Bachelor of Information Technology/Bachelor of Mathematics (IX57)

Year offered: 2010
Admissions: Yes
CRICOS code: 059226F
Course duration (full-time): 4 Years
Domestic fees (indicative): 2010: CSP $2,850 (indicative) per semester
International Fees (indicative): 2010: $11,000 (indicative) per semester
Domestic Entry: February
International Entry: February
QTAC code: 419552
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.studentservices.qut.edu.au/apply/ug/info/knowledge.jsp
Total credit points: 384
Course coordinator: Mr Richard Thomas (Information Systems), Dr Tim Moroney (Mathematical Sciences)
Campus: Gardens Point

Course Description
The double degree offers a foundation in mathematics and information technology in the first year. You will then select integrated strands combining units from the areas of applicable mathematics, computational mathematics, operations research, statistics, or financial mathematics with a combined major in Data Communications and Software Engineering.

This degree equips you to build and apply creative, innovative IT solutions across diverse industries. A hands-on, real world based curriculum gives you the opportunity to explore a wide range of areas within the two strands of this degree, and gain deep understanding within your chosen area speciality, such as networking, software engineering, data warehousing, business process modelling, enterprise systems, information management, web technologies, or digital societies. You will experience an innovative, hands-on approach to learning through projects where you develop IT systems. You will be able to gain entrepreneurial skills if you wish to learn how to develop an idea into a commercial opportunity. You learn to harness your creativity and people skills to maximise the impact of your technical know-how in the booming IT marketplace. It positions you for a challenging and rewarding career within the global economy. Full-time students are eligible for the Cooperative Education Program; paid industry work experience with credit towards your degree. Students are also offered many other work-integrated learning opportunities where you receive first-hand industry experience.

Career Outcomes
IT is now an integral part of all commercial, industrial and government activities. A graduate may find employment as a programmer, software engineer, systems programmer, computer scientist, systems analyst, security analyst, data communications specialist, information manager, electronic commerce developer, games developer, multimedia specialist, network administrator, database manager, web developer, mathematician, or statistician.

Study Areas
IX57 will not have nominated majors and minors and consequently there will not be a Study Area A shown on a graduate’s parchment. Instead, IX57 will have specialisations. The specialisation areas that will be available for students will include:
- Business Process Management
- Data Warehousing
- Digital Societies
- Enterprise Systems
- Information Management
- Network Systems
- Software Engineering
- Web Technologies

Professional Recognition
On graduation, you will be eligible for membership of the Mathematical Society of Australia (MSA), the Statistical Society of Australia (SSA) and, depending on unit selection, the Australian Society for Operations Research (ASOR). Graduates of the Bachelor of Information Technology meet the knowledge requirement for admission to the Australian Computer Society (ACS).

Entry Requirements
Year 12 or equivalent
Prerequisites: Nil
Primary Fields: C
Secondary Fields: B

International Students
English language requirements
In addition to the above academic entry requirements, international students must meet the University’s English language requirements of IELTS of 6.5 (with no lower than 6.0 for any one band).
Pathways to Further Studies
In 2001, an accelerated Honours program was introduced to increase the number of Bachelor of Information Technology students continuing their studies to complete the Honours year. The program allowed selected high achieving students the opportunity to undertake one postgraduate unit in the final semester of their a BIT degree (or double degree) which would be counted both for completion of the degree and towards the Honours program. The program also provided students with the opportunity to commence their Honours studies over the Summer Semester.

An alternative to the Honours program is the Master of Information Technology (Research). Students who complete a BIT degree (or double degree) with a grade point average equal to, or greater than 5 (7 point scale) and who have decided against enrolling in an Honours program, could undertake this course. In addition, students may wish to enrol in the re-designed postgraduate coursework Masters which has ten specialisations allowing students to either extend their area of interest or specialise in other areas at the Masters level.

Cooperative Education
The School of IT’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.

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

Information Systems Coordinator
Mr Richard Thomas
Phone: +61 7 3138 2782
Email: enquiry.scitech@qut.edu.au

Mathematical Sciences Coordinator
Dr Tim Moroney
Phone: +61 7 3138 2262
Email: t.moroney@qut.edu.au

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

<table>
<thead>
<tr>
<th>Year 1, Semester 1</th>
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<tbody>
<tr>
<td>INB101 Impact of IT</td>
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<td>INB102 Emerging Technology</td>
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<td>MAB121 Calculus and Differential Equations</td>
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<td>MAB122 Algebra and Analytic Geometry</td>
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<th>Year 1, Semester 2</th>
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<tr>
<td>INB103 Industry Insights</td>
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<td>INB104 Building IT Systems</td>
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<td>MAB210 Statistical Modelling 1</td>
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<td>MAB220 Computational Mathematics 1</td>
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<th>Year 2, Semester 1</th>
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<tr>
<td>IT Breadth Unit Option</td>
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<tr>
<td>MAB101 Statistical Data Analysis 1</td>
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<td>MAB312 Linear Algebra</td>
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<th>Year 2, Semester 2</th>
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<tr>
<td>IT Breadth Unit Option</td>
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<td>Level 2 or 3 Maths Unit</td>
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<th>Year 3, Semester 1</th>
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<td>INB201 Scalable Systems Development</td>
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<td>MAB311 Advanced Calculus</td>
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<td>Level 2 or 3 Maths Unit</td>
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<tr>
<th>Year 3, Semester 2</th>
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<tr>
<td>INB300 Professional Practice in IT</td>
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<td>Level 2 or 3 Maths Unit</td>
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<tr>
<th>Year 4, Semester 1</th>
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<td>INB301 The Business of IT</td>
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<td>IT Specialisation Unit Option</td>
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<td>Level 2 or 3 Maths Unit</td>
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<tr>
<th>Year 4, Semester 2</th>
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<tr>
<td>INB302 Capstone Project</td>
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### Course Structure for Students with Four Semesters of Senior Mathematics B Only

