

**REGULATIONS FOR THE DEGREES OF  
MASTER OF SCIENCE IN ENGINEERING (MSc[Eng])  
MASTER OF SCIENCE IN COMPUTER SCIENCE (MSc[CompSc]), AND  
MASTER OF SCIENCE IN ELECTRONIC COMMERCE AND INTERNET  
COMPUTING (MSc[ES&IC])**

*(Applicable to students admitted in the academic year 2016-17 and thereafter)*

*(See also General Regulations and Regulations for Taught Postgraduate Curricula)*

The degrees of MSc(Eng), MSc(CompSc) and MSc(ES&IC) are each a postgraduate degree awarded for the satisfactory completion of a prescribed curriculum in the Faculty of Engineering.

For the MSc(Eng) degree, the major part of the curriculum must include courses offered in one of the following fields: building services engineering, electrical and electronic engineering, energy engineering, environmental engineering, geotechnical engineering, industrial engineering and logistics management, infrastructure project management, mechanical engineering, structural engineering, and transportation engineering.

The MSc(Eng), MSc(CompSc) and MSc(ES&IC) curricula are offered in part-time and full-time modes.

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**MSc 1 Admission requirements**

To be eligible for admission to the curriculum leading to the degree of MSc(Eng) / MSc(CompSc) / MSc(ES&IC), a candidate shall:

- (a) comply with the General Regulations;
- (b) comply with the Regulations for Taught Postgraduate Curricula;
- (c) hold (i) a Bachelor's degree of this University in a relevant field; or  
(ii) a relevant qualification of equivalent standard from this University or from another university or comparable institution accepted for this purpose; and
- (d) satisfy the examiners in a qualifying examination if required.

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**MSc 2 Qualifying Examination**

- (a) A qualifying examination may be set to test the candidate's academic ability or his/her ability to follow the curriculum prescribed. It shall consist of one or more written papers or their equivalent and may include a dissertation.
- (b) A candidate who is required to satisfy the examiners in a qualifying examination shall not be permitted to register until he/she has satisfied the examiners in the examination.

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**MSc 3 Period of Study**

The curriculum of the degree of MSc(Eng)/MSc(CompSc)/MSc(ES&IC) shall normally extend over one academic year of full-time study or two academic years of part-time study.

Candidates shall not be permitted to extend their studies beyond the maximum period of registration of two academic years of full-time study or three academic years of part-time study, unless otherwise permitted or required by the Board of Faculty. For both full-time and part-time modes, the period of study shall include any assessment to be held during and/or at the end of each semester.

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#### **MSc 4 Curriculum Requirements**

To complete the curriculum, a candidate shall, within the prescribed maximum period of registration stipulated in Regulation MSc3 above:

- (a) satisfy the requirements prescribed in TPG6 of the Regulations for Taught Postgraduate Curricula;
  - (b) take not fewer than 72 credits of courses, in the manner specified in these regulations and syllabuses and pass all courses as specified in the syllabuses;
  - (c) follow courses of instruction and complete satisfactorily all prescribed practical / laboratory work; and
  - (d) satisfy the examiners in all forms of assessment as may be required in either
    - (i) 72 credits of courses which must include a dissertation of 24 credits or a project of 12 credits as capstone experience; or
    - (ii) at least 60 credits of courses successfully completed at this University (which must include a dissertation of 24 credits or a project of 12 credits) and not more than 12 credits of courses successfully completed at this or another university before admission to the MSc(Eng) / MSc(CompSc) / MSc(ES&IComp) and approved by the Board of the Faculty.
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#### **MSc 5 Dissertation or project report**

- (a) A candidate who is permitted to select a dissertation or a project is required to submit the dissertation or the project report by a date specified by the Board of Examiners.
  - (b) All candidates shall submit a statement that the dissertation or the project report represents his/her own work undertaken after the registration as a candidate for the degree.
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#### **MSc 6 Selection of Courses**

- (a) A candidate shall select courses according to the guidelines stipulated in the syllabuses for the degree of MSc(Eng)/MSc(CompSc)/MSc(ES&IComp).
- (b) Selection of study patterns, as stipulated in the respective syllabus, shall be subject to the approval of the Head of the Department concerned.
- (c) Candidates shall select their courses in accordance with these regulations and the guidelines specified in the syllabuses before the beginning of each academic year.
- (d) Changes to the selection of courses may be made only during the add/drop period of the semester in which the course begins, and such changes shall not be reflected in the transcript of the candidate.
- (e) Subject to the approval of the Committee on Taught Postgraduate Curricula on the recommendation of the Head of the Department concerned, a candidate may in exceptional circumstances be permitted to select additional course(s).

