Faculty of Health Sciences
School of Biomedical Sciences

Bioinformatics 631

Semester One, 2011

Unit study package number:	13371
Mode of study:	Internal
Tuition pattern summary:	Lecture 1 X 2 hours weekly Practical 1 X 3 hours weekly
Credit value:	25
Pre-requisite units:	Molecular Biology/Genetics 231, Biochemistry 231 or equivalent in previous course of study
Co-requisite units:	NIL
Anti-requisite units:	NIL
Additional Requirements:	NIL
Result type:	Grade and Mark
Approved incidental fees:	All fee information can be obtained through the Fees Centre. Visit fees.curtin.edu.au for details.

Scheduled times and Venues:	Lecture: Tues 12-2 – 400.305	
	Practical: Thurs 2-5 – 308:104	
Unit Coordinator:	Name:	Ms Eleanor Morgan
	Phone:	9266 7516
	Email:	e.morgan@curtin.edu.au
	Building : Room:	308:205
	Consultation times:	TBA
Lecturer or Tutor:	Name:	As Above
	Phone:	
	Email:	
	Building : Room:	
	Consultation times:	
Administrative contact:	Name:	Dr Keith Gregg
	Phone:	9266 7671
	Email:	K.Gregg@curtin.edu.au
	Building : Room:	308:226

Learning Management System: FLECS - Blackboard (oasis.curtin.edu.au)

Syllabus

This unit describes the organisation and analysis of molecular biological data and explores the nexus between biology and information science. Bioinformatics is a necessary discipline to exploit the large amount of rapidly accumulating raw biological data generated by the numerous genome projects currently being undertaken. It focuses on: molecular databases and genome composition; molecular evolution and sequence alignment; phylogenetic analysis and comparative genomics. Principles are illustrated by case studies.

Introduction

Welcome to Bioinformatics 631 (Introduction to Bioinformatics and Functional Genomics)

This unit will assist you in learning new skills in computational biology and will introduce new unifying concepts in molecular science.

Bioinformatics and functional genomics entails the organization and analysis of molecular biological data. It is a relatively new discipline and describes the nexus between biology and information science. Bioinformatics uses computers to collect, store, retrieve and analyse biological data. It is an enabling discipline to take advantage of the vast amount of raw biological data accumulating at an exponential rate as a consequence of the genome projects currently being undertaken around the world.

I have provided my contact details above. Feel free to contact me if you have any problems, questions or concerns as the semester progresses.

Best wishes for the coming semester,

Eleanor (Nell) Morgan

Unit Coordinator

Unit Learning Outcomes On successful completion of this unit students can:	Graduate Attributes addressed:
1. Use primary and derived databases to collate biological sequence information relating to function	
2. Generate and analyse local and global alignments of homologous nucleotide and amino acid sequences based on evolutionary concepts.	
3. Construct and interpret phylogenetic trees showing evolutionary relationships between homologous sequences	
4. Predict function in novel protein sequences	
5. Analyse genomic sequences for genic structures and other features	
6. Research contemporary topics in bioinformatics and report on this information in a professional manner.	

Curtin's Graduate Attributes

	Apply discipline knowledge		Thinking skills		Information skills
	Communication skills		Technology skills		Learning how to learn
	International perspective		Cultural understanding		Professional skills
Find out more about Curtin's Graduate attributes at the Office of Teaching & Learning website: otl.curtin.edu.au					

Learning Activities

Students attend one 2 hour lecture and one 2-3 hour practical each teaching week. There are a total of 13 weeks in the semester, which includes a 1 week tuition free period in April.

Lectures will be presented in PowerPoint format and will be available for download online. Students are encouraged to ask questions during the lecture. In some weeks, student activities will be included to facilitate understanding of some concepts. The practical sessions will be held in the School computing lab (308:104). The exercises provide practical hands-on experience in the use of common Bioinformatics databases and applications. Students should keep a portfolio of practical results, which will be necessary to complete the practical tests competently. In the final week(s), students will be asked to present a short seminar on a topic or case study in Bioinformatics.

Learning Resources

Highly Recommended Texts

Purchase of one of these texts is highly recommended.

- **Xiong, Jin (2006). Essential Bioinformatics. Cambridge University Press.**
  A concise yet comprehensive textbook written specifically for a life science audience. It covers key areas of bioinformatics and the computational methods employed in a way that is accessible to students without a sophisticated computational background.
- **Zvelebil, M and Baum, JO. 2008. Understanding Bioinformatics. Garland Science.**
  Suitable for advanced undergraduates and postgraduates, "Understanding Bioinformatics" provides a definitive guide to this vibrant and evolving discipline. It is a comprehensive textbook that covers both application and theory in Bioinformatics.. The book is well organized, presenting separate chapters on application (practical use of Bioinformatics tools) and theory (how the applications work). The book includes chapters on secondary and tertiary protein structure prediction that may be useful for students continuing on to Drug Discovery and Development in semester 2.
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Additional Recommended Texts

You do not have to purchase the following textbooks but you may like to refer to them.