#### Year 1, Semester 1
- INB101 Impact of IT
- INB102 Emerging Technology
- MAB101 Statistical Data Analysis 1
- MAB120 Algebra and Calculus

#### Year 1, Semester 2
- INB103 Industry Insights
- INB104 Building IT Systems
- MAB121 Calculus and Differential Equations
- MAB122 Algebra and Analytic Geometry

#### Year 2, Semester 1
- IT Breadth Unit Option
- MAB220 Computational Mathematics 1
- MAB312 Linear Algebra

#### Year 2, Semester 2
- IT Breadth Unit Option
- MAB210 Statistical Modelling 1

#### Year 3, Semester 1
- INB201 Scalable Systems Development
- MAB311 Advanced Calculus

#### Year 3, Semester 2
- INB300 Professional Practice in IT

#### Year 4, Semester 1
- INB301 The Business of IT

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### Mathematics Units

#### Level 2 Units
- MAB311 Advanced Calculus
- MAB312 Linear Algebra
- MAB313 Mathematics of Finance
- MAB314 Statistical Modelling 2
- MAB315 Operations Modelling 2
- MAB413 Differential Equations
- MAB414 Applied Statistics 2
- MAB420 Computational Statistics 2
- MAB422 Mathematical Modelling
- MAB461 Discrete Mathematics
- MAB480 Introduction to Scientific Computation
- MAB481 Visualisation and Data Analysis

Note: MAB311 Advanced Calculus and MAB312 Linear Algebra are mandatory units.

#### Level 3 Units - at least 4 units must be selected
- MAB521 Applied Mathematics 3
- MAB522 Computational Mathematics 3
- MAB524 Statistical Inference
- MAB525 Operations Modelling 3A
- MAB533 Statistical Techniques
- MAB536 Time Series Analysis
- MAB613 Partial Differential Equations
- MAB623 Financial Mathematics
- MAB624 Applied Statistics 3
- MAB625 Operations Modelling 3B
- MAB640 Industry Project
- MAB672 Advanced Mathematical Modelling
- MAB681 Advanced Visualisation and Data Analysis

Note: MAB523 Introduction to Quality Management and MAB621 Discrete Mathematics do not contribute to the mandatory 48 credit points minimum from Level 2 or 3 Maths Unit.
Level 3 Mathematics units.

**IT Breadth Option Unit List**

**IT Breadth Option Units**

You must complete four (4) units from the following list. You should not commence these units until you have completed INB101, INB102, INB103 and INB104.

- INB120 Corporate Systems
- INB210 Databases
- INB220 Business Analysis
- INB250 Systems Architecture
- INB251 Networks
- INB255 Security
- INB270 Programming
- INB271 The Web
- INB272 Interaction Design

**IT Specialisation Option Unit List**

**IT Specialist Option Units**

You must complete four (4) units from the following list. Please ensure you have completed a minimum of 36 credit points (3 units) of IT Breadth Option Units before commencing these units. The units are grouped in areas to assist you in focusing your studies.

1. **BUSINESS PROCESS MANAGEMENT:**
   - INB320 Business Process Modelling
   - INB321 Business Process Management
   - INB322 Information Systems Consulting
   - INB123 Project Management Practice

2. **DATA WAREHOUSING:**
   - INB340 Database Design
   - INB341 Software Development With Oracle
   - INB342 Enterprise Data Mining
   - INB343 Advanced Data Mining and Data Warehousing
     
     Please note: INB343 not offered in 2010

3. **DIGITAL ENVIRONMENTS:**
   - INB345 Mobile Devices
   - INB346 Enterprise 2.0
   - INB347 Web 2.0 Applications
   - INB335 Information Resources

4. **ENTERPRISE SYSTEMS:**
   - INB123 Project Management Practice
   - INB221 Technology Management
   - INB311 Enterprise Systems
   - INB312 Enterprise Systems Applications
   - INB350 Internet Protocols and Services
   - INB351 Computer Network Administration
   - INB352 Network Planning and Deployment
   - INB353 Wireless and Mobile Networks
   - INB355 Cryptology and Protocols
   - INB365 Systems Programming
   - INB860 Computational Intelligence for Control and Embedded Systems
   
   Please note: INB343 & INB323 are not offered in 2010

**Potential Careers:**

Actuary, Computer Game Programmer, Data Communications Specialist, Database Manager, Market Research Manager, Mathematician, Network Administrator, Network Manager, Programmer, Quantitative Analyst, Software Engineer, Statistician, Systems Analyst.

**UNIT SYNOPSES**

Information for future students
Published on : 16 May 2011
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INB101 IMPACT OF IT
You will gain an appreciation of the massive and positive impact that IT has had on a wide range of fields including business, science, engineering, education and health. You will learn about the benefits of increased productivity due to IT. You will consider ethical issues and possible negative impacts of IT. You will raise your awareness of the social implications of IT systems for society at the global, local and personal levels. You will develop an informed position on issues, and justify your reasoning with considered supportive arguments.

Antirequisites: ITB361, INN101  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1 and 2010 SEM-2

INB102 EMERGING TECHNOLOGY
The aim of this unit is to provide you with a conceptual framework so that you clearly identify Information Technologies and their purpose. This task will be fun as it covers a wide spectrum of ideas and allows us to examine some currently popular technologies. Information Technology has become so entwined with everyday life that identifying its scope is difficult, which also makes it difficult to identify opportunities where IT might further infiltrate into our daily lives for work and play. To achieve these aims, the unit introduces you to some of the theories and engineering practicalities that have already resulted in technological advances in the area of information technology. Concepts leading to existing technologies are introduced during lectures, which are followed by laboratory sessions where students will be encouraged to discuss social change, future information tools and explore the concepts required for constructing these technologies.

Antirequisites: ITB360  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1 and 2010 SEM-2

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.

Antirequisites: ITB005  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1 and 2010 SEM-2

INB104 BUILDING IT SYSTEMS
This team-based 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.