- (f) Requests for changes after the designated add/drop period of the semester shall be subject to the approval of the Committee on Taught Postgraduate Curricula. Withdrawal from courses beyond the designated add/drop period will be subject to the approval of the Committee on Taught Postgraduate Curricula.

### **MSc 7 Assessment**

- (a) The written examination for each course shall be held after the completion of the prescribed course of study for that course, and not later than January, May or August immediately following the completion of the course of study for that course unless otherwise specified in the syllabuses.
- (b) A candidate, who is unable to complete the requirements within the prescribed maximum period of registration specified in Regulation MSc3 because of illness or circumstances beyond his/her control, may apply for permission to extend his/her period of studies.
- (c) A candidate who has failed to satisfy the examiners in any course(s) is required to make up for failed course(s) in the following manners:
- (i) undergoing re-assessment/re-examination in the failed course(s); or
  - (ii) repeating the failed course(s) by undergoing instruction and satisfying the assessments;  
or
  - (iii) taking another course in lieu and satisfying the assessment requirements.
- (d) A candidate who has failed to satisfy the examiners in his/her dissertation or project report may be required to submit or resubmit a dissertation or a project report on the same subject within a period specified by the Board of Examiners.
- (e) In accordance with G9(h) of the General Regulation and TPG8(d) of the Regulations for Taught Postgraduate Curricula, there shall be no appeal against the results of examinations and all other forms of assessment.

### **MSc 8 Grading system**

Individual courses shall be graded according to the following grading system as determined by the Board of Examiners:

Standard	Grade	Grade Point
Excellent	A+	4.3
	A	4.0
	A-	3.7
Good	B+	3.3
	B	3.0
	B-	2.7
Satisfactory	C+	2.3
	C	2.0
	C-	1.7
Pass	D+	1.3
	D	1.0
Fail	F	0

### **MSc 9 Discontinuation of Studies**

Unless otherwise permitted by the Board of the Faculty, a candidate will be recommended for discontinuation of their studies in accordance with General Regulation G12 if he/she has:

- (a) failed to pass 12 credits in an academic year; or
  - (b) failed to satisfy the examiners at a second attempt in his/her dissertation or project report within the specified period; or
  - (c) exceeded the maximum period of registration specified in Regulation MSc3.
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### **MSc 10 Advanced Standing**

Advanced standing may be granted to candidates in recognition of studies completed successfully before admission to the curriculum in accordance with TPG3 of the Regulations for Taught Postgraduate Curricula. Candidates who are awarded Advanced Standing will not be granted any further credit transfer for those studies for which Advanced Standing has been granted. The amount of credits to be granted for Advanced Standing shall be determined by the Board of the Faculty, in accordance with the following principles:

- (a) a candidate may be granted a total of not more than 20% of the total credits normally required under a curriculum for Advanced Standing unless otherwise approved by the Senate; and
  - (b) credits granted for advanced standing shall not be included in the calculation of the GPA but will be recorded on the transcript of the candidate.
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### **MSc 11 Award of Degree**

To be eligible for the award of the degree of MSc(Eng) / MSc(CompSc) / MSc(ES&IC), a candidate shall:

- (a) comply with the General Regulations and the Regulations for Taught Postgraduate Curricula; and
  - (b) complete the curriculum and satisfy the examiners in accordance with the regulations set out.
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### **MSc 12 Assessment results**

On successful completion of the curriculum, candidates who have shown exceptional merit may be awarded a mark of distinction, and this mark shall be recorded on the candidates' degree diploma.

## **SYLLABUS FOR THE DEGREE OF MASTER OF SCIENCE IN ELECTRONIC COMMERCE AND INTERNET COMPUTING**

(Applicable to students admitted to the curriculum in the academic year 2017-18 and thereafter)

### Definition and Terminology

Discipline course – any course on a list of courses in the discipline of curriculum which a candidate must pass at least a certain number of credits as specified in the Regulations.

