Wellington Institute of Technology
Whitireia Community Polytechnic

Programme Document
PR5006/HV4701 Bachelor of Information Technology

Programme Title:	Bachelor of Information Technology
Programme Code:	PR5006 (Whitireia) HV4701 (WelTec)
Level:	7
Credits:	360

Embedded Qualification/s   NA
Short Name: BIT

Programme Version: 1   **EFTS value**: 3.0   **NZSCED:** 020103
Qualification Version: 1
School: Information Technology (IT)

Amendments

Approved date	Details	Rationale
17/9/20	Change code and title for Capstone Project to IT7510 IT Capstone Project	To correct an error for TEC funding
5 July 2021	Administrative update of statement in 6.1 in the Programme Document to read:'An elective course is any course chosen from the BIT schedule of courses or the HV4707 Graduate Diploma in Cyber Security schedule of courses.'	To update the Programme named from the old *Graduate Diploma in Information Assurance and Security* to its replacement.

Programme Portfolio Status Information

Replaced Programmes

Code	Title	Version	Closure dates		
			New learner enrolments	Award of qualification	Removal from portfolio
HV4395	Bachelor of Information Technology		Nov 2017	Dec 2022	Feb 2023
PR4696	Bachelor of Information Technology		Nov 2017	Dec 2022	Feb 2023

Key Dates

Internal approval			
NZQA approval	6/12/18	Programme number	
First date for delivery	March 2019		
Review date			

Programme Status Information (when approved for expiry)

Replaced by		
Last date for enrolments	New learners	
	Existing learners	
Last date for award of qualification		
Date of removal from portfolio		

Contents

1   Introduction

1.1   Programme Aim

The aim of the Bachelor of Information Technology (BIT) is to prepare graduates for meaningful careers in the Information Technology (IT) industry. On completion of the BIT, a graduate will have a solid understanding of the fundamental principles and theory of Information Technology, a familiarity with information technologies commonly used in organisations, and the ability to learn new skills in a rapidly changing environment. This three-year degree is designed to provide graduates with both the ability to pursue a professional career in the Information Technology industry and the academic base required for higher studies

The programme builds learners' expertise in the IT discipline, developing professional competencies, critical thinking and problem solving, and collaboration and communication capabilities, which they can then apply to roles in the IT profession. The degree prepares learners to participate in and contribute to the economic, social and cultural life of society, whether in New Zealand or internationally. The programme facilitates multi-disciplinary, work-focused projects through links forged with the IT industry.

1.2   Programme Rationale

BIT contributes to the following priorities within the Tertiary Education Strategy 2014-19:

- Priority 1 Delivering skills for industry
- Priority 5 Strengthening research-based institutions
- Priority 6 Growing international linkages

Priority 1 – This programme draws on the industry needs analyses and planning that contributed to the development of the suite of New Zealand certificates and diplomas at levels 5 and 6, and further industry consultation carried out during the degree development. Transferable skills such as critical thinking, problem solving, collaboration, communication are developed in all courses, with much of the teaching and assessment achieved through project-based work. Specific skills for the IT industry are addressed in major streams of study, as well as through interdisciplinary collaborative projects and work-focused projects.

Priority 5 – Staff teaching on the BIT are expected to have applied research capabilities in their discipline, and to engage in research projects that result in recognised research outputs and/or conference presentations and academic journal articles. Staff act as role models and mentors for the learners, demonstrating the wide scope for IT practice research in their own specialisation, or in interdisciplinary projects or industry projects.

Priority 6 – The Bachelor of IT Programme will provide industry with skilled graduates possessing an advanced understanding of IT technologies as practiced in the New Zealand context and more broadly in the global business environment. These individuals are expected to build crucial links between New Zealand enterprises and existing and future counterparts in overseas markets.

Working to establish international links with institutions overseas, working towards conjoint study arrangements. These links bring international learners to New Zealand and may provide opportunities for New Zealand learners to attend the international institutions for a period of study to be credited to their degree. Other international learners enrol directly in the programme, broadening cultural understanding for all participants and enhancing the skills of international learners who seek to remain in New Zealand.

1.3   Target Groups of Learners

- Secondary school leavers seeking a qualification in IT
- Mature learners seeking opportunities for a change of employment or a new qualification
- Industry personnel interested in developing enhanced skills in a range of IT areas

- International learners who wish to obtain a New Zealand IT degree
- Graduates of the pathway qualifications offered at Whitireia and WelTec:
    - New Zealand Certificate in Information Technology Essentials (Level 4)
    - New Zealand Certificate in Information Technology (Level 5)
    - New Zealand Diploma in Information Technology Technical Support (Level 5)
    - New Zealand Diploma in Information Systems (Level 5)
    - New Zealand Diploma in Information Systems (Information Systems Innovation) (Level 6)

1.4   Value to Industry and Communities

The IT industry has become one of the strongest industries globally, is a key driver of global economic growth and is continuing to grow rapidly. The IT sector has emerged as a major source of both growth and employment and is an essential part of nearly every major national or global industry.

The IT industry is knowledge-based and requires people from various disciplines to work together, bringing their own particular skills to a project, and to have a clear understanding of the opportunities provided by other disciplines.

Because of this, the industry requires people who can think creatively, adapt to change, work in teams, communicate across teams, and develop, test, refine and deploy a range of technologies. This programme produces graduates suitable for employment in data science, cyber security, interaction design, software development and networking and infrastructure roles. Graduates will have a broad background in the fundamental principles and theory of IT and sufficient depth in their area of speciality to be immediately useful in the workplace.

Technological developments have always led to changes in industry and workplaces and created new work opportunities; the rate of change is now increasing rapidly, creating opportunities for work we cannot necessarily envisage at present. Graduates need to be prepared for ongoing changes. The programme therefore emphasises adaptability and recognises that graduates will need to continue learning in order to progress with future changes. Graduates will be able to apply their skills in critical analysis, problem solving, communication, and cultural awareness and contribute to new ways of working.

2   Context

2.1   Te Tiriti o Waitangi

The Education Act 1989 requires that the principles of Te Tiriti o Waitangi, the founding document of Aotearoa New Zealand, are acknowledged. WelTec and Whitireia are Crown entities that have established governance and executive advisory relationships with Mana Whenua, Ngāti Toa Rangatira and Te Ātiawa in recognition of the important role of Māori.

Learners in the programme investigate and understand Te Tiriti o Waitangi, and its study is integrated in the disciplines. Learners also explore what Te Tiriti and tikanga Māori mean to them as individuals and how they can foster and implement Te Tiriti principles in their personal and professional lives.

2.2   Partnership

WelTec and Whitireia have a strategic partnership with a focus on improving choice and study outcomes for learners in the Wellington region. The partnership includes combined governance in the form of a Council, an Academic Board and a Quality Management System that serve both institutions. This is documented in a Memorandum of Agreement.

3   Strategic Purpose Statement

This qualification provides a forward-looking, versatile programme of study for learners who wish to enter the IT industry, both in New Zealand and globally. Graduates will have the academic base required for further study and the ability to pursue a professional career in the Information Technology industry, particularly in the areas of data science, cyber security, interaction design, software development and networking and infrastructure.

The focus of this qualification is on both theoretical and applied learning, and the development of IT skills and knowledge that are valued both in a range of occupations and professions and in the wider community. The incorporation of industry-focused projects develops both specific skills in a discipline and the transferable skills needed for collaborative and entrepreneurial work.

Learners graduate with a familiarity with information technologies commonly used in organisations, and the ability to learn new skills in a rapidly changing environment. They have an expectation of ongoing change throughout their careers, and with the skills, attributes and capability to adapt to such changes.

4   Outcome Statement

4.1   Graduate Profile

Graduates of the Bachelor of Information Technology will be able to:

- Research, evaluate and apply the underpinning theoretical knowledge and skills required to work in the computing and technology fields.

- Manage resources in a team setting by identifying, assigning, prioritising and achieving goals in a timely fashion.

- Identify, analyse, generate and evaluate solutions to complex problems in unfamiliar settings

- Select, adapt and apply a range of processes in the Information Technology field

- Present and defend views effectively through current communication media

- Work effectively in teams demonstrating a team mind-set and cultural awareness and sensitivity

- Interpret the regulations and statutes related to a body of knowledge

- Demonstrate a creative, innovative approach to solving complex problems as well as an awareness of social and ethical issues as an emerging Information Technology professional

- Understand and implement the principles of IT project management.

Cyber Security Major

In addition to the BIT graduate profile, graduates of the Cyber Security major will be able to:

- Perform security risk management, vulnerability assessment, and business impact analysis for information systems to ensure the confidentiality, integrity, availability and adherence to recognised industry standards

- Design and develop security policies and controls to meet the security goals of an organisation

- Investigate and manage an appropriate incident response to breaches of security using policies, technical controls and forensic techniques

- Plan and implement security testing to validate enterprise policy and processes.

Applied Data Science Major

In addition to the BIT graduate profile, graduates of the Applied Data Science major will be able to:

- Understand the concepts of business intelligence and data mining, and design and build solutions to support business intelligence and analytical outcomes
- Communicate the results of data analysis through visualisation, stories, and interpretable summaries to support strategic business decision making
- Create and validate business analytical models using the data science process
- Assess user requirements, identify opportunities for IT-enabled organisational improvement and design solutions that produce a high-quality user experience and support business outcomes
- Design, implement and query complex databases
- Understand the concepts of information systems management and how to exploit organisational data and information.

Interaction Design Major

In addition to the BIT graduate profile, graduates of the Interaction Design major will be able to:

- Define the meanings of Human-Computer Interaction and User Experience Design
- Scope and select appropriate technologies to solve user centred problems
- Evaluate and develop effective user experiences that use technology to enhance a wide range of human activities
- Design and create a range of interfaces for a variety of devices, which synthesise the high levels of interactivity
- Understand the process of interaction design, including, fieldwork, requirements elicitation, prototyping, evaluation frameworks and testing
- Analyse ways that user interfaces effectively relate to users' characteristics considering characteristics such as age, education, culture and ability
- Engage in speculative design processes to determine future developments.

Networking and Infrastructure Major

In addition to the BIT graduate profile, graduates of the Networking and Infrastructure major will be able to:

- Analyse needs, design, implement and document network architectures, topologies and integration components, including operating systems and associated services, in an organisation using appropriate technologies
- Investigate, diagnose and resolve network problems using appropriate networking technologies and procedures
- Plan and document network infrastructure and integration components to meet service level agreements
- Design, install, upgrade, control, maintain and monitor IT network components.

Software Development Major

In addition to the BIT graduate profile, graduates of the Software Development major will be able to:

- To plan, analyse, design, and develop software applications to solve unstructured problems using appropriate methodologies, technologies and tools

- Plan and implement testing and maintenance of complex, scalable software applications using suitable framework and techniques

- Use appropriate resources to stay conversant with latest practices in the software development industry.

4.2   Education Pathways

Graduates from the Bachelor of Information Technology can progress to study towards the Postgraduate Certificate in Information Technology, Postgraduate Diploma in Information Technology or Master of Information Technology at Whitireia and WelTec or other similar programmes at tertiary organisations within New Zealand and internationally.

The Bachelor of Information Technology is part of a group of programmes designed to staircase learners from Level 2 study to Masters Study. This support learners to enter IT study at the level that suits their background and provides a clear pathway for their progression through learning.

4.3   Employment Pathways

Graduates of the Bachelor of Information Technology have detailed knowledge and skills in selected areas of IT for employment as an IT professional. Opportunities within the IT industry include employment in public organisations, private companies, IT enterprises, self-employment, and teaching.

Graduate occupations include, but are not limited to:

Cyber Security

Security analyst, security administrator, incident responder, information assurance analyst, security assessor/auditor, penetration tester, digital forensic technician/analyst, or other information/cyber security-related roles, including support roles such as service desk.

Data Science

Data scientist, business intelligence analyst, data management and analytics, database developer, marketing data analytics, systems analyst, business analyst, data warehouse developer, BI reporting analyst, social media analytics, data analyst and reporting analyst.

Interaction Design

IT design practice lead, product designer IT, designer in emerging technologies, user experience IT communications lead, quality standards and customer feedback officer, user testing manager, IT test planning, user experience designer, user interface designer, user experience researcher, requirements lead, digital design & content manager, web manager, front-end web developer design integrator.

Networking and Infrastructure

Network engineer, systems engineer, systems engineer/cloud support, ICT support technician, cloud network engineer, infrastructure engineer, network support, network administrator, or service desk support.

Software Development

Full stack developer, web developer, analyst programmer, AI application developer, system test analyst / engineer, business analyst, net developer, software developer, mobile application developer, game developer, software engineer, system and software tester.

5 Approach to Learning and Teaching

5.1 Programme Philosophy

The aim of the Bachelor of Information Technology Programme is to produce graduates with the personal and professional skills necessary to be successful in demanding and evolving business environments, whether locally, nationally or internationally. The programmes maintain close links with Industry to ensure currency in the subject areas.

The Programme provides learners with practical and theoretical skills in information technology and related fields. The qualifications associated with this programme will enable graduates to develop professional careers in information technology/information systems.

The objectives of the BIT programme of study is to:

- provide a solid foundation of knowledge and capabilities suitable for a range of careers involving information technology
- develop intellectual, logical and analytical capabilities and powers
- encourage responsible and ethical behaviour in an information technology environment
- encourage learning and the constant updating of knowledge as required professional behaviour in the information technology industries
- promote critical thinking and develop the powers of reasoning, expression, practical application and independent thought in individual graduates and to encourage them to apply these skills in an integrated way throughout their professional career
- evolve dynamically with the introduction of new technology and/or changes in the industry
- offer in-depth study of chosen areas which reflect the diversity of knowledge requirements and career options.

The starting point for the design of this Programme was with the Graduate Profile and desired learner outcomes. There are consistent, coherent and logical interconnections between the graduate profile, intended learning outcomes, teaching/learning activities and assessment activities. Content is to be appropriately structured and purposeful.

Constructive alignment underpins an outcomes-focused approach to defining, promoting and assessing learners' learning. It also promotes the idea that tutors create a system to support learners' learning in which learners and tutors are active participants in the learning process.

The Programme Aim reflects the Graduate Outcome for the Bachelor of Information Technology, and reflects the Core Transferable Skills learners develop as they progress through the degree. The specific skills developed within each course are identified in each Course Descriptor.

Course Learning Outcomes are designed to contribute to the achievement of the Graduate Profile, to the achievement of the core transferable skills, and to the achievement of the Programme Aims.

Within each individual course, learning and assessment activities, resources and learning support mechanisms are designed to maximise each learners' chances of achieving the course Learning Outcomes.

The aim of the programme is to facilitate learner determined learning within the bounds of the approved curriculum, supporting learners to investigate solutions to problems within the subject domain. This is strengthened through sharing the knowledge gained within the group. The learning includes aspects related to capability and learning how to learn. Experience and interaction with others are valued, and learners are encouraged to form their own networks of resources and information. This approach recognises the need to be flexible in learning,

promoting a critical approach to tasks, and the development of powers of reasoning, expression, and independent thought.

It is essential that the curriculum be informed by research. As a device for the dissemination of knowledge created through research, the undergraduate degree is intended to provide learners with access to knowledge and expertise belonging to both the teaching staff and wider academic and professional contexts.

5.2   Assessment Rationale

Assessment is the collection and evaluation of evidence to establish the level of a learner's performance. Assessment is an essential part of each course, focussing on a wide range of learner activities, and addressing the course learning outcomes. There are regular assessments throughout a course. At the commencement of each course, learners will be given an *assessment schedule.* This includes detailed information including the number, type, weighting and timing of the assessments set for that course.

The assessment philosophy underpinning this programme supports learners to develop a comprehensive range of practical knowledge and skills to support their professional practice. Assessment is used to engage learners in learning that is productive, and feedback from assessment is used actively to improve learner learning. Tutors create a system to support learner learning in which both learners and tutors are active participants in the learning process.

Design of assessment in the BIT Programme follows the principles of constructive alignment where there are consistent, coherent and logical interconnections between the graduate profile, intended learning outcomes, teaching/learning activities and assessment activities.

Achievement Based Assessment measures learner performance, in relation to criteria that are specified, in terms of grades and levels.

Assessment is both formative and summative:

> **Formative assessments** do not contribute to the final course grade. Formative assessments occur in response to a set schedule. Learners receive oral and written feedback for all formative assessments. Results are kept on a learner's file and may inform aegrotat assessments. Formative assessments are indicator assessments only and are to assist the teaching and learning process.

> **Summative assessments** do contribute to the final course grade. Assessments address course learning outcomes and determine a learner's final course grade.

All assessment policies, methodology and planning and academic regulation will be in line with the Academic Statute and fully communicated to learners in the learner/programme handbook. In each course, learners will receive a clear description of each assessment, including the requirements for successful completion and the performance criteria, or objectives, against which they will be assessed prior to commencing the work that is to be assessed.

Over the duration of completing their qualification, learners are exposed to a variety of assessment tools and methods. Transferable skills such as communication, teamwork, planning, critical thinking and reflection are incorporated throughout assessments rather than tested in isolation.

Group work and presentations are used to demonstrate interpersonal skills and communication skills. Assignments and projects are used to demonstrate applied skills. Essays, reports, presentations, and posters are used to demonstrate theoretical knowledge and the

understanding of concepts. Tests and exams are used to demonstrate theoretical and applied skills in a controlled environment and a set timeframe.

5.3   Responsiveness to Māori Learners

The significance of Te Tiriti o Waitangi is acknowledged, and the aspirations, values and cultures of individual learners and staff are embraced within the context of Aotearoa New Zealand. This Programme has been designed to be supportive and inclusive of Tangata Whenua and other cultures, using inclusive teaching methods that encourage group collaboration and value learner contributions from their own backgrounds and cultures.

Tutors are supported to uphold Tikanga Māori relevant to this programme in learning and teaching activities. At WelTec, support is available from the Kaiwhakahaere Māori and the Tamaiti Whāngai Mentoring staff and at Whitireia, Te Wānanga Māori and the Māori Success Co-ordinator.

Māori support staff work alongside academic and non-academic staff to support positive educational outcomes for Māori learners.

5.4   Responsiveness to Identified Groups of Learners

The curriculum aims to foster an environment where learners of all ethnicities can grow and develop within the context of a multicultural environment, drawing upon both their traditional roots and modern technologies. The curriculum aims to produce graduates with a strong sense of identity and culture who can readily work in New Zealand or overseas.

International learners are welcomed for the contribution they bring from their cultural background to the programme, and provision is made for supporting them as they settle into study in a new country.

Whitireia and WelTec observe and are bound by the Education (Pastoral Care of International Students) Code of Practice 2016 published by the NZQA.

Our staff provide support for international learners throughout their studies that can include:

- Liaison with Immigration New Zealand
- Organising insurance and assisting with claims
- Orientation programmes
- Organising visas
- Assisting in programme selection
- Arranging English Language training.

5.5   Literacy and Numeracy

The development of academic and discipline literacy and numeracy skills relevant to this programme is integrated throughout all courses and embedded in the learning and assessment. In achieving all the graduate outcomes, learners will demonstrate that they can:

- Prepare a range of business documents using discipline-related language appropriate to the context
- Effectively reflect on and review own writing in terms of coherence, purpose and audience
- Understand and use specialised discipline-related vocabulary and terminology appropriate to a range of contexts
- Evaluate and understand discipline-related texts, summarising and synthesising information from a wide range of contexts; and
- Select and use appropriate number strategies to solve problems related to their use in the IT industry, describe and interpret numerical data where relevant.

5.6   Learning Activities

A variety of learning and teaching activities are planned throughout the programme to meet the learning outcomes of courses. These activities are allocated time within the overall programme hours and more specifically identified within each course.