Antirequisites: ITB001  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1 and 2010 SEM-2

INB120 CORPORATE SYSTEMS
Corporate Systems Management is a growing area where people can make a difference to the way organisations and societies operate. In key business domains, such as Government, Health, Finance, Utilities and Primary Industries, Corporate Systems Managers play a vital role in directing the socio-technical systems that affect everyone's lives. This unit will help students to gain an overview of these major roles and key business domains in order to set the scene for their future studies and help them to match their emerging professional interests with potential career directions.

Antirequisites: ITB360  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1

INB123 PROJECT MANAGEMENT PRACTICE
Successful businesses use Project Management (PM) processes to structure the implementation, upgrades and process improvement activities undertaken within organisations. This unit investigates project management processes and analyses, combines and applies the basic elements and tools of successful projects to ICT cases. With a focus on contemporary organisations, the unit covers activities such as communication and risk management, change management, recording keeping and project reporting. The unit covers practical, relevant and topical PM issues delivered as a complex project activity.

Antirequisites: INN500  Assumed knowledge: Completion of 48 credit points of an Undergraduate study is assumed knowledge.  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

INB201 SCALABLE SYSTEMS DEVELOPMENT
TBA

Prerequisites: (INB102 or ITB005) and (INB104 or ITB001)  Assumed knowledge: Completion of 36cp of Breadth
units is assumed knowledge Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1

INB204 SPECIAL TOPIC 1
This unit gives you the opportunity to apply, under appropriate guidance, the knowledge and skills gained in your course to date and to execute a substantial development project. The ability to apply technical knowledge and skills to real-life situations is essential for information technology professionals. A substantial project, under academic supervision, will develop your initiative and ability to apply your knowledge and skills in a professional capacity. Completing the project will also enable you to appreciate the complementary nature of the course material in total, particularly the need for careful project management.

Prerequisites: INB371 Assumed knowledge: Knowledge of programming in Java, C# or C++. Knowledge of basic data structures (stacks, queues, trees, linked lists, hash tables), complexity analysis Credit points: 12 Contact hours: 3 per week Campus: Gardens Point

INB205 SPECIAL TOPIC 2
This unit gives you the opportunity to apply, under appropriate guidance, the knowledge and skills gained in your course to date and to execute a substantial development project. The ability to apply technical knowledge and skills to real-life situations is essential for information technology professionals. A substantial project, under academic supervision, will develop your initiative and ability to apply your knowledge and skills in a professional capacity. Completing the project will also enable you to appreciate the complementary nature of the course material in total, particularly the need for careful project management.

Prerequisites: INB255, INB351 and INB365 Assumed knowledge: Basic computer security knowledge, a good understanding of the use of Unix operating systems, computer networking and Programming experience (such as Python, C#, C, Java). Other requisites: Students must have completed 192 credit points towards their bachelor degree. Students must have a GPA of 5.5 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point

INB210 DATABASES
The aim of this unit is to help you develop your knowledge, understand a formal specification tool (ORM) for modelling information systems unambiguously and to apply this formal technique to conceptualise information systems found in many real world application domains.

Assumed knowledge: Students are expected to have solid IT background knowledge (e.g., completion of at least 192 credit points) Equivalents: ITB004, ITB115 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-2

INB220 BUSINESS ANALYSIS
This unit is aims to give you an introduction to the role, knowledge, and skills required of a business analyst. This unit focuses on both the trades—tools and methods used by a business analyst, as well as the soft skills—creativity and communication, both of which are critical to successful business and requirements analysis. Through lectures, cases studies and role playing activities, you will develop basic knowledge and skills required for introductory business analysis (BA).

Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1

INB221 TECHNOLOGY MANAGEMENT
This unit presents operational, tactical and strategic insights that support the activities central to the leadership and management of technology. These insights include project management, organisational leadership, planning, governance and millennium technologies. Such insights are used to inform decision-making - the core skill of any manager. Technology managers must understand the factors influencing any decision point. This unit equips students for the challenges of management and to contribute to the decision-making faced by managers and the staff who advise on these issues.

Prerequisites: INB103 or ITB002 or INB120 or ITB360 Antirequisites: ITN241, ITN251 and ITN366 Equivalents: ITB366, ITB241 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1

INB250 SYSTEMS ARCHITECTURE
Contemporary computer-based systems are built from a wide range of technologies working at different levels of abstraction, from microprocessor hardware, to operating system and application software, to entire communications networks. At each abstraction level different techniques are needed to support the emergent properties of the system. This unit introduces some of the foundational principles commonly used to reason about the behaviour of computer-dependent systems at different levels of abstraction. Such techniques are especially important in the context of safety-, security- or mission-critical systems.

Assumed knowledge: Basic familiarity with set theory (Venn diagrams and set operators), elementary algebra (polynomial and summation expressions, exponents and logarithms, etc) and simple probability concepts
INB251 NETWORKS
Computer systems and communications networks are essential to the activities of modern organisations. When you graduate from a course in Information Technology, employers expect you to have a sound understanding of the terminology and concepts of computer systems, communications networks, and network services. This unit provides you with an introductory study of communications network technologies and network applications. The unit serves as an entry point to further specialised studies in the field of computer network systems.

Antirequisites: ITB006 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-2

INB255 SECURITY
This unit aims to give you an understanding of the major issues in information security. You will be able to identify critical information security concepts and determine the information security implications of interactions between entities. You will have knowledge of a range of techniques for protecting information, and understand the limitations of these techniques. You will be aware of international information security management standards.

Antirequisites: ITB161, ITB523, ITB623 and ITN161 Equivalents: ITB730 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1

INB270 PROGRAMMING
This unit aims to give you a positive introduction to the skills required in solving computational problems and implementing solutions in a programming or scripting language. Although some theoretical aspects of computer programming are introduced briefly, the overall emphasis of the unit is programming practice. The unit emphasises generic programming concepts and related problem-solving strategies. The skills you learn in this unit will be applicable to a wide variety of commonly-used, industrially-significant programming and scripting languages.

