Master of Biotechnology (Advanced) (LS96)

Year offered: 2010
Admissions: Yes
CRICOS code: 054279M
Course duration (full-time): 4 semesters (2 years)
Course duration (part-time): 8 semesters (4 years)
Domestic fees (indicative): 2010: Full fee tuition $8,000 (indicative) per semester
International Fees (indicative): 2010: $11,500 (indicative) per semester
Domestic Entry: July (Note: Students commencing in July, enrol in Semester 2 units first) *Also see "ENTRY REQUIREMENTS" below
International Entry: July (Note: Students commencing in July, enrol in Semester 2 units first) *Also see "ENTRY REQUIREMENTS" below
Total credit points: 192
Standard credit points per full-time semester: 48
Standard credit points per part-time semester: 24
Course coordinator: Dr Mark O’Brien
Campus: Gardens Point

Entry Requirements
A bachelor degree or equivalent, preferably but not necessarily in science, is required. Please contact the course coordinator for further information on the entry requirements for this course.

*LS96 commences in July (Module 1 entry). Students with advanced standing for Module 1 should commence in February as the Faculty does not offer sufficient units in Module 2 in second semester. Note especially that the February entry point for this course is for students with advanced standing for Module 1. It is not possible to commence Module 1 in February.

For students with advanced standing for Module 1 and who wish to enter LS96 in July, a modified program will be required and this should be discussed with the course coordinator prior to enrolment. Students should note that this may require them to study business electives only in their first semester and could lead to them having to take an additional semester to complete the requirements of their program. Also, students may not be able to undertake the project component of LS96.

Career Outcomes
Career opportunities include employment as research and support staff in the biotechnology industry - private or public biotechnology companies, universities, CSIRO, research institutes, government departments, pathology laboratories and hospitals.

Professional Recognition
Graduates are eligible to join the AusBiotech, the Australian Society for Biochemistry and Molecular Biology, and the Australian Society for Microbiology.

Course Design
The program of study for an individual student will be decided in consultation with the course coordinator and will take into account the student’s background in the biomolecular sciences and area of interest in biotechnology. LS96 Master of Biotechnology (Advanced) completes the comprehensive training of students and follows successful completion of core and elective units offered in LS66, LS76 and LS86. It is comprised of 192 credit points of assessed coursework in general, medical and/or plant biotechnology. In their final semester of the program, students may undertake a supervised research project either at QUT or in the workplace. Students must discuss research project areas prior to enrolment in this course to select both a suitable project and a project supervisor(s) prior to entry (or as soon as possible thereafter). While the School of Life Sciences has a wide range of research project areas available, it may not always be possible for students to conduct a research project exactly in the area they desire. Part-time students may also elect to do a research project at their place of work, with both a workplace supervisor and a QUT supervisor. Alternative options are available. For students not undertaking a research project, additional coursework must be completed. Students will need to consult with the course coordinator in selecting additional coursework units. The LS96 Master of Biotechnology (Advanced) program not only offers students opportunities to pursue study in several relevant focus areas including the theoretical and practical aspects of biotechnology, but also the business of biotechnology, marketing, commercialisation, as well as the legal and ethical aspects of biotechnological applications. Advanced standing may be given for the suite of units offered in the foundation program, LS66 Graduate Certificate in Biotechnology, if the student has a bachelor degree or equivalent with a recent and appropriate undergraduate-level knowledge and practical experience in the key areas of molecular biology, cell biology, biochemistry and/or microbiology at an advanced level. If advanced standing is granted, students can enrol directly in LS96 in their first semester.

Overview
LS96 Master of Biotechnology (Advanced) is one of four nested postgraduate coursework programs in biotechnology offered by the School of Life Sciences. The LS96 Master of Biotechnology (Advanced) program offers students a
complete and comprehensive training in biotechnology by extending the suite of units offered within the LS86 Master of Biotechnology program or by giving students the opportunity in their final semester of study to pursue a research project. The Master of Biotechnology (Advanced) is a two year full-time program of study commencing with the foundation suite of core units, where appropriate. The LS96 Master of Biotechnology (Advanced) program will suit anyone who has a recent undergraduate degree (preferably, but not necessarily in science) and who wishes to gain training and advanced specialisation in general, medical and/or plant biotechnology. The program also caters for working scientists, support staff, or students involved in commercial aspects of biotechnology, who wish to update their theoretical and practical biotechnology skills for a current or future position. Science-based biotechnology units emphasise laboratory skills and hands-on laboratory experimentation feature prominently in the program, which covers contemporary techniques in biotechnology. New technology is incorporated as it becomes available. The program also offers students opportunities to pursue studies related to the business of biotechnology, marketing, commercialisation, as well as the legal and ethical aspects of biotechnological applications.

