MIT (12254014)

Duration of study	2 years
Total credits	180

Programme information

This degree programme is presented in English only.

Also consult G Regulations G.30 to G.54

The curriculum is determined in consultation with the programme organiser.

A student will have to apply to the Dean of the Faculty of Engineering, Built Environment and Information Technology if he/she requires more than three years to complete the degree.

Admission requirements

i. Subject to the stipulations of Gen. Reg. G.1.3, G.30 and G.62, an appropriate honours or bachelor's degree is a requirement for admission to Stream A and Stream B; and an honours degree is an admission requirement for Stream C.
ii. A pass mark in Mathematics at grade 12 level or another qualification in Mathematics, Statistics or Mathematical Statistics, which the Chairperson of the School of Information Technology considers to be sufficient. This requirement is not applicable to Stream C.
iii. Sufficient appropriate practical experience in the technology field in the opinion of the Chairperson of the School of Information Technology. This requirement is not applicable to Stream C.
iv. The Chairperson of the School of Information Technology may impose additional requirements for admission. In particular, this will apply to candidates with insufficient academic background in Information Technology. This requirement is not applicable to Stream C.
v. Selection of candidates will take place.
vi. The result of the selection is final and no correspondence will be entered into.

See additional requirements for Stream C: Big Data Science below.

vii. A minimum pass rate of 65% for the previous degree, AND
viii. Successfully completed higher education modules, or other modules with similar content, as part of the previous degree in:

- Statistics,
- Calculus I,
- Linear Algebra I,
- Programming,
- Database systems, and
- Research Methods; AND

ix. Success in the selection process based on:

- Previous education,
- passing an English test, and
- passing a proficiency test in Databases, Programming, Mathematics and Statistics.

Examinations and pass requirements

A minimum semester mark of 40% is required in order to be admitted to the final examinations in all the prescribed modules of the degree. A final mark of 50% is required to pass all coursework modules and the mini-dissertation.

Discontinuation of studies
The Dean may, on the recommendation of the admissions committee, cancel the studies of a student who fails more than one module. A module may only be repeated once.

Deregistration of modules
Deregistration of modules for Stream C is only allowed before the early deadline.

Conferment of the degree
The Master's degree in Information Technology Stream A and Stream B is conferred on a student who successfully completes the following:

- Mini-dissertation – 90 credits
- Core modules – 90 credits
- Total – 180 credits

The Master's degree in Information Technology Stream C is conferred on a student who successfully completes the following:

- Mini-dissertation – 90 credits
- Core modules – 55 credits
- Research methods – 5 credits
- Projects – 20 credits
- Elective modules – 10 credits
- Total – 180 credits

Pass with distinction

The degree is conferred with distinction on students who have obtained at least 75% for the mini-dissertation and a minimum of 75% weighted average final mark for the coursework modules.

Curriculum: Year 1

Minimum credits: 74

Core modules

Information and knowledge management 835 (MIT 835)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Semester 1

Organisational behaviour and management 841 (MIT 841)

Module credits	8.00
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Semester 2

Computer science in perspective 842 (MIT 842)

Module credits	5.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Computer Science
Period of presentation	Semester 1

Information in perspective 843 (MIT 843)

Module credits	5.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Semester 1

Life-cycle and maturity models for IT 850 (MIT 850)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Computer Science
Period of presentation	Semester 2

Digital economy 851 (MIT 851)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Informatics
Period of presentation	Semester 2

ICT project management 852 (MIT 852)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Informatics
Period of presentation	Semester 2

Corporate IT systems 853 (MIT 853)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Computer Science
Period of presentation	Semester 2

ICT infrastructure management 860 (MIT 860)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per semester

Language of tuition	Module is presented in English
Academic organisation	Computer Science
Period of presentation	Semester 1

IT research 862 (MIT 862)

Module credits	8.00
Prerequisites	This module is a compulsory requirement for admission of A Stream students to MIT 840
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Semester 1

Module content

Research methodologies applicable to the IT field as preparation for the mini-dissertation for the A Stream students.