Prerequisites: INB104 or ENB246 Antirequisites: ITB003, ITB112, ITB411, INN270 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-2

INB271 THE WEB
The aims of the unit are to give you a thorough understanding of what the web is, how it works and what it has to offer. Additionally, the unit aims to give you a general understanding and basic skills in developing dynamic web applications, including an appreciation of the variety of implementation technologies available. Through an understanding of how web technologies have evolved to date, you will appreciate the necessity for lifelong learning and become an insightful predictor of future developments in this area. You will learn to critically analyse technological alternatives in order to adapt to and innovate with technologies that presently do not exist. You will appreciate the business or organizational context within which web applications exist and be skilled in communicating within that environment. You will appreciate the social and ethical issues relating to web based systems including accessibility, globalization, privacy, and piracy.

Prerequisites: INB104 Antirequisites: INB373 and INN373 and ITB007 and ITB227 and ITN007 and ITN227 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1

INB272 INTERACTION DESIGN
The aim of this unit is to provide you with an understanding of the theory, practices and challenges associated with the development of creative interactive design and human computer interaction.

Prerequisites: INB103 or INB181 Equivalents: ITB254 Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-2

INB300 PROFESSIONAL PRACTICE IN IT
In this unit you will have the opportunity to experience real world work experiences and to reflect on how your studies have prepared you for the work environment. This will give you the opportunity to plan on how to best take advantage of your remaining studies to prepare for your planned career. To help you to understand your future career you will be working in a team and/or group environments, seeing firsthand the challenges and constraints that arise during professional practice in a real world industry environment. You will develop a richer appreciation of the graduate capabilities required of all information technology professionals, particularly skills such as communication, negotiation and problem-solving strategies.

Prerequisites: ITS020, INS010, INS011, INS012, INS020 Assumed knowledge: Completion of 168 credit points within BIT is assumed Credit points: 12 Contact hours: 3 per week Campus: Gardens Point Teaching period: 2010 SEM-1, 2010 SEM-2 and 2010 SUM

INB301 THE BUSINESS OF IT
As an IT professional you are more and more evaluated in terms of the business value that you produce. This unit will
prepare you for professional practice by making you “business savvy,” i.e. giving you the business knowledge and skills that will help you with your future career and job. In particular the unit will address three themes: (1) career planning and job applications, (2) entrepreneurship & innovation, and (3) business and IT strategy. You will be introduced to career development tools that enable you to self-manage your career and life. You will learn how to critically think about the requirements of a job and reflect upon your own experiences and learn how to communicate them. You will also learn about the entrepreneurial process of identifying a business opportunity and how to take advantage of that opportunity. In addition, you will gain an understanding of core strategic concepts and models, discuss typical strategy tools and then apply them to the ‘Business of IT’.

**Antirequisites:** ITB009  
**Assumed knowledge:** Completion of 120 credit points within BIT is assumed  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1 and 2010 SEM-2

**INB302 CAPSTONE PROJECT**

Students are to work together in a team of 4-5 on a project that addresses one of the following three types of problems: real business problems, real market needs, real research problems. This unit extends students’ development of the professional, technical and teamwork skills required by IT professionals in practice. Students will extend their knowledge and skills in the areas of IT project management through completing professional project documentation and managing the team project. Students will also gain a greater understanding and skill level in analysis and design, and their significance in delivering successful business or research outcome. The unit also focuses on furthering students’ professional skills in report writing, oral communication, and visual communication.  

**Prerequisites:** INB301  
**Assumed knowledge:** Students are expected to have a solid IT background knowledge (e.g., completion of at least 192 credit points)  
**Equivalents:** ITB010  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1, 2010 SEM-2 and 2010 SUM

**INB304 SPECIAL TOPIC 3**

Traditional Artificial Intelligence (AI) aims at satisfying the Turing test, that is, it aims at making computers indistinguishable from humans. Computer games AI aims at giving Non-Player Characters (NPC) behavioural artefacts that complement a game narrative. Computer game AI is a special area of study that deals with algorithmic approaches to entertainment affects in NPC. Students will develop in this unit an understanding of problems, solutions and algorithms that generally defines the current state of computer game AI. The aim of this unit is to provide students with an intermediate level course in computer game AI that involves a set of the most relevant algorithms and their applications in the interactive entertainment and game industries.

**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**INB305 SPECIAL TOPIC 4**

INB305 BGIE Project Design Phase (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:** INB371  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**INB306 PROJECT 1**

This unit gives you the opportunity to apply, under appropriate guidance, the knowledge and skills gained in your course to date and to execute a substantial development project. The ability to apply technical knowledge and skills to real-life situations is essential for information technology professionals. A substantial project, under academic supervision, will develop your initiative and ability to apply your knowledge and skills in a professional capacity. Completing the project will also enable you to appreciate the complementary nature of the course material in total, particularly the need for careful project management.

**Prerequisites:** INB101, INB102, INB103, INB104 and INB201  
**Assumed knowledge:** As a minimum requirement you must have completed at least 132 credit points of IT units, including INB101, INB102, INB103, INB104, INB201, four breadth units, and at least two specialisation units.  
**Equivalents:** ITB230  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1, 2010 SEM-2 and 2010 SUM

**INB307 PROJECT 2**

This unit gives you the opportunity to apply, under appropriate guidance, the knowledge and skills gained in your course to date and to execute a substantial development project. The ability to apply technical knowledge and skills to real-life situations is essential for information technology professionals. A substantial project, under academic supervision, will develop your initiative and ability to apply your knowledge and skills in a professional capacity.
capacity. Completing the project will also enable you to appreciate the complementary nature of the course material in total, particularly the need for careful project management.