Further Information
For further information about this course, please contact:

Dr Mark O’Brien
Phone: +61 7 3138 2782
Email: enquiry.scitech@qut.edu.au

Course structure - Full-time

<table>
<thead>
<tr>
<th>Year 1, Semester 2 (MODULE 1)</th>
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<tbody>
<tr>
<td>LSN101 Molecular Biosciences</td>
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<td>LSN102 Cellular Biosciences</td>
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<tr>
<td>LSN103 Postgraduate Learning and Research Skills</td>
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<td>LSN483 Molecular Biology Techniques</td>
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<th>Year 2, Semester 1 (MODULE 2)</th>
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<tr>
<td>LSP127 Business Aspects of Biotechnology</td>
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<tr>
<td>Either</td>
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<tr>
<td>LQB583 Genetic Research Technology</td>
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<tr>
<td>Or</td>
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<td>LQB585 Plant Genetic Manipulation</td>
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In consultation with the course coordinator, choose 24 credit points from the following units:

LQB582 Biomedical Research Technologies
LQB583 Genetic Research Technology
LQB585 Plant Genetic Manipulation
GSN408 Fundamentals of Marketing Management
LWN135 Law, Justice and New Genetic Technologies

Year 2, Semester 2 (MODULE 3)

| BSB311 Innovation Commercialisation Strategies |
| LQB685 Plant Microbe Interactions |
| Either |
| LSN684 Medical Biotechnology 2 |

In consultation with the course coordinator, choose 24 credit points from the following units:

LQB484 Introduction to Genomics and Bioinformatics
LQB681 Biochemical Research Skills
LQB682 Protein Biochemistry and Bioengineering
LQB685 Plant Microbe Interactions
LSN684 Medical Biotechnology 2
GSN418 Marketing Strategy Development
MGN409 Introduction to Management

Year 3, Semester 1 (MODULE 4)

| LSN710 Project |
| For those students NOT undertaking LSN710 Project, in consultation with the course coordinator, choose 48 credit points from the following units: |

LQB582 Biomedical Research Technologies
LQB583 Genetic Research Technology
LQB585 Plant Genetic Manipulation
GSN408 Fundamentals of Marketing Management
LWN135 Law, Justice and New Genetic Technologies

Course structure - Part-time

<table>
<thead>
<tr>
<th>Year 1, Semester 2 (MODULE 1)</th>
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<tr>
<td>LSN101 Molecular Biosciences</td>
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<td>LSN102 Cellular Biosciences</td>
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<th>Year 2, Semester 2 (MODULE 1)</th>
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<tr>
<td>LSN103 Postgraduate Learning and Research Skills</td>
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<td>LSN483 Molecular Biology Techniques</td>
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<th>Year 3, Semester 1 (MODULE 2)</th>
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<tbody>
<tr>
<td>LQB583 Genetic Research Technology</td>
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Either
LQB585  Plant Genetic Manipulation
Or
LSP127  Business Aspects of Biotechnology

Year 3, Semester 2 (MODULE 3)
In consultation with the course coordinator, choose 24 credit points from the following units:
LQB681  Biochemical Research Skills
LQB682  Protein Biochemistry and Bioengineering
LSN103  Postgraduate Learning and Research Skills
MGN409  Introduction to Management

Year 4, Semester 1 (MODULE 2)
In consultation with the course coordinator, choose 24 credit points from the following units:
LQB582  Biomedical Research Technologies
LQB583  Genetic Research Technology
LQB585  Plant Genetic Manipulation
GSN408  Fundamentals of Marketing Management
LWN135  Law, Justice and New Genetic Technologies

Year 4, Semester 2 (MODULE 3)
BSB311  Innovation Commercialisation Strategies
Either
LQB685  Plant Microbe Interactions
Or
LSN684  Medical Biotechnology 2

Year 5, Semester 1 (MODULE 4)
LSN711  Project 1
For those students NOT undertaking LSN712 Project 2, in consultation with the course coordinator, choose 48 credit points from the following units:
LQB582  Biomedical Research Technologies
LQB583  Genetic Research Technology
LQB585  Plant Genetic Manipulation
GSN408  Fundamentals of Marketing Management
LWN135  Law, Justice and New Genetic Technologies

