

Biotechnology is defined as the controlled and deliberate manipulation of biological systems for the efficient manufacture or processing of useful products.

The Objective of this four-year, full-time degree is to produce graduates for the Bioprocessing Industries, with skills developed at laboratory and pilot plant scale in microbiology, biochemistry, molecular biology, genetics and process engineering.

Programme Outline

The **first year** of the B.Sc. Biotechnology (jointly with Analytical Science and Pharmaceutical & Chemical Sciences) concentrates on the disciplines of biology, chemistry, physics, mathematics and computing. In the **second year**, equal emphasis is placed on the biological and engineering aspects of Biotechnology and in **third year**, specialist areas of biology are introduced such as immunology, genetic engineering and cell culture. In engineering, students are introduced to separation processes and transport phenomena in bioprocess systems. In **year four**, the underlying biological and engineering principles of biotechnical processes are detailed and developed and the students are given the opportunity to specialise in a specific advanced area of Biotechnology.

Relevant Work Experience through DCU's work experience programme *INTRA* (INtegrated TRaining) is an integral part of our Biotechnology degree and has been a central feature of education at DCU since its foundation. **Students from the B.Sc. Biotechnology are required to complete an INTRA placement of up to six months' duration at the end of third year, during the period April to September.**

Skills

Students from the B.Sc. Biotechnology will have the ability to work in roles listed below:

- | | | |
|---------------------------------------|------------------------------|---------------------------------------|
| ■ Process/Bioprocess Engineering | ■ Quality control/assurance | ■ Biochemical Analysis |
| ■ Process validation | ■ Immunodiagnosics | ■ Microbiological Analysis |
| ■ Protein separation and purification | ■ Animal/plant cell culture | ■ Environmental Monitoring & Analysis |
| ■ Fermentation | ■ Molecular biology/genetics | ■ Waste Treatment |
| ■ Project Engineering | ■ Food Processing | |

Work Areas

To date, Biotechnology graduates have worked successfully in the following industries worldwide:

- | | | |
|------------------|--------------------|------------------|
| ■ Pharmaceutical | ■ Medical | ■ Agricultural |
| ■ Biomedical | ■ Brewing | ■ Bulk Chemicals |
| ■ Diagnostics | ■ Food | ■ Plant Science |
| ■ Fine Chemicals | ■ Dairy Production | ■ Veterinary |

Student Availability

Students are available for interview from October onwards. Please post vacancies on the *INTRA* online website at www.intra.dcu.ie, or send details to:

INTRA Unit, Student Support & Development,
Dublin City University,
Glasnevin, Dublin 9, Ireland.

Phone: 00 353 1 700 5514

Fax: 00 353 1 700 5505

Website: www.intra.dcu.ie



B.Sc. Biotechnology

Year 1

BIOLOGY

PHYSICS

INTERDISCIPLINARY SCIENCE

MATHEMATICS

CHEMISTRY

Year 2

BIOLOGY

Biochemistry
Microbiology
Genetics
Instrumentation
Bioanalysis

PROCESS ENGINEERING

Engineering Principles
Heat Transfer
Fluid Flow
Mass Transfer
Engineering
Thermodynamics
Engineering Statistics

MATHEMATICS

CHEMISTRY

Year 3

BIOLOGY

Recombinant DNA Technology
Immunology
Food Science
Cell Structure
Plant Biotechnology
Molecular Genetics
Environmental Microbiology
Biochemical separations/analysis

BIOPROCESS ENGINEERING

Rheology of Biofluids
Two-phase Fluid Flow
Aeration & Agitation
Heat Transfer in Bioprocess
Filtration
Centrifugation
Evaporation
Drying

COMMERCIAL BIOTECHNOLOGY

Communication of Scientific Topics
Principles of QA & IP Protection
Drug Development Pipeline
Company Case Study
Group Assignments

I N T R A

Year 3

BIOTECHNOLOGY CORE

Batch & Continuous Bioreactors
Instrumentation & Control
Waste Treatment Engineering
Malting & Brewing
Microbial Biotechnology
Proteomics and Protein Biotechnology
Biosensors
Recombinant DNA Technology
Protein Purification
Bioprocessing Laboratory

OPTIONS

Immunoanalysis
Genetics
Animal Cell Biotechnology
Biochemical Engineering
Environmental Biotechnology
Food Biotechnology

RESEARCH PROJECT

Literature Survey
Laboratory-based work