Fundamental course – any course in a subset of discipline courses which are considered fundamental or important in the curriculum which a candidate must pass at least 24 credits.

Elective course – any Taught Postgraduate level course offered by the Departments of the Faculty of Engineering for the fulfilment of the curriculum requirements of the degree of MSc in Electronic Commerce and Internet Computing that are not classified as discipline courses.

Capstone Experience – a 12-credit case study project or a 24-credit dissertation which is an integral part of the curriculum focusing on the integration and application of knowledge and skills that candidates have acquired throughout their studies.

### Curriculum Structure

Candidates are required to complete 72 credits of courses as set out below, normally over one academic year of full-time study or two academic years of part-time study:

<b>Course Category</b>	<b>Enrolment Mode of 10 courses + Case study project</b>	<b>Enrolment Mode of 8 courses + Dissertation</b>
	<b>No. of Credits</b>	<b>No. of Credits</b>
Discipline Courses	Not less than 48 [Include at least 24 credits in Fundamental courses]	Not less than 36 [Include at least 24 credits in Fundamental courses]
Elective Courses	Not more than 12	Not more than 12
Capstone Experience	12	24
Total	72	72

### *Enrolment Mode*

Candidates are required to successfully complete 72 credits to graduate. They can do that by studying in one of the following enrolment modes:

- (a) 10 courses (each equivalent to 6 credits) + Case study project (equivalent to 12 credits)
- OR
- (b) 8 courses (each equivalent to 6 credits) + Dissertation (equivalent to 24 credits)

*Subject Area*

The curriculum tries to provide an integration of technology with businesses, and consists of courses falling into two major and related subject areas: electronic commerce (ESCOM) courses and Internet computing (ICOM) courses. Students are encouraged to take courses in both areas, provided they have the necessary pre-requisite knowledge for the particular course. Extensive counselling will be provided to assist students to choose their courses.

*Course Selection*

Candidates shall select courses in accordance with the regulations of the degree. In addition, the MSc(ESCom&IComp) curriculum has the following guidelines on course selection.

- i. Candidates have to complete at least 4 courses (at least 24 credits in total) from the following list of fundamental courses:

Course code	Title
ESCOM6004	Legal aspects of IT and e-commerce
ESCOM6008	Supply chain and e-logistics management
ESCOM6013	E-commerce technologies
ESCOM6029	E-business transformation
ICOM6012	Internet infrastructure technologies
ICOM6034	Website engineering
ICOM6045	Fundamentals of e-commerce security
ICOM6046	Semantic data architecture

- ii. Candidates can select any courses in MSc(ESCom&IComp) discipline, which are listed in the course descriptions section below. They can be any mixture of courses from ESCOM and/or ICOM subject area(s).
  - iii. Candidates may also in exceptional circumstances select at most 2 courses (at most 12 credits in total) offered by other taught postgraduate curricula in the Faculty of Engineering as electives. All course selection will be subject to approval by the Course Coordinators concerned.
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**MSc(ESCom&IComp) Course descriptions**

The following is a list of discipline courses offered by the Department of Computer Science for the MSc(ESCom&IComp) curriculum.

It is the goal of the programme to have a comprehensive and dynamic curriculum in order to meet the challenges and opportunities of the fast developing Internet world. Therefore the courses, both in terms of range and syllabus, are updated and revised continuously and are subject to the approval of the University's Senate. The list of courses below is not final and some courses may not be offered every year.

All courses are assessed through examination and / or coursework assessment, the weightings of which are subject to approval by the Board of Examiners.

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**ESCom6004. Legal aspects of I.T. and e-commerce (6 credits)**

This course provides an introduction to some of the main legal problems generated by recent developments in information technology and e-commerce, and their possible solutions. Topics to be covered include, but are not limited to, copyright, domain name disputes and other intellectual property issues on the Internet, contractual issues of on-line trading, public key infrastructure and electronic transactions, privacy and data protection.

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**ESCom6008. Supply chain and e-logistics management (6 credits)**

The course is designed to prepare you to apply business strategies, analytical methodologies and information technology in supply chain management. Traditionally industries have focussed on operation evaluation and performance improvement of mainly the manufacturing process; however, the deficiency of supply chain coordination results in severe downgrade of business competitiveness. With advent of information technology, computers not only improve manufacturing operation and management and also strategic decision-making as well. This course focuses on the systems approach to the planning, analysis, design, development, and evaluation of supply chain and e-logistics management.