Year 5, Semester 2 (MODULE 4)
LSN712  Project 2
For those students NOT undertaking LSN711 Project 1, in consultation with the course coordinator, choose 24 credit points from the following units:
LQB484  Introduction to Genomics and Bioinformatics
LQB681  Biochemical Research Skills
LQB682  Protein Biochemistry and Bioengineering
LQB685  Plant Microbe Interactions
LSN684  Medical Biotechnology 2
GSN408  Fundamentals of Marketing Management
GSN418  Marketing Strategy Development
MGN409  Introduction to Management

Potential Careers:
Biochemist, Biotechnologist, Medical Biotechnologist, Microbiologist, Molecular Biologist, Plant Biotechnologist, Research Assistant, Scientist, Virologist.

UNIT SYNOPSES

BSB311  INNOVATION COMMERCIALISATION STRATEGIES
Students study strategies and approaches used in industry and government organisations for the research, development and commercialisation of biotechnology innovations. The unit offers the opportunity to read widely as well as in depth about the commercialisation of molecular biology and biotechnology research. Theoretical concepts are integrated with prepared case studies prior to guest speaker seminars.
Prerequisites:  BSB310 or MGB223  Credit points: 12
Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

GSN408  FUNDAMENTALS OF MARKETING MANAGEMENT
This unit provides students with the opportunity to critically examine and evaluate the role of marketing and its contribution to the strategic processes of the modern firm operating in an increasingly competitive national and international environment. Key marketing decision areas are examined, including the marketing concept, the marketing mix, marketing information systems and marketing research, market segmentation, targeting and positioning, and the process of marketing planning, implementation and control. Students have the opportunity to consider the evolution of marketing philosophy, determinants of consumer and organisational behaviour and the influences of environmental forces on marketing decision-making within the firm.
Antirequisites:  GSN206  Equivalents:  GSN408  Credit points: 6  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 6TP1, 2010 6TP3
and 2010 6TP4

GSN418 MARKETING STRATEGY DEVELOPMENT
This unit builds upon the foundation provided by GSN408 and examines the managerial process involved in identifying and developing effective marketing strategies. It examines the role of marketing within the strategic processes of the modern firm and considers the process involved in strategic marketing in the global business context. It takes a case based approach to illustrating the effectiveness of key approaches to marketing strategy development and highlights the importance of new and emerging fields of marketing practice.
Prerequisites: GSN408 Antirequisites: GSN206
Credit points: 6 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 6TP4

LQB484 INTRODUCTION TO GENOMICS AND BIOINFORMATICS
The completion of the Human Genome project, along with similar projects on other organisms of a prokaryote and eukaryote nature, marked the beginning of a major revolution in fundamental biology that changed our understanding of the natural world. To understand how information on genome structure-function relationships (ie bioinformatics) is being used in areas such as gene discovery, disease diagnosis and drug development, students need to understand how the information content of DNA and proteins is extracted and analysed. This unit introduces students to the approaches to database mining and genome exploration.
Prerequisites: LQB383 or LSB338 or LSN101 and LSN102 Antirequisites: LSB537, LSB619, LSB469
Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-2

LQB582 BIOMEDICAL RESEARCH TECHNOLOGIES
This unit will study the technical principles and practical techniques that are essential for advancing research and development in biochemistry and biotechnology.
Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

LQB583 GENETIC RESEARCH TECHNOLOGY
The tools available for the discovery and manipulation of new genes are increasing exponentially and, in turn, this is having a significant impact in many areas of the life sciences. The true potential for this ultimately relies on the ability to link genes and their function. There are many strategies, both targeted and global, which facilitate an understanding of gene and genome structure function relationships. These strategies rely on integrated technologies based on molecular genetics, molecular biology and genetic engineering. The identification of function leads then to unlimited potential for detection and manipulation of these genes in human, animal and plant systems.
Prerequisites: LQB483 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

LQB585 PLANT GENETIC MANIPULATION
The potential of plant biotechnology can only be recognised as a result of the significant advances being made in technologies enabling the genetic manipulation of plants. Familiarity with the strategies, techniques and breadth of applications is essential as a basis for anyone planning a career in plant biotechnology. The unit is designed with a significant emphasis on achieving technical expertise in plant genetic manipulation and control of gene expression.
Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

