has three themes:

- Genes (including chromosome organisation, genome composition and recombinant DNA techniques)
- Genomics (including mapping, sequencing & assembly, coding region identification, genome projects & model genomes)
- 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 MODULE

The aims of this unit are:

- 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 the opportunity to interpret experimental data and present results in the form of a short written paper.

4. LEARNING OUTCOMES

4.1 Knowledge and Understanding

- Become familiar with current approaches to nucleic acid and protein sequence analysis.
- Understand the complement of tools available for large-scale screening of genomes, proteomes and beyond.
- Extended their skills in data interpretation and have understood the often-conflicting concepts of mathematical and biological significance.

4.2 Intellectual Skills

- Discuss the human genome and proteome projects and their ramifications in health and disease.
- Understand bioinformatics, proteomics and genomics.

4.3 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.

4.4 Transferable Skills

- Use and search complex databases.
- Advanced and topical scientific methodology and concepts.
- Presentation skills.

5. ASSESSMENT OF THE MODULE

Assessment will be by 60% final unseen examination of three hours and 40% for coursework, comprising a problem set based on the bioinformatics classes. The pass mark is 40%.
Please note: all coursework must be submitted using Turnitin and will be checked for plagiarism. Any piece of coursework scoring higher than 20% similarity will have failed to meet the module learning outcomes and will result in failure of that piece of coursework.

6. FEEDBACK

Feedback will usually be given to students 15 working days after the submission of an assignment unless otherwise informed.

7. INTRODUCTION TO STUDYING THE MODULE

7.1 Overview of the Main Content

The structure, function and evolution of the human genome. Strategies for large scale sequencing projects. Human disease genes. 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.

7.2 Overview of Types of Classes

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

7.3 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.

7.4 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 in Depth

Week 2: Sequencing Technologies

Week 3: The Art of Cloning

Week 4: Genome Mapping Techniques

Week 5: Post-genomic Analysis

Week 6: Protein Production from Cloned Genes

Week 7: Genome-wide Analysis

Week 8: Finding Human Disease Genes

Weeks 9-11: Easter Break

Week 12: Introduction to Sequence Analysis I (computer class)

Week 13: Introduction to Sequence Analysis II (computer class)

Week 14: Functional Genomics.

Week 15: Self Managed Study

PLEAS NOTE: The lecture series above is for information only, and the series of lectures may be subject to change.

9. LEARNING RESOURCES

9.1 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.

9.2 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.