Learning activities on the programme include:

Activity	Description
Classroom activities	Lectures, tutorials, individual and group work, role plays, simulated workplace learning, presentations, practical exercises in computer rooms
Practical demonstrations	Learner observes a range of practical skills demonstrated by the tutor to underpin practical components in courses
Guest speakers	Industry professionals or graduates share experiences with learners of working in the relevant area/s of study
Work experience/Work integrated learning	Learner has opportunities to apply knowledge and skills in an industry setting
Assessment preparation	Learner completes assignment/s on time, and is prepared for supervised assessments
Laboratory/workshop	Learner practices skills or develops outputs to meet assessment task requirements
Group study	Notes, activities or output meet assessment task requirements
Independent study	Learner engages in a variety of tutor recommended or self-selected materials to meet assessment outcomes
Information gathering, readings	Learner discusses gathered information in tutor-directed activities, and in assessment (including evidence for portfolio)
Observation	Learner reflects on workplace practice in relation to theoretical and practical learning
Project work	Defined project outcomes are progressively achieved
Online learning	Learner engages in formative learning on Moodle and other learning platforms.

Tutors advise learners of the activities relevant to each course in course outlines.

6   Structure and Coherence

6.1   Structure

The structure of the degree enables a learner to undertake study in a specialised area, or major, leading to substantial applied project work at level 7. The programme prepares learners with well-developed knowledge, skills and attributes for IT employment. The award of the degree states the major endorsement:

- Bachelor of Information Technology (Cyber Security)
- Bachelor of Information Technology (Applied Data Science)
- Bachelor of Information Technology (Interaction Design)
- Bachelor of Information Technology (Networking and Infrastructure)

- Bachelor of Information Technology (Software Development)
- Bachelor of Information Technology

Students may select a specific major endorsement for their study or may choose to study the unendorsed Bachelor of Information Technology, which has no specified major.

To complete the degree, a learner must pass courses worth 360 credits, with a minimum of 90 credits at level 7 and a maximum of 135 credits at level 5. The credits to complete the qualification comprise core compulsory courses, compulsory courses within a major, and elective courses.

An elective course is any course chosen from the BIT schedule of courses or the Graduate Diploma in Cyber Security schedule of courses. Elective courses from other degree level qualifications can be selected on approval from the Programme Manager. Learners from other majors may study a majors' compulsory courses as electives.

Unspecified Credits can be used only for cross-credit of a course/s that was completed as part of a different programme and where the course content is related to Information Technology but not directly equivalent to a course in this degree.

The credit value allocation for each year of full time study is shown in the table below:

Degree with Major

Levels	Core Courses	Major Compulsory	Elective Courses*	Total Credits
Level 5	30	15	75	120
Level 6	30	60	30	120
Level 7	60	30	30	120

*Elective course selection must comprise no more than 90 credits at level 5, with the remainder of elective credit at level 6 and or level 7

Unendorsed degree

Levels	Core Courses	Elective Courses*	Total Credits
Level 5	30	90	120
Level 6	30	90	120
Level 7	60	60	120

*Elective course selection must comprise no more than 105 credits at level 5, with the remainder of elective credit at level 6 and or level 7

The inclusion of core courses each year, common to all majors of the degree, ensures that all learners have a broad range of IT knowledge and skills, and the foundation necessary to engage in collaborative and interdisciplinary projects.

The sequence of courses in each major follows a progression, building skills and knowledge over three years. The common core courses also add further depth each year:

- Level 5 courses focus on developing broad understanding of principles and application of learning in defined IT contexts
- Level 6 courses extend the learning and support learners in adapting their application of learning to less clearly defined IT problems or situations, drawing on further development of knowledge and skills in the discipline
- Level 7 courses require learners to develop and critique a range of responses to IT situations, problems or project briefs, synthesising knowledge, expertise and values developed across their studies in the programme.

The overall structure of core and major courses for Bachelor of Information Technology is shown on the following page.

Refer to Appendix A for all course descriptors.

Bachelor of Information Technology Structure

Level 5									
CS: Cyber Security, ADS:Applied Data Science, ID: Interaction Design,									
NI: Networking and Infrastructure SD: Software Development,									
UN: Unendorsed									

Code	Title	Pre-requisites	Credits	CS	ADS	ID	NI	SD	UN
IT5501	Mathematics for IT	None	15	•	•	•	•	•	•
IT5502	Communications for IT	None	15	•	•	•	•	•	•
IT5504	Information Security I	None	15	•					
IT5507	Fundamentals of Data Science	None	15		•				
IT5505	Interaction Design Fundamentals	None	15			•			
IT5506	Introduction to Networking	None	15				•		
IT5503	Programming I	None	15					•	
IT5508	Electronics Fundamentals	None	15						
IT5509	Software Testing Fundamentals	None	15						
IT5510	Introduction to Operating Systems	None	15						
IT5599	Unspecified credits		15						
IT5598	Unspecified credits		30						
	Compulsory credit			45	45	45	45	45	30
	Elective credit			75	75	75	75	75	90
	Total credit			120	120	120	120	120	120

Level 6									
Code	Title	Pre-requisites	Credits	CS	ADS	ID	NI	SD	UN
IT6501	Systems Analysis and Design	IT5507, IT5503	15	•	•	•	•	•	•
IT6502	Project Management	IT5502	15	•	•	•	•	•	•
CS6501	Information Security II	None	15	•					
CS6502	Linux System Administration	IT5504, IT5506	15	•					
CS6503	Digital Forensics	IT5504, IT5506	15	•					
CS6504	Cryptography and Blockchain Fundamentals	IT5504, IT5506	15	•					
DS6501	Social Data Analytics	IT5507	15		•				
DS6502	Data Analysis and Visualisation	IT5507	15		•				
DS6503	Data Mining Tools and Techniques	IT5507	15		•				
DS6504	Business Intelligence and Big Data	IT5507	15		•				
ID6501	Responsive Website Design	None	15			•			
ID6502	3D Environments	IT5505	15			•			
ID6503	Advanced Interaction Design	IT5505	15			•			
ID6504	User Interface and User Experience	IT5505	15			•			
NI6501	Networking II – LAN	IT5506	15				•		
NI6502	Networking III – Campus	NI6501	15				•		
NI6503	Unified Infrastructure Services	IT5506	15				•		
NI6504	Cloud Computing	IT5506	15				•		
SD6501	Mobile Application Development	IT5503, IT5507	15					•	
SD6502	Programming II	IT5503	15					•	
SD6503	Testing and Secure Coding	SD6502	15					•	
SD6504	Game Development	IT5501, IT5503	15					•	
IT6503	Microcomputer Systems	IT5503	15						
IT6504	Embedded Systems I	IT5503	15						
IT6505	Advanced Software Testing	IT5509	15						
IT6506	Carrier Technology I	IT5506, IT5501	15						
IT6507	Wireless Networking Technology	None	15						
IT6508	Research in IT	IT5502	15						
IT6509	IT Business Environment	IT5502	15						
IT6599	Unspecified credits		15						
		Compulsory credit		90	90	90	90	90	30
		Elective credit		30	30	30	30	30	90
		Total credit		120	120	120	120	120	120

Level 7									
Code	**Title**	**Pre-requisites**	**Credits**	**CS**	**ADS**	**ID**	**NI**	**SD**	**UN**
IT7510	IT Capstone Project	*	45	•	•	•	•	•	•
IT7502	Digital Ethics	IT5502	15	•	•	•	•	•	•
CS7501	Information Security III	IT5504, IT5506	15	•					
CS7502	Special Topic in Cyber Security	IT5504, IT5506	15	•					
DS7501	Data Mining for Business Analytics	DS6502	15		•				
DS7502	Data Warehouse Design and Implementation	DS6503	15		•				
ID7501	Advanced Interface Technologies	ID6504	15			•			
ID7502	Human Computer Interaction	IT5505	15			•			
NI7501	Current topic in Networking and Infrastructure	NI6501, NI6502	15				•		
NI7502	Emerging topic in Networking and Infrastructure	NI6501, NI6502	15				•		
SD7501	Web Application Development	IT5507, SD6502	15					•	
SD7502	Intelligent Systems Development	IT5501, SD6502	15					•	
CS7503	Network Fundamentals for Information Assurance and Security		15						
CS7504	Security for DevOps		15						
CS7505	Incident Response and Digital Forensics		15						
CS7506	Cloud Security		15						
IA7307	Cryptography and Security Mechanisms		15						
IA7308	Security Testing and Network Defence		15						
IT7503	Special Topic	**	15						
IT7504	Middleware	SD6502, IT5507	15						
IT7505	Embedded Systems II	IT6504 or IT6503	15						
IT7506	Testing Automation	IT6505	15						
IT7507	Carrier Technology II	IT6506	15						
IT7508	Internship	***	30						
IT7509	Unspecified credits		15						

	CS	ADS	ID	NI	SD	UN
Compulsory credit	90	90	90	90	90	60
Elective credit	30	30	30	30	30	60
Total credit	**120**	**120**	**120**	**120**	**120**	**120**
Total for degree	**360**	**360**	**360**	**360**	**360**	**360**

Key

•	Common core compulsory courses
•	Cyber Security (CS) major compulsory courses
•	Applied Data Science (ADS) major compulsory courses
•	Interaction Design (ID) major compulsory courses
•	Networking and Infrastructure (NI) major compulsory courses
•	Software Development (SD) major compulsory courses
	Elective courses

Note

*   240 credits at level 5 and above with 1 course at level 7

**   Level 6 study as appropriate for topic

***   Completion of 240 credits at level 5 and above

- Pre-requisites may be waived by the Head of School for transition purposes
- An elective may be any course chosen from the BIT schedule of courses or the Graduate Diploma in Information Assurance and Security (or successor thereof) schedule of courses. Elective courses from other degree level qualifications can be selected on approval from the Programme Manager.
- Learners from other majors may study another majors' compulsory courses as electives.
- Not all electives will be offered every year or at every campus. A list of available elective courses for the following three years will be available to learners on enrolment.

6.1.1 Matrix showing relationship between graduate profile and learning outcomes

Bachelor of Information Technology

Graduate Profile

Courses in Bachelor of IT		Research, evaluate and apply the underpinning theoretical knowledge and skills required to work in the computing and technology fields	Identify, analyse, generate and evaluate solutions to complex problems in unfamiliar settings	Select, adapt and apply a range of processes in the Information Technology field	Demonstrate a creative, innovative approach to solving complex problems as well as an awareness of social and ethical issues as an emerging Information Technology professional	Manage resources in a team setting by identifying, assigning, prioritising and achieving goals in a timely fashion	Self-manage learning by selecting and assigning priorities within restricted resources and to organise work to meet tight deadlines in team settings	Present and defend views effectively through current communication media	Work effectively in teams demonstrating a team mind-set and cultural awareness and sensitivity	Interpret the regulations and legislation related to a body of knowledge
IT5501	Mathematics for IT	LO1, 2	LO1, 2							
IT5502	Communications for IT	LO3			LO4, 5		LO3	LO1, 2, 6	LO1, 3	LO4, 5
IT6501	Systems Analysis and Design	LO1, 2, 3	LO3	LO3, 4	LO3			LO3		
IT6502	Project Management	LO1, 2	LO2, 3	LO2, 3		LO1-3			LO3	
IT6508	Research in IT		LO3, 4		LO1		LO4	LO2		
IT6509	IT Business Environment	LO2						LO1		LO3, 4
IT7502	Digital Ethics	LO3	LO2		LO1 - 3			LO1, 3		LO1 - 3
IT7510	IT Capstone Project	LO1 - 6	LO1 - 6	LO3, 6	LO1 - 6	LO4	LO2, 3, 4, 7	LO1, 2, 5, 6, 7	LO2	
IT7508	Internship	LO1	LO2	LO2	LO3		LO1	LO3	LO1	

Course	Courses in Bachelor of IT	Research, evaluate and apply the underpinning theoretical knowledge and skills required to work in the computing and technology fields	Identify, analyse, generate and evaluate solutions to complex problems in unfamiliar settings	Select, adapt and apply a range of processes in the Information Technology field	Demonstrate a creative, innovative approach to solving complex problems as well as an awareness of social and ethical issues as an emerging Information Technology professional	Manage resources in a team setting by identifying, assigning, prioritising and achieving goals in a timely fashion	Self-manage learning by selecting and assigning priorities within restricted resources and to organise work to meet tight deadlines in team settings	Present and defend views effectively through current communication media	Work effectively in teams demonstrating a team mind-set and cultural awareness and sensitivity	Interpret the regulations and legislation related to a body of knowledge
IT5504	Information Security I	LO4		LO4, 6						LO6
IT5507	Fundamentals of Data Science	LO2, 3		LO2, 3				LO1		
IT5505	Interaction Design Fundamentals	LO2	LO3	LO4,5	LO3					
IT5506	Introduction to Networking	LO1, 3		LO2, 4, 5						
IT5503	Programming I			LO1 - 5						
CS6501	Information Security II		LO3	LO4	LO5	LO1-3				LO5
CS6502	Linux System Administration	LO1 - 5		LO2 - 5			LO5			
CS6503	Digital Forensics	LO1		LO4				LO5		
CS6504	Cryptography and Blockchain Fundamentals	LO1-4		LO3	LO4					LO4
DS6501	Social Data Analytics	LO4		LO1, 2	LO4			LO3		
DS6502	Data Analysis and Visualisation	LO2	LO3	LO1						
DS6503	Data Mining Tools and Techniques	LO1	LO2, 4	LO4						
DS6504	Business Intelligence and Big Data	LO2, 5		LO1, 3, 4	LO5					
ID6501	Responsive Website Design		LO1, 2, 5	LO3, 4			Project			

	Courses in Bachelor of IT	Research, evaluate and apply the underpinning theoretical knowledge and skills required to work in the computing and technology fields	Identify, analyse, generate and evaluate solutions to complex problems in unfamiliar settings	Select, adapt and apply a range of processes in the Information Technology field	Demonstrate a creative, innovative approach to solving complex problems as well as an awareness of social and ethical issues as an emerging Information Technology professional	Manage resources in a team setting by identifying, assigning, prioritising and achieving goals in a timely fashion	Self-manage learning by selecting and assigning priorities within restricted resources and to organise work to meet tight deadlines in team settings	Present and defend views effectively through current communication media	Work effectively in teams demonstrating a team mind-set and cultural awareness and sensitivity	Interpret the regulations and legislation related to a body of knowledge
							Graduate Profile			
ID6502	3D Environments		LO6	LO2-4			Project			
ID6503	Advanced Interaction Design	LO1	LO2, 4	LO5, 6	LO6		Project			
ID6504	User Interface and User Experience Design	LO5	LO1, 3, 4, 5	LO2			Project			
NI6501	Networking II – LAN	LO1-6		LO1-6						
NI6502	Networking III – Campus	LO1		LO2						
NI6503	Unified Infrastructure Services	LO1	LO2	LO2						
NI6504	Cloud Computing	LO1		LO2						
SD6501	Mobile Application Development	LO1-6	LO1-6	LO1-6	LO3		Project			
SD6502	Programming II			LO1-4			Project			
SD6503	Game Development	LO1, 2	LO4, 5	LO3			Project			
SD6504	Testing and Secure Coding	LO4	LO3, 6	LO2			Project			
CS7501	Information Security III	LO1 - 4	LO4	LO1-4						
CS7502	Special Topic in Cyber Security		LO1-2	LO2						
CS7503	Network Fundamentals for Information Assurance and Security	LO1-6	LO1-6	LO2, 3, 6						

Courses in Bachelor of IT		Research, evaluate and apply the underpinning theoretical knowledge and skills required to work in the computing and technology fields	Identify, analyse, generate and evaluate solutions to complex problems in unfamiliar settings	Select, adapt and apply a range of processes in the Information Technology field	Demonstrate a creative, innovative approach to solving complex problems as well as an awareness of social and ethical issues as an emerging Information Technology professional	Manage resources in a team setting by identifying, assigning, prioritising and achieving goals in a timely fashion	Self-manage learning by selecting and assigning priorities within restricted resources and to organise work to meet tight deadlines in team settings	Present and defend views effectively through current communication media	Work effectively in teams demonstrating a team mind-set and cultural awareness and sensitivity	Interpret the regulations and legislation related to a body of knowledge
CS7504	Security for DevOps	LO1-3	LO1-3	LO2, 3						
CS7505	Incident Response and Digital Forensics	LO1-6	LO1-6	LO1-6						
CS7506	Cloud Security	LO1-5	LO2-5		LO5					
DS7501	Data Mining for Business Analytics	LO5, 6		LO1-4	LO1			LO4		
DS7502	Data Warehouse Design and Implementation	LO1-5	LO1-6	LO2-6	LO4					
IA7307	Cryptography and Security Mechanisms	LO1-5	LO1-4	LO1, 4, 5						
IA7308	Security Testing and Network Defence	LO1-4	LO1-4	LO1-4						
ID7501	Advanced Interface Technologies	LO1-4		LO4	LO4		Project	LO2, 4		
ID7502	Human Computer Interaction		LO5	LO2-5			Project			LO7
NI7501	Current topic in Networking and Infrastructure		LO2							
NI7502	Emerging topic in Networking and Infrastructure		LO2							
SD7501	Web Application Development	LO1	LO3	LO3			Project			
SD7502	Intelligent Systems Development		LO2, 5	LO4, 5	LO5		Project			

Additional Graduate Outcomes for Bachelor of Information Technology (Cyber Security)

Graduate Profile	Courses for Cyber Security major in Bachelor of Information Technology						
	Information Security I	Information Security II	Linux System Administration	Digital Forensics	Cryptography and Blockchain Fundamentals	Information Security III	Special Topic in Cyber Security
Perform security risk management, vulnerability assessment, and business impact analysis for information systems to ensure the confidentiality, integrity, and availability and adherence to recognised industry standards	LO1, 3, 6	LO1-3			LO4	LO4-5	
Design and develop security policies and controls to meet the security goals of an organisation		LO4-5	LO3		LO1-3	LO1-3	
Investigate and manage an appropriate incident response to breaches of security using policies, technical controls, and forensic techniques			LO3	LO1-5		LO2, 5	LO1, 2
Plan and implement security testing to validate enterprise policy and processes		LO3	LO5	LO5	LO4	LO3	LO1, 2

Additional Graduate Outcomes for Bachelor of Information Technology (Applied Data Science)

Graduate Profile	Courses for Applied Data Science major in Bachelor of Information Technology						
	Fundamentals of Data Science	Social Data Analytics	Data Analysis and Visualisation	Data Mining Tools and Techniques	Business Intelligence and Big Data	Data Mining for Business Analytics	Data Warehouse Design and Implementation
Understand the concepts of business intelligence and data mining, and design and build solutions to support business intelligence and analytical outcomes		LO1, 2, 3	LO1, 2	LO1, 3	LO5	LO1, 2, 3, 5	LO1, 5
Communicate the results of data analysis through visualisation, stories, and interpretable summaries to support strategic business decision making	LO1	LO3	LO4			LO2, 4	LO6
Create and validate business analytical models using the data science process		LO2, 3	LO3	LO4	LO3	LO1, 2, 3, 4, 6	LO6
Assess user requirements, identify opportunities for IT-enabled organisational improvement and design solutions that produce a high-quality user experience and support business outcomes	LO2			LO2	LO5	LO1, 5	LO1, 5
Design, implement and query complex databases	LO2, 3				LO1, 3, 4	LO3, 5	LO2, 3, 4
Understand the concepts of information systems management and how to exploit organisational data and information		LO4		LO4	LO2, 5	LO5	LO5

Additional Graduate Outcomes for Bachelor of Information Technology (Interaction Design)