LQB681 BIOCHEMICAL RESEARCH SKILLS
In the real world, the design and completion of successful research and/or business projects demand that individuals gather information, solve problems, work effectively as a part of a team and analyse and communicate results in a critical manner. This unit offers opportunities for you to develop these skills that are valued highly by potential employers and research project leaders. This unit is a capstone biochemistry unit designed to prepare you as a prospective graduate for independent and group research.
Prerequisites: LQB381 or LSB308. Students with equivalent study can apply for a requisite waiver Equivalents: LSB607 Credit points: 12 Contact hours: 5 per week Campus: Gardens Point Teaching period: 2010 SEM-2

LQB682 PROTEIN BIOCHEMISTRY AND BIOENGINEERING
This unit is designed to give you the essential concepts and techniques driving research and industrial biotechnology so that you will be equipped for multiple careers in the biological sciences. The skills you develop will allow you to enter a practical laboratory environment or to apply your knowledge in related areas of evaluations of technologies and intellectual property.
Prerequisites: LQB381 or LSB308 or LSN101 and LSN102 Antirequisites: LSB605, LSB608 Credit points: 12 Contact hours: 5 per week Campus: Gardens Point Teaching period: 2010 SEM-2

LQB685 PLANT MICROBE INTERACTIONS
Microorganisms, including viruses, bacteria and fungi, cause many devastating diseases in plants and are responsible for significant losses to crops in Australia and Internationally. Diagnosis and control of these organisms, which vary considerably in their biology and infection strategies, is an ongoing challenge. However, plant genetic
engineering approaches are now offering new and novel solutions to these problems. These approaches are of widespread scientific, commercial and humanitarian interest. The application of current technologies and development of new, novel technologies relies on an understanding of the biology of the organism, of the way in which these organisms cause disease in plants and the mechanism by which many plants are resistant.

**Prerequisites:** LQB483 or LSN483 and LSN101 and LSN102  
**Antirequisites:** LSB578  
**Assumed knowledge:** LQB386 recommended  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

### LSN101 MOLECULAR BIO SCIENCES

This unit explores the relationships between cellular components and provides a high level of understanding of cell and molecular biology suitable for students wishing to undertake further postgraduate studies. You will study: both informational and structural macromolecules found within the cell and relate their structure to function; cell metabolism; cell division, including DNA replication, transcriptional regulation in prokaryotes and gene regulation in eukaryotes; inheritance; and introductory bioinformatics.

**Corequisites:** LSN102, LSN483  
**Assumed knowledge:** Students should enrol in either LSN102 or LSN483 in the same semester if not already completed.  
**Credit points:** 12  
**Contact hours:** 5 hours  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

### LSN102 CELLULAR BIO SCIENCES

The unit examines the responses available to cells and tissues in normal growth and development and following exposure to injury or stress mechanisms. The role and control of these responses in a range of disease processes is considered. The unit is designed to present, at the level of cell and tissue systems, the effects of physical, chemical, biochemical and metabolic processes. Successful completion of this unit provides a fundamental understanding of cellular structure and function, and prepares students for further postgraduate studies in cell and molecular biology. Additionally, students gain an appreciation of contemporary methods for studying the structure and function of cells and tissues.

**Corequisites:** LSN101, LSN483  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

### LSN103 POSTGRADUATE LEARNING AND RESEARCH SKILLS

This unit assists you in developing of a range of generic and specific skills and attributes to be a successful postgraduate student. On completion of the unit, you will: (i) know how to manage information tools and resources effectively in order to advance your university study and become an independent and competent learner (ii) build and increase your knowledge and competence in using basic software applications and general knowledge of information communication technologies and (iii) develop key skills in project design and management. This unit consists of a series of workshops, seminars and on-line tutorials presented by a team of teaching and learning support staff from across the university.

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1 and 2010 SEM-2

### LSN483 MOLECULAR BIOLOGY TECHNIQUES

This unit introduces students to the theory and practice of general molecular biology techniques for gene detection and analysis, gene isolation, cloning and amplification, and gene library construction and screening. The unit is designed with a significant emphasis on achieving technical expertise in a range of procedures for isolation, purification and genetic engineering of nucleic acids.

