



The University of Southern Queensland

## Course specification

The current and official versions of the course specifications are available on the web at <http://www.usq.edu.au/coursespecification/current>.  
Please consult the web for updates that may occur during the year.

### Description: Experimental Bioinformatics

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
BIO	8212	91458	2, 2009	ONC	1.00	Toowoomba

<b>Academic group:</b>	FOSCI
<b>Academic org:</b>	FOS002
<b>Student contribution band:</b>	6
<b>ASCED code:</b>	010900

### STAFFING

Examiner: Guang Liu  
Moderator: Grant Daggard

### RATIONALE

The module in Experimental Bioinformatics will provide the student with practical chances of fundamental underlying of the important tools provided by the National Centre for Biotechnology Information (NCBI). This will give the students experiences of using those tools and understanding the interpretation of the outcomes analysed by these tools, through practice. At the same time, students will understand the development of contemporary molecular biology, and the format of the databases used.

### SYNOPSIS

Experimental Bioinformatics brings together the fields of life science, computer science and mathematics. Students will be involved in the development and application of current computational technologies for storing, extracting, organizing, analysing and interpreting complex biological information. The course will provide advanced practical experience in DNA and protein sequence analysis including the searching of DNA, protein and nucleic acid databases using homology-based and pattern-based search algorithms, as well as sequence comparisons and alignments and evolutionary analysis. Students will develop skills in interfacing with and retrieving information from sequence and genome databases. Methods of gene expression analysis will also be investigated in the context of personalised medical diagnostics.

### OBJECTIVES

On completion of this course students will be able to:

1. demonstrate a proficiency in using NCBI tools (assignment);
2. familiar with the functional linkage within Map Viewer (assignment);
3. demonstrate an understanding of basic tools used in the Molecular Modeling Database (MMDB) and the Conserved Domain Database (CDD) (assignment);
4. ability to use Influenza Virus Sequence Database (Examination);
5. understand the basic structure of Ensembl and how to obtain data (Examination);

6. demonstrate a basic understanding of visualizing protein structures with Cn3D, an interactive 3D graphic modelling tool. (Examination);
7. demonstrate an understanding of gene bank and OMIM database (Examination);
8. ability to obtain and interpret the data in dbMHC (The Major Histocompatibility Complex Database) (Examination);
9. demonstrate a basic understanding of the strategy and important tools in BioManager (Examination).

## TOPICS

	Description	Weighting (%)
1.	Map Viewer Basic	10.00
2.	Map Viewer Application	9.00
3.	Online Mendelian Inheritance in Man: disease information search	9.00
4.	Using Ensembl Gene Browser for analysis	8.00
5.	Ensembl Advanced + BioMart	8.00
6.	Cn3D basic	8.00
7.	Cn3D advanced	8.00
8.	Macromolecular Structure Databases	8.00
9.	Major Histocompatibility Complex Database (dbMHC) 1	8.00
10.	The dbMHC 2	8.00
11.	The NCBI Influenza Virus Sequence Database	8.00
12.	BioManager Interface and Bioinformatic Programs	8.00

## TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at <http://bookshop.usq.edu.au> click 'Semester', then enter your 'Course Code' (no spaces).

## REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

'Cn3D tutorial' (Available: (<http://www.ncbi.nlm.nih.gov/Structure/CN3D/cn3dtut.shtml>)).

'OMIM Help' (Available: (<http://www.ncbi.nlm.nih.gov/Omim/omimhelp.html>)).

'The NCBI Influenza Virus Sequence Database' (Available: (<http://www.ncbi.nlm.nih.gov/genomes/FLU/help.html>)).

'Data mining in Ensembl with BioMart' (Available: ([http://www.ensembl.org/info/using/website/tutorials/biomart\\_worked\\_ex\\_nov.pdf](http://www.ensembl.org/info/using/website/tutorials/biomart_worked_ex_nov.pdf))).

David Wheeler et al 2003, 'Exercises: Using Map Viewer' (Available: (<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=handbook.chapter.ch24>)).

Eric Sayers and Steve Bryant 2002, 'Macromolecular Structure Databases' (Available: (<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=handbook.chapter.ch3>)).

Karp, G 2005, *Cell and molecular biology: concepts and experiments*, 4th edn, Wiley, Hoboken, NJ.

(ISBN 0 471 19279 1)

Susan M Dombrowski and Donna Maglott 2003, 'Using the Map Viewer to Explore Genomes' (Available: (<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=handbook.chapter.ch20>)).

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Private Study	112.00
Tutorials	26.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg (%)	Due date
ASSIGNMENT	50.00	50.00	10 Oct 2009
EXAM PT A OF 2HR REST CMA M/C	60.00	30.00	END S2 (see note 1)
EXAM PT B OF 2HR RESTRICT S/A	40.00	20.00	END S2 (see note 2)

### NOTES

1. Examination dates will be available during the Semester. Please refer to the examination timetable when published.
2. Examination dates will be available during the Semester. Please refer to the examination timetable when published.

## IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:  
It is the students' responsibility to attend and participate appropriately in all tutorials scheduled for them, and to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course. To maximize their chances of satisfying the objectives of the practical component of the course, students should actively participate in the practice during the tutorial.
- 2 Requirements for students to complete each assessment item satisfactorily:  
To complete the assignment satisfactorily, students must obtain at least 50% of the marks available for the assignment.
- 3 Penalties for late submission of required work:  
The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if request by the Examiner. Students must retain a copy of each item submitted for assessment. This

- must be produced within five days if required by the Examiner. If students submit assignments after the due date without (prior) approval of the examiner then a penalty of 5% of the total marks gained by the student for the assignment may apply for each working day late up to ten working days at which time a mark of zero may be recorded.
- 4 Requirements for student to be awarded a passing grade in the course:  
To be assured of receiving a passing grade a student must achieve at least 50% of the total weighted marks available for the course.
  - 5 Method used to combine assessment results to attain final grade:  
The final grades for students will be assigned on the basis of the weighted aggregate of the marks (or grades) obtained for each of the summative assessment items in the course.
  - 6 Examination information:  
Candidates are allowed access only to specific materials during a Restricted Examination. The only materials that candidates may use in the restricted examination for this course are: (non-electronic and free from material which could give the student an unfair advantage in the examination); calculators which cannot hold textual information (students must indicate on their examination paper the make and model of any calculator(s) they use during the examination). Students whose first language is not English, may, take an appropriate unmarked non-electronic translation dictionary (but not technical dictionary) into the examination. Dictionaries with any handwritten notes will not be permitted. Translation dictionaries will be subject to perusal and may be removed from the candidate's possession until appropriate disciplinary action is completed if found to contain material that could give the candidate an unfair advantage.
  - 7 Examination period when Deferred/Supplementary examinations will be held:  
Any Deferred or Supplementary examinations for this course will be held during the next examination period.
  - 8 University Regulations:  
Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL <http://www.usq.edu.au/corporateservices/calendar/part5.htm> or in the current USQ Handbook.

## **ASSESSMENT NOTES**

- 1 Students will attend all tutorials of BIO8212 Experimental Bioinformatics.