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**ESCom6013. E-commerce technologies (6 credits)**

This course provides an overview of technologies currently used in electronic commerce and an introduction to some likely to play a major role in the future. Topics include (but are not limited to) Internet & e-commerce infrastructure, e-commerce presence & development life cycle, web design & implementation, mobile commerce technology, Internet & e-commerce security, electronic payment systems, blockchain & cryptocurrencies, AI & machine learning, smart city & IoT, e-commerce technology trends.

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**ESCom6014. E-marketing (6 credits)**

This course considers how to create customer centric strategies for e-businesses. Marketing focuses on the interaction between the producer and the consumer. This focus remains unchanged in e-marketing, but our ability to foster this interaction with technology has been dramatically increased. The Internet provides new forms of communications like web sites, e-mail, social media, and mobile communications. However, these technologies do not necessarily replace traditional marketing vehicles like mass media, direct mail, and telephone marketing, but instead augment them to improve the customer experience. The basic premise of this course is that these technologies can be used to fulfill the goal of a customer-centered marketing strategy.

The goal for this course is to develop a set of principles so that managers can effectively develop and implement e-marketing strategies. A core framework that we will use in this course is an interactive marketing strategy. Interactive marketing goes by many names, including customer relationship management (CRM). E-marketing allows companies to interact with consumers on an individual basis and create customized products and services using personalized knowledge about a consumer. As part of this course we develop a compatible set of quantitative techniques to implement interactive marketing strategies. Throughout the course we explore examples and cases to understand how e-marketing is evolving in practice.

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#### **ECOM6016. Electronic payment systems (6 credits)**

The course covers banking systems, e-payment security, foreign exchange, Internet banking, wireless payments, stored-value cards, micropayments, peer-to-peer payments, electronic and virtual currencies such as Bitcoin, large-scale B2B payments and the future of money. Particular attention is given to Hong Kong and Mainland China banking and payment systems.

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#### **ECOM6020. Customer relationship management: business strategies and techniques (6 credits)**

The objectives of this course are to understand CRM concepts; CRM business strategies; typical business applications for CRM; and the process to implement CRM projects.

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#### **ECOM6022. Topics in electronic commerce (6 credits)**

This course covers advanced topics in areas in electronic commerce that are relevant at the time. Leaders in the field, expert practitioners and distinguished scholars in the field around the world will be invited to participate in this course.

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#### **ECOM6023. E-financial services (6 credits)**

This course provides students with the fundamentals of financial services in the context of e-Commerce and mobile devices. Payment systems in general and various payment transaction systems in particular will be examined. Similarly, eFinance has brought new concepts into e-Brokerage, e-Insurance, e-Lending and other fields. The course covers technology, operations, customer experience as well as demonstrates how regulations and security aspects are impacted by developments like Bitcoin and Blockchain. Studies of established banks as well as new FinTech Players serve as examples and reinforcements for many of the concepts.

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#### **ECOM6029. E-business transformation (6 credits)**

The Internet has shortened business transaction cycles, expanded market reach, and allowed companies to build and manage customer relationship more effectively. Today almost every company is trying to find out how best to deploy the Internet throughout its value chain to improve operational effectiveness, entrench strategic position, and ultimately create sustainable competitive advantage. Transformational initiatives, however, are difficult to implement and prone to failure as companies must grapple with a whole host of strategic, organizational, technical and increasingly global issues.

This course builds on the basic principles of business and economics to examine the role of the Internet as a strategic necessity. It provides a roadmap for transforming companies into inter-networked enterprises where proprietary and shared infrastructures are used to link customers, suppliers, partners

and employees to create superior economic value. You will learn how the Internet can provide firms with the necessary infrastructure needed to align their business strategy with IT strategy, streamline front-end and back-end processes, manage relationships and partnerships, and adapt to emerging global issues such as outsourcing and offshoring.