	Courses for Interaction Design major in Bachelor of Information Technology						
Graduate Profile	Interaction Design Fundamentals	Responsive Web Design	3D Environments	Advanced Interaction Design	User Interface and User Experience	Advanced Interface Technologies	Human Computer Interaction
Define the meanings of Human-Computer Interaction and User Experience Design	LO1, 2, 3, 4, 5			LO1	LO1		LO1, 2, 3, 4, 5
Scope and select appropriate technologies to solve user centred problems	LO5	LO1, 4	LO1, 2, 3		LO1, 2	LO1	LO4
Evaluate and develop effective user experiences that use technology to enhance a wide range of human activities	LO2, 5	LO1, 2, 3		LO3	LO4, 5	LO3	LO1, 4
Design and create a range of interfaces for a variety of devices, which synthesise the high levels of interactivity		LO3, 5	LO3, 4, 5	LO4	LO2, 4	LO3, 4	LO3, 4, 5
Understand the process of interaction design, including, fieldwork, requirements elicitation, prototyping, evaluation frameworks and testing	LO4			LO2, 6	LO1, 2, 3, 4		LO2, 3, 4
Analyse ways that user interfaces effectively relate to users' characteristics considering characteristics such as age, education, culture and ability.	LO3		LO6	LO3	LO1	LO1, 2	LO2, 5
Engage in speculative design processes to determine future developments			LO6	LO5		LO3, 4	LO5

Additional Graduate Outcomes for Bachelor of Information Technology (Networking and Infrastructure)

	Courses for Networking and Infrastructure Major in Bachelor of Information Technology						
Graduate Profile	Introduction to Networking	Networking II - LAN	Networking III - Campus	Unified Infrastructure Services	Cloud Computing	Current Topic in Networking and Infrastructure	Emerging Topic in Networking and Infrastructure
Analyse needs, design, implement and document network architectures, topologies and integration components, including operating systems and associated services, in an organisation using appropriate technologies	LO1, 3	LO4	LO1	LO1	LO1	LO1, 2	LO1, 2
Investigate, diagnose and resolve network problems using appropriate networking technologies and procedures	LO5	LO2	LO2	LO2	LO2	LO2	LO2
Plan and document network infrastructure and integration components to meet service level agreements	LO2, 4	LO4	LO1	LO1, 2	LO2	LO2	LO2
Design, install, upgrade, control, maintain and monitor IT network components	LO2	LO1, 2, 3	LO2	LO2	LO2	LO1, 2	LO1, 2

Additional Graduate Outcomes for Bachelor of Information Technology (Software Development)

Graduate Profile	Courses for Software Development major in Bachelor of IT						
	Programming I (Core)	Mobile Application Development	Programming II	Testing and Secure Coding	Game Development	Web Application Development	Intelligent Systems Development
To plan, analyse, design, and develop software applications to solve unstructured problems using appropriate methodologies, technologies and tools	LO1, 2, 3, 4	LO1, 2, 3, 4	LO1,3,4	LO2,3,4,5	LO1,2,3,4,5	LO1,2,3,4	LO1, 3, 4, 5
Plan and implement testing and maintenance of complex, scalable software applications using suitable framework and techniques	LO5	LO5, 6	LO2	LO1,3	LO4,5	LO3,4	LO1, 3, 5
Use appropriate resources to stay conversant with latest practices in the software development industry	LO1, 4	LO1, 4	LO3,4	LO6	LO3,4	LO1,2,4	LO2, 3, 4, 5

6.2   Content

The degree courses focus on developing learners' expertise, knowledge and skills in each of the major specialisations (Applied Data Science, Cyber Security, Interaction Design, Networking and Infrastructure, and Software Development). Every major has a suite of courses focused on developing technical skills for the relevant IT industry, together with the industry knowledge and attributes valued in the workplace.

The core courses taken by all learners reinforce that learning, focusing on contextual understanding, commercial enterprise and collaboration.

Study in each major culminates in a capstone project designed to integrate and apply learning from the prior courses. Particular attention is given to collaboration, critical thinking, communication, cultural awareness and employability, which underpin all the teaching content and delivery.

Study on the unendorsed BIT, allows the student to plan their own pathway through the learning, following pre-requisite streams of knowledge through the programme of study. This study also culminates in a capstone project designed to integrate and apply learning from the prior courses.

Special Topic courses are developed to pilot new courses. These are used to introduce new technologies, techniques and/or emerging knowledge. A special topic course can be developed to integrate and impart the work of a visiting academic, who may be part of an academic exchange programme with an overseas institution.

Key content of each compulsory course is summarised below. Fuller details are provided in the course descriptors in Appendix A.

Core Courses (CC)	
Level 5	
Mathematics for IT	• Learners will be introduced to topics in discrete mathematics that are important for studies in computing and to topics in statistics that are directed to the needs of the IT industry.
Communications for IT	• To introduce learners to the theories, principles and practical skills associated with effective communication in relation to Information Technology contexts.
Level 6	
Systems Analysis and Design	• To enable learners to evaluate and apply the important procedures involved in systems analysis and systems design.
Project Management	• To enable learners to explain the requirements of project planning and control, and use best practice project management techniques and software to manage tasks • To enable learners to incorporate typical IT industry practices into project management activities.
Level 7	
Capstone Project	• To provide learners the opportunity to research, select, integrate and apply a range of techniques and technology to solve a workplace problem • To provide learners the opportunity to demonstrate workplace-ready skills, attitudes and aptitudes suited to the IT industry.
Digital Ethics	• To enable learners through careful research and analysis to identify and manage ethical issues related to the use and advancement of digital technologies.

Cyber Security (CS) Major

Level 5	
Information Security I	• To understand basic information security principles and approaches as well as to recognise the major information security threats and countermeasures.
Level 6	
Information Security II	• Learners should be able to demonstrate an understanding of the foundations of cyber security, threats towards information system, and perform risk assessment and management.
Linux System Administration	• To provide a practical introduction to junior and intermediate level Linux/Unix system administration and deliver skills required to manage small-sized Linux networks.
Digital Forensics	• To provide learners with a comprehensive understanding of digital forensic principles and the collection, preservation, and analysis of digital evidence.
Cryptography and Blockchain Fundamentals	• This course exposes learners to blockchain technology, smart contracts, fundamentals of cryptocurrency and applications. Learners will also learn the fundamentals of cryptography.
Level 7	
Information Security III	• This course covers the key technologies and systems required to implement defence in depth and protect organisational information infrastructures from threats and attacks.
Special Topic in Cyber Security	• To enable learners to select a focus area of study in cyber security to reach their desired career and/or graduate study goals.

Applied Data Science (ADS) Major

Level 5	
Fundamentals of Data Science	• To provide learners with a basic understanding of how data is modelled, stored, manipulated and analysed using databases and visualisation techniques.
Level 6	
Social Data Analytics	• To introduce learners to the analysis of social data using tools and techniques to extract knowledge and insights from social media networks.
Data Analysis and Visualisation	• To introduce learners to a range of data analysis and visualisation techniques used in statistical inference and exploratory data analysis.
Data Mining Tools and Techniques	• To introduce learners to the data science process and the application of data mining tools and techniques.
Business Intelligence and Big Data	• To introduce learners to the techniques used in the design and implementation of business intelligence solutions and the issues relating to big data.
Level 7	
Data Mining for Business Analytics	• To provide learners with practical experience in developing analytical tools that provide insight and understanding of business performance based on data mining methods.
Data Warehouse Design and Implementation	• To provide learners with practical experience in the design and implementation of data warehouses and the development of OLAP tools.

Interaction Design (ID) Major

Level 5	
Interaction Design Fundamentals	• To provide learners with the skills to utilise design principles to evaluate digital interactive products. To provide learners with skills and knowledge to design and develop a digital interactive product.
Level 6	
Responsive Web Design	• Learners will be able to design and build websites that respond to any device for example, phone, tablet desktop or headset.
3D Environments	• To introduce learners to 3D graphics, modelling, animation, software and environments. Learners will use complex software tools to build 3D models, develop motion, texture and render projects.

Interaction Design (ID) Major	
Advanced Interaction Design	• At the end of the course, learners will be able to analyse and apply user centred design processes to build digital interactive artifacts that demonstrate effective user experiences.
User Interface and User Experience Design	• Learners will analyse and synthesise the processes of contextual inquiry relating to client objectives. • They will evaluate the effectiveness of user experience design for multi-device environments. • They will utilise design processes and technologies to create highly resolved solutions. • Learners will apply appropriate industry standards to digital product implementation.
Level 7	
Advanced Interface Technologies	• Learners will synthesise their knowledge of technologies and techniques in relation to interface design. • Learners will develop the ability to apply advanced techniques in designing and implementing innovative interactive interface solutions.
Human Computer Interaction	• To enable learners to understand the principles of human-computer interaction (HCI) in relation to design and implementation of computer systems and to experience different application tools in the design, implementation and documentation of user interfaces.

Networking & Infrastructure (NI) Major	
Level 5	
Introduction to Networking	• To introduce fundamental networking concepts, technologies, and basics of network theory and skills needed to implement a simple network.
Level 6	
Networking II - LAN	• This course introduces the essential knowledge and skills of a networker. To develop knowledge of the logic and algorithms involved in routing and switching traffic. • Learners will develop an understanding of individual routing protocols and concepts and learn to configure RIP, NAT, ACL and DHCP and to analyse, verify and troubleshoot routing and switching operations.
Networking III	• To provide a comprehensive, theoretical and practical approach and resolve common issues with routing and switching implementation for a larger sized network using IPv4 and IPv6.
Unified Infrastructure Services	• To introduce fundamental network infrastructure components necessary to implement a small to medium sized network.
Cloud Computing	• To develop an understanding of the incorporation and management of cloud technologies as part of broader systems operations. Learning about new technologies that support the changing cloud market as more organisations depend on cloud-based technologies to run mission critical systems, where hybrid and multi-cloud have become the norm.
Level 7	
Current Topic in Networking and Infrastructure	• To enable learners to understand the underlying principles of a current topic relating to Networking and Infrastructure, apply the underlying principles and concepts to the identification and solution of a variety of problems in various settings, research the topic, evaluate, and implement methods of solving problems related to the topic.
Emerging Topic in Networking and Infrastructure	• To enable learners to understand the underlying principles of an emerging topic relating to Networking and Infrastructure, apply the underlying principles and concepts to the identification and solution of a variety of problems in various settings, research the topic, evaluate, and implement methods of solving problems related to the topic.

Software Development (SD) Major	
Level 5	
Programming I	• A learner will be able to design software using appropriate syntax, implement software designs and apply basic object-oriented concepts.
Level 6	
Mobile Application Development	• To equip learners with the knowledge and fundamental skills of mobile application development using a contemporary programming language and mobile platform.
Programming II	• To allow learners to extend their programming skills with the introduction of advanced concepts.
Testing and Secure Coding	• To provide learners with an advanced level of knowledge and skills required for developing secure software that is designed and tested using appropriate testing and security tools.
Game Development	• Provide learners with a foundation of effective game design and development using tools, algorithms, and game programming techniques.
Level 7	
Web Application Development	• Evaluate and apply the use of appropriate platform and architecture, for the development of web applications. • Integrate applications with a database and learn how to access web data using managed data providers and objects. • Investigate the security challenges and security models for web applications.
Intelligent Systems Development	• To provide learners with an advanced level of knowledge and skills required for development artificially intelligent applications.

7 Learning and Teaching

7.1 Learning Mode

Blended

7.2 Teaching Sites

The two main teaching campuses are

- Petone: 21 Kensington Avenue, Petone, Wellington
- Porirua: 3 Wi Neera Drive, Porirua

Moodle is the blended learning platform.

7.3 Learning Methods

The Bachelor of Information Technology is delivered using blended delivery with face-to-face classes on campus supplemented with web-based support.

As an applied programme of study, learner learning is generated from classroom presentations, case studies, real life projects, guest speakers and assignments. Assignments offer learners the chance to conduct research, write essays and reports or develop Information Technology components and work closely with their classmates in a team environment. Some assignments are completed in groups.

A certain amount of self-directed learning is required to gain maximum learning and benefit from the programme. Computer labs and software for home computers are available for learners to practise what they are learning. Learners are provided with high specification computer laboratories for classroom based theory sessions and applied sessions. Learners have timetabled workshop time to practise their skills.

A variety of teaching techniques are used in the Bachelor of Information Technology. These include:

- Lectures – integrated use of visual aids e.g. video
- Tutorials – discussion, reflection, explanations and clarification of course content
- Workshops – practical exercises in computer rooms
- Learning packages – used to assist learners in researching information, reading and summarising material
- Computer Assisted Learning Packages – used to enhance learner knowledge at a self-paced level
- Learner presentations – encourage information sharing research skills and group participation; provide an opportunity for self and peer assessment
- Self-directed exercises – encourage learners to gather information, participate in discussion and share findings
- Case studies – provides the learner with the opportunity to gather and document relevant information from an individual or group
- Journaling – encourages the learner to gather data about their learning progress in relevant courses (example: Programming)

7.3.1 Project Work

Projects are used as vehicles for both learning and assessment. Well-designed briefs lead learners into learning situations where they can explore and test possibilities, develop and apply problem solving and critical thinking capacities, and evaluate the results they produce.

Collaboration is required in project activity, supported by learning about group processes, roles and teamwork, and communication skills. Tutors support learners in their interpretation of briefs and planning, provide for regular progress checks and give formative feedback. Guidance also includes advising learners not to follow a path that would take them too far off track and risk non-completion of a course.

In the third year of the degree, all learners complete 45-credit capstone projects. The capstone project is an industry project. This compulsory course offers learners the opportunity to work with a team of learners on a real project with real clients. This opportunity offers learners a chance to showcase and apply what they have been learning throughout their studies. This is generally carried out as a group project, but there is allowance for an individual project to be carried out on approval from the Programme Manager.

The capstone project is carried out in an area related to the major that the student is enrolled on. For those students who have elected to study an unendorsed BIT, the project will be focussed in an area where the student has completed learning to level 7.

An academic supervisor with expertise in a relevant field supports each team; for example, websites, databases, networks, programming. Additional expertise may be called upon from within the school. A project coordinator is assigned to develop and maintain relationships with clients and manage the process for learners and the academic supervisor. The Capstone Project Handbook contains the information required by the learner about the project process.

7.4   Assessment Methods

This programme uses achievement based assessments.
- Individual assessments may cover one or more of the learning outcomes.
- The result for each assessment is given as a mark.
- Each summative assessment is assigned a percentage weighting.
- The overall percentage mark for the course is calculated by adding the weighted results for all summative assessments.

A range of assessment methods may be used. The following are examples of appropriate methods of assessment:
- test
- assignment
- presentation
- project
- journal
- group assessment
- examination

7.4.1 Test

A test is a controlled written, oral or online assessment held part way through a course covering one or more learning outcomes.

7.4.2 Assignment

An assignment may include any of the following:
- laboratory exercise and written report
- practical exercise
- essay
- analysis/design with documentation
- written description/evaluation/essay
- investigation and written report
- folders of work

- Case study: a case study consists of a scenario, usually supported by documentation, which may be real or fictitious, from which learners are expected to work under the direction of the academic staff member.

7.4.3 Presentation

Presentations can vary from informal classroom presentations to the much more formal delivery expected in project presentations. They may be required for several reasons, for example to explain the results of a study and to assess presentation skills.

7.4.4 Project

A **project** is usually defined in discussion with the academic staff member, and learners then work under the supervision of the academic staff member.

7.4.5 Journal

A **journal** is a regularly updated personal commentary that records the learner's development during the course. It may be of a self-reflective, exploratory nature, or a log of progress and processes used in a project. Each learner will be issued with a guide to help develop the reflective journal process.

7.4.6 Group assessment

In **group assessments**, learners will be informed by the academic staff member, before the commencement of the assessment, how any individual's work will contribute to the final grade for the assessment.

7.4.7 Examination

An **examination** is a significant controlled written, oral or online assessment at or near the end of a course forming a major part of the overall assessment.

7.5   Learning Hours

Teaching weeks: 34
Vacation weeks: 2
Total gross weeks: 36

	Level 5	Level 6	Level 7	Average over degree
Teaching hours per week :	15.3	12.2	8.4	12
Self-directed learning hours / week:	20	23	27.1	23.3
Total learning hours/week:	35.3	35.3	35.3	35.3

8   Regulations

This programme is subject to the A1-R1 Academic Statute, policies, and procedures within the Taikura Quality Management System.

8.1   Entry Requirements

Achievement of NCEA Level 3 (60 credits at Level 3 or higher and 20 credits at Level 2 or higher) including:
- A minimum of 14 credits at Level 3 or higher in each of three subjects from the list of approved subjects
- A minimum of 10 credits at Level 2 or higher in English or Te Reo Māori made up of:
  - 5 credits in reading
  - 5 credits in writing

  AND

- A minimum of 10 credits at Level 1* or above in Numeracy, made up of: achievement standards – specified achievement standards available through a range of subjects, or unit standards - package of three numeracy unit standards (26623, 26626, 26627- all three required)
  OR
- Any qualification (New Zealand or overseas) recognised by NZQA as being equivalent to achievement of NCEA Level 3
- A qualification considered to be equivalent to the above

An applicant with equivalent experience, who does not meet all of the entry requirements, may be granted entry at the discretion of the Head of School where it is considered that the applicant has a reasonable chance of succeeding in the qualification.

English Language Requirements:
All applicants must have a level of English sufficient to be able to study at this level. Those learners whose first language is not English should have:

- An international English Language Testing System (IELTS) overall academic score of at least 6.0 (with at least 5.5 in each band) issued within the last two years, or equivalent.

8.2   Material requirements

- Calculator
- A laptop / PC is recommended to support off site and self-directed learning but is not mandatory.

8.3   Enrolment Options

Full time / part-time.

8.4   Recognition of Prior Learning

Learners may be granted cross credit and recognition of prior learning according to the approved Academic Statute and relevant procedures. An application for recognition of prior learning is submitted at the time of enrolment.

Learners who have completed prior study in an alternative qualification, and where those courses do not match those in the BIT schedule, may apply to have courses credited as unspecified credit within the degree.

8.5   Selection Criteria

If the number of applicants is greater than the number of places on the programme, then the successful applicants are selected on a first-come-first-served basis.

8.6   Research Requirements

The BIT programme lays the foundations of research skills which are relevant to the IT industry with the aim of equipping learners with the transferrable research skills, problem-solving techniques and technologies that are used in the development and deployment of information technology systems and that lead to graduate-level study.

This is done through an iterative process, with assignment/project briefs at every level that require a student to search for, identify and critically evaluate technologies and approaches used in information technology in order to fulfil the requirements of the brief. This repeated involvement in the applied research process strengthens and expands the students' knowledge of research of this nature.

In year three, learners are required to complete a capstone project that provides learners with the opportunity to carry out applied research to solve a business or industry based problem. Where research is carried out that has ethical considerations involved, or if the research will be published or disseminated externally, learners will be required to obtain Research and Ethics Committee approval.

8.7   Assessment Requirements

The grade method is GM2.

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

To pass a course where there is an examination set, a learner must:

- Attempt all assessments,
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Extensions and opportunities for further assessment

Extensions and opportunities for further assessment are allowed in accordance with the A1-R1 Academic Statute and approved by the Programme Manager. There is a limit of one resubmission per course. The highest grade awarded for any resubmission is the lowest pass grade.

Students wishing to complete assessments in Te Reo Māori should advise the Head of School at the time of enrolment to the programme to enable the appropriate assessors and moderators to be arranged.

8.8   Progress through Programme

The Bachelor of Information Technology is a three-year full-time (or part-time equivalent) qualification. The programme must be completed within six years of first enrolling on the programme.

8.9   Award of Qualification

8.9.1 Bachelor of Information Technology

In order to be awarded the Bachelor of Information Technology, a learner must successfully pass courses to a total of 360 credits, with a minimum of 90 credits at level 7 and a maximum of 135 credits at level 5.