**Assumed knowledge:** Assumed knowledge is completion of 192cp of which at least 144cp must be IT units  
**Equivalents:** ITB791  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1, 2010 SEM-2 and 2010 SUM

**INB308 PROJECT 3**  
This unit gives you the opportunity to apply, under appropriate guidance, the knowledge and skills gained in your course to date and to execute a substantial development project. The ability to apply technical knowledge and skills to real-life situations is essential for information technology professionals. A substantial project, under academic supervision, will develop your initiative and ability to apply your knowledge and skills in a professional capacity. Completing the project will also enable you to appreciate the complementary nature of the course material in total, particularly the need for careful project management.

**Assumed knowledge:** Assumed knowledge is completion of 192 credit points of which at least 14 credit points must be for IT units  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1, 2010 SEM-2 and 2010 SUM

**INB311 ENTERPRISE SYSTEMS**  
The unit presents and discusses the Enterprise Systems Lifecycle model, orienting students to the requirements of addressing total cost of ownership, change management requirements and process modelling requirements in order to achieve business benefits. Concepts of Enterprise Systems success and associated enablers and barriers are also introduced. This unit introduces the technical architecture of complex 3-tiered client server environments. It seeks to show how an integrated complex database environment meets common business needs, and yet fails to meet the total Information Systems requirements.

**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**INB312 ENTERPRISE SYSTEMS APPLICATIONS**  
The aim of this unit is to introduce one of the more complex and comprehensive Enterprise Systems applications. This unit introduces the business perspective and application processes of modules (such as FI, CO, PP, MM and S&D) and investigates the support provided by these systems and the integration between modules by following some of the major processes in a business. The unit enables you to experience both the business analyst view and the user's view of the system across a number of business processes.

**Antirequisites:** INN312  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**INB313 ELECTRONIC COMMERCE SITE DEVELOPMENT**  
This unit will enable you to specify, design, implement and maintain effective e-commerce applications. You will obtain a broad understanding of the potential of e-commerce and how it can be employed to benefit an organisation. You will get direct experience of creating an e-commerce storefront following a business to business (B to B) or business to consumer (B to C) model. You will also have an understanding of the computer systems that underpin e-commerce including payment systems and secure transactions.

**Equivalents:** ITB260  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**INB320 BUSINESS PROCESS MODELLING**  
The aim of this unit is to introduce you to modern methods and tools of business process management. These skills will be applied to the most complex, comprehensive and relevant IT applications. This unit also seeks to develop logical thinking and the capability to understand and deal with complex systems, within a business management framework. The content will focus strongly on business process modelling, as a fundamental technique to manage the complexity associated with process management tasks within various contexts.

**Equivalents:** ITB298  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**INB321 BUSINESS PROCESS MANAGEMENT**  
The aim of this unit is to introduce you to modern methodologies of Business Process Management. A main objective is to increase your awareness of the close link between business requirements and IT capabilities, and the related fundamental role of business processes. This unit also seeks to develop logical thinking, an appreciation for conceptual models, and the capability to understand and deal with complex systems.

**Antirequisites:** INN321  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1
INB322 INFORMATION SYSTEMS CONSULTING
The aim of the unit is to develop your skills in the consulting engagement process. This unit will give you an appreciation of the management of consulting practices and an understanding of the consulting sector generally. This unit presents the tactical and strategic issues involved in management consulting, and in particular: client engagement. In the unit there is an emphasis on Information Systems (IS) related work. IS constitutes a substantial portion of consulting activity and cuts across all areas of business expertise. The unit examines the dynamics of IS consulting within the context of large consulting firms and familiarises students with the consulting engagement lifecycle.

**Prerequisites:** INB210 or ITB004 or INB122
**Equivalent:** ITB264, ITN264
**Assumed knowledge:** Completion of 96 credit points of an Undergraduate study is assumed knowledge
**Credit points:** 12
**Contact hours:** 3 per week
**Campus:** Gardens Point
**Teaching period:** 2010 SEM-1

INB335 INFORMATION RESOURCES
This unit will help you to understand the structure of the information environment, to reflect upon the information resources you discover, and to develop the ability to find appropriate information for future problem solving. You will develop your skills in identifying, accessing, evaluating and retrieving information resources to meet specific information needs. The unit will also help you develop skills in teamwork and oral and written communication.

**Equivalent:** ITB322
**Credit points:** 12
**Contact hours:** 3 per week
**Campus:** Gardens Point
**Teaching period:** 2010 SEM-2

INB340 DATABASE DESIGN
The aim of this unit is to help you develop your knowledge, understand a formal specification tool (ORM) for modelling information systems unambiguously and to apply this formal technique to conceptually information systems found in many real world application domains.

**Prerequisites:** INB210 or ITB004
**Antirequisites:** ITB229
**Credit points:** 12
**Contact hours:** 3 per week
**Campus:** Gardens Point
**Teaching period:** 2010 SEM-1

INB341 SOFTWARE DEVELOPMENT WITH ORACLE
Oracle Corporation is the leading supplier of database software. This unit aims to develop a sound understanding of database creation, installation, administration, management, security, back up/recovery and application development. The unit aims to develop practical skills in each of these elements, using appropriate Oracle software.

**Assumed knowledge:** prior knowledge of relational database terminology and concepts, be thoroughly able to develop SQL for querying, updating and creating tables, and have a sound knowledge of database design.

**Prerequisites:** INB210 or ITB004 or INB122
**Equivalent:** ITB239
**Credit points:** 12
**Contact hours:** 3 per week
**Campus:** Gardens Point
**Teaching period:** 2010 SEM-2

INB342 ENTERPRISE DATA MINING
This unit will provide a comprehensive theoretical coverage of various topics in data and web mining. In addition there will be a significant practical component using handson tools to solve real-world problems. Specifically, we will consider techniques from machine learning, data mining, text mining, and information retrieval to extract useful knowledge from data which are used for business intelligence, document databases, site management, personalization, and user profiling. This unit will first cover a detailed overview of the mining process and techniques, and then concentrate on applications of these techniques to web, e-commerce, document databases and data from advanced applications.

