TAFE NSW DEGREES

Course information for

Bachelor of Information Technology (Data Infrastructure Engineering)

Course Number

HE20525

Locations

Meadowbank

Course Design

The Bachelor of Information Technology (Data Infrastructure Engineering) is a three-year professional degree in information technology majoring in data infrastructure engineering providing graduates with the requisite knowledge and technical skills for the design, implementation, and management of 'big data', data systems and their infrastructure. This new major builds on and complements the core theoretical and practical foundations of the existing Bachelor of Information Technology degree to provide a new specialisation in data infrastructure engineering.

Course Learning Outcomes

Graduates of the Bachelor of Information Technology (Data Infrastructure Engineering) will:

- Acquire a broad and coherent body of knowledge in information technology with an in-depth understanding of the practical application and theoretical frameworks of networking, data infrastructure, and data analytics.
- Acquire analytical and critical evaluation skills to apply the theory and practice of data infrastructure engineering and analysis in a range of workplace contexts.
- Generate innovative and practical approaches and solutions to complex networking and data infrastructure problems with initiative, creativity, and accountability.
- Effectively communicate concepts and information around infrastructure applications, and the results of data analytics in a selection of written, digital and oral formats to a range of audiences.
- Have the ability for providing solutions to complex problems to meet the needs of diverse stakeholders in adherence to ICT professional standards and frameworks.
- Apply professional practice knowledge and skills with initiative, intellectual independence, and judgement in planning, problem solving, and decision making in collaboration with others and in diverse contexts.
- Act responsibly and being accountable for personal, professional and scholarly development to support professional practice and to adapt ICT knowledge and skills within broad parameters.

Course Structure

The structure below is the typical study pattern for a full time student. Elective choice and study pattern is determined by the campus. All Subjects are worth 10 credit points (CP). The Bachelor of Information Technology (Data Infrastructure Engineering) require the completion of 24 subjects with 240 credit points.

Year 1 Level 100 – Foundation Skills

Semester 1

ITICT102A	Introduction to Programming (10 CP)
ITICT103A	Internetworking 1 (10 CP)
ITICT106A	Introduction to Computing (10 CP)
ITPRD101A	Critical Thinking for the IT Professional (10 CP)

Semester 2

ITDAT101A	Introduction to Data Analysis (10 CP)
ITICT104A	Internetworking 2 (10 CP)
ITICT107A	Introduction to Databases (10 CP)
ITPRD102A	Communication for the IT Professional (10 CP)

80 credit points required to complete Diploma of Information Technology

Year 2 Level 200 – Development

Semester 1

ITDAT201A	Advanced Data Analysis (10 CP)
ITICT207A	Fundamentals of Computer Science (10 CP)
ITNET203A	Network Security (10 CP)
ITPRD205A	Project Management (10 CP)

Semester 2

ITDAT202A	Data Infrastructure Engineering (10 CP)
ITICT205A	Virtualisation (10 CP)
ITPRD202A	Professional Issues in IT (10 CP)

Plus one level 200 elective

Year 3 Level 300 – Synthesis

Semester 1

ITDAT301A	Big Data and Advanced Data Concepts (10 CP)
ITDAT302A	Data Mining and Visualisation (10 CP)
ITNET311A	Major Group Project (10 CP)

Plus one level 300 elective

Semester 2

ITDAT303A	Data and Network Security (10 CP)
ITDAT304A	Emerging Trends in Data Technology (10 CP)
ITNET312A	Major Individual project (10 CP)

Plus one level 300 elective

Elective bank

ITICT202A	Wireless Networks (10 CP)
ITICT206A	Machine Learning (10 CP)
ITNET202A	Enterprise Security (10 CP)
ITPRD203A	Knowledge Management (10 CP)
ITICT303A	Distributed Computing (10 CP)
ITNET307A	National Data Infrastructure Security (10 CP)
ITNET308A	eCommerce and eGovernment Security (10 CP)
ITNET309A	Computer and Network Forensics (10 CP)
ITNET310A	Software Defined and Programmable Networks (10 CP)

240 credit points required to complete Bachelor of Information Technology (Data Infrastructure Engineering)

Overview of subject requirements

The information on the following pages provides an overview and an indicative assessment schedule for each subject in the course. It is provided for information purposes only. The Subject Guide distributed to enrolled students will detail full learning and assessment requirements for each subject.

