Bachelor of Games and Interactive Entertainment/Bachelor of Mathematics (IX64)

Year offered: 2011
Admissions: Yes
CRICOS code: 063031E
Course duration (full-time): 4 years
Domestic Fees (indicative): 2011: CSP $3,028 (indicative) per semester
International Fees (indicative): 2011: $11,375 (indicative) per semester
Domestic Entry: February
International Entry: February
QTAC code: 418672
Past rank cut-off: 81
Past OP cut-off: 10
OP Guarantee: Yes
Assumed knowledge: English (4,SA), Maths B (4,SA)
Preparatory studies: For information on acquiring assumed knowledge visit http://www.qut.edu.au/assumed-knowledge
Total credit points: 384
Standard credit points per full-time semester: 48
Course coordinator: Michael Docherty (Games and Interactive Entertainment Major); Dr Tim Moroney (Mathematics Major)
Campus: Gardens Point

Course Overview
This double degree gives you the opportunity to use your problem-solving skills to develop realistic games in a competitive gaming environment. A decade ago, people probably wouldn't have noticed if the cape the game hero was wearing didn't flap in the wind as he ran, or that the boxes in the corner of the room of the dungeon didn't fall over when they are run into in a fight. Nowadays, serious gamers notice and demand this type of realism in their virtual worlds. This is where your maths and problem-solving capabilities come into play. Complex formulae are used in games design to create realistic scenes, and knowledge of mathematics will certainly aid your understanding.

Students undertake core units from both their Bachelor of Mathematics and Bachelor of Games and Interactive Entertainment. They can subsequently select from the strands of applied, computational, discrete and financial mathematics; mathematical modelling; operations research; scientific computation and visualisation; statistics and statistical modelling in their Bachelor of Mathematics and from the majors of animation, digital media, game design or software technologies in their Bachelor of Games and Interactive Entertainment degree.

Career Outcomes
A graduate may find work in film and television special effects or in the games and interactive entertainment environments making games look more realistic (such as concept artist).

Professional Recognition
Membership of the Australian Mathematical Society, the Statistical Society of Australia and the Australian Society for Operations Research is available. This course is accredited by the Australian Computer Society (ACS). ACS accreditation is internationally recognised by the Seoul Accord.

Cooperative Education Program
The Faculty's Cooperative Education Program gives you the opportunity of 10-12 months paid industry placement during your course where you can integrate real experience with what you’re learning in your degree. Companies that QUT’s Coop Ed students have worked with include Energex, Boeing, CITEC, CSC Mining, Environmental Protection Agency, Dialog, UNiTAB, RACQ and many Queensland Government departments. The Coop Ed Program is available to Australian citizens and permanent residents only.

Find out more about the Cooperative Education Program.

Limits on grades of 3
A new policy concerning grades of 3 came into effect from 1 January 2009 (QUT MOPP C/5.2). With effect from this date grades of 3 are no longer considered a conceded or low pass but are classified as a fail grade. Any grades of 3 awarded prior to 1 January 2009 retain the conceded pass status and will be counted for graduation purposes up to the maximum number of grades of 3 permitted for your course. Grades of 3 incurred in units that commence after 1 January 2009 will not count towards your degree. Further information is available on the Student Services website

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

Games and Interactive Entertainment
Michael Docherty
Phone: +61 7 3138 2782
Email: enquiry.scitech@qut.edu.au
Mathematical Sciences
Dr Tim Moroney
Phone: +61 7 3138 2262
Email: t.moroney@qut.edu.au

Financial Support
You should consider applying for an industry-sponsored mathematics bursary to help you financially throughout your studies. For further information visit Scholarships.

Deferrment
Domestic students can defer their offer in this course for one year. In exceptional circumstances up to 12 months of additional deferment may be granted.

Find out more on deferment.