Web trends in the library 865 (MIT 865)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per year
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Year

Digital repositories 866 (MIT 866)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per year
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Year

The knowledge society and international librarianship 867 (MIT 867)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per year
Language of tuition	Module is presented in English

Academic organisation	Information Science
Period of presentation	Year

Facilitating information retrieval and information use 868 (MIT 868)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per year
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Year

IT systems in libraries 869 (MIT 869)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per year
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Year

Knowledge management 872 (MIT 872)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per year
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Year

Network technologies 873 (MIT 873)

Module credits	6.00
Prerequisites	No prerequisites.
Contact time	8 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Semester 1

Organisational behaviour and leadership 875 (MIT 875)

Module credits	6.00

Prerequisites	No prerequisites.
Contact time	8 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Semester 1

Strategic ICT management 876 (MIT 876)

Module credits	5.00
Prerequisites	No prerequisites.
Contact time	8 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Informatics
Period of presentation	Semester 2

IT Research 879 (MIT 879)

Module credits	8.00
Prerequisites	This module is a compulsory requirement for admission of B Stream students to MIT 880
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Semester 2

Module content

Basic research methodology as preparation for the mini-dissertation for the B Stream students.

Introduction to big data science 800 (MIT 800)

Module credits	5.00
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Quarter 1

Module content

This is the first and introductory module for the MIT degree in Big Data Science. Big Data and Data Science will be defined and students will be exposed to different application domains within the participating academic departments in the MIT degree. These departments include: Computer Science, Electrical, Electronic and Computer Engineering (EECE), Informatics, Information Science, Mathematics and Applied Mathematics, Statistics, and Health Science departments. The presentation of this module will be in the format of a two-day workshop.

Introduction to machine and statistical learning 801 (MIT 801)

Module credits	15.00
Prerequisites	First year level higher education modules in Computer Science, Mathematics and Statistics.
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Semester 1

Module content

In this module students will be exposed to different categories of machine and statistical learning algorithms that can be used to manipulate big data, identify trends from the data, modelling trends for prediction purposes as well as modelling for the detection of hidden knowledge. Students will be exposed to various machine and statistical learning algorithms/methods and they will learn how to make the right choice with regard to these. Learning, in a supervised and unsupervised mode will be covered. Furthermore students will develop a practical understanding of methods that can aid the learning process, such as, new developments in regression and classification, probabilistic graphical models, numerical Bayesian and Monte Carlo methods, neural networks, decision trees, deep learning and other computational methods. This module also includes a visualisation component focusing on the encoding of information, such as patterns, into visual objects.

Introduction to data platforms and sources 802 (MIT 802)

Module credits	5.00
Prerequisites	First year level higher education modules in Computer Science and Statistics.
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Quarter 2

Module content

Students will obtain hands-on experience on the following technologies such as: Python, Spark, Hadoop, R and SAS, Streaming, Data fusion, Distributed file systems; and Data sources such as social media and sensor data.

Introduction to Information Ethics for Big Data Science 803 (MIT 803)

Module credits	5.00
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Quarter 1

Module content

The focus in this module is on Information Ethics and its place within the disciplines of Ethics and Philosophy. The following topics will be covered: Information Ethics and PAPAS (privacy, accuracy, property, access, security); Information ethics and the life cycle of big data; Information ethical dilemmas within big data in different disciplines, e.g. science, technology, engineering and mathematics (STEM), health sciences, economics and management sciences, social sciences and the humanities; and Case studies.

Introduction to mathematical optimization for big data science 804 (MIT 804)

Module credits	5.00
Prerequisites	First year level higher education modules in Computer Science, Mathematics and Statistics.
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Quarter 2

Module content

In this module students will be introduced to Mathematical Optimization through gaining knowledge about the theory and algorithms to solve optimisation problems. Topics will include: Linear programming, unconstrained optimization, equality constrained optimization, general linearly and nonlinearly constrained optimization, quadratic programming, global optimization, Theory and algorithms to solve these problems.