**Prerequisites:** INB122 or INB210 or INB340 or AYB114
**Antirequisites:** INN342
**Credit points:** 12
**Contact hours:** 3 per week
**Campus:** Gardens Point
**Teaching period:** 2010 SEM-2

INB343 ADVANCED DATA MINING AND DATA WAREHOUSING
Data warehousing and mining have been well recognized as the dominating techniques for using databases in the future. This unit discusses the concepts, structures and algorithms of data warehousing and mining, e.g., data architecture and quality, data warehouse and data mart, data cubes, OLAP, patterns, association rules and decision tables. Through this study, students will be able to demonstrate knowledge and skills of designing, developing and implementing data warehousing components in SQL environments. It also enables students to design systems and tools that provide services to data management and analysis, such as data warehouses, data mining tools, business intelligence based systems, smart information use systems, and data processing systems.

**Prerequisites:** INB210
**Credit points:** 12
**Contact hours:** 3 per week
**Campus:** Gardens Point

INB345 MOBILE DEVICES
This unit provides the opportunity for exploring new and emerging mobile devices and wireless technology including iPhone, Netbook, 3G, WiMax, and RFID. Students will critically review and understand how they can be used for...
current contexts such as government, business, education and social community, as well as emerging ‘wilderness’ environments with no power and wired communication. Students will appreciate the impacts of these devices and be inspired for the current and future opportunities in ICT usage trends.

**Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1**

**INB346 ENTERPRISE 2.0**
This unit will help you to acquire the skills and knowledge required to critically explore and utilise applications within diverse contexts and organisations.

**Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2**

**INB347 WEB 2.0 APPLICATIONS**
Web 2.0 applications enable the user to be control. The unit will provide the opportunity for students to explore web 2.0 applications including blogs, wikis, social networking, social tagging, podcasts, gaming, storytelling and virtual worlds such as second life. Students will critically consider the many and varied web applications and how they can be used in different contexts such as government, small and medium size businesses, non-profit organisations, educational institutions and community groups.

**Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1**

**INB350 INTERNET PROTOCOLS AND SERVICES**
An understanding of the theoretical and practical concepts of network protocols and services is highly useful and relevant to network engineers and others working in the Information Processing industries. This unit introduces you to Internet protocols and the design, implementation and operation of network based applications. Theory and practical skills taught in this unit will be useful if you intend undertaking further networking units.

**Prerequisites: INB251 or ITB006 or ITB510  Equivalents: ITB721, ITB625, ITB535, ITB525  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1**

**INB351 COMPUTER NETWORK ADMINISTRATION**
The aim of this unit is to provide students with a working knowledge of the technical aspects and theory of network administration and management. The unit uses the Unix environment as the learning platform for attaining technical skills and for the development of problem solving skills necessary to be a successful networking professional.

**Prerequisites: INB350  Equivalents: ITB721, ITB625, ITB535, ITB525  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2**

**INB352 NETWORK PLANNING AND DEPLOYMENT**
The unit draws together subject matter from a number of different networking-related areas. The aim of the unit is to assemble the previously acquired knowledge and techniques and apply it in a cohesive fashion to the task of network planning.

**Prerequisites: INB350  Antirequisites: ITB551, ITB628, ITB722, INN352, ITN551, ITN722  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2**

**INB353 WIRELESS AND MOBILE NETWORKS**
This unit provides you with the skills to be able to design and understand the issues involved with different types of wireless communications systems. It develops your knowledge of Wide Area Networks (WANs), Local Area Networks (LANs) and Personal Area Networks (PANs) as well as skills in programming for mobile handsets. You will also develop knowledge of the different types of wireless communications technologies available and when each is most applicable in a particular situation.

**Prerequisites: INB251 or ITB006  Antirequisites: ITN723  Assumed knowledge: Networks or equivalent networking knowledge is assumed knowledge  Equivalents: ITB723  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1**

**INB355 CRYPTOLOGY AND PROTOCOLS**
Cryptographic techniques are widely used to implement computer and network security. As an IT security professional you may be required either to evaluate or implement information systems using cryptographic algorithms and protocols. This elective unit covers the main cryptographic technical concepts including encryption, digital signatures and cryptographic protocols.

**Antirequisites: ITB646, ITB548, ITB566  Assumed knowledge: Maths B or equivalent is assumed knowledge.  Equivalents: ITB732  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1**

**INB365 SYSTEMS PROGRAMMING**
Systems programming is an essential part of any computer-science education. This unit uses operating system concepts to teach the foundations of systems programming and advanced concepts for producing softwares that provide services to computer hardware. Through this study,
you will be able to demonstrate knowledge of the principles and techniques of process management, memory and file management, protection & security, and distributed systems.

**Prerequisites:** INB270  
**Antirequisites:** INN365, ITB745, ITB706  
**Assumed knowledge:** Fundamentals of computer architecture; high level programming languages (such as C, C++, Java Python) is assumed knowledge.  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**INB370 SOFTWARE DEVELOPMENT**
Understanding software development is an integral part of the IT industry for software engineers. Software development relies on object technologies, programming techniques and numerous code libraries provided by language developers and third party vendors. Integrated Development Environments, unit testing frameworks, automated and continuous build tools and versioning systems are all becoming part of the tool set modern software developers must be familiar with. This unit is designed to introduce these technologies and techniques to show how software can be rapidly developed.

**Prerequisites:** INB270 or ITB003 or INN270  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**INB371 DATA STRUCTURES AND ALGORITHMS**
The purpose of this unit is to ensure that you have a sound knowledge of modern programming techniques and their use in providing medium-scale software solutions. This unit will teach you to decompose a problem and produce a modular solution to a programming task. The principles to analyse algorithms for efficiency will also be introduced. In addition, you will acquire the necessary skills for you to use the tools available in common development environments, such as Microsoft Visual Studio.

**Prerequisites:** INB270 or ITB003  
**Antirequisites:** ITB711, ITB702, INN371  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**INB372 AGILE SOFTWARE DEVELOPMENT**
This unit introduces you to the software development process. You will look at each of the major activities involved in developing a software system. You will also learn how to manage and control the software development process for a large project when a number of team members are involved in the development. This unit develops the professional practice of working on large software systems.