Course Structure for Students with Four Semesters of Senior Mathematics B and Senior Mathematics C

Year 1, Semester 1
INB180 Computer Games Studies
INB182 Introducing Design
MAB121 Calculus and Differential Equations
MAB122 Algebra and Analytic Geometry

Year 1, Semester 2
INB181 Introduction to Games Production
INB104 Building IT Systems
MAB101 Statistical Data Analysis 1
MAB220 Computational Mathematics 1

Year 2, Semester 1
INB103 Industry Insights
Games & Interactive Entertain Major Unit
MAB210 Statistical Modelling 1
MAB312 Linear Algebra

Year 2, Semester 2
Games & Interactive Entertain Major Unit
Games & Interactive Entertain Major Unit
Level 2 or 3 Maths Unit
Level 2 or 3 Maths Unit

Year 3, Semester 1
Games & Interactive Entertain Major
Games & Interactive Entertain Major
MAB311 Advanced Calculus

Year 3, Semester 2
Games & Interactive Entertain Major
Games & Interactive Entertain Major
Level 2 or 3 Maths Unit
Level 2 or 3 Maths Unit

Year 4, Semester 1
INB379 Game Project Design
Games & Interactive Entertain Major
Level 2 or 3 Maths Unit
Level 2 or 3 Maths Unit

Year 4, Semester 2
INB380 Games Project
Level 2 or 3 Maths Unit
Level 2 or 3 Maths Unit

Course Structure for Students with Four Semesters of Senior Mathematics B Only

Year 1, Semester 1
INB180 Computer Games Studies
INB182 Introducing Design
MAB101 Statistical Data Analysis 1
MAB120 Algebra and Calculus

Year 1, Semester 2
INB181 Introduction to Games Production
INB104 Building IT Systems
MAB121 Calculus and Differential Equations
MAB122 Algebra and Analytic Geometry

Year 2, Semester 1
INB103 Industry Insights
Games and Interactive Entertain Major Unit
MAB220 Computational Mathematics 1
MAB312 Linear Algebra

Year 2, Semester 2
MAB202 Computational Mathematics 2

Year 3, Semester 1
Games and Interactive Entertain Major
Games and Interactive Entertain Major
MAB311 Advanced Calculus

Year 4, Semester 2
Games and Interactive Entertain Major
Games and Interactive Entertain Major
Level 2 or 3 Maths Unit
### Mathematics Units

<table>
<thead>
<tr>
<th>Year 3, Semester 1</th>
<th>Games and Interactive Entertain Major Unit</th>
<th>Games and Interactive Entertain Major Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAB311</td>
<td>Advanced Calculus</td>
<td>Level 2 or 3 Maths Unit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3, Semester 2</th>
<th>Games and Interactive Entertain Major Unit</th>
<th>Games and Interactive Entertain Major Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level 2 or 3 Maths Unit</td>
<td>Level 2 or 3 Maths Unit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4, Semester 1</th>
<th>INB379 Game Project Design</th>
<th>Games and Interactive Entertain Major Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Level 2 or 3 Maths Unit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4, Semester 2</th>
<th>INB380 Games Project</th>
<th>Level 2 or 3 Maths Unit</th>
</tr>
</thead>
</table>

### Potential Careers:

Actuary, Computer Game Programmer, Market Research Manager, Mathematician, Quantitative Analyst, Statistician.

### UNIT SYNOPSISES

**INB103 INDUSTRY INSIGHTS**

This unit aims to develop your awareness of the career possibilities in the ICT industry and to equip you with some of the essential skills required of an ICT professional. The unit helps you to derive a roadmap for your career; to enable you to identify the qualities, skills and interests you need to possess, to plan your career path. The unit will also introduce you the inter-disciplinary nature of ICT careers.

**Equivalents:** ITB002  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1 and 2011 SEM-2

**INB104 BUILDING IT SYSTEMS**

Today’s modern integrated technology is built on IT systems which run in a range of contexts (e.g. mobile computing, robotics, and web-based systems) using a range of technological solutions such as programming and scripting, databases, web development and network programming. This unit is an integrated introduction to information technology designed to engage, inspire and inform and will demonstrate the important role that technical system design and development plays in achieving robust operation of a large variety of technological solutions. This unit will give you substantial hands-on, practical learning experiences and will motivate you through engagement in the creative, explorative and meaningful development of technological artefacts that operate in real world contexts.

**Equivalents:** ITB001  
**Credit points:** 12  
**Contact hours:**
3 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1 and 2011 SEM-2

**INB180 COMPUTER GAMES STUDIES**
This unit is designed to give you a clear understanding of the socio-cultural issues that affect the computer game industry. Through critical review of games and games industry literature, playing games and actively participating in classroom discussion you will develop your capacity to join in the discourse about the design, impact and future direction of computer games in our society.