Required Courses		Credits
Compulsory Courses		
IT5501	Mathematics for IT	15
IT5502	Communications for IT	15
IT6501	Systems Analysis and Design	15
IT6502	Project Management	15
IT7502	Digital Ethics	15
IT7510	IT Capstone Project	45
	Total Compulsory Credit	**120**
Elective Courses		
	Elective course at Level 5-7	105
	Elective courses at Level 6-7	105
	Elective courses at Level 7	30

		Total Elective Credit	**120**
		Total Credit	**360**

8.9.2 Bachelor of Information Technology (Cyber Security)

In order to be awarded the Bachelor of Information Technology (Cyber Security), a learner must successfully pass courses to a total of 360 credits, with a minimum of 90 credits at level 7 and a maximum of 135 credits at level 5.

Required Courses		Credits
Compulsory Courses		
IT5501	Mathematics for IT	15
IT5502	Communications for IT	15
IT5504	Information Security I	15
IT6501	Systems Analysis and Design	15
IT6502	Project Management	15
CS6501	Information Security II	15
CS6502	Linux System Administration	15
CS6503	Digital Forensics	15
CS6504	Cryptography and Blockchain Fundamentals	15
IT7502	Digital Ethics	15
IT7510	IT Capstone Project	45
CS7501	Information Security III	15
CS7502	Special Topic in Security	15
	Total Compulsory Credit	**225**
Elective Courses		
	Elective credit at Level 5-7	90
	Elective courses at Level 6-7	45
	Total Elective Credit	**75**
	Total Credit	**360**

8.9.3 Bachelor of Information Technology (Applied Data Science)

In order to be awarded the Bachelor of Information Technology (Applied Data Science), a learner must successfully pass courses to a total of 360 credits, with a minimum of 90 credits at level 7 and a maximum of 135 credits at level 5.

Required Courses		Credits
Compulsory Courses		
IT5501	Mathematics for IT	15
IT5502	Communications for IT	15
IT5507	Fundamentals of Data Science	15
IT6501	Systems Analysis and Design	15
IT6502	Project Management	15
DS6501	Social Data Analytics	15
DS6502	Data Analysis and Visualisation	15
DS6503	Data Mining Tools and Techniques	15
DS6504	Business Intelligence and Big Data	15
IT7502	Digital Ethics	15
IT7510	IT Capstone Project	45
DS7501	Data Mining for Business Analytics	15
DS7502	Data Warehouse Design and Implementation	15
	Total Compulsory Credit	**225**
Elective Courses		
	Elective credit at Level 5-7	90
	Elective courses at Level 6-7	45
	Total Elective Credit	**135**
	Total Credit	**360**

8.9.4 Bachelor of Information Technology (Interaction Design)

In order to be awarded the Bachelor of Information Technology (Interaction Design), a learner must successfully pass courses to a total of 360 credits, with a minimum of 90 credits at level 7 and a maximum of 135 credits at level 5.

Required Courses		Credits
Compulsory Courses		
IT5501	Mathematics for IT	15
IT5502	Communications for IT	15
IT5505	Interaction Design Fundamentals	15
IT6501	Systems Analysis and Design	15
IT6502	Project Management	15
ID6501	Responsive Website Design	15
ID6502	3D Environments	15
ID6503	Advanced Interaction Design	15
ID6504	User Interface and User Experience	15
IT7502	Digital Ethics	15
IT7510	IT Capstone Project	45
ID7501	Advanced Interface Technologies	15
ID7502	Human Computer Interaction	15
	Total Compulsory Credit	**225**
Elective Courses		
	Elective credit at Level 5-7	90
	Elective courses at Level 6-7	45
	Total Elective Credit	**75**
	Total Credit	**360**

8.9.5 Bachelor of Information Technology (Networking and Infrastructure)

In order to be awarded the Bachelor of Information Technology (Networking and Infrastructure), a learner must successfully pass courses to a total of 360 credits, with a minimum of 90 credits at level 7 and a maximum of 135 credits at level 5.

Required Courses		Credits
Compulsory Courses		
IT5501	Mathematics for IT	15
IT5502	Communications for IT	15
IT5506	Introduction to Networking	15
IT6501	Systems Analysis and Design	15
IT6502	Project Management	15
NI6501	Networking II – LAN	15
NI6502	Networking III – Campus	15
NI6503	Network Infrastructure Support	15
NI6504	Cloud Computing	15
IT7502	Digital Ethics	15
IT7510	IT Capstone Project	45
NI7501	Current topic in Networking and Infrastructure	15
NI7502	Emerging topic in Networking and Infrastructure	15
	Total Compulsory Credit	**225**
Elective Courses		
	Elective credit at Level 5-7	90
	Elective courses at Level 6-7	45
	Total Elective Credit	**75**
	Total Credit	**360**

8.9.6 Bachelor of Information Technology (Software Development)

In order to be awarded the Bachelor of Information Technology (Software Development), a learner must successfully pass courses to a total of 360 credits, with a minimum of 90 credits at level 7 and a maximum of 135 credits at level 5.

Required Courses		Credits
Compulsory Courses		
IT5501	Mathematics for IT	15
IT5502	Communications for IT	15
IT5503	Programming I	15
IT6501	Systems Analysis and Design	15
IT6502	Project Management	15
SD6501	Mobile Application Development	15
SD6502	Programming II	15
SD6503	Testing and Secure Coding	15
SD6504	Game Development	15
IT7502	Digital Ethics	15
IT7510	IT Capstone Project	45
SD7501	Web Application Development	15
SD7502	Intelligent Systems Development	15
	Total Compulsory Credit	**225**
Elective Courses		
	Elective credit at Level 5-7	90
	Elective courses at Level 6-7	45
	Total Elective Credit	**75**
	Total Credit	**360**

8.10 Transition Arrangements

Bachelor of Information Technology

Learners enrolled in the current Bachelor of Information Technology at WelTec or Bachelor of Information Technology at Whitireia in 2018, and who have passed all courses of the first year, are awarded 120 credits at level 5 and will transfer into the relevant major of second year of the new Bachelor of Information Technology.

Learners with passes in fewer courses of the first year of the current Bachelor of Information Technology at WelTec or Whitireia will be awarded cross credits to equivalent courses in the new Bachelor of Information Technology, and may transfer into the relevant major to continue their studies.

Mapping of courses for cross credit

Bachelor of Information Technology		Whitireia Bachelor of Information Technology	
IT5501	Mathematics for IT	IT5185	Mathematics for Information Technology
IT5502	Communications for IT	IT5181	Communication Studies
IT5503	Programming I	IT5184	Programming
IT5505	Interaction Design Fundamentals	IT5171	Digital Media
IT5506	Introduction to Networking	IT5187	Fundamentals of Networking
IT5507	Fundamentals of Data Science	IT5182	Fundamentals of Data Models and Databases
IT5510	Introduction to Operating Systems	IT5189	Introduction to Operating Systems
	Elective	IT5170	Programming Logic
	Elective	IT5173	Hardware Fundamentals
	Elective	IT5183	Fundamentals of Software Development and Design
	Elective	IT5186	The Information Technology Environment

Bachelor of Information Technology		WelTec Bachelor of Information Technology	
Level 5			
IT5501	Mathematics for IT	IT5186	IT Mathematics
IT5502	Communications for IT	IT5178	Communication Studies
IT5503	Programming I	IT5185 OR IT5187	Programming 1A OR Programming Principles
IT5504	Information Security I	IT5192	Information Security Fundamentals
IT5506	Introduction to Networking	IT5174	Networking I
IT5510	Introduction to Operating Systems	IT5159	Operating System Fundamentals
IT5508	Electronic Fundamentals	IT5152	Electronics I
	Elective	IT5153	Electronics II
	Elective	IT5156	Programming 1B
	Elective	IT5162	Scripting I
	Elective	IT5169	Software Engineering
	Elective	IT5173	Microcomputer Systems I
	Elective	IT5177	Emerging Technologies
	Elective	IT5190	Linux System Administration I
	Elective	IT5191	Enterprise Desktop Support

Learners who have passed all courses of the first year and entered second year studies of the current Bachelor of Information Technology at WelTec or Bachelor of Information Technology at Whitireia in 2018 will continue into the third year of their current programme in 2019.

For those students who do not complete their current programme by November 2019, individual study plans will be developed, with the student enrolling on courses from within the new degree schedule and cross crediting those courses to fulfil the completion requirements of their current programme.

New Zealand Diploma in Information Systems (Level 5)

Learners enrolled in the current NZ Diploma in Information Systems (Level 5) at Whitireia in 2018 who:

- have passed all eight courses in that year
- provide evidence of having achieved an IELTS overall academic score of at least 6.0 (with at least 5.5 in each band)

will be awarded 120 credits at level 5 and will transfer into the relevant major of the second year of the new Bachelor of Information Technology.

Mapping of courses for cross credit

Bachelor of Information Technology		Whitireia NZ Diploma in Information Systems (L5)	
IT5501	Mathematics for IT	IT5485	Mathematics for Information Technology
IT5502	Communications for IT	IT5481	Communication Studies
IT5503	Programming I	IT5484	Programming
IT5506	Introduction to Networking	IT5487	Fundamentals of Networking
IT5507	Fundamentals of Data Science	IT5482	Fundamentals of Data Models and Databases
IT5510	Introduction to Operating Systems	IT5489	Introduction to Operating Systems
	Elective course	IT5486	The Information Technology Environment
	Elective course	IT5483	Fundamentals of Software Development and Design

New Zealand Diploma in Information Technology (Technical Support)(Level5)

Learners enrolled in the current NZ Diploma in Information Technology (Technical Support) (Level5) at WelTec in 2018 who:

- have passed all eight courses in that year
- provide evidence of having achieved an IELTS overall academic score of at least 6.0 (with at least 5.5 in each band)

will be awarded 120 credits at level 5 and will transfer into the relevant major of the second year of the new Bachelor of Information Technology.

Mapping of courses for cross credit

Bachelor of Information Technology		NZ Diploma in IT Technical Support L5	
IT5501	Communications for IT	IT5118	Professional Practice
IT5503	Programming I	IT5121	Fundamentals of Programming and Problem Solving
IT5506	Introduction to Networking	IT5122	Implementing Networks
IT5507	Fundamentals of Data Science	IT5116	Database Administration
	Elective	IT5117	Hardware Servicing
	Elective	IT5119	IT Technical Support
	Elective	IT5120	Server Management
	Elective	IT5115	IT System Overview

9 Resource Requirements

9.1 Teaching Spaces and Materials

This programme requires classrooms and computer laboratories with high spec desktops. It is web-supported using Moodle resources and emerging communication technologies.

Portable resources include:
- network pods
- wireless resources – VoIP equipment
- handheld technologies (tablets, phones)
- additional laptops.

The physical resources required to teach this programme are:
- Theory classrooms – for large and small groups
- Break-out spaces for smaller tutorials
- Computer laboratories capable of delivering software appropriate to all levels and majors of the programme
- Project room for learners
- Exhibition spaces for annual project showcase
- Library resources – print and online.

Library resources

Library personnel deliver a high quality, user-friendly service. An interloan service is offered by the Library, as is access to online literature search facilities. New resources are budgeted for and ordered by lecturers and librarians to ensure new books, journals, videos and CD-ROMs are added to the current stock. Staff and learners have access to a wide range of electronic resources and academic databases.

9.2 Academic and Support Staff

Academic staff must:

- Hold a relevant qualification at least one level above the degree, or equivalent industry or professional experience

- Have experience in teaching adult learners, and a qualification in adult teaching at level 5 or above, or be engaged in completing such a qualification

- Be engaged in research within their area of expertise that contributes to knowledge and understanding in the relevant disciplines, and/or research that supports the continued development of the degree programme and its delivery. Academic staff demonstrate the link between their research and their teaching in the degree.

All academic staff employed on the degree will be required to undertake approved research work in proportion to their teaching load. The expectation is that tutorial staff will complete one research output per year. Staff members conduct research within their area of experience, which advances knowledge and understanding and supports their function as teachers. Research is funded through external research grants and allocation of polytechnic funds. The quantity and quality of staff research outputs will be monitored to ensure that the collective output is consistent with the development and maintenance of an on-going research culture in support of the degree programme.

Supplementary teaching staff:

Contract and fixed term tutors who have IT industry experience and are at the forefront of the skills and technologies of their industry, supplement permanent teaching staff. Their input is of considerable value to the programme and to the learners. Their current practice is directly engaged through applying their knowledge and skills in the field of the specialisation in which they teach. Any assessment by supplementary staff must be done in conjunction with one of the programme tutors.

Programme support staff:

- IT technicians to support computers and software used by staff and learners in all majors
- Administration staff to deal with support services for learners, including course information, enrolment, credit recognition, graduation, attendance and academic progress.

9.3   Risk Management

9.3.1   Financial

The institutions operate under an Investment Plan agreed with the Tertiary Education Commission, which forms the basis of financial planning. The School of IT is responsible for managing the human and financial resources for the academic programmes. The Head of School and management team monitors income and expenditure against the budget, under the overview of the Director Finance and Operations.

9.3.2   Health and Safety

WelTec and Whitireia support a healthy work and study environment for all. The health and safety policies and procedures are applied in the three campuses in relation to regular maintenance and upkeep of equipment, and safe practices when using all equipment and tools.

All the campuses are smoke free. This means that no person is permitted to smoke on any WelTec and Whitireia campuses:

- In all buildings or parts of buildings that are under WelTec and Whitireia's management
- On all WelTec and Whitireia's land holdings and perimeters, including all car parks and green spaces.

WelTec and Whitireia staff are trained in emergency and disaster preparedness. Learners are expected to follow all directions from staff to ensure safety regulations are met. They are required to comply with health and safety aspects during their study, including notifying their tutor of any hazards or concerns. They will familiarise themselves with emergency exits, and any safety rules applied to the classrooms/workshops that they are working in. They will dress practically and appropriately for their study environment, which includes the correct use of protective clothing (PPE) and equipment/machinery.

10   Quality Assurance and Evaluation

Evaluation and review of the programme is conducted in accordance with T3 Evaluation and Quality Improvement Policy and Procedures of the Taikura Quality Management System (QMS).

10.1   Programme Evaluation

Programme evaluation is based on the self-assessment of educational outcomes and the analysis and interpretation of information and feedback from stakeholders. It results in clear judgements about quality and value and the development of action plans for improvement.

Feedback and evidence are collected in a variety of ways, including learner surveys, graduate survey, employer survey, and internal and external moderation.

An annual programme evaluation report/self-assessment report is produced for each teaching programme. The key evaluation questions at the core of the NZQA Evaluative Quality Assurance Framework provide the framework for the evaluation.

Effectiveness of programme evaluation is monitored internally through the Boards of Studies and the Evaluation Committee. The results are integrated into the strategic and business planning of the institution(s) and used constructively to effect improvement and to guide future planning.

10.2 Programme Changes

Changes to programmes are made in accordance with Taikura QMS procedures and subject to the approval of Board of Studies, Programme Committee and the Academic Board. Significant changes are subject to approval from NZQA.

Industry or advisory group meetings and/or regular communication with external stakeholders ensure that programme delivery and changes meet the needs of industry, employers, the community and other stakeholders.

10.3 Moderation

Moderation is in accordance with Taikura A4 Learning and Teaching policy and institution procedures. This includes pre- and post-delivery internal and external moderation according to an approved moderation plan.

10.4 Degree Monitoring

An NZQA-appointed monitor reports annually on the programme's quality, consistency and compliance with its terms of accreditation until the programme is approved for monitoring by annual programme evaluation report. An external academic advisor is appointed to provide independent external academic and professional input into the on-going quality improvements and delivery of self-monitoring programmes. The programme's annual programme evaluation report is submitted to NZQA.

Appendix A

Course Descriptors

IT5501 Mathematics for IT

Code	Title
IT5501	Mathematics for IT

Level	Credits
5	15

Pre-requisites   None

Learning Hours
Tutor Directed 65 hours
Self-directed   85 hours

Aim
To introduce learners to topics in discrete mathematics that are important for studies in computing and to topics in statistics that are directed to the needs of the IT industry.

Learning Outcomes
On successful completion of this course, the learner will be able to:

1. Solve problems in selected topics in discrete mathematics

2. Solve problems in selected topics in statistics

Indicative content
- Algorithms
- Number bases
- Computer representation of numbers
- Logic
- Sets and relations
- Functions
- Induction and recursion
- Boolean algebra and digital circuits
- Graph theory
- Trees
- Visual presentation of data
- Measures of central tendency
- Measures of dispersion including standard deviation
- Sampling
- Probability
- The normal distribution
- Correlation
- Regression
- Hypothesis testing

Assessments

Assessment Method	Weighting	Learning Outcome/s
Test 1	20%	1 - 2
Test 2	20%	1 - 2
Assignment	20%	1 - 2
Final Assessment	40%	1 - 2

Assignments can be broken down into a number of small modules.

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Indicative texts:

Grossman, P. *Discrete Mathematics for Computing* Macmillan. Third Edition, 2009

Croucher, J.S. *Introductory Mathematics and Statistics for Business* McGraw-Hill. 6th Edition, 2013

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Hardware lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT5502 Communications for IT

Code | **Title**
IT5502 | Communications for IT

Level | **Credits**
5 | 15

Pre-requisites None

Learning Hours
Tutor Directed 65 hours
Self-directed 85 hours

Aim

To introduce learners to the theories, principles and practical skills associated with effective communication in relation to Information Technology contexts.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Describe effective ways to influence and improve communication in a business setting and demonstrate knowledge of the principles of communication methodologies and influences

2. Undertake a range of business communication techniques and practices

3. Apply effective communication strategies through co-operative work in a group, leadership, negotiation techniques and conflict management

4. Demonstrate an understanding of workplace ethics, law, cultural awareness, and Te Tiriti o Waitangi

5. Demonstrate an understanding of copyright and citation issues

6. Verbally present information in a professional manner

Indicative content

- Principles of effective communication strategies
- Business communication practices including: meeting techniques, interviews record keeping, technical writing and use of mainstream business software
- Principles and practices of team and group work, leadership, negotiation, conflict management, workplace ethics and legal implications
- Verbal and non-verbal communication
- Use of citations and referencing techniques
- Effective oral presentations

Assessments

Assessment Method	Weighting	Learning Outcome/s
Test	20%	1, 4
Assignment 1	30%	2, 5
Group Assignment 2	30%	1 - 5
Presentation	20%	4, 6

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Indicative text:

Dwyer, J (2016). *Communication for business and the professions* (6th Ed.). Frenchs Forest NSW: Pearson Australia.

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Hardware lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT6501 Systems Analysis and Design

Code	Title
IT6501	Systems Analysis and Design

Level	Credits
6	15

Pre-requisites   IT5507 Fundamentals of Data Science
                        IT5503 Programming I

Learning Hours

Tutor directed	52 hours
Self-directed	98 hours

Aim

To enable learners to evaluate and apply the important procedures involved in systems analysis and systems design.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Evaluate a range of models, as well as contemporary techniques and procedures, used in the Systems Development Life Cycle (SDLC)

2. Assess various approaches for systems analysis and design for an object-oriented SDLC

3. Produce appropriate analysis and design documentation for a given business problem

4. Analyse and design different components of a system to support contemporary systems architecture

5. Describe the current trends in systems development

Indicative content

The course may contain topics of
- the systems development life cycle models
- role of systems analyst, and systems designer
- adaptive approaches to SDLC compared to a predictive approach
- requirements analysis and its modelling
- systems design and its modelling
- model, view and controller layers of a system
- appropriate development methodologies
- current trends in systems development or equivalent

This content will be delivered in an applied manner, with extensive use of case studies.