**Prerequisites:** INB103 or ITB002  
**Antirequisites:** ITB257  
**Credit points:** 12  
**Contact hours:** 3 per week

**INB373 WEB APPLICATION DEVELOPMENT**
This unit will provide you with an understanding of the issues, structure and technologies used for developing web-based systems. The unit will provide you with the theoretical and practical skills needed to develop enterprise critical applications designed with an n-tier architecture using state of the art technologies. A comparative technology approach is taken, including an analysis of how web technologies have evolved to date, in order to identify common themes and to better enable you to comprehend and critically evaluate future web technology offerings.

**Prerequisites:** INB271 or ITB007  
**Antirequisites:** INN373  
**Equivalents:** ITB716 and ITN716  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**INB374 ENTERPRISE SOFTWARE ARCHITECTURE**
This unit aims to introduce you to the field of enterprise software architecture. It attempts to give you a grounding in the basic knowledge and skills required by an enterprise architect. This includes a solid understanding of the IT challenges currently facing medium to large size organizations, the theory and technologies currently used to address them and an appreciation of the business imperative for which they are utilized.

**Prerequisites:** INB270 or ITB003  
**Equivalents:** ITB717  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**INB385 MULTIMEDIA SYSTEMS**
This unit will explore the concepts underpinning multimedia systems and the role played by these technologies in the overall knowledge of a computer professional. You will learn to: design and develop different kinds of interactive multimedia applications; understand the bank of knowledge in cultural developments surrounding the emergence of multimedia technologies; analyse design and processes that contribute to the production of a creative work, using contemporary hardware and software technologies; develop the creative potential of temporal media forms and their placement and use within new media works; understand principles and conventions associated with the interpretation and production of meaning through interactive visual representation.

**Prerequisites:** INB103 or ITB002  
**Antirequisites:** ITB257  
**Credit points:** 12  
**Contact hours:** 3 per week
INB386 ADVANCED MULTIMEDIA SYSTEMS
This advanced level unit will give you high level design and development skills in some of the current and emerging areas of the new media. Web delivered applications, stand-alone systems and installations will be included. It will endeavour to give you an in-depth understanding of interactive Multimedia Systems. You will be given the theoretical basis and practical skills to motivate you in the design and creation of a state-of-the-art system in this discipline. In the process it will encourage a professional team approach appropriate to the industry environment.

Prerequisites: INB385 (Special considerations may apply)
Equivalent: ITB259
Credit points: 12
Contact hours: 3 per week
Campus: Gardens Point
Teaching period: 2010 SEM-2

INB860 COMPUTATIONAL INTELLIGENCE FOR CONTROL AND EMBEDDED SYSTEMS
This is a specialisation unit in the area of Infomechatronics that introduces five methods from the field of computational intelligence and relates them to applications on real time control and embedded systems. The methods are: Knowledge Base Systems, Fuzzy Control, Neural Networks, Reinforcement Learning and Evolutionary Computation. The unit is also intended to teach the specific design and programming skills that will enable you to solve problems using computational intelligence methods in real-time embedded systems. It is assumed that you already have knowledge of programming.

Antirequisites: ITB847
Credit points: 12
Contact hours: 3 per week
Campus: Gardens Point
Teaching period: 2010 SEM-1

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
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: 2010 SUM-2, 2010 SEM-1 and 2010 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.

Assumed knowledge: Grade of at least Sound Achievement in Senior Mathematics B (or equivalent) or MAB105 is assumed knowledge
Equivalent: MAB100, MAB125, MAB180
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching period: 2010 SEM-1, 2010 SEM-2 and 2010 SUM

MAB121 CALCULUS AND DIFFERENTIAL EQUATIONS
This unit extends the areas of function and calculus introduced in MAB120 by introducing series representations for functions and more advanced methods of differentiation and integration for functions of one variable. A strong connection to real world problems is made by introducing the use of differential equations in modelling, and exploring appropriate methods of solution. Practical calculations of volumes and surface areas of solids of revolution extend your interpretations of the definite integral. Taylor and Fourier series are introduced as a means of approximating functions by sums of polynomials and periodic functions. Some more advanced methods for indefinite integrals, such as partial fraction decomposition, are also introduced.

Assumed knowledge: Grade of at least Sound Achievement in Senior Mathematics C (or equivalent) or MAB125 or MAB180 or MAB120 is assumed knowledge
Equivalent: MAB111, MAB126
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching period: 2010 SEM-1, 2010 SEM-2 and 2010 SUM

MAB122 ALGEBRA AND ANALYTIC GEOMETRY
This unit extends your knowledge in the areas of functions, calculus, matrices and vectors introduced in MAB120 by introducing functions of more than one variable, partial derivatives and multiple integrals, vector valued functions, and matrix methods for the solution of large systems of linear equations.

Equivalent: MAB112, MAB127, MAB132
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching period: 2010 SEM-1, 2010 SEM-2 and 2010 SUM

MAB210 STATISTICAL MODELLING 1
This unit includes: probability; independence; system reliability; using conditional probability in modelling; Bayes;
introductory Markov chains; random variables and distributions; special distributional models; Bernoulli process; Poisson process; exponential; introductory queuing processes; expected values and moments; goodness-of-fit tests; measures of dependence; introductory bivariate and correlation properties; conditioning arguments.

