Course Outline

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Course Details

Course Code	BINF6111
Course Title	Genome Informatics Engineering Workshop
Convenor	Bruno Gaeta (/users/z8670378) , Mike Bain
Admin	Bruno Gaeta (/users/z8670378)
Classes	*Lectures:* Tue 9:00 – 11:00 Online Wed 14:00 – 16:00 Online *Tutorials:* Wed 16:00-18:00 Online Timetable for all classes (/BINF6111/20T2/timetable)
Consultations	By appointment
Units of Credit	6
Course Website	https://moodle.telt.unsw.edu.au/course/view.php?id... (https://moodle.telt.unsw.edu.au/course/view.php?id=51315) Note that webcms3 is used only for the course outline
Handbook Entry	http://www.handbook.unsw.edu.au/undergraduate/courses/current/BINF6111.html (http://www.handbook.unsw.edu.au/undergraduate/courses/current/BINF6111.html)

Course Summary

Engineering software systems for managing and analysing large datasets derived from genomics experiments is a key application of bioinformatics. This course revolves around a guided team project for the design and implementation of a complex system bringing together a variety of tools and methods for analysing genomic data. Methodologies for requirement gathering, system design, project management and documentation will be applied. The project work will be complemented by lectures on algorithms for biological sequence analysis that form the basis of the project work.

Assumed Knowledge

Before commencing this course, students should:

- Be familiar with basic software engineering and development concepts and tools
- Be able to program in at least one programming language including C, Java, Perl or Python

These are assumed to have been acquired in the courses COMP1531 or COMP2041 or COMP9021

- Be familiar with the fundamentals of bioinformatics applications as covered in the course BINF3010/9010

Student Learning Outcomes

After completing this course, students will:

L01. Define and apply key computational and statistical concepts in bioinformatics approaches to pairwise and multiple sequence analysis including sequence alignment, genome assembly, read mapping and hidden Markov models

L02. Demonstrate practical design skills, particularly in software component design and integration

L03. Identify suitable technologies and components for implementing a system meeting the specifications

L04. Demonstrate project management, teamwork and communication skills necessary for working as part of a team under strict time constraints

L05. Communicate with stakeholders from a different background, especially domain experts in biology, through reports, oral presentations and documentation

This course contributes to the development of the following graduate capabilities:

Graduate Capability	**Acquired in**
Scholars capable of independent and collaborative enquiry, rigorous in their analysis, critique and reflection, and able to innovate by applying their knowledge and skills to the solution of novel as well as routine problems	L01, L02, L03
Entrepreneurial leaders capable of initiating and embracing innovation and change, as well as engaging and enabling others to contribute to change	L04, L05
Professionals capable of ethical, self- directed practice and independent lifelong learning	L04, L05
Global citizens who are culturally adept and capable of respecting diversity and acting in a socially just and responsible way	L05

Teaching Strategies

The major project enables the students to work as a team to apply the lecture/tutorial content and design and implement a complex genome informatics management and analysis system, including project management, stakeholder presentations and documentation

The lectures introduce major concepts of algorithms in sequence and genome data analysis. Lectures are supplemented by an assignment that require students to implement algorithms discussed in lectures and design solutions to practical problems

Online delivery

In 2020 the plan is to deliver the course online, although if circumstances permit the final assessment may take place in person. Lectures and tutorials will be delivered using Microsoft Teams or a similar delivery platform, as will project presentations. Lectures will be recorded but we encourage you to attend the presentation online so you can ask questions. For the team project, it is expected that you will be communicating online with your team members and your “customer”. Although this is not ideal, it provides useful training as collaborative software development is increasingly done remotely.

Teaching Rationale

This is a practical course that requires students to learn by doing. Students undertake a group project with guidance from a mentor with set milestones throughout the session, including presentations, software demonstrations, and submission of reports and documentation. A series of lectures on genome informatics algorithms complement the project work.

Student Conduct

The **Student Code of Conduct** (Information (https://student.unsw.edu.au/conduct) , Policy (https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf)) sets out what the University expects from students as members of the UNSW community. As well as the learning, teaching and research environment, the University aims to provide an environment that enables students to achieve their full potential and to provide an experience consistent with the University's values and guiding principles. A condition of enrolment is that students *inform themselves* of the University's rules and policies affecting them, and conduct themselves accordingly.

In particular, students have the responsibility to observe standards of equity and respect in dealing with every member of the University community. This applies to all activities on UNSW premises and all external activities related to study and research. This includes behaviour in person as well as behaviour on social media, for example Facebook groups set up for the purpose of discussing UNSW courses or course work. Behaviour that is considered in breach of the Student Code Policy as discriminatory, sexually inappropriate, bullying, harassing, invading another's privacy or causing any person to fear for their personal safety is serious misconduct and can lead to severe penalties, including suspension or exclusion from UNSW.

If you have any concerns, you may raise them with your lecturer, or approach the School Ethics Officer (mailto:ethics-officer@cse.unsw.edu.au) , Grievance Officer (mailto:grievance-officer@cse.unsw.edu.au) , or one of the student representatives.