Assessments

Assessment Method	Weighting	Learning Outcomes
Assignment 1	30%	1 - 5
Assignment 2	30%	1 - 5
Examination	40%	1 - 5

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Indicative text:

Systems analysis and design in a changing world, (most recent edition). By John W. Satzinger, Robert B. Jackson, Stephen D. Burd*. Cengage Learning.*

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT6502 Project Management

Code   **Title**
IT6502   Project Management

Level   **Credits**
6   15

Pre-requisites   IT5502   Communications for IT

Learning Hours
    Tutor Directed   52 hours
    Self-directed   98 hours

Aims
- To enable learners to explain the requirements of project planning and control, and use best practice project management techniques and software to manage tasks
- To enable learners to incorporate typical IT industry practices into project management activities

Learning Outcomes
    On successful completion of this course, the learner will be able to:

1. Define, select, and explain current theories and practices from the current Project Management Body of Knowledge (PMBOK) knowledge areas

2. Apply knowledge from the PMBOK knowledge areas and demonstrate this using appropriate practices and software

3. Explain and explore techniques to deal with significant human resources issues relevant to IT project management

Indicative content
    The course may contain topics of:

- The knowledge areas identified in the Project Management Institute's PMBOK contextualised for application in the Information Technology industry

- Practical application of project planning and control tools

- Significant issues relating to managing people in projects

- Agile software development (Jira, VSTS)

- Code versioning

- Project risk

This content will be delivered in an applied manner, including the use of case studies and shared experiences.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Test	20%	1
Project	40%	2, 3
Examination	40%	1-3

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Indicative text:
Schwalbe, K., *Information Technology Project Management* (8th ed.), Cengage Learning, 2016.

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT7502 Digital Ethics

Code	Title
IT7502	Digital Ethics

Level
7

Credits
15

Pre-requisites   IT5502 Communications for IT

Learning Hours

| Tutor Directed | 52 hours |
| Self-directed | 98 hours |

Aim

To enable learners, through careful research and analysis, to identify and manage ethical issues related to the use and advancement of digital technologies.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Critically analyse ethical issues related to ICT

2. Critically evaluate, assess and apply ethical theories and ICT Codes of ethics to an ethical problem

3. Analyse a current ICT ethical problem using critical thinking techniques and provide solutions within the context of the analysis

Indicative content

- Critical thinking
- professionalism
- ethical theories
- privacy
- security
- cybercrime
- intellectual property
- freedom of speech and regulation of the internet
- legislation related to course content
- big data
- reliability
- social and ethical issues related to emerging technologies
- piracy

Assessment

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	30%	1
Assignment 2	30%	2
Examination	40%	3

Successful completion of course:

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Indicative Texts:

Tavani, H. T. (2013). *Ethics and technology: Controversies, questions, and strategies for ethical computing (4th Ed)*. Australia: Wiley.

Himma, K. E. & Tavani, H.T. (2009).*The handbook of information and computer ethics.* USA: Wiley.

Simpson, C.R., Nevile, L., Burmeister, O.K., (2003) Doing Ethics: A universal technique in an accessibility context. *Australasian Journal of Information Systems.* 10(2).

Spinello, R. A. & Tavani, H. T. (Eds.) (2010*). Readings in cyber ethics.* London: Jones and Bartlett.

Spinello, R. A. (2014). *Morality and law in cyberspace (5th Ed).* Massachusetts: Jones & Bartlett.

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT7510 IT Capstone Project

Code	Title
IT7510	IT Capstone Project

Level	Credits
7	45

Pre-requisites   240 credits at levels 5 and above with one level 7 paper
IT6502 Project Management

Learning Hours
Tutor-directed 25 hours
Self-directed   425 hours

Aims

- To provide learners the opportunity to research, select, integrate and apply a range of techniques and technology to solve a business or industry based problem
- To provide learners the opportunity to demonstrate workplace-ready skills, attitudes and aptitudes suited to the IT industry

Learning Outcomes
On successful completion of this course, the learner will be able to:

1. Produce a proposal for the project

2. Work collaboratively, using professional and interpersonal skills, cooperative methods and communication with team members, project sponsor and advisor.

3. Apply the techniques and knowledge gained throughout the degree programme to research, analyse, design, develop, test and produce a solution

4. Manage and control all aspects of the project

5. Carry out a concluding review of the project with the sponsor

6. Produce relevant IT artefacts for the project. Range may include software, design, implementation, installation, testing, training, support, maintenance, administration, user manual and help documents

7. Critically reflect on learning that has taken place during the project and relevant courses during the degree

8. Effectively present the project experience and achievement to an audience including the project sponsor

Indicative content
Topics may include

- Developing a Business Proposal or Specification
- Effective communication
- Integration and application of knowledge
- Project management
- Project delivery
- Industry standard project documentation
- Promotion of project outcome

Assessments

Assessment Method	Weighting	Learning Outcome/s
Project proposal	10%	1, 2, 6
Self-management review	10%	2, 4
Panel assessment	80%	2-8

A Panel is defined as several evaluators. Panel Assessment may vary at the discretion of the Panel, depending on the type of project produced. A typical project may be:

Assessment Method	Weighting	Learning Outcome/s
Panel Assessment		
Development / deliverable	50%	3,5,6
Project management	5%	2,4
Self-evaluation and presentation	15%	2,3,7, 8
Client evaluation	10%	2,5

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

2.0 Cyber Security Major Courses

IT5504 Information Security I

Code	Title
IT5504	Information Security I

Level	Credits
5	15

Pre-requisites   None

Learning Hours

Tutor Directed	65 hours
Self-directed	85 hours

Aim

To provide learners with an understanding of basic information security principles and approaches as well as to recognise the major information security threats and countermeasures.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Explain information security fundamentals

2. Analyse personal security

3. Identify threats to computer security

4. Identify and apply internet security procedures

5. Examine mobile security

6. Identify risks to Internet privacy

Indicative content

- Information security fundamentals
- Personal security
- Computer security
- Malware
- Mobile security
- Privacy

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	30%	1 - 3
Assignment 2	30%	4 - 6
Examination	40%	1 - 6

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Indicative texts

Ciampa, M. (2017). *Security Awareness: Applying Practical Security in Your World (5th Ed).* USA: Cengage

ISECOM. (2017), *Network Security Essentials: Study Guide and Workbook – Volume 1(2nd Ed)*

ISECOM. (2017), *Security Analysis Essentials: Study Guide and Workbook – Volume 2*

ISECOM. (2017), *Hacking Essentials: Study Guide and Workbook – Volume 3*

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

CS6501 Information Security II

Code   **Title**

CS6501   Information Security II

Level   **Credits**
6   15

Pre-requisites   None

Learning Hours

Tutor Directed   52 hours
Self-directed   98 hours

Aim

To enable learners to develop an understanding of the foundations of cyber security, threats towards information system, and perform risk assessment and management.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Describe information security principles, key terms and essential concepts and examine the business drivers behind the design process of information security analysis

2. Identify and explain common attack techniques and sources of threat

3. Conduct a fundamental information security assessment for an organisation, including risk identification and assessment, implementing effective control measures to minimise the risk introduced by potential threats, and performing cost benefit analysis

4. Describe and apply physical, procedural and technical controls to protect information system components

5. Describe and explain legal, regulatory, and ethical standards relevant to an information systems

Indicative content

- Confidentiality, integrity and availability
- Identification, authentication, authorisation and access control
- Auditing and accountability
- Attacks, threats and vulnerabilities
- Operating system and application security
- Physical, personnel and operations security
- Network security controls
- Security standards and policies
- Risk assessment and management
- Legal, ethical and professional issues in information security

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	30%	1-3
Assignment 2	30%	3-5
Examination	40%	1-5

Successful completion of course:

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

CS6502 Linux System Administration

Code **Title**

CS6502 Linux System Administration

Level **Credits**

6 15

Pre-requisites IT5504 Information Security 1
IT5506 Introduction to Networking

Learning Hours
Tutor Directed 52 hours
Self-directed 98 hours

Aim

To provide a practical introduction to junior and intermediate level Linux/Unix system administration and to enable the learner to develop the skills required to manage small-sized Linux networks.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Explain the fundamental elements of the Linux/Unix systems

2. Install, configure and manage a workstation including partitioning, managing software and devices, Linux desktop and shell environments through the command line

3. Explain and perform administrative and troubleshooting tasks including, but not limited to, management of users, groups, printing services, managing Linux processes, file and folder permissions, log management, backup and basic security tasks through command line

4. Demonstrate an understanding of Linux networking services, setup basic Local Area Network (LAN) and Internet connectivity and perform network troubleshooting

5. Install, configure and manage a range of systems present in a typical Linux network environment

Indicative content

- Kernel, boot, initialisation, shutdown and run levels
- Printing, documentation and shell environments
- Linux installation, GNU and Unix commands, managing hardware and devices
- The X Window System, Linux file systems, Linux user and group management, file and folder permissions, Linux processes and task scheduling
- Package management, compiling software from source, shell scripting and basic shell programming
- Administrative tasks including management of networking services, backup and security
- Basic network configuration, setup and configuration of network services such as web server, file server, Dynamic Host Configuration Protocol (DHCP) and email servers

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	30%	1-3
Assignment 2	30%	2-5
Examination	40%	1-5

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

CS6503 Digital Forensics

Code   **Title**

CS6503   Digital Forensics

Level   **Credits**
6   15

Pre-requisites   IT5504 Information Security I
                            IT5506 Introduction to Networking

Learning Hours
        Tutor Directed   52 hours
        Self-directed   98 hours

Aim

        To provide learners with a comprehensive understanding of digital forensic principles and
        the collection, preservation, and analysis of digital evidence.

Learning Outcomes

        On successful completion of this course, the learner will be able to:

        1. Identify the attributes of file systems and storage media and perform analysis on at least
            two common file systems

        2. Identify and analyse potential sources of electronic evidence

        3. Describe the importance of maintaining the integrity of digital evidence

        4. Perform basic forensic data acquisition and analysis using computer and network-based
            applications and utilities

        5. Accurately document forensic procedures and results and develop a case summary

Indicative content
        •   Forensic investigation
        •   Operating system functionality
        •   File system analysis
        •   Operating system artifact analysis
        •   Browser and email analysis
        •   Investigative methodologies
        •   Forensic report writing
        •   Overview of memory forensics

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	30%	1, 2, 4
Assignment 2	30%	2, 3, 5
Examination	40%	1-5

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

CS6504 Cryptography and Blockchain Fundamentals

Code	**Title**
CS6504	Cryptography and Blockchain Fundamentals

Level	**Credits**
6	15

Pre-requisites   IT5504 Information Security I
                          IT5506 Introduction to Networking

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

This course exposes learners to blockchain technology, smart contracts, fundamentals of cryptocurrency and applications. Learners will also learn the fundamentals of cryptography.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Explain blockchains and the cryptocurrency ecosystem

2. Analyse the role cryptography plays in a blockchain

3. Develop simple blockchains and distributed applications

4. Examine security issues within the cryptocurrency ecosystem

Indicative content

- Basic Cryptography: public/private key encryption, hash functions, digital signatures, Merkle trees
- Blockchain:
  - Properties: immutability, consensus, anonymity
  - Components: node, distributed ledger, transaction
  - Operations: verification, proof of work
- Smart contracts and blockchain applications
- Privacy and scalability issues in blockchain
- Block ciphers
- Digital signatures

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1: written	20%	1-2
Assignment 2: Labs	20%	1-2
Group Project	20%	3
Examination	40%	1-4

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

CS7501 Information Security III

Code	Title
CS7501	Information Security III

Level	Credits
7	15

Pre-requisites   IT5504 Information Security I
IT5506 Introduction to Networking

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

This course covers the key technologies and systems required to implement defence in depth and protect organisational information infrastructures from threats and attacks.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Describe and implement systems and methods employed to provide operating system and host-based security for a range of potential threats

2. Categorise the technologies and techniques necessary for the defence and maintenance of networks and their hosts and demonstrate their use

3. Explain the functionality and operation of security techniques and implement them as they apply to software, databases and data

4. Evaluate the security models, deployment and management of the security of information systems and methods available to identify and reduce risk

Indicative content

- Host-based and operating system security
- Application and data security
- Database security
- Network security
- Security architecture and models
- Risk mitigation techniques

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	30%	1-2
Assignment 2	30%	3-4
Examination	40%	1-4

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

CS7502 Special Topic in Cyber Security

Code	Title
CS7502	Special Topic in Cyber Security

Level
7

Credits
15

Pre-requisites   IT5504 Information Security I
                       IT5506 Introduction to Networking

Learning Hours
     Tutor Directed   52 hours
     Self-directed   98 hours

Aim
     To enable learners to select a focus area of study in cyber security to reach their desired career and/or graduate studies goals. Topic selection will be based upon learner interest and faculty research and expertise and will generally change annually. Learners may substitute a cyber security related graduate diploma course for this requirement.

Learning Outcomes
     On successful completion of this course, the learner will be able to:

  1. Evaluate, and analyse characteristics of, a specified current topic relating to cyber security.

  2. Define, apply and implement an appropriate technological solution to a problem or problems related to the topic.

Indicative content
  - Topic selection will be based upon learner interest and faculty research and expertise and will generally change annually.
  - Detailed learning outcomes, content and assessment for the selected topic(s) will be developed prior to the commencement of the course and approved by the Head of School.
  - In the event of course substitution, indicative content will be that of the substituted graduate diploma course.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Applied work	60%	1, 2
Examination	40%	1, 2

Successful completion of course:

     To pass a course where there is no final examination, a learner must:

  - Attempt all assessments
  - Achieve an average mark of **50%** or above over all assessments, including the examination
  - Achieve a mark of **40%** or above in their final examination

Resources

Indicative Texts:

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

3.0 Applied Data Science Major Courses

IT5507 Fundamentals of Data Science

Code	**Title**
IT5507	Fundamentals of Data Science

Level	**Credits**
5	15

Pre-requisites   None

Learning Hours

Tutor Directed 65 hours
Self-directed   85 hours

Aim

To provide learners with a basic understanding of how data is modelled, stored, manipulated and analysed using databases and visualisation techniques.

Learning Outcomes

On successful completion of this course, the learner will be able to

1. Describe and explain data using a variety of visualisation techniques and software tools

2. Analyse the data requirements of simple systems and model those requirements using conceptual and logical data modelling techniques

3. Create a simple database that includes tables, columns, primary keys, foreign keys and simple queries

Indicative content

- Data visualisation techniques such as bar charts, pie charts, scatter diagrams, gauges and bubble charts created within a variety of software tools
- Conceptual and logical data modelling techniques that capture the data requirements of simple systems
- Normalisation of tables
- Introduction to Structured query Language (SQL) such as Data Definition language (DDL) and Data manipulation language (DML) statements to create simple databases and to manipulate and extract data

Assessments

Assessment Method	Weighting	Learning Outcome/s
Coursework	60%	1, 2, 3
Test	40%	1, 2

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners
- Specialist guest speakers
- Hardware lab
- Library including online resources

The course outline will contain a list of recommended resources.

DS6501 Social Data Analytics

Code	Title
DS6501	Social Data Analytics

Level **Credits**
6   15

Pre-requisites   IT5507 Fundamentals of Data Science

Learning Hours
Tutor Directed   52 hours
Self-directed   98 hours

Aim

To introduce learners to the analysis of social data using tools and techniques to extract knowledge and insights from social media networks.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Identify and explain contemporary text mining tasks typically applied to document collections

2. Perform introductory text mining tasks on publically available social media data

3. Identify and explain the visual analytical concepts applied to large social data sets

4. Analyse and discuss current social, ethical, security and privacy issues relating to large-scale social data analytics

Indicative content

- Social data analytics and the factors of context, content and sentiment

- Machine learning techniques employed to model and structure the information content of textual data

- Text analytics techniques used in sentiment analysis to determine people's attitudes

- Data mining techniques such as link and association analysis, visualisation and predictive analytics using statistical programming tools

- API's for accessing data on social networks

- Contemporary issues relating to social media data

Assessments

Assessment Method	Weighting	Learning Outcome/s
Course work	60%	1, 2
Test	40%	1, 3, 4

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

DS6502 Data Analysis and Visualisation

Code	**Title**
DS6502	Data Analysis and Visualisation

Level	**Credits**
6	15

Pre-requisites   IT5507 Fundamentals of Data Science

Learning Hours

Tutor Directed 52 hours
Self-directed   98 hours

Aim

To introduce learners to a range of data analysis and visualisation techniques used in statistical inference and exploratory data analysis.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Use statistical programming tools and visualisation techniques to analyse data

2. Identify and explain a variety of techniques used in statistical inference and exploratory data analysis

3. Interpret and evaluate results derived from the application of confirmatory data analysis techniques

4. Communicate the meaning of results derived from data analysis to a target audience

Indicative content

- Intermediate statistics for data analysis; confidence intervals, regression analysis, hypothesis tests, accuracy, precision, specificity/selectivity and correlation analysis
- Information visualisation techniques used in exploratory data analysis
- Statistical programming languages used to generate descriptive models of data
- Methods of communicating results derived from data analysis to a target audience

Assessments

Assessment Method	Weighting	Learning Outcome/s
Course work	60%	1, 3, 4
Test	40%	2, 3, 4

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

DS6503 Data Mining Tools and Techniques

Code	Title
DS6503	Data Mining Tools and Techniques

Level	Credits
6	15

Pre-requisites   IT5507 Fundamentals of Data Science

Learning Hours

Tutor Directed 52 hours
Self-directed   98 hours

Aim

To introduce learners to the data science process and the application of data mining tools and techniques.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Identify and explain the steps associated with the data science process

2. Define the data requirements for a range of analytical problems

3. Identify and explain the basic application of a variety of commonly used data mining techniques

4. Perform an introductory analytical investigation using the data science process and a statistical programming tool

Indicative content

- The steps of the data science process and its application within business analytics
- Data pre-processing techniques for dealing messy data using software tools
- Determining data requirements to develop predictive models
- Types of data, descriptions of data, measures of similarity and dis-similarity
- Introductory Classification, Association Rules, Clustering and Machine Learning categories of data mining techniques using statistical programming tools

Assessments

Assessment Method	Weighting	Learning Outcome/s
Course work	60%	2, 3, 4
Test	40%	1, 3, 4

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

DS6504 Business Intelligence and Big Data

Code
DS6504

Title
Business Intelligence and Big Data

Level
6

Credits
15

Pre-requisites   IT5507 Fundamentals of Data Science

Learning Hours
Tutor Directed 52 hours
Self-directed   98 hours

Aim

To introduce learners to the techniques used in the design and implementation of business intelligence solutions and the issues relating to big data.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Create Structured Query Language (SQL) queries for extracting and summarising data using joins, subqueries and aggregate functions

2. Identify and explain the issues relating to the management of data and the role of the Database Administrator (DBA)

3. Construct stored procedures to be used in the implementation of reporting applications and to perform basic data pre-processing steps

4. Create a multidimensional model using the star schema architecture in the design of a data warehouse

5. Discuss and explain contemporary issues and challenges relating to big data and business intelligence

Indicative content

- Intermediate Data Manipulation Language (DML) statements involving inner joins, outer joins, aggregate functions, date and string functions to create views and other reporting functionality
- Stored procedures with input and output parameters for data summarisation, error handling, and row processing involved in generating reports and dashboards and the handling messy data
- Issues relating to the management of data and the role of the DBA
- Data warehousing design strategies, star and snowflake schemas
- Issues and challenges relating to big data, cloud computing and the storage of unstructured data
- The Four V's of Big Data.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Coursework	60%	1, 3, 4
Test	40%	2, 4, 5

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

DS7501 Data Mining for Business Analytics

Code	**Title**
DS7501	Data Mining for Business Analytics

Level	**Credits**
7	15

Pre-requisites

DS6502 Data Analysis and Visualisation

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

To provide learners with practical experience in developing analytical tools that provide insight and understanding of business performance based on data mining methods.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Create a range of explanatory and predictive models that support fact-based management and decision making

2. Critically assess analytical results and convey their meaning to a target audience

3. Use statistical programming tools to perform a variety of commonly applied data mining functions on business data

4. Apply visualisation techniques for evaluating predictive models and the presentation of analytical results

5. Identify and explain appropriate data mining methods for tasks relating to business analytics

6. Critically assess the quality of predictive models using statistical methods

Indicative content

- Data mining algorithms and their application on business analytical problems including clustering, association rules, classification and machine learning

- Statistical methods for evaluating the predictive accuracy of data mining models

- Visual approaches for presenting and evaluating predictive models and their results

- Contemporary issues relating to data mining and its application within business analytics

- Communication strategies for conveying meaning from analytical results to a target audience

- Statistical programming tools and techniques for creating and evaluating predictive and explanatory models

Assessments

Assessment Method	Weighting	Learning Outcome/s
Course work	60%	1 - 6
Examination	40%	2, 5, 6

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

DS7502 Data Warehouse Design and Implementation

Code	Title
DS7502	Data Warehouse Design and Implementation

Level
7

Credits
15

Pre-requisites   DS6503 Data Mining Tools and Techniques

Learning Hours
Tutor Directed   52 hours
Self-directed   98 hours

Aim

To provide learners with practical experience in the design and implementation of data warehouses and the development of Online Analytical Processing (OLAP) tools.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Identify and explain commonly used architectures in the design of data warehouses

2. Create multidimensional models using star and snowflake schemas

3. Perform Extract-Transform-Load (ETL) procedures to populate a data warehouse

4. Create queries that analyse multidimensional data from multiple perspectives

5. Identify and explain the characteristics of data warehouses and their role within strategies for achieving business intelligence

6. Perform data mining functions on data cubes and explain analytical results to a target audience

Indicative content

- ETL procedures involving staging, data integration and access layers
- Multidimensional modelling approaches for implementing data warehouse architectures
- Querying languages and reporting tools commonly used on OLAP cubes for roll-up, drill-down and slice and dice operations
- Approaches for conveying the analytical results from OLAP tools and data cube mining to a target audience
- Contemporary issues relating to data warehousing and its role within strategies for achieving business intelligence

Assessments

Assessment Method	Weighting	Learning Outcome/s
Course work	60%	2, 3, 4, 6
Examination	40%	1, 2, 5,

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT5505 Interaction Design Fundamentals

Code	Title
IT5505	Interaction Design Fundamentals

Level	Credits
5	15

Pre-requisites   None

Learning Hours

Tutor Directed	65 hours
Self-directed	85 hours

Aim

To provide learners with the skills to utilise design principles to evaluate digital interactive products. Learners will develop the skills and knowledge to design and develop a digital interactive product.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Describe the history, business and technical changes of a digital, interactive platform and be able to evaluate social impacts.