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**ECOM6033. Geospatial information and technology for location-based services (6 credits)**

Location-based services (LBS) are the collection of data and technology that drive popular applications such as in-car navigation, mapping of nearby points of interest on cell phones, automatic notification of weather hazards as they impact travel along a highway route, location-based advertising, geosocial networking, and tracking of inventory in warehouses. These applications leverage the user's or object's physical location to locate and access additional relevant information. LBS is enabled by the nexus of the Internet, wireless and geospatial technology realms. While geospatial technology is perhaps the least understood of these, geospatial content and services comprise the majority of the value component in LBS. To help students explore the full value of LBS, this course examines how to identify, obtain and manage the location-based information that users need and the geospatial technology and content behind LBS called Geographic Information Systems (GIS).

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**ECOM6037. Developing business models for digital media (6 credits)**

The course introduces digital media cases and platforms that are used as a foundation for student work to design business models for media concepts. The course specifically explores business models focused on social media and content apps for handheld devices. This means not only smart phones, but also notebooks and tablets such as the i-Pad as well as devices and controllers used for electronic games. Special attention will be paid to developments in Hong Kong and Mainland China.

Agile methods like effectuation and the business model development canvas are applied to identify, develop, and argue the case for launching an innovative digital media product. The aim of the course is therefore to ensure that students have the necessary competencies to select and further develop an appropriate business model for a digital media innovation of their choice should they want to join the media industry.

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**ECOM7121. Dynamic digital capabilities (6 credits)**

This course covers the fundamental business and economic principles of dynamic digital capabilities as well as mobile platform innovation. It provides a systematic framework, cases and hands-on experience. It is designed to guide managers, developers, engineers and graduate students in the development of transformative digital and smartphone business models and capability-building. Cases include multinational corporations, entrepreneurial startups, emerging unicorns, nonprofit and government worldwide.

Mutually exclusive with: ECOM6030 Web 2.0 strategy and innovation

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**ECOM7122. Entrepreneurship development and FinTech ventures in Asia (6 credits)**

This course provides an intense and mentored hands-on experiential learning opportunity where highly motivated entrepreneurial teams of students can be guided in Lean Startup techniques and learn interactively while helping analyze, expand and pivot already-award-winning early stage ventures.

We will focus on FinTech Ventures and Ecosystems in Asia, a high priority area for the Hong Kong government and China, where the online transaction volume of online giants like AliPay and WeChat already eclipses traditional banks and financial institutions.

Mutually exclusive with: ECOM6036 Entrepreneurship development

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### **ECOM7123. Building smart cities: an information system approach (6 credits)**

Hong Kong, like a number of cities in China and overseas, is considering the transformational development into a smart city. The concept of a smart city is based on the application of ICT in various aspects of the city to connect and integrate the systems and services of the city for better synergy and efficient use of resources. The vast amount of real-time data generated by smart sensors can be integrated with the modern information and communication technologies, useful information and insights can then be derived by analytic techniques to optimize and automate city management. Productivity can be boosted and sustainability can be ensured based on the effective collection, delivery and manipulation of the information in smart cities by innovative applications. The ultimate goal of smart city development is to improve people's quality of life and support the development of innovation and business enterprises.

This course presents an overview and the core concepts and techniques of building smart cities by utilizing the technologies like Geographic Information Systems (GIS), Big Data analytics, Internet of Things (IoT), Artificial Intelligence (AI) etc., that are indispensable to the development and effective management of the key components of smart cities. Key components of smart cities in the Smart City Wheel will be discussed in details and current and potential technologies facilitating smart city development will be introduced. Students will not only learn the concepts but also real applications being developed or used in smart cities. A series of guest lectures will be arranged for our students to understand more about the actual implementations of smart city projects in various industries in Hong Kong.

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### **ECOM7124. Mobile and IoT computing services and applications (6 credits)**

With nearly 5 billion mobile phone users worldwide, including well over 2 billion smartphone users, new mobile and IoT technologies are driving the development of a slew of new products and services. This course introduces students to the technologies, applications, services and business models associated with the mobile Internet and the Internet of Things ("IoT"). This includes looking at underlying technologies as well as important usability, security, privacy and business considerations, and learning to appreciate and analyze the challenges and tradeoffs they entail. The course also provides an overview of future trends and ongoing research in this new and fast growing area.

Mutually exclusive with: ECOM6024 Mobile and pervasive commerce

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### **ECOM7000. Dissertation (24 credits)**

The dissertation project is to provide an opportunity for the student to dive in depth into either a business case and/or a technology development in the e-commerce and Internet computing, and apply their body of knowledge learned in the programme to implement the business plan and/or the relevant technology to demonstrate its feasibility in a real or simulated business environment. This would involve substantive research into the chosen business plan and/or technology, implement and evaluate the proposed business plan or technology. Finally consolidate the findings and conclusion in the dissertation, and demonstrate the project result.