Plagiarism is defined as (https://student.unsw.edu.au/plagiarism) using the words or ideas of others and presenting them as your own. UNSW and CSE treat plagiarism as academic misconduct, which means that it carries penalties as severe as being excluded from further study at UNSW. There are several on-line sources to help you understand what plagiarism is and how it is dealt with at UNSW:

- Plagiarism and Academic Integrity (https://student.unsw.edu.au/plagiarism)
- UNSW Plagiarism Procedure (https://www.gs.unsw.edu.au/policy/documents/plagiarismprocedure.pdf)

Make sure that you read and understand these. Ignorance is not accepted as an excuse for plagiarism. In particular, you are also responsible that your assignment files are not accessible by anyone but you by setting the correct permissions in your CSE directory and code repository, if using. Note also that plagiarism includes paying or asking another person to do a piece of work for you and then submitting it as your own work.

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.

If you haven't done so yet, please take the time to read the full text of

- UNSW's policy regarding academic honesty and plagiarism (https://student.unsw.edu.au/plagiarism)

The pages below describe the policies and procedures in more detail:

- Student Code Policy (https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf)
- Student Misconduct Procedure (https://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)
- Plagiarism Policy Statement (https://www.gs.unsw.edu.au/policy/documents/plagiarismpolicy.pdf)
- Plagiarism Procedure (https://www.gs.unsw.edu.au/policy/documents/plagiarismprocedure.pdf)

You should also read the following page which describes your rights and responsibilities in the CSE context:

- Essential Advice for CSE Students (https://www.engineering.unsw.edu.au/computer-science-engineering/about-us/organisational-structure/student-services/policies/essential-advice-for-cse-students)

Assessment

Item	Topics	Due	Marks	Contributes to

Project	*Project plan 10% - due week 3* The initial project plan includes a group presentation (online) on which feedback will be provided, and a document which will be marked *Initial project presentation* A 20-minute presentation by the team introducing their project and plan for development. Presentation should include background and motivation for the project, main requirements, and project management strategy. *Project design document (including requirements) and project plan* A document listing requirements, user stories (including priority and scope, classified into epics), chosen technologies, major design decisions, test cases etc. It should also include a project plan outlining the proposed sprints (with planned deliverables for each sprint), team roles and responsibilities, meeting schedule, project management and version control software to be used *Final product 25% - due week 10* A mark decided in consultation with the customer, reflecting the quality and usefulness of the final product. Although this is group work, individual contributions will be peer-evaluated using the moodle “team evaluation” module in order to allocate individual marks. *Product documentation 5% - due week 10* Documentation supplied with the final product, including both technical documentation and user manual. Assessed based on completeness and clarity of the document.	Weeks 3,10	40%	L02, L03, L04, L05
Assignment	A programming assignment in 3 parts focusing on the dynamic programming alignment algorithm. *Part 1 7% - due week 2* *Part 2 13% - due week 7*	Weeks 2, 7	20%	L01, L02
Final Exam	An exam in the exam period covering the lecture content of the course	Exam period	40%	L01

Supplementary assessment policy

A student will be offered a supplementary exam for the final exam only if they have missed the exam due to a well-documented medical reason. Students who sit a supplementary exam will have their marks calculated in the same way as other students. No supplementary exam will be awarded if the student has already sat the exam. Students must apply for special consideration in order to be considered for a supplementary exam.

Course Schedule

Week	Starting	Lec 1 (2hrs)	Lec 2 (2hrs)	Tute (2 hrs)	Assessment
1	Jun 1	Optimal and heuristic sequence alignment	Optimal and heuristic sequence alignment	**Project intro**	
2	Jun 8	Optimal and heuristic sequence alignment	Optimal and heuristic sequence alignment	Tutorial (alignment)	Assignment part 1 due 7%
3	Jun 15	Hidden Markov Models	Hidden Markov Models	**Project ppts**	Project plan 10%
4	Jun 22	Phylogeny and tree-building algorithms	Phylogeny and tree-building algorithms	Tutorial (sequence search)	
5	Jun 29			**Sprint review 1**	
6	Jul 6	*Flexibility week*			
7	Jul 13				Assignment part 2 due 13%
8	Jul 20			**Sprint review 2**	
9	Jul 27	Sequence assembly and genome informatics	Sequence assembly and genome informatics	Tutorial (sequence assembly)	
10	Aug 3	Sequence assembly and genome informatics	**Final demos**	**Final demos**	Final product 25% Product documentation 5%

Resources for Students

There are no required textbooks however recommended books for this course include:

- Bioinformatics Algorithms: An Active Learning Approach (Volumes I and II) Compeau and Pevzner, Active Learning Press (2015)
- Biological Sequence Analysis – Probabilistic models of proteins and nucleic acids Durbin, Eddy, Krogh and Mitchison, Cambridge University Press (1998)

Lecture slides, discussion forums, announcements and assignment specs will be made available on the course moodle website (accessible through my.unsw)

Course Evaluation and Development

This course will be evaluated through the online MyExperience process at the end of session. Individual lecturers may also distribute surveys on their own teaching. Feedback from these surveys is taken seriously and you are encouraged to respond. This is the first year the course is offered in this format so no previous feedback is available

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Comments

(/BINF6111/20T2/forums/search?forum_choice=resource/46933) (/BINF6111/20T2/forums/resource/46933)

There are no comments yet.