**Antirequisites:** INN180, ITB750  **Credit points:** 12  **Contact hours:** 3 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1

**INB181 INTRODUCTION TO GAMES PRODUCTION**
This subject will provide you with knowledge and skills in games production. By gaining an overview of the production process, you will learn how the technology and the people involved integrate into a coherent and efficient manufacturing process. By the end of this subject you will have the knowledge to conceive, create, integrate and optimise tools and personnel into a complete games production system.

**Antirequisites:** INN181  **Equivalents:** ITB751, ITN751  **Credit points:** 12  **Contact hours:** 3 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-2

**INB182 INTRODUCING DESIGN**
Please note: this unit is only available to BGIE (Bachelor of Games and Interactive Entertainment) students. The act of designing is a common link between many disciplines such as game design, software design, animation and character design, architecture, industrial design, etc. This unit offers a broad and generic introduction to the act of designing in a discipline context free environment.

This unit is designed to expose you to a range of experiences not possible within the confines of the usual university routine. It also calls upon you to exert physical and mental efforts that may be different in degree and nature to your usual coursework. Through these opportunities this unit seeks to introduce you the ways of thinking like a designer.

**Antirequisites:** DEB101  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1

**INB379 GAME PROJECT DESIGN**
INB379 BGIE Game Project Design (P1) extends your work on the role, design, and plan of a computer game concept. The unit covers the conceptualisation and game design stages up to the game design pitch. If the project is given a green light by the assessment panel, it may be developed later in the P2 unit.

**Prerequisites:** Completion of 144 credit points of study  **Antirequisites:** ITB009  **Assumed knowledge:** Completion of at least 144 credit points of IT04 units, including including all first year core units is assumed  **Credit points:** 12  **Contact hours:** 1 hour lecture - 2 hour supervisor meetings  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1 and 2011 SEM-2

**INB380 GAMES PROJECT**
This unit seeks to give you the opportunity to apply, under appropriate guidance, the knowledge and skills gained in your course to date and to execute a substantial related project. The unit also aims to allow you to develop the critical professional skills of working within a cross-disciplinary team and, through implementation of your project, develop the understanding of the role of careful planning, scope control and task management in ensuring that the project is successful.

**Prerequisites:** INB379 or INB305  **Antirequisites:** ITB020  **Assumed knowledge:** Students undertaking this unit must be enrolled in the Bachelor of Games and Interactive Entertainment  **Credit points:** 24  **Contact hours:** 3 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1 and 2011 SEM-2

**MAB101 STATISTICAL DATA ANALYSIS 1**
Experiments, observational studies, sampling, and polls; data and variables; framework for describing and manipulating probability; independence; Binomial and Normal distributions; population parameters and sample statistics; concepts of estimation and inference; standard error; confidence intervals for means and proportions; tests of hypotheses on means and proportions (one sample and two independent samples); inference using tables of counts; modelling relationships using regression analysis; model diagnosis; use of statistical software.

**Antirequisites:** BSB123, EFB101, MAB141, MAN101, MAB233  **Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics B (or equivalent) or MAB105 is assumed knowledge.  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SUM-2, 2011 SEM-1 and 2011 SEM-2

**MAB120 ALGEBRA AND CALCULUS**
This unit introduces and reviews the elementary concepts of function, calculus, matrices and vectors with special reference to applications in science, technology and business where appropriate. Topics covered include the algebra of complex numbers, elementary functions (polynomial, trigonometric, exponential and logarithmic) and...
their properties, differentiation and integration methods and principles, geometric and algebraic applications of vectors and the solution of linear systems using matrices. **Antirequisites:** MAN120  **Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics B (or equivalent) or MAB105 is assumed knowledge  **Equivalents:** MAB100, MAB125, MAB180  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1, 2011 SEM-2 and 2011 SUM

MAB210 STATISTICAL MODELLING 1  This unit is intended for all mathematics degree students, all double degree students with mathematics, secondary education students with mathematics as a teaching area, and quantitatively-oriented students in other courses, particularly in Science, Information Technology, Engineering and areas of Business. The unit will provide you with fundamental skills and operational knowledge for all further study in statistics, and highly relevant foundations for other areas of mathematics such as mathematical modelling and operations research. The unit will also help you develop fundamental problem-solving skills in statistics and mathematics.  **Prerequisites:** MAB121 or MAB122  **Antirequisites:** MAN210  **Assumed knowledge:** Grade of Sound Achievement in Senior Mathematics C (or equivalent) or MAB120 is assumed knowledge. Students are advised to enrol in either MAB121 or MAB122 in the same semester if not previously completed.  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1 and 2011 SEM-2