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**ECOM7001. Case study project (12 credits)**

The case study project is to provide an opportunity for the student to dive in depth into either a business case or a technology development in the e-commerce and Internet computing, and apply their body of knowledge learned in the programme to understand and critically analysis the particular case. This would involve substantive research into the "Subject", collect appropriate data by suitable means, research into reports and publicly available information, and consolidate their findings and conclusion in a case study report.

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**ICOM6012. Internet infrastructure technologies (6 credits)**

This course takes a systematic approach to study the various components which form the infrastructure of the Internet. It provides a comprehensive coverage of existing and emerging Internet technologies and applications. Topics include: access and backbone network technologies; IP addressing and routing architectures; standard transport and application protocols; operating principles and internals of network entities. We will focus not only on how the Internet works but also its design rationale and engineering tradeoffs.

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**ICOM6027. E-crimes: digital crime scenes and legal sanctions (6 credits)**

This course helps participants to grapple with crimes in the electronic age from both technical and legal points of view. It addresses three important aspects of the subject, namely, technologies adopted in e-crimes, legal sanctions and management of e-crimes scenes. Topics covered include: trends in e-crimes; different types of e-crimes, tools and technologies for committing e-crimes; laws relating to e-crimes and criminal sanctions; digital forensics, post-incident and live-forensic crime scene management, chain of evidence, collecting and collating digital evidence.

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**ICOM6029. Topics in Internet computing (6 credits)**

This course covers advanced topics in areas in Internet computing that are relevant at the time. Leaders in the field, expert practitioners and distinguished scholars in the field around the world will be invited to participate in this course.

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**ICOM6034. Website engineering (6 credits)**

This course will introduce the standards, the software technologies and some good practices for implementing websites and web applications. It aims at covering an "end-to-end" picture of content delivery and presentation on the web, that is, from the "server-sides" where data is stored, adapted or integrated, to the "client-sides" with various demands and capabilities. It will suit students who wish to have a technical understanding on the subject or a career in website engineering, as it will introduce the techniques for building maintainable, extensible, interactive and mission-critical websites and web applications, using state-of-the-art standards and open-source tools.

The topics covered will be organized into four parts: (1) Website development basics (enabling standards and technologies, responsive web design, basic web security); (2) Design and implementation of web applications (rich Internet applications, client-side frameworks, MVC design patterns and libraries, content management systems); (3) Interoperability of web applications and services (web API protocols, mashups, cloud services for web development); and (4) Optimizations (traffic analysis, search engine and performance optimization techniques).

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**ICOM6041. An introduction to cloud computing (6 credits)**

This course offers an overview of current cloud technologies, and discusses some issues in the design and implementation of cloud systems, and the impact cloud computing on business.

Topics include Cloud Service models (SaaS, PaaS, and IaaS), virtualization techniques (Xen, KVM, VMWare, Linux Container), cluster and data center networking, software-defined network (SDN) and OpenFlow, Big Data processing frameworks (Hadoop and Spark), Map/Reduce and Spark programming paradigm for large-scale data analysis. Motivating examples from major cloud computing players such as Google, Amazon, and Microsoft will be discussed.

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**ICOM6042. Designing apps for smart mobile phones (6 credits)**

Smart phones have dominated the technology market in recent years, led by the major brands of iPhones, Android and Windows phones. These increasingly powerful phones are supported by a whole range of applications (abbreviated to “Apps”) developed and uploaded for commercial or free distribution by professional as well as aspiring programmers that a whole new worldwide market has sprung up. More and more of these apps have been specially designed and developed for corporations that they are now beginning to play an important role in e-business operations.

This course introduces the design principles of these apps, their development, testing, and marketing as well as the technology platforms and programming languages for use on small screens. Hands-on practice is provided for students to gain confidence and some expertise, so that they can be on their way to exploit this new emerging career opportunity.

