

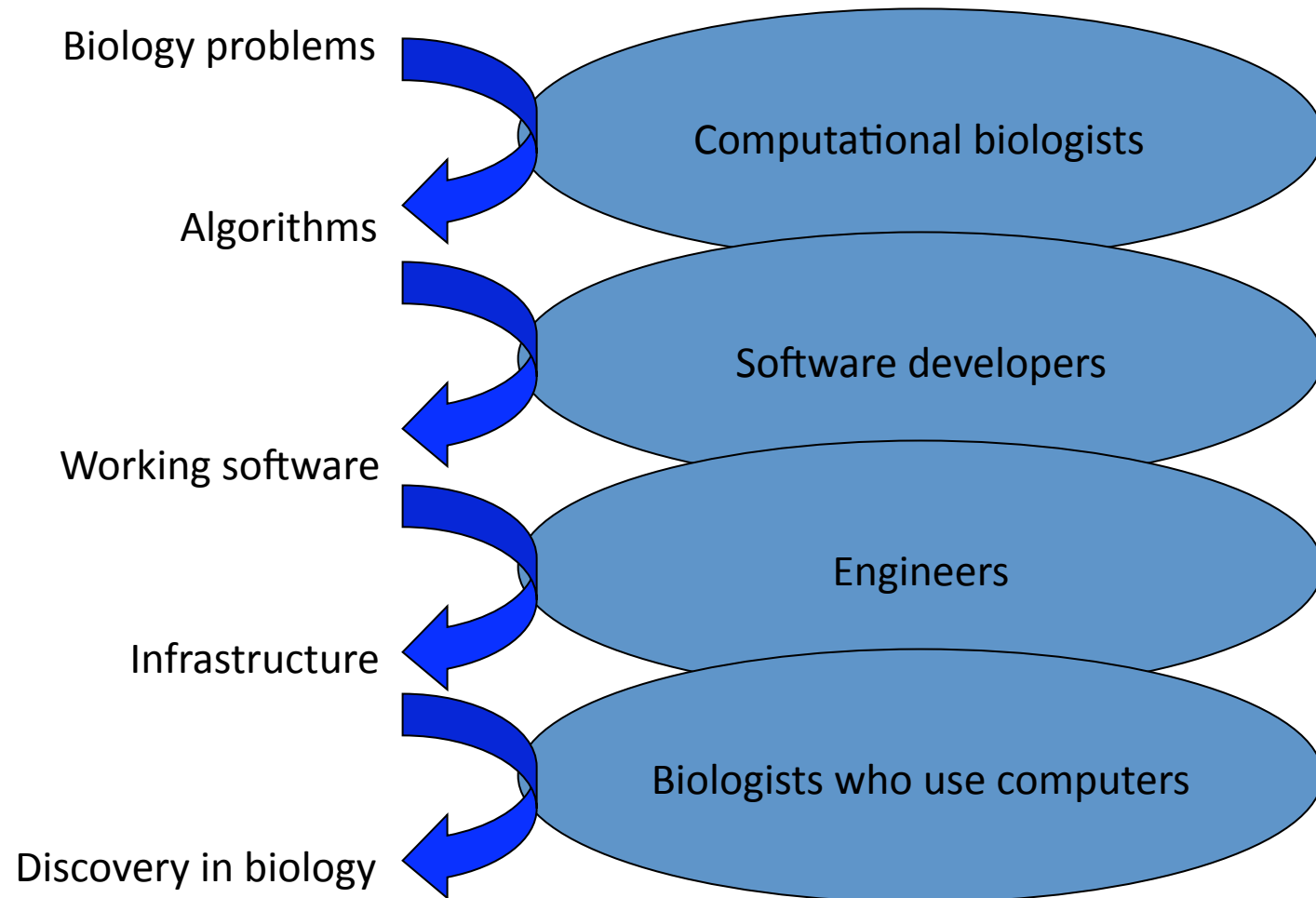
Running a bioinformatics undergraduate program

Challenges and... more challenges!

UNSW Bachelor of Engineering (Bioinformatics Engineering)

- Since 2001
- ~70 graduates so far (15 of which have gone on to do a PhD or MSc Research)

Who are bioinformaticians?



An Engineering program

- Accredited by the Institute of Engineers (Australia) and the Australian Computer Society
- Focus not just on scientific enquiry, but on designing and building solutions
- Project management, professional issues and ethics



1P



http://www.cse.unsw.edu.au/undergrad/programs/BINFA13647.html



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Bioinformatics. Each course runs for 12 weeks during session one (S1) or session 2 (S2). UOC is a measure of the amount of work required in a course.

YEAR 1		UOC S1	
COMP1917	Higher Computing 1	6	
COMP1927	Higher Data Structures & Algorithms	-	
MATH1131 MATH1141	Mathematics 1A or Higher Mathematics 1A	6	
MATH1231 MATH1241	Mathematics 1B or Higher Mathematics 1B	-	
BABS1201	Molecules, Cells & Genes	6	
CHEM1021 CHEM1041	Fundamentals of Chem 1B or Higher Chemistry 1 D	-	
CHEM1011 CHEM1031	Fundamentals of Chemistry 1A or Higher Chemistry 1C *	6	
BINF1001	Bioinformatics 1	-	
		24	

[1](#) is appropriate for those who have 75-100 in 2U Chemistry or equivalent.