Big data 805 (MIT 805)

Module credits	10.00
Prerequisites	First year level higher education modules in Computer Science.
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Semester 2

Module content

This module focuses on tools for Big Data processing. The focus is on the 3 V- characteristics of Big Data namely volume, velocity and variety. Students will learn about the different architectures available for Big Data processing. The map-reduce algorithm will be studied in detail as well as graphical models for Big Data. The module will include a significant component of practical work (hands-on) where students will be exposed to real use cases that are or can be implemented on Big Data platforms.

Big data management 806 (MIT 806)

Module credits	10.00
Prerequisites	First year level higher education modules in Computer Science.
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo

| **Period of presentation** | Quarter 4 |

Module content

Big data management is the governance, administration and organization of large volumes of both structured and unstructured data. Aspects included in big data management are: big data as organizational asset, harnessing big data as disruptive technology for competitive advantage, big data quality and accessibility; management strategies for large and fast-growing internal and external data, big data infrastructure and platform management, and big data policy, strategy and compliance.

Research methods for big data science 809 (MIT 809)

Module credits	5.00
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Semester 2

Module content

Similar to MIT 862; which has the following description: Research methodologies applicable to the IT field as preparation for the mini-dissertation for the A Stream students.

Elective modules

Big data science elective 801 (COS 801)

Module credits	5.00
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	Computer Science
Period of presentation	Semester 2

Module content

Example courses, amongst others, may include: Cyber-security, Digital Forensics, Deep Machine Learning, Image and sound analysis, Feature extraction, and Graph Modelling. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Big data science elective 802 (COS 802)

Module credits	5.00
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	Computer Science
Period of presentation	Semester 2

Module content

Example courses, amongst others, may include: Cyber-security, Digital Forensics, Deep Machine Learning, Image and sound analysis, Feature extraction, and Graph Modelling. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Big data science elective 801 (INF 801)

Module credits	5.00
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	Informatics
Period of presentation	Semester 2

Module content

See existing electives from MIT modules in Stream A and B. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Big data science elective 802 (INF 802)

Module credits	5.00
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	Informatics
Period of presentation	Semester 2

Module content

See existing electives from MIT modules in Stream A and B. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Big data science elective 820 (INL 820)

Module credits	5.00
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Semester 2

Module content

Five credits of an elective module can be drawn from Information Science. A module in Research Data Management (RDM) is available as an elective. The following topics would typically be covered: Open Science and the dependency on open (big) data, The research process and the life cycle of big data (data management plans to publishing derivative data sets, licensing and legal implications); managing (curating) big vs long tail data; solving problems with research data vs the business value of big data (data-intensive decisionmaking); managing data as an asset (also data citation); issues and challenges involved in the management of big data (principles and best practices for effective big data governance); trusted data repositories; data stewardship frameworks for big data; and the data steward's toolbox.

Big data science elective 801 (WTW 801)

Module credits	5.00
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	Mathematics and Applied Maths
Period of presentation	Semester 2

Module content

Five 5 credits of an elective course can be drawn from Mathematics and Applied Mathematics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Big data science elective 802 (WTW 802)

Module credits	5.00
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	Mathematics and Applied Maths
Period of presentation	Semester 2

Module content

Five 5 credits of an elective course can be drawn from Mathematics and Applied Mathematics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Statistics elective 802 (STK 802)

Module credits	5.00
Prerequisites	As determined by the Department of Statistics.
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	Statistics

| **Period of presentation** | Semester 2 |

Module content

Five 5 credits of an elective course can be drawn from the Department of Statistics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Statistics elective 801 (STK 801)

Module credits	5.00
Prerequisites	As determined by the Department of Statistics.
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	Statistics
Period of presentation	Semester 2

Module content

Five 5 credits of an elective course can be drawn from the Department of Statistics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Big data science elective 801 (ERZ 801)

Module credits	5.00
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	Electrical, Electronic and Com
Period of presentation	Semester 2

Module content

Example courses may include: Intelligent systems and Internet of Things. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Big data science elective 802 (ERZ 802)

Module credits	5.00
Contact time	5 contact hours
Language of tuition	Module is presented in English
Academic organisation	Electrical, Electronic and Com
Period of presentation	Semester 2

Module content

Example courses may include: Intelligent systems and Internet of Things. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Curriculum: Final year

Minimum credits: 106

Core modules

Mini-dissertation 840 (MIT 840)

Module credits	90.00
Prerequisites	MIT 862 (for the A Stream students)
Language of tuition	Module is presented in English
Academic organisation	Informatics
Period of presentation	Year

Module content

The mini-dissertation is an individual report of independent research under the guidance of a supervisor for the A Stream students.