MAB220 COMPUTATIONAL MATHEMATICS 1  Many real world problems are not solvable analytically, meaning that it is necessary to develop computational methods that can be used to solve these problems. Additionally, to be able to apply these methods to large problems, they must be implemented as algorithms in a computer language such as MATLAB. This unit addresses both the theoretical development of computational methods and their implementation in MATLAB. The aim of this unit is to provide you with the introductory concepts, computational techniques and programming skills that will allow you to solve many real world problems. It is also designed to prepare you for study in the advanced units in computational mathematics.  **Antirequisites:** MAB120 is assumed knowledge. Students are advised to enrol in either MAB121 or MAB122 in the same semester if not previously completed.  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1 and 2011 SEM-2

MAB311 ADVANCED CALCULUS  This unit includes the following: polar coordinates; parametric equations; conic sections; quadric surfaces; vector-valued functions; Fourier series; functions of several variables; graphs; partial derivatives; total derivatives; extrema; Lagrange multipliers; Taylor series for multivariable functions; double and triple integrals; Green's theorems; line and surface integrals; divergence theorem; Stoke's theorem; applications.  **Prerequisites:** (MAB111 or MAB121) and (MAB112 or MAB122)  **Credit points:** 12  **Contact hours:** 4 per week
Campus: Gardens Point  Teaching period: 2011 SEM-1

MAB312 LINEAR ALGEBRA
This unit covers the following broad topics from linear algebra: matrix analysis; eigenvalues and eigenvectors; vector spaces; inner product spaces.
Prerequisites: (MAB111 or MAB121) and (MAB112 or MAB122)  Antirequisites: MAN312  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

MAB313 MATHEMATICS OF FINANCE
Finance provides one of the significant areas for the application of mathematics. Understanding the fundamental principles involved will enhance your general preparation for life and provide an essential tool for those of you who intend to pursue further studies or careers in the financial area. The aim of this unit is to provide you with an introduction to the methods used in obtaining relevant solutions to financial and business problems.
Prerequisites: MAB111 or MAB121 (which can be concurrently enrolled)  Antirequisites: MAN313  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

MAB314 STATISTICAL MODELLING 2
This unit includes: models for stochastic processes and statistical methods, which have applications in engineering, information technology, finance, and physical and life sciences. Markov chains; random walks; branching processes; queuing processes; long-term behaviour of processes; use of generating functions; bivariate and conditional distributions; transformations of random variables; beta and gamma distributions; mixture distributions; order statistics, minimum and maximum.
Prerequisites: MAB112 and MAB210  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

MAB315 OPERATIONS RESEARCH 2
This unit introduces the essential features of operations research methods. It develops a number of basic mathematical techniques to solve generic problems and the theoretical foundations of these techniques. Students should develop the ability to apply various operations research methods, algorithms and techniques in the solution of practical problems. Students will also look at the applications of operations research techniques to real-world problems.
Prerequisites: MAB210 and (MAB112 or MAB122)  Antirequisites: MAN315  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

MAB413 DIFFERENTIAL EQUATIONS
Differential Equations are among the most important aspects of the theoretical developments of any branch of science. It is often the case that the formulation of mathematical models of real world problems leads to an equation in which a function and its derivatives play a major role. Such equations are examples of differential equations. This unit builds on studies of differential equations in first year and provides a framework for studying partial differential equations and other aspects of applied mathematics in later semesters.
Prerequisites: MAB311 or MAB312  Antirequisites: MAN413  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

MAB414 APPLIED STATISTICS 2
This unit includes: Simple linear regression (revision), multiple linear regression, making inferences from regressions, choosing a model, checking model assumptions, general linear models - analysis of covariance, ANOVA revisited, designing experiments, issues in designing experiments, analysing experimental results, further experimental designs, assumptions, and how to cope if they aren't met, simulations.
Prerequisites: MAB101  Assumed knowledge: MAB112 is recommended prior study  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

MAB420 COMPUTATIONAL MATHEMATICS 2
This unit provides you with the opportunity to employ a number of the skills that you have developed in the disciplines of computational mathematics and linear algebra, combining them in a coherent manner for resolving topical and relevant real world problems. You will become familiar with the methodologies for developing numerical algorithms that can be employed for either the direct solution or the iterative solution of large, sparse linear systems.
Prerequisites: MAB220 and MAB312  Antirequisites: MAN420  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