2. Investigate interactive tools and apply design principles to critically evaluate and user-test digital interactive products.

3. Plan a digital interactive product demonstrating consideration of users and clients.

4. Understand and apply front-end development processes to create an interactive product.

5. Integrate toolsets and/or languages to create digital content and/or interactivity.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Project 1	55%	1 - 3
Project 2	45%	4, 5

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

ID6501 Responsive Web Design

Code
ID6501

Title
Responsive Web Design

Level
6

Credits
15

Pre-requisites

None

Learning Hours

Tutor Directed   52 hours
Self-directed   98 hours

Aim

Learners will be able to design and build websites that respond to any device for example, phone, tablet desktop or headset.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Evaluate the design and architecture of a web or mobile application.

2. Plan a website and organise information effectively.

3. Describe and apply design principles and process to create a website utilising web standards from bodies such as W3C.

4. Use a variety of strategies and technologies to create websites.

5. Create and evaluate responsive web interface designs that adjust to a range of screen sizes and or devices.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Project 1	30%	1,2
Project 2	30%	2, 3
Project 3	40%	3-5

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

ID6502 3D Environments

Code   **Title**
ID6502   3D Environments

Level   **Credits**
6   15

Pre-requisites   IT5505 Interaction Design Fundamentals

Learning Hours
    Tutor Directed   52 hours
    Self-directed   98 hours

Aim

    To introduce learners to 3D graphics, modelling, animation, software and environments. Learners will use complex software tools to build 3D models, develop motion, texture and render projects.

Learning Outcomes

    On successful completion of this course, the learner will be able to:

    1.   Use problem solving techniques to follow a brief using 3D environment/s.

    2.   Apply a range of modelling tools to build digital models.

    3.   Investigate and apply methods of controlling motion and/or 3D environments.

    4.   Apply lighting, texturing and rendering techniques.

    5.   Plan and create short motion or interactive 3D work.

    6.   Demonstrate investigation and analysis of interaction within a sophisticated software environment.

Indicative content

   - inverse kinematics
   - remote rendering
   - virtual world solutions
   - motion solutions
   - modelling solutions
   - interactive environments such as game engines

Assessments

Assessment Method	Weighting	Learning Outcome/s
Project 1	50%	1, 2, 4,
Project 2	50%	1, 3,4, 5, 6

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

ID6503 Advanced Interaction Design

Code   **Title**
I**D6503**   Advanced Interaction Design

Level   **Credits**
6   15

Pre-requisites   IT5505 Interaction Design Fundamentals

Learning Hours
    Tutor Directed   52 hours
    Self-directed   98 hours

Aim

At the end of the course, learners will be able to analyse and apply user centred design processes to build digital interactive artefacts that demonstrate effective user experiences.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1   Explain how the user interface (UI) and interaction affect usability.

2   Analyse design problems and utilise user centred methods to support design from requirements analysis to planning, prototyping and reflection.

3   Design an effective interface in relation to users' characteristics (e.g., age, education, cultural differences and abilities).

4   Demonstrate responsive design using a range of digital tools.

5   Explain and apply the use of emerging technologies. This could include the use of multimodal interfaces or the integration of emerging toolsets.

6   Explain and apply methods to evaluate interaction designs and demonstrate ethical evaluation procedures.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Course work	20%	1-5
Project 1	30%	1, 2
Project 2	40%	2, 3, 4, 5, 6
Test	10%	1 - 6

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Indicative Texts:

The Encyclopaedia of Human-Computer Interaction, 2nd Ed. Don Norman

Interaction Design: Beyond Human-Computer Interaction, Yvonne Rogers, Jenny Preece, Helen Sharp, 4th Ed

Microinteractions: Full Color Edition: Designing with Details, Dan Saffer, 1st Ed.

Universal Principles of Design, Revised and Updated: 125 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach through Design, William Lidwell, Kritina Holden, Jill Butler, 2nd Ed

The Design of Everyday Things: Revised and Expanded Edition, Donald Norman

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

ID6504 User Interface and User Experience Design

Code

ID6504

Title

User Interface and User Experience Design

Level

6

Credits

15

Pre-requisites   IT5505 Interaction Design Fundamentals

Learning Hours
Tutor Directed	52 hours
Self-directed	98 hours

Aim

Learners will analyse and synthesise the processes of contextual inquiry relating to client objectives. They will evaluate the effectiveness of user experience design for multi-device environments. They will utilise design processes and technologies to create highly resolved solutions. Learners will apply appropriate industry standards to digital product implementation.

Learning Outcomes

By the end of this course, the learner will be able to:

1. Define project objectives, in relation to user needs for multi-device environments.

2. Synthesise and apply flexible content strategies to integrate technologies, delivered across devices and applications.

3. Scope and illustrate requirements and processes to create products with flexible architecture and content.

4. Create prototypes and analyse the ways that user experiences can be enhanced.

5. Apply user experience design principles to evaluate products.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Course work	20%	1-5
Project 1	30%	1, 2
Project 2	40%	2, 3, 4, 5
Test	10%	1 - 5

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Indicative Texts:

The Design of Everyday Things: Revised and Expanded Edition, Donald Norman

Communicating Design: Developing Web Site Documentation for Design and Planning, Dan M Brown, 2nd Ed.

A Project Guide to User Experience Design: For user experience designers in the field or in the making, Russ Unger, Carolyn Chandler, 2nd Ed.

The Elements of User experience: User-Centered Design for the Web and Beyond, Jesse James Garrett, 2nd Ed.

The Non-Designer's design hand book, Robin Williams

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

ID7501 Advanced Interface Technologies

Code	Title
ID7501	Advanced Interface Technologies

Level	Credits
7	15

Pre-requisites   ID6504 User Interface and User Experience Design

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

Learners will synthesise their knowledge of technologies and techniques in relation to interface design. Learners will develop the ability to apply advanced techniques in designing and implementing innovative, interactive interface solutions.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Analyse and critically evaluate the technologies and principles needed to design and implement advanced interactive applications.

2. Analyse the elements required for effective communication with a specific target audience.

3. Appraise and implement complex interaction and interface design techniques.

4. Use advanced interaction design technologies to create interactive interfaces and communication experiences for users.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Project 1	40%	1-2
Project 2	40%	2-4
Test	20%	1-3

Successful completion of course:

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

ID7502 Human Computer Interaction

Code	Title
ID7502	Human Computer Interaction

Level	Credits
7	15

Pre-requisites   IT5505 Interaction Design Fundamentals

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

To enable learners to understand the principles of human-computer interaction (HCI) in relation to the design and implementation of computer systems and to experience different application tools in the design, implementation and documentation of user interfaces.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Analyse and critique interaction design products, methods utilising current theory and standards.

2. Appraise, select and implement appropriate data gathering techniques in order to interpret and analyse a user problem.

3. Apply user interface design processes and to analyse and develop requirements and scenarios.

4. Create a range of prototypes from low fidelity parallel prototypes to high fidelity functional prototypes utilising relevant technologies.

5. Plan user testing frameworks and guidelines.

6. Evaluate, interpret and present data to create a development plan.

Indicative content

- Human Computer Interaction theory, user interface architecture and technologies.
- Conceptual terms for analysing human interaction with products (e.g., affordance and feedback).
- Ethical and practical constraints in relation to HCI fieldwork
- HCI frameworks, models and life cycles including need finding and data gathering techniques
- User interface design processes, in response to triangulated data collections and requirements:
    - conceptual modelling
    - development of interface metaphors
    - affordances
    - scenarios and experience mapping
- User centred design research, prototyping techniques and technologies
- User testing frameworks and guidelines

- Creating a development plan
- Applying findings to an interaction design life cycle utilising relevant technologies.
- Ubiquitous computing
- Virtual reality and Augmented reality

Assessments

Assessment Method	Weighting	Learning Outcome/s
Research Essay	25%	1, 2
Project 1	35 %	2,3,4,5,6
Project 2	40 %	2,3,4,5,6

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Indicative text

Rogers, Y., Sharp, H., & Preece, J. (2015). *Interaction design* (4rd Ed.). Chichester, West Sussex, U.K.: Wiley.

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

5.0 Networking and Infrastructure Major Courses

IT5506 Introduction to Networking

Code	**Title**
IT5506	Introduction to Networking

Level	**Credits**
5	15

Pre-requisites   None

Learning Hours

Tutor Directed	65 hours
Self-directed	85 hours

Aim

To introduce fundamental networking concepts, technologies, the basics of network theory and the skills needed to implement a simple network.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Describe network protocol models and devices to explain the layers of communications in data networks.

2. Design and calculate IP addresses and subnet masks for both IPv4 and IPv6 for given simple networks, using IPv4 and IPv6.

3. Explain fundamental Ethernet concepts.

4. Describe and build a simple Ethernet network using routers and switches employing basic cabling and network design.

5. Identify and perform basic router and switch configuration and verification.

Indicative content

- Network Protocols
- IP address calculations
- Ethernet concepts
- Subnetting
- Basic Router and Switch Configuration
- Network Topologies
- Networking concepts: client/server, Peer-to-peer

Assessment

Assessment Method	Weighting	Learning Outcomes
Test 1	20%	1, 2, 3
Test 2	30%	4, 5
Practical 1	20%	1, 2, 3
Practical 2	30%	4, 5

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Cisco Network Academy: CCNA Routing and Switching: Introduction to Networks

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

NI6501 Networking II - LAN

Code	Title
NI6501	Networking II LAN

Level	Credits
6	15

Pre-requisites   IT5506 Introduction to Networking

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

This course introduces the essential knowledge and skills of a networking professional and develops knowledge of the logic and algorithms involved in routing and switching traffic. Learners will develop an understanding of individual routing protocols and concepts and learn to configure network addressing services and to analyse, verify and troubleshoot routing and switching operations.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Configure routers and switches using a variety of common network technologies.

2. Troubleshoot routers and switches using a variety of common network technologies.

3. Configure static and dynamic routes

4. Design and implement classless IPv4 and IPv6 addressing schemes for networks

5. Configure basic router and switch operations and troubleshoot common issues and problems

6. Configure and verify basic addressing services in a small routed and switched network

Indicative content

- Static and Dynamic Routing
- Switch Configuration
- Router Configuration
- Network Address Translation
- ACL , RIP, DHCP & VLANs
- Access Control Lists
- Dynamic Host Configuration Protocol

Assessment

Assessment Method	Weighting	Learning Outcomes
Test 1	20%	1, 2, 3
Test 2	30%	4,5,6
Practical 1	20%	1, 2, 3
Practical 2	30%	4,5,6

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Cisco Network Academy: CCNA Routing and Switching: Routing and Switching Fundamentals

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

NI6502 Networking III - Campus

Code **Title**

NI6502 Networking III - Campus

Level **Credits**
6 15

Pre-requisites NI6501 Networking II – LAN

Learning Hours
Tutor Directed	52 hours
Self-directed	93 hours

Aim

To provide a comprehensive, theoretical and practical approach and resolve common issues with routing and switching implementation for a larger sized network using IPv4 and IPv6.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1 Demonstrate a comprehensive knowledge of the technologies and techniques necessary to design and implement a converged network.

2 Apply appropriate actions to configure, verify and troubleshoot routing and switching implementation for a network with some complexity, including IPv4 and IPv6.

Indicative content

- LAN architecture
- Multiple Switch implementations
- Enhanced performance between switches
- Dynamic routing implementations
- Configuring varied implementations
- Tuning and troubleshooting

Assessments

Assessment Method	Weighting	Learning Outcome/s
Test 1	25%	1, 2
Test 1	25%	1, 2
Practical 1	25%	1, 2
Practical 2	25%	1, 2

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Indicative Texts:

Cisco Networking Academy. (2017). Scaling Networks v6 Companion Guide (Vol. 6). Cisco Press.

Oswald Coker & Siamak Azodolmolky. (2017). Software-Defined Networking with Openflow (Second). Packt Publishing, Limited, 2017.

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

NI6503 Unified Infrastructure Services

Code	Title
NI6503	Unified Infrastructure Services

Level
6

Credits
15

Pre-requisites   IT5506 Introduction to Networking

Learning Hours
Tutor Directed   52 hours
Self-directed   98 hours

Aim

To introduce the fundamental network infrastructure components necessary to implement a small to medium sized network.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1   Demonstrate a comprehensive knowledge of the technologies and techniques necessary to configure Directory Services, Group Policy and account management

2   Analyse and implement and maintain appropriate unified infrastructure services

Indicative content
- Server operating system
- Directory services
- User account administration
- Administration via group policies
- DNS configuration and deployment scenarios
- DHCP including deployment and backup
- Managing DNS and DHCP

Assessments

Assessment Method	Weighting	Learning Outcome/s
Test 1	25%	1, 2
Test 1	25%	1, 2
Practical 1	25%	1, 2
Practical 2	25%	1, 2

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Indicative Texts

MCSA Guide to Networking with Windows Server 2016, Exam 70-741 by Greg Tomsho

MCSA Guide to Identity with Windows Server 2016, Exam 70-742 by Greg Tomsho

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

NI6504 Cloud Computing

Code	Title
NI6504	Cloud Computing

Level	Credits
6	15

Pre-requisites   IT5506 Introduction to Networking

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

To develop an understanding of the incorporation and management of cloud technologies as part of broader systems operations. Learning about new technologies that support the changing cloud market as more organisations depend on cloud-based technologies to run mission critical systems, where hybrid and multi-cloud have become the norm.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1   Demonstrate a comprehensive knowledge of the technologies and techniques necessary to configure and maintain a cloud environment

2   Identify and apply appropriate actions to implement and troubleshoot common problems within a cloud environment

Indicative content
- Cloud deployments and configurations
- Security in the cloud
- Maintenance including backup and patching
- Disaster recovery and business continuity
- Cloud management of resources and account provisioning
- Performance baseline comparison and service level agreements
- Troubleshooting common cloud issues
- Troubleshooting networking and security issues
- Storage technologies and cloud storage concepts

Assessments

Assessment Method	Weighting	Learning Outcome/s
Test 1	25%	1, 2
Test 1	25%	1, 2
Practical 1	25%	1, 2
Practical 2	25%	1, 2

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Indicative Text

CompTIA Cloud+ Study Guide CVO -002

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

NI7501 Current Topic in Networking and Infrastructure

Code   **Title**
NI7501   Current Topic in Networking and Infrastructure

Level   **Credits**
7   15

Pre-requisites   NI6501 Networking II - LAN
                            NI6502 Networking III - Campus

Learning Hours
    Tutor Directed   52 hours
    Self-directed   98 hours

Aim

    To enable learners to understand the underlying principles of a current topic relating to Networking and Infrastructure, apply the underlying principles and concepts to the identification and solution of a variety of problems in various settings, research the topic and evaluate and implement methods of solving problems related to the topic.

Learning Outcomes

    On successful completion of this course, the learner will be able to:

    1. Evaluate, and analyse characteristics of a specified current topic relating to Networking and Infrastructure.

    2. Design and implement an appropriate technological solution to a problem or problems related to the topic.

Indicative content

- A specific topic relating to Networking and Infrastructure will be approved for this course, and advised to prospective learners in advance of enrolling.
- The topic will be approved by the Head of School.
- Detailed learning outcomes, content and assessment for the topic will be developed prior to the commencement of the course, approved by the Head of School, and made available to learners.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Applied work	50%	1, 2
Written assignment	50%	1, 2

Successful completion of course

    To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

NI7502 Emerging Topic in Networking and Infrastructure

Code	Title
NI7502	Emerging Topic in Networking and Infrastructure

Level	Credits
7	15

Pre-requisites   NI6501 Networking II – LAN
                         NI6502 Networking III – Campus

Learning Hours
        Tutor Directed   52 hours
        Self-directed   98 hours

Aim

  To enable learners to understand the underlying principles of an emerging topic relating to Networking and Infrastructure, apply the underlying principles and concepts to the identification and solution of a variety of problems in various settings, research the topic and evaluate and implement methods of solving problems related to the topic.

Learning Outcomes

  On successful completion of this course, the learner will be able to:

  1. Evaluate and analyse characteristics of a specified emerging topic relating to networking and infrastructure.

  2. Design and implement an appropriate technological solution to a problem or problems related to the topic.

Indicative content
  - A specific topic relating to Networking and Infrastructure will be selected for this course, and advised to prospective learners in advance of enrolling.
  - Networking specialists from industry will be involved in selecting the emerging topic
  - The topic will be approved by the Head of School.
  - Detailed learning outcomes, content and assessment for the topic will be developed prior to the commencement of the course, approved by the Head of School, and made available to learners.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Applied work	50%	1, 2
Written assignment	50%	1, 2

Successful completion of course

  To pass a course where there is no final examination, a learner must:

  - Attempt all assessments
  - Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

6.0 Software Development Major Courses

IT5503 Programming I

Code	**Title**
IT5503	Programming I

Level	**Credits**
5	15

Pre-requisites　　　　None

Learning Hours

Tutor Directed	65 hours
Self-directed	85 hours

Aim

A learner will be able to design software using appropriate syntax, implement software designs and apply basic object-oriented concepts.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Translate program designs into a programming language.

