Description: Experimental Bioinformatics

<table>
<thead>
<tr>
<th>Subject</th>
<th>Cat-nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
<th>Campus</th>
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<tr>
<td>CSC</td>
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<td>67155</td>
<td>2, 2007</td>
<td>ONC</td>
<td>1.00</td>
<td>Toowoomba</td>
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Academic group: FOSCI
Academic org: FOS003
Student contribution band: 2
ASCED code: 010999

STAFFING
Moderator: Grant Daggard

RATIONALE
Through undertaking computer laboratory exercises, and literature surveys, the aim of this course is to provide an in-depth understanding of current computational tools involved in the analysis of complex biological systems. The course is of particular relevance to students wishing to pursue careers in biology, biomedical science and recombinant DNA technologies. For biomedical graduates this course will provide the practical and investigative skills necessary to undertake advanced analysis of complex biological systems.

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. acquire an in-depth understanding of current computational tools involved in the analysis of complex biological systems. (All assessment items)
### TOPICS

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
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<tbody>
<tr>
<td>1. Introduction to Experimental Bioinformatics</td>
<td>5.00</td>
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<tr>
<td>2. Understanding Nucleotide Sequence Databases</td>
<td>10.00</td>
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<tr>
<td>3. Understanding Protein and Specialized Sequence Databases.</td>
<td>10.00</td>
</tr>
<tr>
<td>4. Operations with single Protein or nucleotide sequences.</td>
<td>10.00</td>
</tr>
<tr>
<td>5. Operations with multiple Protein or nucleotide sequences.</td>
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<tr>
<td>6. Protein 3D structure prediction.</td>
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<tr>
<td>7. RNA secondary structure prediction.</td>
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<tr>
<td>8. Prediction and analysis of phylogenetic tress.</td>
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### 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.

,  *BMC Bioinformatics*,  
(http://www.biomedcentral.com/bmcbiology/)

,  *Briefings in Bioinformatics*,  
(http://search.epnet.com/direct.asp?db=aph&jid=%22G0Y%22&scope)

,  *Journal of Bioinformatics and Computational Biology*,  
(http://search.epnet.com/direct.asp?db=aph&jid=%22P5K%22&scope)


### STUDENT WORKLOAD REQUIREMENTS

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>Assessment</td>
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<tr>
<td>Lectures</td>
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<tr>
<td>Practical Experience</td>
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<td>Private Study</td>
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### ASSESSMENT DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks out of</th>
<th>Wtg(%)</th>
<th>Due date</th>
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<tbody>
<tr>
<td>ASSIGNMENT 1</td>
<td>20.00</td>
<td>20.00</td>
<td>25 Jul 2006 (see note 1)</td>
</tr>
<tr>
<td>ASSIGNMENT 2</td>
<td>20.00</td>
<td>20.00</td>
<td>25 Jul 2006 (see note 2)</td>
</tr>
<tr>
<td>ASSIGNMENT 3</td>
<td>60.00</td>
<td>60.00</td>
<td>25 Jul 2006 (see note 3)</td>
</tr>
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**NOTES**

1. Examiner to advise due date for Assignment 1
2. Examiner to advise due date for Assignment 2
3. Examiner to advise due date for Assignment 3

### IMPORTANT ASSESSMENT INFORMATION

1. Attendance requirements:
There are no attendance requirements for this course. However, it is the students' responsibility 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 and to be informed of course-related activities and administration.

2 Requirements for students to complete each assessment item satisfactorily:
   Not applicable

3 Penalties for late submission of required work:
   If students submit assignments after the due date without (prior) approval of the examiner then a penalty of 20% of the total marks gained by the student for the assignment will apply for each working day late.

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 aggregate of the weighted marks obtained for each of the summative assessment items in the course.

6 Examination information:
   There is no examination in this course.

7 Examination period when Deferred/Supplementary examinations will be held:
   As there are no examinations in this course, there will be no deferred or supplementary examinations.

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.