MAB422 MATHEMATICAL MODELLING
In this unit you will develop skills in the formulation and interpretation of mathematical models of 'real-world' problems drawn from the literature, the media and the lecturer's own research areas. You will also develop and extend your skills in the use of mathematical software to investigate solutions of some of these models. By emphasising the need to write clear mathematical arguments and to explain in logical and clear English the conclusions drawn from the mathematical models developed in the unit, you will also develop your written
MAB461 DISCRETE MATHEMATICS
Discrete mathematics is playing an ever increasingly important role in society. We live in an electronic age where information security is of paramount importance, and it is discrete mathematics in the main that provides this security. In addition, many real world systems are discrete in nature and therefore lend themselves to a discrete analysis. These methods are therefore vital to the professional mathematician and useful to those with an interest in mathematics. This second level unit will provide you with an introduction to discrete and combinatorial mathematics, and give you a mathematical perspective that is different from the traditional coverage in other mathematics units. It will also provide you with valuable methods to apply in other areas of science and computer science.

Prerequisites: MAB112 or MAB122  Credit points: 12
Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

MAB480 INTRODUCTION TO SCIENTIFIC COMPUTATION
This unit teaches students how to implement a mathematical algorithm in a modern scientific computing environment (eg Matlab). A case-study approach is used with an emphasis on writing efficient code. Also an overview of other software packages used in mathematics will be given.

Prerequisites: ITB849  Credit points: 12
Contact hours: 4 per week  Campus: Gardens Point

MAB521 APPLIED MATHEMATICS 3
This unit includes: partial differential equations such as the wave, heat and Laplace equations; special functions (gamma, delta, Bessel and error functions, Legendre polynomials); vector analysis and applications (vector algebra, vector calculus, fields, grad, div, curl, line and surface integrals, divergence theorem, Stoke's theorem, applications); functions of a complex variable (analytic functions, contour integrals, Laurent series, residues).

Prerequisites: MAB311  Credit points: 12
Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

MAB522 COMPUTATIONAL MATHEMATICS 3
This unit includes: deriving the basic equations that describe fluid motion: the finite volume method for solving PDEs (application to the generalised diffusion equation, cell-centred and vertex-centred schemes, handling of boundary and initial conditions); solution of systems of nonlinear equations (Newton's method, Inexact Newton methods, Globally convergent methods).

Prerequisites: MAB311 and MAB420  Antirequisites: MAB523  Credit points: 12
Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

MAB524 STATISTICAL INFERENCE
This unit includes: maximum likelihood estimation, confidence intervals and hypothesis tests, introduction to Bayesian inference, prior and posterior distributions, Bayesian inference for binomial data, Poisson count data and normal data, simulation techniques for sampling from distributions. Use of software Matlab and R.

Prerequisites: MAB314  Credit points: 12
Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

MAB525 OPERATIONS RESEARCH 3A
This unit develops problem-solving skills and sharpens analytical skills. This unit introduces the technical issues involved in applying operations research principles, methods and algorithms in the solution of real-world problems.

Prerequisites: MAB315  Antirequisites: MAB525  Credit points: 12
Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

MAB533 STATISTICAL TECHNIQUES
This unit builds on your knowledge and skills of statistical techniques and aims to provide you with an understanding and a working knowledge of some more specialised statistical techniques and their applications. Topics covered include quality management concepts and tools for statistical process control, modelling and analysis of reliability (for inanimate objects) and survival (for living entities), and multivariate techniques such as principal components analysis, discriminant analysis and cluster analysis.

Prerequisites: MAB210 and MAB414  Antirequisites: MAB523  Credit points: 12
Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

MAB536 TIME SERIES ANALYSIS
Data in business, economics, engineering and the natural sciences often occur in the form of time series. Time Series Analysis provides models and methods for the analysis of such series of correlated observations. The ability to forecast optimally, to understand causal relationships between variables, and to analyse dynamic systems is of great practical importance. For example, optimal sales forecasts are needed for business planning, transfer function models are needed for improving the design and control of a process plant, and vector time series models
are used to represent the relationships and interactions of macroeconomic variables in an economy. This unit is concerned with the building of time series models and the use of such models for practical applications such as optimal forecasting, simulation, causality analysis, and analysis of dynamic systems.

