

Biotechnology

Biotechnology is the application of biological knowledge to useful ends. It includes the use of living things in industrial or commercial processes and accordingly draws upon many life sciences disciplines. Recent breakthroughs in biotechnology offer exciting prospects such as more effective pharmaceuticals (drugs), new disease treatments, higher yielding crops, improved foods, novel ways to fight pollution. As well as providing a strong background in life sciences, the biotechnology co-major teaches practical skills relevant to the Australian biotechnology industry including applications of biotechnology, regulatory, safety and ethical issues, and steps involved in taking a product from the research laboratory to the marketplace.

The biotechnology co-major offers a high degree of flexibility in terms of combinations of subjects. This co-major can be undertaken in conjunction with a life sciences major, or as a double major where one major has a specialisation with a 'biotechnology flavour'. One of two core subjects must be taken as part of the biotechnology co-major; a 200-level subject 600-205 Biotechnology in Practice or a 300-level subject 526-302 Biotechnology 2: Commercial Innovation (*p.850*). Credit will not be given for both subjects.

Career opportunities

Training in biotechnology provides skills for jobs in many fields including drug discovery and production, health work, food technology, forensic science, agriculture, and waste management.

Structure of the biotechnology co-major

100-level

Package in life sciences including 25 points in each of biology, chemistry, mathematics and statistics.

200-level

Students must choose a life sciences major in anatomy, biochemistry and molecular biology, cell biology, chemistry, genetics, immunology, microbiology, neuroscience, pathology, pharmacology, physiology or plant sciences. Students must also take 600-205 Biotechnology in Practice (see options A and B), unless they will take 526-302 Biotechnology 2: Commercial Innovation (*p.850*) in their third year (see option C).

300-level

Option A: Students will have taken 600-205 Biotechnology in Practice and will be completing a selected life sciences major. Additionally students must take at least 37.5 points including three other elective 300-level subjects with a 'biotechnology flavour' (see below). At least two of these subjects must be from a department different to that responsible for teaching the major. Two practical subjects must be included, either within the co-major or the major.

Some elective subjects may count towards both the major and the biotechnology co-major.

300-level elective subjects with a 'biotechnology flavour'	Points
521-301 Protein Structure, Design & Engineering (<i>p.787</i>)	12.5
521-302 Functional Genomics (<i>p.787</i>)	12.5
521-303 Molecular Aspects of Cell Biology (<i>p.787</i>)	12.5
521-306 Plant Biochemistry & Biotechnology (<i>p.788</i>)	12.5
521-307 3D-Macromolecular Structure and Dynamics (<i>p.788</i>)	12.5
606-309 Cell Biology III (<i>p.797</i>)	12.5
606-313 Molecular Evolution & The Origin of Life (<i>p.797</i>)	12.5
610-332 Bio-organic Chemistry (<i>p.804</i>)	12.5
652-301 Genomes and Evolution (<i>p.820</i>)	12.5
652-302 Molecular Genetics (<i>p.820</i>)	12.5
652-303 Developmental and Cellular Genetics (<i>p.820</i>)	12.5
652-305 Human Genetics (<i>p.820</i>)	12.5
526-301 Biotechnology 1: Microbial Genes & Cells (<i>p.850</i>)	12.5
526-304 Principles of Immunology (<i>p.850</i>)	12.5
526-307 Applied Environmental Microbiology (<i>p.851</i>)	12.5
531-303 Molecular/Genetic Basis of Disease-Lect (<i>p.858</i>)	12.5
136-337 Biotechnology in Modern Society (Sci.3) (<i>p.227</i>)	12.5

300-level elective practical subjects with a 'biotechnology flavour'	Points
521-321 Gene Technology & Protein Expression (<i>p.789</i>)	12.5
521-322 Protein Biochemistry and Proteomics (<i>p.789</i>)	12.5
606-314 Experimental Techniques in Plant Science (<i>p.797</i>)	12.5
610-399 Chemical Research Project (<i>p.805</i>)	12.5
652-304 Genetic Analysis (<i>p.820</i>)	12.5

300-level elective practical subjects with a 'biotechnology flavour'	Points
652-306 Experimental Genetics (<i>p.820</i>)	12.5
526-321 Molecular Microbiology Techniques (<i>p.851</i>)	12.5
526-322 Project Prac: Biotech/Environmental (<i>p.851</i>)	12.5
526-323 Project Prac: Medical/Immunology (<i>p.852</i>)	12.5
526-324 Immunological Techniques (Practical) (<i>p.852</i>)	12.5
534-303 Molecular Pharmacology (<i>p.860</i>)	12.5

Option B: Students will have taken 600-205 Biotechnology in Practice and will be completing a double major in life sciences where one major has a Biotechnology specialisation

Option C: Students undertaking a selected life sciences major can do 526-302 Biotechnology 2: Commercial Innovation (*p.850*) instead of 600-205 Biotechnology in Practice if appropriate prerequisites and course structure are adopted. Credit will not be given for both subjects.

Biotechnology subjects

600-205 Biotechnology in Practice

Note: Students cannot obtain credit for this subject and 526-302 Biotechnology 2: Commercial Innovation (*p.850*)

Credit points: 12.5

HECS-band: 2

Coordinator: Dr C Cobbett

Prerequisites: Biochemistry and molecular biology 521-211; and one of genetics 652-214, microbiology and immunology 526-201, botany 606-205, or biochemistry and molecular biology 521-220.

Corequisites: Biochemistry and molecular biology 521-212.

Contact: 24 lectures and 24 hours of other activities (assignments, e.g. researching intellectual property protection for a product, computer searches of patent databases, developing a business plan, preparing case studies) (*Semester 2*).

Description: This subject will enable students to develop skills relevant to the Australian biotechnology industry. It will enhance students' understanding of the processes involved in the commercialisation of biotechnology research and is a core subject for students taking the biotechnology co-major. Topics include what is biotechnology?; the history of, and recent developments in, biotechnology; Australia's place in biotechnology; research in an industry setting; intellectual property protection and management; commercialisation of research; company structures and funding; regulatory issues; and public perceptions of biotechnology. The steps involved in taking a product from the research laboratory to the marketplace will be illustrated by case studies presented by participants in Australian biotechnology development. Participants in this subject include contributors from industry, research development consultants, intellectual property lawyers, members of regulatory bodies and staff from a number of University departments.

Assessment: End-of-semester 2-hour exam, up to three written assignments.