Level 100 Subjects

SUBJECT: Introduction to programming

CODE: ITICT102A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

Students are introduced to the fundamentals of computer programming and how they can be used to solve business problems. Students are introduced to a number of key programming languages and their environments, but will focus on the use of Java, one of the most popular and widely used programming languages.

Indicative assessment schedule

Tutorial quizzes	10%
Practical assignment 1	20%
Practical assignment 2	20%
Final exam	50%

SUBJECT: Internetworking 1

CODE: ITICT103A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

This subject introduces students to the exciting world of computer networks and the internet. Students will look at the different types of networks and network architectures and will explore a number of specific network configurations and data protocols.

Indicative assessment schedule

Tutorial quizzes	10%
Practical assignment	40%
Final exam	50%

SUBJECT: Introduction to computing

CODE: ITICT106A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

Students are introduced to the key theoretical and practical elements of computer technology including computer hardware and software development and operations, PC maintenance and correct, safe handling procedures, systems assembly and configuration, and computer processor technologies. Students explore computer operating systems and are introduced to the different types of computers and associated peripheral devices.

Indicative assessment schedule

Tutorial quizzes	25%
Practical report	25%
Final exam	50%

SUBJECT: Critical thinking for the IT professional

CODE: ITPRD101A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

In this subject students are introduced to the different types of problems they may face in the IT field. Students explore critical thinking techniques and systematic approaches and methods that are used to solve problems. Students are introduced to logic and mathematics in computing and the fundamental concepts of discrete mathematics that are the tools of the IT specialist. Students learn to apply an integrated range of thinking tools to problem solving including an understanding of cognitive biases, deductive and inductive reasoning, set theory and probability, and the fundamentals of algorithms. Students apply their critical thinking skills through workplace and IT-related problem solving activities and assignments.

Indicative assessment schedule

Tutorial quizzes	10%
Practical assignment	50%
Final exam	40%

SUBJECT: Introduction to data analysis

CODE: ITDAT101A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

Students will be introduced to data analysis through the study of fundamental statistical topics such as data collection, population distributions, hypothesis testing, confidence intervals, correlation and regression, statistical modelling, and data visualisation.

Indicative assessment schedule

Tutorial quizzes	20%
Practical and technical assessment	30%
Final exam	50%

SUBJECT: Internetworking 2

CODE: ITICT104A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITICT103A

Subject overview

Students explore in more detail several different types of networks and network concepts, including VLANs, wireless networks, and wide area networks (WANs) and their associated technologies. Students will focus on the use of switches and basic switching concepts and configurations as well as network management and administration, and network threats and security. Students conclude the subject by examining emergent networking technologies and discussing associated issues and challenges.

Indicative assessment schedule

Tutorial quizzes	20%
Engineering Journal	10%
Group practical assignment	35%
Final exam	35%

SUBJECT: Introduction to databases

CODE: ITICT107A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITICT106A

Subject overview

Students develop a sound understanding of the theories associated with database management systems and their application to real world contexts. Students explore the concepts of relational databases and database design and explain how Structured Query Language (SQL) is used. They discuss various application development tools and consider a number of database models, especially Entity-Relationship and Relational models. Students will undertake practical activities to ensure that they understand data organisation and can perform SQL and other database queries in real life scenarios.

Indicative assessment schedule

Tutorial quizzes	10%
Practical assessment	40%
Final exam	50%

SUBJECT: Communication for the IT professional

CODE: ITPRD102A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

This subject introduces students to the research and writing skills required for successful undergraduate-level study in information technology. It focuses on both academic and technical literacy, both of which are underpinned by skills in searching for, identifying, evaluating, and selecting appropriate information sources. Students apply their theoretical understanding to practical activities including producing written, oral, and visual communication in both an academic and an IT context.

Indicative assessment schedule

Essay	20%
Practical assignment 1	30%
Practical assignment 2	50%

Level 200 Subjects

SUBJECT: Advanced data analysis

CODE: ITDAT201A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITDAT101A

Subject overview

This subject will introduce more advanced statistical methods, such as linear regression, cross-validation, and p-values. Extensive use will be made of statistical packages and the R statistical programming language.

Indicative assessment schedule

Tutorial quizzes	20%
Practical assessment	30%
Final exam	50%

SUBJECT: Fundamentals of computer science

CODE: ITICT207A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITICT102A

Subject overview

This subject will introduce students to algorithms and data structures. Students will study algorithm efficiency, searching, sorting, recursion, stacks, queues, heaps, hash tables, trees, and graphs.