**Corequisites:** LSN101, LSN102  
**Assumed knowledge:** Students should enrol in either LSN101 or LSN102 in the same semester if not already completed.  
**Equivalents:** LQB483, LSB468  
**Credit points:** 12  
**Contact hours:** 5 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

### LSN684 MEDICAL BIOTECHNOLOGY 2

In this unit students gain a thorough understanding of diagnostics and therapeutics in the commercial environment of medical biotechnology. LSN685 aims to increase the student's understanding of cell-based strategies, approaches and applications used as therapeutic interventions in medicine. The unit focuses on current, state-of-the-art and emerging technologies and applications within biotechnology as directed to novel therapeutic discovery, design, development and delivery of clinical therapeutics including tissue transplantation and regeneration, cellular therapies, genetic therapies, immunotherapies, clinical, ethical and regulatory affairs.

**Antirequisites:** LQB684  
**Assumed knowledge:** A background understanding of Cell and Molecular Biology as provided in LQB383, LQB483 and LQB584 is assumed knowledge.  
**Equivalents:** LSN609  
**Credit points:** 12  
**Contact hours:** 5 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

### LSN710 PROJECT

This unit includes a research project conducted in an area selected by the student in consultation with their supervisor(s) and the postgraduate coursework coordinator. The first part of the project involves compilation and writing of a critical Literature Review on the research topic focusing on clarification of knowledge gaps together with an outline of the planned research to follow. The second and major
part of the project is the supervised research itself. A Research Project Report will be written in a style to evaluate and critically discuss the data. Prescriptive guidelines and submission deadlines must be followed for both the Literature Review document and the Research Project Report.

**Credit points:** 48  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-1 and 2010 SEM-2

**LSN711 PROJECT 1**
In this unit a critical Literature Review is written on a topic selected by the student in consultation with their supervisor(s) and the postgraduate coursework coordinator. This review focuses on clarification of knowledge gaps and, where applicable, provide an outline of the planned research to follow in LSN712 Project 2. Prescriptive guidelines and submission deadlines must be followed for the compilation and writing of the Literature Review document.

**Credit points:** 24  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-1 and 2010 SEM-2

**LSN712 PROJECT 2**
In this unit a research project is conducted in an area selected by the student in consultation with their supervisor(s) and the postgraduate coursework coordinator. This unit is normally a follow-on from LSN711 Project 1. A Research Project Report will be written in a style to evaluate and critically discuss the data. Prescriptive guidelines and submission deadlines must be followed for the compilation and writing of the Research Project Report.

**Prerequisites:** LSN711  **Credit points:** 24  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-1 and 2010 SEM-2

**LSP127 BUSINESS ASPECTS OF BIOTECHNOLOGY**
Supporting a successful biotechnology industry in Australia requires an entrepreneurial framework to be developed which assists the efforts of both researchers and innovators. This unit integrates those essential entrepreneurial techniques of launching a biotechnology business. The unit focus is on the research and development of industrial products and commercialising innovations developed in this industry. On completion of this unit the student will be able to identify and analyse entrepreneurial opportunities and evaluate these opportunities within biotechnology together with the ability to identify and comprehend the steps involved in setting up a new biotechnology enterprise.

**Credit points:** 12  **Contact hours:** 5 per week  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-1

**LWN135 LAW, JUSTICE AND NEW GENETIC TECHNOLOGIES**
Our ability to test, screen and manipulate the human genome is made possible by recent technological breakthroughs in science. The science of genetics is not new, but its public profile has never been higher. Current initiatives in genetic knowledge have been described as an international voyage of scientific discovery. The scientific findings are prompting major rethinking of concepts of law and justice. The legal community faces a perpetual challenge in keeping pace with the revolution in genetics. This unit looks at some legal implications of this revolution and charts the major responses of our legal system to modern genetics and biotechnology.

**Credit points:** 12  **Contact hours:** 26 hrs in total  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-1

**MGN409 INTRODUCTION TO MANAGEMENT**
This unit examines the following: the functions and roles of managers; concepts and principles and their practical applications; the key management functions; areas of planning, organising, staffing, directing and controlling; production/operations management and the management of quality; entrepreneurship and business planning; and important problems, opportunities and trends facing managers in Australia analysed from the viewpoint of relevant academic disciplines.

**Antirequisites:** GSN401 and GSZ401  **Credit points:** 12  **Contact hours:** 3 per week  **Campus:** Gardens Point  **Teaching period:** 2010 SEM-1 and 2010 SEM-2