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**ICOM6044. Data science for business (6 credits)**

The emerging discipline of data science combines statistical methods with computer science to solve problems in applied areas. In this case we focus on how data science can be used to solve business problems especially those in electronic commerce. By its very nature e-commerce is able to generate large amounts of data and data mining methods are quite helpful for managers in turning this data into knowledge which in turn can be used to make better decisions. These data sets and their accompanying quantitative methods have the potential to dramatically change decision making in many areas of business. For example, ideas like interactive marketing, customer relationship management, and database marketing are pushing companies to utilize the information they collect about their customers in order to make better marketing decisions.

This course focuses on how data science methods can be applied to solve managerial problems in marketing and electronic commerce. Our emphasis is developing a core set of principles that embody data science: empirical reasoning, exploratory and visual analysis, and predictive modeling. We use these core principles to understand many methods used in data mining and machine learning. Our strategy in this course is to survey several popular techniques and understand how they map into these core principles. These techniques are illustrated with case studies. However, the emphasis is not on the software for implementing these techniques but on understanding the inputs and outputs of these techniques and how they are used to solve business problems.

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**ICOM6045. Fundamentals of e-commerce security (6 credits)**

This course provides an in-depth understanding of basic security problems and relevant e-commerce solutions, while helping students implement today’s most advanced security technologies, such as designing secure Web, e-commerce, and mobile commerce applications, securing corporate internal network, and providing secure employee/user authentication.

Key topics include: Security mechanisms, key management and certificates, payment security services, communication network and network access layer security, Internet layer security and transport layer security, application layer security, hypertext transfer protocol, web server security, web client security, mobile code security, mobile agent security, mobile commerce security.

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**ICOM6046. Semantic data architecture (6 credits)**

This course covers the technical and strategic approaches for semantic data architectures that enable knowledge systems to gain a greater understanding and insights for enterprise data services. The course will develop critical skills to understand and apply semantic data architecture methodologies, conceptual and logical frameworks, and best practices covering structured data, semantic modelling, metadata, linked open data, and ontologies. The course will also develop skills in analysing semantic data standards for shared interoperability and to support data architecture technology strategies and governance principles.

Mutually exclusive with: ICOM6043 Information architecture

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**ICOM7125. Digital forensics (6 credits)**

This course serves as an introduction to students about current concepts and methodologies in conducting digital forensics investigation. It gives an overview of post-mortem digital forensics analysis, network forensics analysis, mobile forensics analysis as well as live forensics analysis and provides students with hands-on experience of identifying, acquiring, preserving, analysing and presenting digital evidence.

Mutually exclusive with: ECOM6032 E-discovery and digital forensics

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**ICOM7000. Dissertation (24 credits)**

The dissertation project is to provide an opportunity for the student to dive in depth into either a business case and/or a technology development in the e-commerce and Internet computing, and apply their body of knowledge learned in the programme to implement the business plan and/or the relevant technology to demonstrate its feasibility in a real or simulated business environment. This would involve substantive research into the chosen business plan and/or technology, implement and evaluate the proposed business plan or technology. Finally consolidate the findings and conclusion in the dissertation, and demonstrate the project result.

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**ICOM7001. Case study project (12 credits)**

The case study project is to provide an opportunity for the student to dive in depth into either a business case or a technology development in the e-commerce and Internet computing, and apply their body of knowledge learned in the programme to understand and critically analysis the particular case. This would involve substantive research into the "Subject", collect appropriate data by suitable means, research into reports and publicly available information, and consolidate their findings and conclusion in a case study report.

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## **SYLLABUS FOR THE DEGREE OF MASTER OF SCIENCE IN ELECTRONIC COMMERCE AND INTERNET COMPUTING**

(Applicable to students admitted to the curriculum in the academic year 2016-17)

### Definition and Terminology

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Elective course – any Taught Postgraduate level course offered by the Departments of the Faculty of Engineering for the fulfilment of the curriculum requirements of the degree of MSc in Electronic Commerce and Internet Computing that are not classified as discipline courses.

Capstone Experience# – a 12-credit case study project or a 24-credit dissertation which is an integral part of the curriculum focusing on the integration and application of knowledge and skills that candidates have acquired throughout their studies.