Indicative assessment schedule

Tutorial quizzes	50%
Final exam	50%

SUBJECT: Network security

CODE: ITNET203A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITICT104A

Subject overview

Students are introduced to the critical importance of network security. Students start by describing the nature of security threats and the vulnerabilities experienced by various types of networks. Students explore the role of effective network management and administrative and restrictive access in threat and risk mitigation and discuss the importance of developing and implementing an effective network security policy.

Indicative assessment schedule

Tutorial quizzes	20%
Report	30%
Final exam	50%

SUBJECT: Project management

CODE: ITPRD205A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

Students are introduces students to the field of project management, its theory, practice, and development. Students will be introduced to the project life cycle, the often complex role of the project manager, and strategies for how to work and cooperate in teams, and, when necessary, how to overcome conflict. The subject introduces students to some of the most common technologies and software packages used in project management such as MS Project.

Indicative assessment schedule

Practical group assessment 1	50%
Practical group assessment 2	50%

SUBJECT: Data infrastructure engineering

CODE: ITDAT202A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITICT104A

Subject overview

Students will explore data infrastructure design, data equipment and maintenance, and the end-to-end implementation of data technology in an enterprise.

Indicative assessment schedule

Mid semester exam	25%
Practical exercise	25%
Final exam	50%

SUBJECT: Virtualisation

CODE: ITICT205A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

This subject introduces students to the benefits and drawbacks of virtualisation. Students will learn how to deploy, manage, and migrate virtual machines, manage virtual networks and how to manage user access to the virtual infrastructures.

Indicative assessment schedule

Labs	5%
Individual Report	25%
Mid Term Theory Exam	10%
Final exam (Theory)	50%
Final exam (Practical)	10%

SUBJECT: Professional issues in IT

CODE: ITPRD202A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITPRD102A

Subject overview

This subject introduces students to a range of issues that arise in the IT environment and that regularly challenge IT professionals, particularly legal, social, and ethical issues. Students explore issues relating to privacy, computer crime, the reliability of systems, laws relating to network systems such as intellectual property and copyright laws, technology and the work environment, occupational health and safety, and some of the issues surrounding the increasing use of technology in society.

Indicative assessment schedule

Tutorial quizzes	10%
Case study analysis	40%
Final exam	50%

Level 300 Subjects

SUBJECT: Big data and advanced data concepts

CODE: ITDAT301A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITDAT101A

Subject overview

This subject focuses on new database models and systems, particularly big data concepts, database performance and optimisation, indexing strategies, concurrency, transaction management, and enterprise database development.

Indicative assessment schedule

Mid semester exam	25%
Case study report	25%
Final exam	50%

SUBJECT: Data mining and visualisation

CODE: ITDAT302A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITDAT201A

Subject overview

Students will examine the theory and practice of obtaining useful information from data and for visualising those results to enhance data mining efforts and to communicate the mined data.

Indicative assessment schedule

Mid semester exam	25%
Practical exercise	25%
Final exam	50%

SUBJECT: Major group project

CODE: ITNET311A **CREDIT POINTS:** 10 **CONTACT HRS:** 4 hpw **PREREQUISITES:** ITPRD205A

Subject overview

Students work in small groups and with a member of the academic staff to identify and develop their own security-related project.

Indicative assessment schedule

Literature review	10%
Practical project plan	40%
Practical project implementation and presentation	50%

SUBJECT: Data and network security

CODE: ITDAT303A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITNET203A

Subject overview

This subject examines the principles and practice of data and network security and includes topics such as cryptography, secure data storage, secure communications, and cyber-attacks and defences.

Indicative assessment schedule

Mid semester exam	30%
Practical exercise	20%
Final exam	50%

SUBJECT: Emerging trends in data technology

CODE: ITDAT304A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

Students will discuss emerging trends in data technology and the impact of emerging technologies on society and business.

Indicative assessment schedule

Case study report	25%
Report	25%
Final exam	50%

SUBJECT: Major individual project

CODE: ITNET312A **CREDIT POINTS:** 10 **CONTACT HRS:** 3 hpw **PREREQUISITES:** ITPRD205A

Subject overview

This subject offers students the opportunity to undertake a large-scale, complex security project. Students will undertake their work on their own as individual IT professionals.