**Prerequisites:** MAB314 and MAB414

**Antirequisites:** MAB613

**Credit points:** 12

**Contact hours:** 4 per week

**Campus:** Gardens Point

**Teaching period:** 2011 SEM-2

**MAB613 PARTIAL DIFFERENTIAL EQUATIONS**

Partial differential equations are the classical foundation of mathematical models used to unambiguously describe processes exhibiting spatial and temporal variation. There exist numerous modern important examples of such so-called continuum models and so it is essential that any practising mathematician be conversant with both the background, formulation and solution of such equations. This unit aims to develop your understanding of the construction, analysis, solution and interpretation of partial differential equation models of real-world processes.

**Prerequisites:** MAB311 and MAB413

**Antirequisites:** MAB422

**Credit points:** 12

**Contact hours:** 4 per week

**Campus:** Gardens Point

**Teaching period:** 2011 SEM-2

**MAB623 FINANCIAL MATHEMATICS**

This unit includes the following: quantitative techniques in business, economics and finance; theory and structure of interest rates; general accumulation and discounting functions; force of interest; discounting including Modern Portfolio theory and extension; varying interest; general annuities; varying annuities; continuous varying annuities; mathematical analysis of financial transactions in money and capital markets; life annuities and life assurances; the life table; basic life table functions; life annuities and assurances; policy values; paid up policy values; changes to policies; use of life table; superannuation.

**Prerequisites:** MAB313 and MAB311

**Credit points:** 12

**Contact hours:** 4 per week

**Campus:** Gardens Point

**Teaching period:** 2011 SEM-2

**MAB624 APPLIED STATISTICS 3**

Applied statistics provides methods for investigating relationships between variables that arise in data from a variety of areas including science, technology and commerce. The planning of the collection of the data, using ideas of experimental design, and the analysis of the resulting data, using methods based on statistical inference, are fundamental aspects of the statistical process. In addition, communication of results with clear reporting of the conclusions of the analysis is very important. These activities are an important part of decision making processes whatever the context of the application. This unit aims to build on the introductory experimental design and statistical analysis methods presented to you in Applied Statistics 2 in order to introduce modern statistical methods. Additionally, the use of statistical software to carry out analyses and the reporting of conclusions are emphasised.

**Prerequisites:** MAB414

**Antirequisites:** MAN624

**Credit points:** 12

**Contact hours:** 4 per week

**Campus:** Gardens Point

**Teaching period:** 2011 SEM-2

**MAB625 OPERATIONS RESEARCH 3B**

Operations research techniques are used in most industries that are concerned with the application of scientific methods in decision making, especially the allocation of resources. There is thus a need for graduate students who can make decisions on the most appropriate technology to solve a particular problem and implement it. This unit will build on the foundation of previous Operations Research units to develop knowledge and skills in using advanced techniques, tools and methods.

**Prerequisites:** MAB315

**Equivalents:** MAN625

**Credit points:** 12

**Contact hours:** 4 per week

**Campus:** Gardens Point

**Teaching period:** 2011 SEM-2

**MAB640 INDUSTRY PROJECT**

In a holistic and systematic approach to problem solving, it is important that you learn to apply analytical methods and quantitative techniques encountered in a classroom environment to real world issues in industry. The aim of this unit is to allow you to utilise your knowledge of problem solving procedures and develop your communication and interactive skills by completing a specified project in industry under controlled supervision, providing a summary of your findings in a seminar and presenting a formally written detailed report.

**Other requisites:** Unit coordinator approval is required to enrol

**Credit points:** 24

**Campus:** Gardens Point

**Teaching period:** 2011 SEM-1 and 2011 SEM-2

**MAB672 ADVANCED MATHEMATICAL MODELLING**

Models are developed beginning with the description of ‘real world’ problems. Emphasis is on the mathematical modelling and not on the development of new mathematical techniques. The unit includes: mathematical modelling; model formulation; dimensional analysis and re-scaling; curves of pursuit; bungy jumping; modelling with systems of ordinary differential equations; phase plane methods for analysing systems of ODEs; bacterial growth in a chemostat; predator-prey models with harvesting; limit cycles; oscillations and excitable media; modelling with partial differential equations; motion of a continuum; continuity; traffic flow; aggregation of slime mould amoebae; momentum; ideal gas dynamics; quasi-linear PDEs.

**Prerequisites:** MAB422

**Antirequisites:** MAN672

**Assumed knowledge:** MAB311. Also recommend: MAB413

**Credit points:** 12

**Contact hours:** 4 per week

Page 8/9
Campus: Gardens Point  Teaching period: 2011 SEM-1