Please note: All A Stream students first register for MIT 840. As soon as a supervisor has been assigned the student will be moved to the assigned module of the corresponding department. Informatics students will remain registered for MIT 840.

Strategic ICT management 844 (MIT 844)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Informatics
Period of presentation	Semester 1

IT financial management 864 (MIT 864)

Module credits	8.00
Prerequisites	No prerequisites.
Contact time	16 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Informatics
Period of presentation	Semester 1

Computer science in perspective 874 (MIT 874)

Module credits	6.00
Prerequisites	No prerequisites.

Contact time	8 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Semester 1

ICT project management 877 (MIT 877)

Module credits	5.00
Prerequisites	No prerequisites.
Contact time	8 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Information Science
Period of presentation	Semester 1

IT financial management 878 (MIT 878)

Module credits	6.00
Prerequisites	No prerequisites.
Contact time	8 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Informatics
Period of presentation	Semester 1

Mini-dissertation 880 (MIT 880)

Module credits	90.00
Prerequisites	MIT 879 (for B Stream students)
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Year

Module content

The mini-dissertation is an individual report of independent research under the guidance of a supervisor for the B Stream students.

Mini-dissertation 881 (MIT 881)

Module credits	90.00
Prerequisites	MIT 862 (for A Stream students)
Language of tuition	Module is presented in English
Academic organisation	Information Science

| **Period of presentation** | Year |

Module content

The mini-dissertation is an individual report of independent research under the guidance of a supervisor for the A Stream students.

Please note: Only for the department of Information Science students.

Mini-dissertation 882 (MIT 882)

Module credits	90.00
Prerequisites	MIT 862 (for A Stream students)
Language of tuition	Module is presented in English
Academic organisation	Computer Science
Period of presentation	Year

Module content

The mini-dissertation is an individual report of independent research under the guidance of a supervisor for the A Stream students.

Please note: only for the Department of Computer Science students.

Mini dissertation in big data science 807 (MIT 807)

Module credits	90.00
Prerequisites	All the core modules must be passed
Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Year

Module content

Students may choose a supervisor/co-supervisor from any of the participating departments, which includes, but are not limited to: Electrical, Electronic & Computer Engineering (EECE), Informatics, Information Science, Mathematics and Applied Mathematics, and Faculty of Health Science departments (Computational biology, Family Medicine, Radiology). Additionally to the last mentioned, a supervisor/co-supervisor will also be allocated to all students from a department in the School of Information Technology. It is expected that a submission to a relevant journal is made during the course of the study. All the other faculty and university regulations for a master's degree will also be applicable over and above those listed at the beginning of this paragraph.

Big data science project 808 (MIT 808)

Module credits	20.00
Prerequisites	All the core modules must be passed
Contact time	8 contact hours per semester

Language of tuition	Module is presented in English
Academic organisation	School of Information Technolo
Period of presentation	Semester 1

Module content

This module provides the opportunity to students for demonstrating the application of the theoretical Big Data Science knowledge gained in the core part of this degree. Students are expected to identify and work with a collaborator who is taking ownership for the project. This collaborator can either be an industry partner or a researcher within one of the participating departments. Projects will be based on the entire big data lifecycle as discussed in this degree programme. This includes the gathering of data of a significant size as well as a final technical report describing the process followed and the deliverables. Depending on the complexity of the project, students can apply to work in groups with a maximum of two members. The proposed project will be subject to approval by the Department Computer Science.

The information published here is subject to change and may be amended after the publication of this information. The General Regulations (G Regulations) apply to all faculties of the University of Pretoria. It is expected of students to familiarise themselves well with these regulations as well as with the information contained in the General Rules section. Ignorance concerning these regulations and rules will not be accepted as an excuse for any transgression.