Description: Computational Biology Theory

<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>
<td>4501</td>
<td>67154</td>
<td>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
The aim of this course is to provide a theoretical understanding of current computational methodologies 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 theoretical skills necessary to undertake advanced analysis of complex biological systems in either a clinical and or research setting.

SYNOPSIS
In the post-genomic era, complete genomes, proteomes and metabolomes are becoming available for many organisms. This poses new key industrial and research challenges on biology, that is, to understand how isolated parts of biological systems interact and organize to perform a biological function or process. New advances in Biotechnology allow high-throughput biological experiments and the completion of the human genome project has ignited a revolution in our understanding of complex biological systems and in the treatment of disease. This course will produce multiskilled students, with an integrative understanding of computational methodologies and biological systems. Topics include, but are not limited to, collection of sequences, sequence alignment, prediction of RNA secondary structure, phylogenetic relationships, gene prediction, protein structure prediction and gene expression analysis.

OBJECTIVES
On completion of this course students will be able to:

1. provide a theoretical understanding of current computational and mathematical methodologies involved in the analysis of complex biological systems. (All assessment items)
# TOPICS

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>1. Introduction to Computational Biology</td>
<td>10.00</td>
</tr>
<tr>
<td>2. Comparative and Functional Genomics: Models and operations with Nucleotide Sequences.</td>
<td>18.00</td>
</tr>
<tr>
<td>3. Proteomics: Computational analysis of the functions and interactions of proteins in living organisms.</td>
<td>18.00</td>
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<tr>
<td>4. Protein 3D structure analysis and drug discovery.</td>
<td>18.00</td>
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<tr>
<td>5. RNA: Secondary structure prediction and non-coding ARN analysis</td>
<td>18.00</td>
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<tr>
<td>6. Computational Phylogenetics</td>
<td>18.00</td>
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</table>

# 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.

2000, Briefings in Bioinformatics, , (http://search.epnet.com/direct.asp?db=aph&jid=%%22G0Y%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>
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<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 2007</td>
</tr>
<tr>
<td>ASSIGNMENT 2</td>
<td>20.00</td>
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</tr>
<tr>
<td>ASSIGNMENT 3</td>
<td>60.00</td>
<td>60.00</td>
<td>25 Jul 2007</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:
   To satisfactorily complete an individual assessment item a student must achieve at least
   50% of the marks or a grade of at least C-.

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 are no examinations for this course.

7 Examination period when Deferred/Supplementary examinations will be held:
   There are no examinations for this course.

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.