- **Hall, B G (2008). Phylogenetic Trees Made Easy – A How-To Manual for Molecular Biologists (3rd Edition). Sinauer & Associates Massachusetts, USA**.
  A gentle introduction (cook book style) to the construction of phylogenetic trees from sequence data. Covers the use of the MEGA phylogenetics package for PC, as well as use

of PhyML and Mr Bayes. Also explains the theory underlying the different phylogenetic methods. Note – this would make a useful supplementary textbook and future reference if you intend to pursue a research career in molecular genetics/evolution.

- **Pevsner, Jonathan (2003). Bioinformatics and Functional Genomics. Wiley-Liss, New Jersey, USA (ISBN 0-471-21004-8)**
  An excellent and mostly very readable introduction to bioinformatics and genomics. A large book with a useful web site.
  http://pevsnerlab.kennedykrieger.org/wiley/

Online Resources

- FLECS-blackboard - http://lms.curtin.edu.au
- You will also be referred to a wide range of resources, including locations for software downloads and help documentation, on the World Wide Web (internet). You will also need to access a variety of internet servers in order to search databases and complete particular analyses.

Assessment Schedule

Task	Value (%)	Date due	Unit Learning Outcome(s) assessed
Practical Test 1	15	TBA	1,2
Practical Test 2	15	TBA	2.3
Practical Test 3	15	TBA	4,5
Bioinformatics Presentation	20	TBA	6
Final Exam	30	TBA	1-6

Detailed information on assessment tasks

1. Students will sit a one hour test covering Biological databases, pairwise alignment, database searching and multiple sequence alignment. Students will be tested on their interpretation of practical analses, as well as relevant theory covered in the lectures.
2. Students will sit a one hour test covering evolutionary concepts, phylogenetic analysis and analysis of proteins.
3. Students will sit a one hour test covering aspects of functional genomics including genome annotation and gene expression analysis.
4. Each student will research a topic in Bioinformatics as agreed by the Unit Coordinator. Students will present a 20 minute seminar to the class on their selected topic.
5. Students will sit a 2 hour written exam during the official university examination period. Possible exam questions will be provided at the end of each lecture period.

Fair assessment through moderation

Moderation describes a quality assurance process to ensure that assessments are appropriate to the learning outcomes, and that student work is consistently evaluated by assessors. Minimum standards for the moderation of assessment are described in the Assessment Manual, available from policies.curtin.edu.au/policies/teachingandlearning.cfm

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Late penalties

Students are expected to sit each test on the date scheduled. Students who miss a test without prior arrangement will NOT be allowed to sit the test at a later date without written certification from a medical or other professional.

Pass requirements

You must gain an overall mark of at least 50% for the practical tests, a mark of at least 50% for the topic presentation, and a mark of at least 50% for the final exam.

Plagiarism

Plagiarism occurs when work or property of another person is presented as one's own, without appropriate acknowledgement or referencing. Plagiarism is a serious offence. For more information refer to academicintegrity.curtin.edu.au

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Additional information

Enrolment:

It is your responsibility to ensure that your enrolment is correct - you can check your enrolment through the eStudent option on OASIS, where you can also print an Enrolment Advice.

Supplementary/Deferred Exams:

Supplementary and deferred examinations granted by the School of Biomedical Sciences will be held in July, 2011, exact dates TBA. Notification to students will be made after the School of Biomedical Sciences Board of Examiners meeting via the Official Communications Channel (OCC) in OASIS. It is the student's responsibility to check their OASIS account for official Curtin correspondence on a weekly basis. If your results show that you have been awarded a supplementary or deferred exam you should immediately check your OASIS email for details.

Student Rights and Responsibilities

It is the responsibility of every student to be aware of all relevant legislation and policies and procedures relating to his or her rights and responsibilities as a student. These include:

- the Student Charter
- the University's Guiding Ethical Principles
- the University's policy and statements on plagiarism and academic integrity
- copyright principles and responsibilities
- the University's policies on appropriate use of software and computer facilities

Information on all these things is available throughtt the University's "Student Rights and Responsibilities" website at: students.curtin.edu.au/rights.

Recent unit changes

We welcome feedback as one way to keep improving this unit. Students are encouraged to give unit feedback through **eVALUate**, Curtin's online student feedback system (see http://evaluate.curtin.edu.au/info/index.cfm). Recent changes to this unit include:

1. Modifying the assessments to use tests in lieu of written practical reports
2. Provision of iLectures on Blackboard for lectures and tutorials (2010)

	http://evaluate.curtin.edu.au/info/dates.cfm