2. Design structured programs using the principles of the top-down-refinement of pseudocode.

3. Design structured programs using flow charts to illustrate the nesting of control structures.

4. Design object-oriented programs using an iterative and incremental process.

5. Execute and debug programs.

Indicative content

- Introduction to primitive data types, operators
- Pseudocode and flow chart
- Conditional statements and iteration
- Declaring, defining and using functions for structural as well as object-oriented programming
- Passing parameters to functions by value and by reference
- Arrays
- String class
- User defined types
- Unit testing
- Reusability
- Recursion

Assessments

Assessment Method	Weighting	Learning Outcomes
Assignment 1	30%	1 - 5
Assignment 2	30%	1 - 5
Examination	40%	1 - 5

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

SD6501 Mobile Application Development

Code	Title
SD6501	Mobile Application Development

Level	Credits
6	15

Pre-requisites   IT5503 Programming I
IT5507 Fundamentals of Data Science

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

To equip learners with the knowledge and fundamental skills of mobile application development using a contemporary programming language and mobile platform.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Develop mobile applications on a popular mobile platform

2. Write mobile application programs that exhibit different features of a programming language

3. Design and develop sophisticated mobile interfaces that utilize rapid prototyping techniques

4. Construct mobile applications that integrate data storage, serialization techniques, and cloud services

5. Combine relevant code debugging and testing methodologies for developing mobile applications

6. Prepare a mobile application for distribution

Indicative content

- Core and advanced concepts of a programming language
- Techniques to plan, design and prototype mobile application
- Development tools
- Mobile device architecture
- User experience and interface design
- Data Storage and Serialization Techniques
- Cloud Services
- Geo-location and Maps
- Multithreading
- App distribution

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	30%	1, 3
Assignment 2	30%	1, 5
Final Project	40%	1- 6

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

SD6502 Programming II

Code   **Title**
SD6502   Programming II

Level   **Credits**
6   15

Pre-requisite   IT5503 Programming I

Learning Hours
Tutor Directed   52 hours
Self-directed   98 hours

Aim

To allow learners to extend their programming skills with the introduction of advanced concepts.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Implement software designs in an object-oriented programming language

2. Analyse relationship between algorithms and programming, and determine their efficiency

3. Implement most commonly used abstract data types and data structures used in software development

4. Apply prototyping techniques

5. Apply effective problem-solving strategies to foster programming skills

Indicative content
- Syntax and semantics of a selected programming language
- Object-oriented programming
- Advanced algorithms, data structures, problem solving strategies
- Static and Dynamic libraries
- Templates

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	25%	1, 2
Assignment 2: labs	10%	2, 3, 5
Group Project	25%	4
Examination	40%	1, 2, 3, 5

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

SD6504 Game Development

Code	**Title**
SD6504	Game Development

Level	**Credits**
6	15

Pre-requisites   IT5503 Programming I
                              IT5501 Mathematics for IT

Learning Hours
Tutor Directed	52 hours
Self-directed	98 hours

Aim

Provide learners with a foundation of effective game design and development using tools, algorithms, and game programming techniques.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Explain basic game architecture and different phases in game development

2. Describe 2D and 3D graphics, game animation and fundamental concepts of game programming

3. Use an industry standard game development engine to build interactive computer games

4. Evaluate and apply game physics, multi-valued logic, and Artificial Intelligence (AI) solutions for game development

5. Optimize, test and deploy developed games into variety of platforms (Desktop, Mobile, Web)

Indicative content:
- Introduction: Design vs Development, architecture, phases of development
- Level Design, 2D & 3D graphics, animation
- Game physics, Collision and Trigger detection
- Artificial Intelligence solutions: Path finding, Finite state machines, Fuzzy logic
- User interface and GUI
- Optimization, Testing, Publishing

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	30%	1, 3
Assignment 2	30%	3, 5
Project	40%	1-5

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

SD6503 Testing and Secure Coding

Code   **Title**
SD6503   Testing and Secure Coding

Level   **Credits**
6   15

Pre-requisites   SD6502 Programming II

Learning Hours
    Tutor Directed   52 hours
    Self-directed   98 hours

Aim

To provide learners with an advanced level of knowledge and skills required for developing secure software that is designed and tested using appropriate testing and security tools.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Plan and implement the appropriate level of testing within the context of a software development application following the Systems Development Life Cycle (SDLC) and Software Testing Life Cycle (STLC) models

2. Construct a system that executes advanced testing processes and core testing concepts

3. Develop an automated testing environment that tests complex software application and integrates analysis and interpretation of test data

4. Explain the principles and mechanisms of software security

5. Evaluate common security risk and vulnerabilities

6. Evaluate and use appropriate tools to mitigate security risks in the new code or repair security flaws in the existing code

Indicative content

- SDLC and STLC
- Test Documentation and Test Case Design
- Unit Testing
- Automated Testing and Testing Tools
- Software security and risk principles
- Threat modelling ,Secure coding practices
- Types of software vulnerabilities, Exploits

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	30%	1, 2, 3
Assignment 2	30%	4, 5, 6
Final Project	40%	1-6

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

SD7501 Web Application Development

Code   **Title**
SD7501   Web Application Development

Level   **Credits**
7   15

Pre-requisites   IT5507 Fundamentals of Data Science
                       SD6502 Programming II

Learning Hours
    Tutor Directed   52 hours
    Self-directed   98 hours

Aims

To enable the learner to:

- Evaluate and apply the use of appropriate platform and architecture, for the development of web applications.

- Integrate applications with a database and learn how to access web data using managed data providers and objects.

- Investigate the security challenges and security models for web applications.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Evaluate the business, technical and social implications of web application development.

2. Analyse the background and underlying principles of web application development in the selected framework.

3. Design and implement an appropriate secure internet application solution to an unstructured problem.

4. Research and critically evaluate new tools and technologies in relation to internet application development.

Indicative Content

The course will contain the following topics:
- ASP.NET framework, development tools and environment
- MVC framework
- MVC routing, tracing & debugging
- AJAX & JQuery
- Data access and Data Binding
- ASP.NET Core with Entity Framework
- ASP.NET Core Identity
- RESTful Web Services and Web API's
- Web Application Security
- Windows Presentation Foundation (WPF)
- Frontend Development platforms for Web Application
- Web Application Deployment

Assessment

Assessment Method	Weight %	Learning Outcomes
Research Report and Presentation	25%	1, 2, 4
Programming Project	35%	3, 4
Final Exam	40%	1, 2, 3, 4

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Indicative text:

Lasted edition of Pro ASP.NET Core MVC: Develop cloudy-ready web applications using Microsoft's latest Framework, ASP.NET Core MVC Author: Adam Freeman, Publisher: aPress

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

SD7502 Intelligent Systems Development

Code	**Title**
SD7502	Intelligent Systems Development

Level	**Credits**
7	15

Pre-requisites   IT5501 Mathematics for IT
SD6502 Programming II

Learning Hours
Tutor Directed	52 hours
Self-directed	98 hours

Aim

To provide learners with an advanced level of knowledge and skills required for developing artificially intelligent applications.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Prepare framework in a suitable programming environment.

2. Apply the software tools required for a complex application.

3. Implement the recent advances in software development.

4. Analyse data using a pattern recognition approach to identify features of interest.

5. Research, design, develop, and reconstruct models by using current APIs for building a machine learning based application for a complex problem.

Indicative content

- Introduction to computer vision, and Open Source Computer Vision (OpenCV) library
- Use and improve open source W&W Vision library
- Types of features and their application
- Image segmentation
- Deep Learning and GPU processing
- Google Tensor flow vs. Microsoft Cognitive Toolkit
- Keras
- Identify and apply filters for noise estimation and data prediction

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment	40%	1, 3
Midterm project	20%	1, 4
Final Project	40%	1 - 5

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

OpenCV # Computer Vision Application Programming Cookbook, latest edition. Author Robert Laganiere.

Hands-On Machine Learning with Scikit-Learn and Tensorflow, latest edition. Author Aurélien Géron

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recent research articles as well as tutorials for libraries.

IT5510 Introduction to Operating Systems

Code	Title
IT5510	Introduction to Operating Systems

Level	Credits
5	15

Pre-requisites   None

Learning Hours

Tutor Directed	65 hours
Self-directed	85 hours

Aim

- To introduce the underlying principles, evolution and the implementation of operating systems.
- To provide an opportunity to gain experience in using operating system instructions.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Identify the components of operating systems.

2. Describe the evolutionary path of operating systems.

3. Describe the background and underlying principles of operating systems.

4. Describe the operational methods of operating systems.

5. Apply operating system commands.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment	25%	1, 2, 3
Lab Activities	35%	4, 5
Final Exam	40%	1 - 5

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Indicative text:

OpenCV # Computer Vision Application Programming Cookbook, latest edition. Author Robert Laganiere.

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT5508 Electronics Fundamentals

Code	**Title**
IT5508	Electronics Fundamentals

Level	**Credits**
5	15

Pre-requisites   None

Learning Hours

Tutor Directed	65 hours
Self-directed	85 hours

Aim:

- To provide learners with the safe working knowledge of analogue and digital electronics, correct terminology, and the skills required to test computers and related electronic equipment.
- To explain the fundamentals of the safe use of appropriate electronic test instruments to make measurements in electronic and computer equipment.
- To enable learners to identify symbols, packages, operation, and uses of various Analogue and Digital devices.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Read circuit diagrams and apply Ohm's Law to calculate volts, amps and resistance to simple series and parallel circuits and calculate electrical power.
2. Explain the characteristics of analogue devices, their fundamentals principles of operation, and their use.
3. Explain the characteristics of digital devices, their fundamentals principles of operation, and their use.
4. Apply fundamental principles of the safe use of the appropriate electronic test instruments to make measurements in electronic and computer equipment.
5. Use technical terminology correctly.
6. Apply safe design principles and protection.

Indicative Content

Topics may include:

Electro technology
- Electrical components and symbols: capacitors, resistors, inductors, transformers, switches
- Electrical units: amperes, volts, ohms, watts
- Magnitude prefixes: pica to giga
- Ohms Law

Analogue Electronics
- Symbols, packages and operation of: diodes, LEDs, Op-amp-parameters: gain offsets, positive and negative feedback, slew rate, bandwidth CMRR and applications. Filtering (high and low pass, band pass, band reject)

Digital Electronics
- Numbering Systems: binary, hexadecimal, code conversion
- Logic Gates: gates, standard logic symbols, truth tables, timing diagram, Boolean algebra.
- Combination logic: multi-level circuits, logic simplification
- Synchronous sequential: latches, flip flops, registers counters Schmitt triggers.

Instrumentation
- The use of a range of meters: voltmeters, ammeters, multi meters, basic oscilloscope, and power supplies.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Test 1	20%	1, 2, 5
Test 2	20%	1, 3, 5
Labs	30%	1 - 6
Assignment	30%	1 - 4

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Indicative Text

Jackson, H W & White, PA, *Introduction to electrical Circuits,* Prentice-Hall

Tocci, RJ, *Digital Systems: Principles and Applications,* Prentice –Hall.

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT5509 Software Testing Fundamentals

Code | **Title**
IT5509 | Software Testing Fundamentals

Level | **Credits**
5 | 15

Pre-requisites None

Learning Hours
Tutor Directed 65 hours
Self-directed 85 hours

Aim

This course introduces the theory and practice of software testing. This is a vocational course to help learners seek employment in junior software testing roles and/or gain foundation level software testing certification.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Describe the fundamentals of testing, testing throughout the software life cycle, and static techniques.

2. Identify test design techniques, and apply specification-based or black-box techniques, and structure-based or white-box techniques in a practical situation.

3. Describe the management of testing and apply incident management in a practical situation.

4. Explain static techniques.

Indicative Content

- Fundamentals:
  - The importance of testing and general testing principles.
  - The fundamental test process.
  - Procedures and processes in software testing. Range psychology of testing, Software development models, Test levels, Test types, Maintenance testing, Static techniques and the test process, Review process, and Static analysis by tools.

- Test Design Techniques:
  - Test Development Process, and categories of test design techniques.
  - Equivalence partitioning, boundary value analysis, decision table testing and state transition testing.
  - Designing test cases for given control flows.
  - Experience-based techniques and choosing test techniques.

- Test management:
  - Test organization, Test planning and estimation, Test progress monitoring and control, Configuration management, and Risk and testing
  - Incident reporting

- Tool support for testing:
  - Types of test tools, effective use of tools, and potential benefits and risks
  - Fundamentals of introducing a tool into an organization

Assessments

Assessment Method	Weighting	Learning Outcome/s
Theory assessment	30%	1 - 4
Practical assessment	30%	2, 3
Examination	40%	1 - 4

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT6509 IT Business Environment

Code	Title
IT6509	IT Business Environment

Level	Credits
6	15

Pre-requisites: IT5502 Communications for IT

Learning Hours

Tutor-directed	52 hours	
Self-directed	98 hours	

Aim

To enable learners to act as an analyst to bridge the gap between business and IT and to contribute to improving the quality of the products and services delivered to business by IT professionals.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Explain the contribution, functions and role of IT professionals within various organisation structures and use communication tools to convey IT complexity.

2. Analyse the key principles of Business/IT Service Lifecycles using industry standard frameworks.

3. Analyse the application of various IT legal implications, compliance, IT/business ethical impacts, IT employment methodologies and workplace environments

4. Analyse IT business process risk through IT Auditing standards.

Indicative content

The course will contain the following topics:

- IT operational environments including financial operational practices.
- Communicate IT service processes through diagrams and technical writing.
- Legal implications within the IT service industry workplace environments, IT professional practice implications.
- Tendering, IT Service Contracts, Service Level Agreements, Conflict of Interest.
- IT service and TQM frameworks. May involve: ITIL, CMM, COBIT, ISO9000, ISO/IEC 200000, ISO 21500, ISO 27000, ISO/IEC 38500, ISO/IEC 31000, TOGAF
- IT audit standards. Links to financial systems, continuity systems and disaster recovery.

This content will be delivered in an applied manner, with extensive use of case studies.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	20%	1 - 4
Assignment 2	20%	1 - 4
Test	20%	1 - 3
Examination	40%	1 – 4

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT6503 Microcomputer Systems

Code	Title
IT6503	Microcomputer Systems

Level	Credits
6	15

Pre-requisites: IT5503 Programming I

Learning Hours

Tutor-directed	52 hours
Self-directed	98 hours

Aim

To enable learners to appreciate, programme and use the features of microcontroller systems.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Analyse and explain the features of various types of microcontrollers and areas of application.

2. Demonstrate the characteristics of a range of available microprocessors.

3. Select the appropriate microprocessor for a given task.

4. Program a microprocessor in a selected language.

5. Describe the operation of several of the most common industry standard interfaces.

6. Write and test a driver for one or more of the standard interfaces, some of which may be a mixture of language.

7. Develop a small embedded program to illustrate a combination of two or more standard interfaces being used at the same time.

Indicative content

Topics may include:

- Assembler, C and C++ languages
- The development of programmes in High Level Language (HLL) and assembler

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment	20%	1-7
Test	20%	1-7
Practical Labs	20%	2-6
Examination	40%	1-6

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT6508 Research in Information Technology

Code	Title
IT6508	Research in Information Technology

Level	Credits
6	15

Pre-requisites: IT5502 Communication for IT

Learning Hours

Tutor-directed	52 hours
Self-directed	98 hours

Aims

The aim of this course is to provide a comprehensive overview of rigorous research practice and to lay a foundation of research skills, which will be relevant to both further study and professional practice.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Critically evaluate of the nature of research and the research process in IT (including sources of bias and ethical considerations).

2. Critically analyse the sources of research evidence and demonstrate through critical appraisal how such evidence should be interpreted and evaluated.

3. Scope a useful research question.

4. Construct an appropriate research design for a specific research question.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment 1	30%	1
Assignment 2	30%	2
Assignment 3	40%	2-4

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT6504 Embedded Systems I

Code	Title
IT6504	Embedded Systems I

Level	Credits
6	15

Pre-requisites: IT5503 Programming I

Learning Hours

Tutor-directed	52 hours
Self-directed	98 hours

Aims

To develop the learner's knowledge of the technical requirements, both hardware and software, and implementation of a small scale embedded system.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Derive technical requirements for an embedded system from requirements and select appropriate hardware and software for the requirements.

2. Select and use the appropriate development tools.

3. Develop hardware and software for a simple embedded system.

Indicative Content

- Customer specifications and written technical requirements: hardware and software, processing engines, interface requirements, operating systems, development tools
- Tools for host and target machines: cross compilers/assemblers, linker/loader, memory map management
- Development hardware and test equipment: Development boards, ISP, JTAG, Protocol and Logic analysers.
- Domain-specific requirements including operating system and environment issues
- Hardware and software tools
- Interfacing methods
- Target operating system: pre-emptive, multitasking, foreground/background
- Diagnostic techniques: hardware and software

Assessment

Assessment Method	Weighting	Learning Outcome/s
Assignment	20%	1, 2, 3
Test	20%	1, 2, 3
Labs	20%	1, 2, 3
Examination	40%	1, 2, 3

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT6505 Advanced Software Testing

Code	Title
IT6505	Advanced Software Testing

Level	Credits
6	15

Pre-requisites: IT5509 Software Testing Fundamentals

Learning Hours

Tutor-directed	52 hours
Self-directed	98 hours

Aims

- Enable learners to apply fundamental principles of unit testing standards and practices, both independently or as part of a team.

- To apply knowledge and practice that underpin sound testing practice to support the delivery of quality systems consistent with industry standards across several levels.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Conduct unit testing to demonstrate an understanding of effective ways to influence and improve software testing in a business setting.

2. Undertake a range of integrated testing practices, to enable the writing of professional test reports.

3. Apply the role of tester within a development team, using effective communication strategies, through co-operative work in a group, leadership, negotiation techniques and conflict management.

4. Create, maintain and run test scripts to automate testing.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Project 1	20%	1, 2
Group Project 2	20%	3
Project 3	20%	4
Examination	40%	1, 2, 4

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT6506 Carrier Technology I

Code	Title
Code	**Title**
IT6506	Carrier Technology I

Level	Credits
Level	**Credits**
7	15

Pre-requisites: IT5506 Introduction to Networking

IT5501 Mathematics for IT

Learning Hours

Tutor-directed	52 hours
Self-directed	98 hours

Aims

The aim of this course is to introduce the principles and practices of technology used to carry data, video and voice traffic for New Zealand businesses and Internet Service Providers.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Investigate encoding and signalling techniques used for conveying digital information of copper media to end subscribers.

2. Identify and compare industry standards for end subscriber services including Asymmetric digital subscriber line (ADSL) and Very-high-bit-rate digital subscriber line (VDSL).

3. Configure simple end subscriber services.

4. Evaluate Multiprotocol Label Switching (MPLS) features and practices for end subscriber service provisioning.

5. Configure services utilising MPLS features.

Indicative Content

Principles of transmission of digital information
- End subscriber technology including encoding techniques, xDSL and DSLAM.
- The purpose and features of a simple DSLAM for end subscriber use.
- The operation of and application of fibre optic cables for digital communications including encoding, installation, GPON, CWDM and DWDM.
- The fundamentals of the TCP/IP architecture, Ethernet, IPv4 and IPv6 from the perspective of circuit provisioning including typical devices such as repeater, bridge, switch, router, and gateway.
- Configurations and arrangements for providing end subscribe services utilising Ethernet and IP technology including VLAN, Q in Q, loop prevention and address resolution.