Indicative assessment schedule

Literature review	10%
Practical project plan	40%
Practical project & presentation	50%

Level 200 Elective Subjects

SUBJECT: Wireless networks

CODE: ITICT202A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITICT104A

Subject overview

The subject introduces students to the key theoretical and practical elements of WLAN technology including WLAN devices, related software and WLAN operations, configuration, troubleshooting and maintenance. Students will explore types of antennas used in WLAN networks and will be introduced to the different types of WLAN protocols WLAN security. Students conclude with a discussion of emerging technologies and discuss some of the challenges that IT professionals may face in the future with WLAN technologies.

Indicative assessment schedule

Tutorial quizzes	10%
Engineering journal	10%
Practical report	30%
Final exam	50%

SUBJECT: Machine learning

CODE: ITICT206A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

This subject introduces students to the ideas, techniques, and algorithms of machine learning and how they can be applied to big data analytics.

Indicative assessment schedule

Practical exercises	45%
Final examination	55%

SUBJECT: Enterprise security

CODE: ITNET202A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** ITNET203A

Subject overview

This subject introduces students to enterprise-wide network security systems and the concept of an Enterprise System Architecture (ESA), the structures and systems, both physical and procedural, that contributes to the security of information and data across a distributed computing environment. Students will explore concepts such Enterprise Application Architecture, Enterprise Application Integration and Enterprise Collaboration systems. They will discuss the technical and operational differences between authentication and access principles, and various access control concepts such as DAC, MAC, and RBAC. Students also examine the various security considerations associated with different systems architectures.

Indicative assessment schedule

Tutorial quizzes	10%
Case study report	40%
Final exam	50%

SUBJECT: Knowledge management

CODE: ITPRD203A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

This subject introduces students to the principles of managing knowledge as a strategic asset. Students explore how knowledge is created and what constitutes the knowledge environment of businesses. Students examine workplace structures that support and enable knowledge sharing and management.

Indicative assessment schedule

Tutorial quizzes	20%
Essay	30%
Final exam	50%

Level 300 Elective Subjects

SUBJECT: Distributed computing

CODE: ITICT303A **CREDIT POINTS:** 10 **CONTACT HRS:** 5 hpw **PREREQUISITES:** Nil

Subject overview

Students will examine the principles and practice underlying distributed systems and explore how such systems can be used to enhance data exploration and analysis.

Indicative assessment schedule

Tutorial quizzes	50%
Final exam	50%

SUBJECT: National data infrastructure security

CODE: ITNET307A **CREDIT POINTS:** 10 **CONTACT HRS:** 4 hpw **PREREQUISITES:** Nil

Subject overview

This subject introduces students to the concept of information warfare and the importance of organisational and national data and information infrastructure protection and integrity. Students explore the people or organisations who might commit data or cyber attacks, the objectives and actual targets of those attacks.

Indicative assessment schedule

Short essay	20%
Essay 2	30%
Case study report	50%

SUBJECT: eCommerce and eGovernment security

CODE: ITNET308A **CREDIT POINTS:** 10 **CONTACT HRS:** 4 hpw **PREREQUISITES:** Nil

Subject overview

This subject addresses the imperative of providing information security for e-customers as well as e-business providers. Students begin by a discussion of eCommerce and eGovernment technology and the requirements for information security, secure transactions, protection from fraud, protection of intellectual property, and so on. They examine common threats and vulnerabilities such as credit card fraud, hacking, and identity theft, and explore principles of information security, including privacy, integrity, authentication, and non-repudiation.

Indicative assessment schedule

Report	20%
Presentation	30%
Final exam	50%

SUBJECT: Computer and network forensics

CODE: ITNET309A **CREDIT POINTS:** 10 **CONTACT HRS:** 4 hpw **PREREQUISITES:** Nil

Subject overview

This subject examines contemporary computer crime, including malware attack, identify theft, fraud, child pornography, organised crime, and cyber-terrorism, followed by cyber-crime within the Australian and international legal framework. Students analyse the cyber incident response process, from setting up a forensic toolkit, through the processes of detection, investigation, and gathering court-admissible evidence, to forensic reporting.

Indicative assessment schedule

Practical Report	15%
Research report	10%
Practical assignment	25%
Final exam	50%

SUBJECT: Software defined programmable networks

CODE: ITNET310A **CREDIT POINTS:** 10 **CONTACT HRS:** 4 hpw **PREREQUISITES:** Nil

Subject overview

Practically explores programmable and software defined concepts of networking, how they can be implemented in an enterprise environment, and how they simplify network management.

Indicative assessment schedule

Tutorial Quizzes	20%
Case Study	30%
Final exam	50%