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: 2010 SEM-1 and 2010 SEM-2

MAB220 COMPUTATIONAL MATHEMATICS 1
This unit includes: sources of error; computer arithmetic; solution of nonlinear equations in one variable; solution of systems of linear equations; interpolation; finite differences; numerical differentiation and integration; solution of first order linear differential equations; MATLAB programming. Students without an exit level of Sound Achievement in four semesters of Senior Mathematics C need to be concurrently enrolled in MAB100 if not completed earlier. Assumed knowledge: Grade of at least Sound Achievement in Senior Mathematics B (or equivalent) or MAB105 and corequisite MAB120 or MAB125 or MAB100 or MAB180 if you don’t have Senior Mathematics C is assumed knowledge Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1 and 2010 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: 2010 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) Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

MAB313 MATHEMATICS OF FINANCE
This unit includes: interest rates; solution of problems in compound interest; applications of annuities; valuation of securities; quantitative techniques in business and finance. Students need to concurrently enrol in MAB111 unless already completed. Prerequisites: MAB111 or MAB121 Antirequisites: MAN313 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 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; queueing 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: 2010 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) Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 SEM-1

MAB413 DIFFERENTIAL EQUATIONS
This unit includes: linear and nonlinear differential equations; series methods; Laplace transform; transforms of derivatives and integrals; systems of differential equations; basic theory on linear systems; solution of linear systems with constant coefficients; matrix methods; phase plane analysis. Prerequisites: MAB311 or MAB312 Antirequisites: MAN413 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2010 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 and MAB111  
Assumed knowledge: MAB112 is recommended prior study  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

MAB420 COMPUTATIONAL MATHEMATICS 2
This unit includes: direct methods for systems of linear equations; solution methods for special matrix systems (banded matrix systems, block-banded matrix systems, data structures and algorithms for storing and manipulating sparse matrices, reordering schemes); vector and matrix norms (basic theory and definitions, error bounds for direct methods, condition numbers); iterative methods for systems of linear equations (Jacobi, Gauss-Siedel, Successive Over-Relaxation, conjugate gradient); iterative methods for the eigenvalue problem. 
Prerequisites: MAB220 and MAB312  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

MAB422 MATHEMATICAL MODELLING
This unit includes models developed with the "real world" description. These models are taken from the areas of cancer research, population growth and engineering. Emphasis is on mathematical modelling and not on the development of new mathematical content. 
Prerequisites: MAB121  
Antirequisites: MAN422  
Assumed knowledge: MAB220 is recommended for prior/concurrent study for exposure to MATLAB  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

MAB461 DISCRETE MATHEMATICS
This unit has three basic components. They are combinatorics, abstract algebra and number theory. Combinatorics, which is about 60% of the unit, will largely consist of enumeration techniques in variopis settings. Abstract algebra (~20%) will advance the student's knowledge of groups, rings and fields to include additive groups, multiplicative groups; polynomial rings, finite fields, isomorphisms, and homomorphisms. Number theory (~20%) will include methods of proof including induction and contradiction, modular arithmetic and congruence, gcd/lcm and theorems involving these, fundamental theorem of arithmetic, Fermat's theorems, Euler's theorem. 
Prerequisites: MAB112 or MAB122  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 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. 
Prerequisite(s): MAB112 or MAB132 or MAB182  
(Recommended: MAB210 or MAB220)  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2009 SEM-2  
Incompatible with: MAB380, ITB849

MAB481 VISUALISATION AND DATA ANALYSIS
This unit covers: history and evolution of data visualisation, definition of data visualisation, impact of data visualisation; fundamentals of computer graphics and modern day visualisation environments; visualisation of 2-D and 3-D data; general visualisation techniques including filtering; colour map transformations; contouring; height fields; coloured height fields; interpolation; Delauney triangulation; iso-surfaces; volume visualisation; probing; slicing; streamlines; streaklines and texture mapping; visualisation of multi-dimensional data; other data types such as finite element, vector, molecular and scatter data. Not offered after 2009. 
Prerequisite(s): MAB101, MAB111, MAB480 or ITB003  
(Highly Recommended: MAB112)  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2009 SEM-1

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: 2010 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  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 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: 2010 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  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 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: MAB536, MAB526  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 SEM-1

**MAB536 TIME SERIES ANALYSIS**
This unit includes the following: fundamentals of time series analysis; time series models; nonstationary processes; seasonal ARIMA models; vector autoregression; long-range dependence and fractional ARIMA models; co-integration of nonstationary processes.

**Prerequisites:** MAB314 and MAB414  Antirequisites: MAN536, MAB526  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

**MAB613 PARTIAL DIFFERENTIAL EQUATIONS**
This unit includes the following: derivation of certain partial differential equations; solution of partial differential equations by separation of variables, Laplace and Fourier transforms; Sturm-Liouville systems; special functions; Green's functions.

**Prerequisites:** MAB311 and MAB413  Antirequisites: MAN613  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 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: 2010 SEM-2

**MAB624 APPLIED STATISTICS 3**
This unit includes the following: design of experiments for factorial investigations (two and three-level factors, Taguchi’s approach, fractions and blocking, response surfaces); general linear model; regression graphics; multi-stratum designs and analysis; repeated measures designs and analysis; linear-logic and log-linear models; use of statistical software.

**Prerequisites:** MAB414  Antirequisites: MAN624  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

**MAB625 OPERATIONS RESEARCH 3B**
This unit includes: phases of an operations research study; decision analysis; queuing theory; simulation; implementation in operations research; heuristic techniques.

**Prerequisites:** MAB315  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2010 SEM-2

**MAB640 INDUSTRY PROJECT**
For this unit, you will usually work in industry part-time. You will be assisted to develop a suitable plan to manage the project. You are expected to record progress and subsequently develop an accurate report.

**Other requisites:** Unit coordinator approval is required to enrol  Credit points: 24  Campus: Gardens Point  Teaching period: 2010 SEM-1 and 2010 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 and MAB312  
**Antirequisites:** MAN672  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**MAB681 ADVANCED VISUALISATION AND DATA ANALYSIS**

This unit includes: advanced visualisation; virtual reality and data analysis; contemporary issues in data visualisation; introduction to advanced tools; completion of a project in advanced visualisation which demonstrates analysis, background research, investigation, development of project proposal, and presentation of the project outcomes.

**Prerequisite(s):** MAB481 (Highly Recommended: MAB380 or MAB480)  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2007 SEM-2  
**Incompatible with:** MAN681