Multi-Protocol Label Switching
- Fundamentals of MPLS as used in provider networks
- Supporting protocols such as LDP and RRP
- How providers can use TE features to offer a variety of end subscriber services

Assessments

Assessment Method	Weighting	Learning Outcome/s
Theory assessment	50%	1-5
Practical assessment	50%	1-5

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT6507 Wireless Networking Technology

Code	Title
IT6507	Wireless Networking Technology

Level	Credits
6	15

Pre-requisites: None

Learning Hours

Tutor-directed	52 hours
Self-directed	98 hours

Aims

The aim of this course is to enable learners to develop an in depth understanding of the structure and operation of wireless networks

Learning Outcomes

On successful completion of this course, the learner will be able to:

1   Identify mandatory and conformance standards and be able to list the main standards organisations.

2   Define basic elements of wireless technology.

3   Identify the purpose, features and functions of wireless networking components.

4   Demonstrate the fundamental concepts of wireless data transmission within the PC environment.

5   Demonstrate the fundamental concepts of site surveying to develop practical wireless installations.

6   Describe the fundamental concepts of wireless security.

Indicative Content

- Wi-Fi Technology and Standards
    - Radio theory, modulation/demodulation, antennae, attenuation etc., and wireless topologies.
    - Standards organisations, range, coverage and capacity, frequencies, channel reuse and co-location, active and passive scanning, data rates, authentication, infra-structure and ad-hoc.

- Hardware (wireless adapters, access points) and software (drivers, clients and servers) required for wireless networking: Access Points, Routers, Bridges, Repeaters, PoE, Drivers, Clients and Servers.

- RF Fundamentals: units of RF measurement, range affecting factors, physical layer wireless technologies, Spread Spectrum, Gain and loss.

- Site Surveying and Installation
    - Gathering business requirements
    - Multiple / Single Channel Architecture
    - Active / Passive Surveys.
    - practical wireless installations

- Security and Compliance
    - SSID hiding
    - Legacy security (passphrase) (WEP, MAC)
    - User-based security (EAP / RADIUS)
    - Data Encryption
    - Regulatory Compliance.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Coursework Laboratories	50%	1-6
Test 1	25%	1-3
Test 2	25%	4-6

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Indicative texts
Certified Wireless Technology Guide Specialist (CWTS) Official Study Guide – Robert J Bartz (ISBN 978-1-118-35911-2)

Certified Wireless Network Administrator (CWNA) Official Study Guide – David D Coleman, David A Westcott (ISBN 978-1-118-89370-8)

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

Code   **Title**

CS7503 Network Fundamentals for Information Assurance and Security

Level   **Credits**

7   15

Pre-requisites   None

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

To develop a student's knowledge of network protocol fundamentals and the analysis and correlation of data sourced from network packet streams and from various network devices in an enterprise network

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Capture, manipulate, and replay packets

2. Analyse data retrieved from network packet capture data using command line tools.

3. Develop and apply an advanced knowledge of key live and network forensic principles and methods.

4. Evaluate network forensics tools and evidence acquisition and analysis from various network devices.

5. Evaluate common approaches to network forensic analysis and their utility in various investigative scenarios

6. Apply knowledge of networking protocols to identify potential evidence within traffic captures and intrusion detection alerts.

Indicative content

- Network protocol fundamentals

- Packet capture, manipulation, replay

- Packet capture applications and data

- Network evidence types and sources

- Investigation OPSEC and footprint considerations

- Common network protocol analysis

- NSM data types

- Log data and other data to supplement network examinations

Assessments

Assessment Method	Weighting	Learning Outcome/s

Assessments	60%	1-6
Examination	40%	1-6

Successful completion of course:

To pass a course where there is an examination set, a learner must:
- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Indicative texts:

Davidoff, S., & Ham, J. (2012). *Network forensics: Tracking hackers through Cyberspace*. Boston, MA: Pearson Education.

Messier, R. (2017). *Network forensics.* New York: Wiley.

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

Code **Title**

CS7504 Security for DevOps

Level **Credits**

7 15

Pre-requisites None

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

To equip students with the knowledge of developing secure software using the DevOps process and cloud services

Learning Outcomes

On successful completion of this course, the learner will be able to:
1. Evaluate the appropriate framework to examine possible architectures, automation, CI/CD and development toolset.
2. Develop software by implementing DevOps methodology and practices
3. Implement security in DevOps

Indicative content

- DevOps fundamentals, core-concepts, principles and practices
- DevOps Tools (Git, GitHub, Docker, Jenkins, etc.)
- Continuous Integration and Continuous Deployment in DevOps
- Testing Automation, Validation, Monitoring and Security

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assessment	30%	1-2
Assessment	30%	1-3
Examination	40%	1-3

Successful completion of course:

To pass a course where there is an examination set, a learner must:
- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Indicative Texts

Hsu, T. (2018). *Hands-On security in DevOps.* Birmingham, UK: Packt Publishing

Kim, Gene, et al. (2016) *The DevOps handbook: How to create world-class agility. Reliability, and security in technology organizations.* IT Revolution Press, LLC*.*

Teaching and Learning resources can include:

- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

Code   **Title**

CS7505 Incident Response and Digital Forensics

Level   **Credits**

7   15

Pre-requisites   None

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

To provide students with the essential skills to conduct an investigation of compromised systems during or after a cyber/security incident.

Learning Outcomes

On successful completion of this course, the learner will be able to:
1. Evaluate the use and application of incident response methodologies in dealing with system security-related incidents.
2. Acquire and analyse live response data from compromised systems.
3. Analyse memory for evidence of a compromise.
4. Analyse file system and operating system artefacts for evidence of a compromise.
5. Evaluate and apply tools and common processes in performing analysis of compromised systems.
6. Apply research methods to obtain current knowledge of events and tools/support kits in the subject area.

Indicative content

- Incident response methodologies

- File system analysis

- Operating system artefact analysis

- Acquisition and analysis of data from 'live' systems

- Memory analysis

- Common methods used by malicious actors to compromise systems

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assessment	20%	1-6
Assessment	20%	2-3

Assessment	20%	4-5
Examination	40%	1-6

Successful completion of course:

To pass a course where there is an examination set, a learner must:
- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Indicative Texts

Luttgens, J., Pepe, M., & Mandia, K. (2014). *Incident response & computer forensics, (3rdEd).* USA: McGraw-Hill Education

Murdoch, D. (2016), *Blue Team Handbook: Incident response edition: A condensed field guide for the Cyber Security Incident Responder (2.2 Ed),* USA: CreateSpace Independent Publishing Platform

Murdoch, D. (2019), *Blue Team Handbook: SOC, SIEM, and Threat Hunting Use Cases: A condensed field guide for the Security Operations Team (Volume 1.02),* USA: CreateSpace Independent Publishing Platform

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

Code **Title**

CS7506 Cloud Security

Level **Credits**

7 15

Pre-requisites None

Learning Hours

Tutor Directed	52 hours
Self-directed	98 hours

Aim

To enable students to understand the technologies and services that enable cloud computing, discuss different types of cloud computing models and investigate security and legal issues associated with cloud computing.

Learning Outcomes

On successful completion of this course, the learner will be able to:
1. Compare and contrast the various cloud delivery and deployment models, particularly the security implications of each.
2. Analyse virtualisation technology and current attacks against it.
3. Critically evaluate service orchestration, business continuity, security, and service management functions for a cloud infrastructure.
4. Appraise the mechanisms used to secure cloud computing platforms, including trustworthy computing, secure computation, and data security in cloud environments.
5. Analyse the challenges that cloud computing introduces for regulatory compliance and digital forensics.

Indicative content
- Cybersecurity concepts, roles, threat model, problem escalation paths, legal environment and compliance requirements.
- Technical security techniques, tools (including tool validation), reporting, compliance to best practice (rules of engagement, penetration testing contracts and others).
- Practical security testing.
- Exposure to a wide range of tools, operating systems and attack techniques.
- Providing input to the security threat model and suggesting security policy solutions.
- Business security testing

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assessment	20%	1, 2, 5
Assessment	20%	2-3
Assessment	20%	3-4
Examination	40%	1-5

Successful completion of course

To pass a course where there is an examination set, a learner must:
- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Cloud Security Alliance. (2018). *Security guidance for critical areas of focus in cloud computing v4.0*
ENISA (2009), *Cloud Computing Risk Assessment*
Dell/EMC (2018), *Cloud Infrastructure and Services v3*

Teaching and Learning resources can include:
- Lecturer

- Tutorial assistant

- Classrooms equipped with computer and data projector

- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.

- Specialist guest speakers

- Specialist IT lab

- Library including online resources

The course outline will contain a list of recommended resources.

Code   **Title**

IA7307 Cryptography and Security Mechanisms

Level   **Credits**

7   15

Pre-requisites   None

Learning Hours

    Tutor Directed   52 hours

    Self-directed   98 hours

Aim

To enable students to develop an understanding of the design requirements and the application of secure systems in business, government and high security environments.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Evaluate and apply modern symmetric and asymmetric cryptographic techniques.

2. Explain and analyse the workings of fundamental public key and symmetric key cryptographic algorithms.

3. Analyse existing authentication and key agreement protocols, identify the weaknesses of these protocols.

4. Apply various security mechanisms derived from cryptography to network, web, and in a variety of system security scenarios.

5. Research, model and design/deploy real-world applications of cryptographic primitives and protocols within business context.

Indicative content

- Mathematical foundation for cryptography.

- Security attacks.

- Principles of modern cryptography: the history, block ciphers, message authentication codes, hash functions, public-key cryptography, digital signatures.

- Key management and distribution.

- Cryptanalysis.

- Zero knowledge proofs, secret sharing, and oblivious transfer and secure multi-party computation.

- Real-world applications of cryptographic primitives and protocols: network security practice, email security, IP security, web security, wireless network security, cloud security and system security.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assessment	20%	1-2
Assessment	20%	2-3
Assessment	20%	3-4
Final Assessment	40%	1-5

Successful completion of course:

To pass a course where there is an examination set, a learner must:
- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer

- Tutorial assistant

- Classrooms equipped with computer and data projector

- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.

- Specialist guest speakers

- Specialist IT lab

- Library including online resources

The course outline will contain a list of recommended resources.

Code   **Title**

IA7308 Security Testing and Network Defence

Level   **Credits**

7   15

Pre-requisites   None

Learning Hours

     Tutor Directed   52 hours

     Self-directed   98 hours

Aim

To develop the technical skills to conduct security tests against networks and the business skills necessary for providing justification, efficiency and an understanding of contemporary business and security needs.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Evaluate the business needs of security testing and apply Cybersecurity knowledge and technical security baselines.

2. Undertake practical security testing and analyse and verify test results using industry processes.

3. Monitor the threat environment, using local and international security alert reports to provide timely and accurate advice to the security team and update the threat model.

4. Analyse the functionality and operation of security techniques and implement them as they apply to software, databases and data.

Indicative content

- Cybersecurity concepts, roles, threat model, problem escalation paths, legal environment and compliance requirements.
- Technical security techniques, tools (including tool validation), reporting, compliance to best practice (rules of engagement, penetration testing contracts and others).
- Practical security testing.
- Exposure to a wide range of tools, operating systems and attack techniques.
- Providing input to the security threat model and suggesting security policy solutions.
- Business security testing

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assessment	20%	1-2
Assessment	20%	2-3
Assessment	20%	3-4
Final Assessment	40%	1-4

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:

- Lecturer

- Tutorial assistant

- Classrooms equipped with computer and data projector

- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.

- Specialist guest speakers

- Specialist IT lab

- Library including online resources

The course outline will contain a list of recommended resources.

IT7503 Special Topic

Code	Title
IT7503	Special Topic

Level	Credits
7	15

Pre-requisites: Level 6 study as appropriate for topic

Learning Hours

Tutor-directed	52 hours
Self-directed	98 hours

Aims

To enable learners to:

- Understand the underlying principles of a specific topic relating to information technology
- Apply those underlying principles and concepts to the identification and solution of unstructured problems in unfamiliar settings
- Implement novel methods of solving problems related to the topic.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Research, evaluate and analyse the background and underlying principles of the major concepts of the topic.

2. Evaluate the business, technical and social implications of the topic.

3. Design and implement an appropriate technological solution to an unstructured problem or problems related to the topic.

Indicative content

- A specific topic relating to IT will be approved for this course, and advised to prospective learners in advance of enrolling.
- The topic will be approved by the Head of School.
- Detailed learning outcomes, content and assessment for the topic will be developed prior to the commencement of the course, approved by the Head of School, and made available to learners.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Presentation	20%	1,2
Report and Presentation	40%	1,2
Project	40%	3

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT7504 Middleware

Code	Title
IT7504	Middleware

Level	Credits
7	15

Pre-requisites: **SD6502 Programming II**

                            IT5507 Fundamentals of Data Science

Learning Hours

Tutor-directed	52 hours
Self-directed	98 hours

Aims

To enable learners to understand the underlying principles of middleware, apply the underlying principles and concepts of middleware to identify and solve information architecture and interconnectivity problems, and research techniques and topics in the field of middleware needed to evaluate and implement middleware solutions.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Research, analyse and critically evaluate the background, underlying principles and aspects of the major middleware concepts.

2. Assess the business, technical and social implications of middleware implementations.

3. Design and implement an appropriate technological solution to a problem requiring a middleware enabled solution.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Poster Presentation	15%	1,2
Project: Database enabled web application	35%	3
Project: Distributed database application	50%	3

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT7505 Embedded Systems II

Code   **Title**

IT7505   Embedded Systems II

Level   **Credits**

7   15

Pre-requisites: IT6503 Microcomputer Systems   **OR**
                IT6504 Embedded Systems I

Learning Hours

    Tutor-directed   52 hours

    Self-directed   98 hours

Aims

    The aim of this course is to:

- Introduce 32-bit multi-tasking embedded systems.

- Build on the learner's knowledge of pre-emptive, real-time systems with complex tasks.

Learning Outcomes

    On successful completion of this course, the learner will be able to:

1. Produce development proposals for making cost-effective design choices for the development of embedded systems

2. Set up the development system and toolchain

3. Set up the selected operating system

4. Implement the specifications

5. Test the system to verify and demonstrate that the specification has been met.

Indicative content

- Analysis of the requirements of an Embedded System and a specification to support those requirements.
- Selection of an operating system methodology and a suitable toolchain.
- System design and selection of hardware.
- Development Plan, Development and Production Costing.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Assignment	20%	1, 3, 4
Test	20%	2, 5
Labs	20%	1-5
Examination	40%	1-5

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Indicative Texts and tutorials

Barr, M, Massa, A (2006), *Programming Embedded Systems with C and GNU Development Tools,* 2nd Edition, O'Reilly

The FreeRTOS Project: http://www.freertos.org/

eCos: http://ecos.sourceware.org/

Real-Time Linux Tutorial: http://www.isd.mel.nist.gov/projects/rtlinux-2O/doc/tutorial.htm#index

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT7506 Testing Automation

Code	Title
IT7506	Testing Automation

Level	Credits
7	15

Pre-requisites: IT6505 Advanced Software Testing

Learning Hours

Tutor-directed	52 hours
Self-directed	98 hours

Aims

- To enable learners to apply automated testing and integrated regression testing across a variety of platforms and technologies, both independently or as part of a team.

- To enable the integration of defect tracking within configuration management to manage performance.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Select and deploy appropriate tools to test activities across a range of software architecture and application types utilising advanced version control and scripting test automation.

2. Use a range of software testing communication techniques and practices within a typical environment: mobile applications, test automation and web application testing.

3. Apply effective software testing information design and efficiency outcomes in a typical organisational environment.

4. Incorporate an appreciation of workplace software ethics, cultural awareness and legal implications into the testing process within an organisational environment.

5. Produce test reports in a highly technical and professional manner.

Indicative Content

- Principles of effective automated testing and integrated regression testing development through continuous integration and deployment of software testing strategies.
- Execute testing and automate data for various requirements to determine whether systems meets requirements.
- Project and statistic tools to analyse, bug and report tracking.
- Performance test techniques to determine whether system meets requirements.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Project 1	30%	1, 2, 3, 5
Project 2	30%	4, 5
Examination	40%	1 – 4

Successful completion of course

To pass a course where there is an examination set, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments, including the examination
- Achieve a mark of **40%** or above in their final examination

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT7507 Carrier Technology II

Code	Title
IT507	Carrier Technology II

Level	Credits
7	15

Pre-requisites: IT6506 Carrier Technology I

Learning Hours

Tutor-directed	52 hours
Self-directed	98 hours

Aims

The aim of this course is to introduce the principles and practices of technology used to carry data, video and voice traffic for New Zealand businesses and Internet Service Providers.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Evaluate Optical Transmission Concepts, Wave Division Multiplexing (WDM) and Optical Transport Hierarchy (OTH) within a given context.

2. Critically examine Multicast types and applications, Component protocols of a multicast enabled network, Multicast addressing, Interior gateway protocol (IGP) in a multicast-enabled network, Internet Group Management Protocol (IGMPv2 and IGMPv3) within a given context.

3. Compare and Contrast the options and configurations utilising policers and shapers in a quality assured network.

4. Evaluate bandwidth allocation models and features that utilise these.

5. Outline service types and the technology upon which they rely; configure technology to provide services; decide management tools to manage services; and troubleshoot services.

Indicative Content

- Principles of transmission of digital information
  - Main transmission concepts and the related devices involved in an optical link, the main impairments occurring within an optical fibre and the related solutions used to compensate these impairments; laser classes risks and safety mechanisms, deploying a WDM network.
  - Basic WDM technology and the operational concepts, the functions of the major components used in WDM; quote the main monitoring parameters related to the transmission quality; evaluate the propagation penalties due to the wavelength multiplexing, evaluate possible ways to improve the signal transmission.

- WDM terrestrial network topology, protection and supervision and the evolution to 40G to 400G.

- Multicast
    - Explain the need for multicasting and the types of multicast applications.
    - Differentiate between the methods of IP packet delivery and their characteristics.
    - Recognize the component protocols of a multicast enabled network.
    - Define IP multicast addressing.
    - Evaluate the role of the interior gateway protocol (IGP) in a multicast-enabled network.
    - Evaluate the operation of Internet Group Management Protocol (IGMPv2 and IGMPv3) and IGMP snooping.

- Quality of Service: Policing and Shaping; Hierarchical Bandwidth Allocation among Queues; Hierarchical Bandwidth Allocation among Policers; Queue Sharing and Redirection within a given context.

- Services Architecture
    - Match services with given scenarios
    - Explain the operation of technology to provide services.
    - Configure, manage and troubleshoot services.

Assessments

Assessment Method	Weighting	Learning Outcome/s
Practical 1	25%	1-5
Practical 2	25%	1-5
Test 1	25%	1-5
Test 2	25%	1-5

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.

IT7508 Internship

Code   **Title**
IT7508   Internship

Level   **Credits**
7   30

Pre-requisites: Completion of 240 credits at level 5 and above

Learning Hours

    Tutor-directed   10 hours

    Self-directed   290 hours

Aims

To provide an opportunity for learners to gain industry experience relevant to a chosen area of IT and to reflect critically on concepts and perspectives studied.

Learning Outcomes

On successful completion of this course, the learner will be able to:

1. Apply taught knowledge, research evidence and skills to a field of IT to assess work practices

2. Identify a problem relevant to the chosen organisation and recommend strategies for solving the problem

3. Document and present recommended strategies as appropriate to a selected audience

Indicative Content

Topics covered:
- Application of taught knowledge, research evidence and skills to a practical context
- Assessment of work practices based on theoretical frameworks
- Problem identification and recommendation of strategies

Assessments

Assessment Method	Weighting	Learning Outcome/s
Internship Logbook. Report on internship experience, including assessment of work practices in an IT Team in the chosen organisation, and referring to advanced concepts, theories and research relevant to the learner's area of IT.	30%	1
Final Report. Report on recommended strategies for solving a problem relevant to the chosen organisation, including relevant theories and practice	50%	2, 3
Presentation of recommended strategies to a selected audience	20%	2,3

Successful completion of course

To pass a course where there is no final examination, a learner must:

- Attempt all assessments
- Achieve an average mark of **50%** or above over all assessments

Resources

Teaching and Learning resources can include:
- Lecturer
- Tutorial assistant
- Classrooms equipped with computer and data projector
- Online course resources such as lab work sheets, walkthroughs, readings, video demos, and quizzes are available to learners.
- Specialist guest speakers
- Specialist IT lab
- Library including online resources

The course outline will contain a list of recommended resources.