YEAR 2		UOC S1	UOC S2
COMP2911	Engineering Design 2	6	-
COMP3711	Software Project Management	-	6
BIOC2101 BIOS2021 BIOS2621 MICR2011 BABS2202	Principles of Biochemistry (Advanced) Genetics or Genetics (Advanced) Microbiology 1 Cell Biology	-	12
MATH1081	Discrete Mathematics	-	6
COMP2041	Software Construction: Techniques and Tools	6	-
BIOC2201	Principles of Mol. Biol	6	-
MATH2901 MATH 2801	Higher Theory of Statistics or Theory of Statistics	6	-
		24	24

ded that students start thinking about [Industrial Training](#) in the summer after Year 2
 y be delayed if a satisfactory report for 60 day industrial training has not been received

YEAR 3		UOC S1	UOC S2
BIOC3121	Molecular Biology of Nucleic Acids	6	-
BINF3010	Bioinformatics Methods & Applications	6	-
BINF3020	Computational Bioinformatics	-	6
COMP3121	Algorithms & Programming Techniques	6	-
COMP3311	Database Systems	6	-
	Life Sciences Elective	-	6
	COMP/MATH Elective	-	6
	Free Elective	-	6
		24	24

YEAR 4		UOC S1	UOC S2
BINF4910	Bioinformatics Thesis A	3	-
BINF4911	Bioinformatics Thesis B	-	12
BINF4920	Professional Issues & Ethics	3	-
	Life Sciences Elective	6	
	COMP/MATH Elective	6	
	Free Elective	6	
	General Education	12	

Some challenges

- Low student numbers
 - Recruiting students
 - Double degrees



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Undergraduate Programs

Bachelor of Engineering Degrees:

Bioinformatics

- [Plan BINFA13647](#) - **BE** Bioinformatics
- [Plan BINFA13715](#) - **BE** Bioinformatics **BCom**
- [Plan BINFA13755](#) - **BE** Bioinformatics **BSc**
- [Plan BINFA13756](#) - **BE** Bioinformatics **BA**
- [Plan BINFA13757](#) - **BE** Bioinformatics **MBiomedE** - Flexible First Year Program 2006 onwards

Program Structure Prior to 2006

- [Plan BINFA13757](#) - **BE** Bioinformatics **MBiomedE**

More challenges

- Covering the bases
 - Addressing the foundations of computing AND biology AND maths/stats/chemistry and still have time to cover advanced topics AND giving students enough choice

Even more challenges

- Keeping the biologists happy
 - Tool users vs tool builders
- Keeping the computer scientists happy
 - Tool builders vs tool users
- Keeping the accountants happy

YEAR 3		UOC S1	UOC S2
BIOC3121	Molecular Biology of Nucleic Acids	6	-
BINF3010	Bioinformatics Methods & Applications	6	-
BINF3020	Computational Bioinformatics	-	6
COMP3121	Algorithms & Programming Techniques	6	-
COMP3311	Database Systems	6	-
	Life Sciences Elective	-	6
	COMP/MATH Elective	-	6
	Free Elective	-	6
		24	24

YEAR 4		UOC S1	UOC S2
BINF4910	Bioinformatics Thesis A	3	-
BINF4911	Bioinformatics Thesis B	-	12
BINF4920	Professional Issues & Ethics	3	-
	Life Sciences Elective	6	
	COMP/MATH Elective	6	
	Free Elective	6	
	General Education	12	

Bioinformatics Methods and Applications - BINF3010

Faculty: Faculty of Engineering

School: School of Computer Science and Engineering

Course Outline: <http://www.cse.unsw.edu.au/>

Campus: Kensington Campus

Career: Undergraduate

Units of Credit: 6

EFTSL: 0.12500 ([more info](#))

Indicative Contact Hours per Week: 6

Enrolment Requirements:

Prerequisite: BIOC2201.

Fee Band: 5 ([more info](#))

Further Information: [See Class Timetable](#)

Description

Bioinformatics (the use of computing methods for the management and analysis of molecular biology data) has become an integral component of biomolecular sciences, especially genomics and proteomics. This course focuses on the principles and practical use of bioinformatics methods and resources for the analysis of DNA and protein sequences and structures, as well as results from microarray and proteomics, with emphasis on their evolutionary underpinnings and statistical foundations.

This course does not require programming, however it does involve the use of Linux.

Computational Bioinformatics - BINF3020

Faculty: Faculty of Engineering

School: School of Computer Science and Engineering

Course Outline: <http://www.cse.unsw.edu.au/>

Campus: Kensington Campus

Career: Undergraduate

Units of Credit: 6

EFTSL: 0.12500 ([more info](#))

Indicative Contact Hours per Week: 5

Enrolment Requirements:

Prerequisite: COMP2011 or COMP2711 or COMP2911.

Fee Band: 5 ([more info](#))

Further Information: [See Class Timetable](#)

Description

Algorithms and representations in DNA and protein sequence analysis: string matching and alignment, tree building methods, hidden Markov models and other statistical representations. Computational representations in systems biology including Boolean and Bayesian networks. Optimisation and machine learning approaches used in bioinformatics.

Where do the graduates find jobs?

- Bioinformatics
- IT/computing
- Biotechnology and biology
- Consulting
- Finance/banking!