### Curriculum Structure

Candidates are required to complete 72 credits of courses as set out below, normally over one academic year of full-time study or two academic years of part-time study:

<b>Course Category</b>	<b>Enrolment Mode of 10 courses + Case study project</b>	<b>Enrolment Mode of 8 courses + Dissertation</b>
	<b>No. of Credits</b>	<b>No. of Credits</b>
Discipline Courses	Not less than 48 [Include at least 24 credits in Fundamental courses]	Not less than 36 [Include at least 24 credits in Fundamental courses]
Elective Courses	Not more than 12	Not more than 12
Capstone Experience#	12	24
Total	72	72

### *Enrolment Mode*

Candidates are required to successfully complete 72 credits to graduate. They can do that by studying in one of the following enrolment modes:

- (a) 10 courses (each equivalent to 6 credits) + Case study project (equivalent to 12 credits)#
- OR
- (b) 8 courses (each equivalent to 6 credits) + Dissertation (equivalent to 24 credits)#

*# Special approval has been given by the Senate for candidates admitted to curriculum in the academic year 2016-17 to take additional discipline courses of the same credit value in lieu of the capstone experience to satisfy the curriculum requirements.*

*Subject Area*

The curriculum tries to provide an integration of technology with businesses, and consists of courses falling into two major and related subject areas: electronic commerce (ESCom) courses and Internet computing (ICOM) courses. Students are encouraged to take courses in both areas, provided they have the necessary pre-requisite knowledge for the particular course. Extensive counselling will be provided to assist students to choose their courses.

*Course Selection*

Candidates shall select courses in accordance with the regulations of the degree. In addition, the MSc(ESCom&IComp) curriculum has the following guidelines on course selection.

- i. Candidates have to complete at least 4 courses (at least 24 credits in total) from the following list of fundamental courses:

Course code	Title
ESCom6004	Legal aspects of IT and e-commerce
ESCom6008	Supply chain and e-logistics management
ESCom6013	E-commerce technologies
ESCom6029	E-business transformation
ICOM6012	Internet infrastructure technologies
ICOM6034	Website engineering
ICOM6045	Fundamentals of e-commerce security
ICOM6046	Semantic data architecture

- ii. Candidates can select any courses in MSc(ESCom&IComp) discipline, which are listed in the course descriptions section below. They can be any mixture of courses from ESCom and/or ICOM subject area(s).
  - iii. Candidates may also in exceptional circumstances select at most 2 courses (at most 12 credits in total) offered by other taught postgraduate curricula in the Faculty of Engineering as electives. All course selection will be subject to approval by the Course Coordinators concerned.
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## **MSc(ESCom&IComp) Course descriptions**

The following is a list of discipline courses offered by the Department of Computer Science for the MSc(ESCom&IComp) curriculum.

It is the goal of the programme to have a comprehensive and dynamic curriculum in order to meet the challenges and opportunities of the fast developing Internet world. Therefore the courses, both in terms of range and syllabus, are updated and revised continuously and are subject to the approval of the University's Senate. The list of courses below is not final and some courses may not be offered every year.

All courses are assessed through examination and / or coursework assessment, the weightings of which are subject to approval by the Board of Examiners.

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### **ESCom6004. Legal aspects of I.T. and e-commerce (6 credits)**

This course provides an introduction to some of the main legal problems generated by recent developments in information technology and e-commerce, and their possible solutions. Topics to be covered include, but are not limited to, copyright, domain name disputes and other intellectual property issues on the Internet, contractual issues of on-line trading, public key infrastructure and electronic transactions, privacy and data protection.

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### **ESCom6008. Supply chain and e-logistics management (6 credits)**

The course is designed to prepare you to apply business strategies, analytical methodologies and information technology in supply chain management. Traditionally industries have focussed on operation evaluation and performance improvement of mainly the manufacturing process; however, the deficiency of supply chain coordination results in severe downgrade of business competitiveness. With advent of information technology, computers not only improve manufacturing operation and management and also strategic decision-making as well. This course focuses on the systems approach to the planning, analysis, design, development, and evaluation of supply chain and e-logistics management.

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### **ESCom6013. E-commerce technologies (6 credits)**

This course provides an overview of technologies currently used in electronic commerce and an introduction to some likely to play a major role in the future. Topics include (but are not limited to) Internet & e-commerce infrastructure, e-commerce presence & development life cycle, web design & implementation, mobile commerce technology, Internet & e-commerce security, electronic payment systems, blockchain & cryptocurrencies, AI & machine learning, smart city & IoT, e-commerce technology trends.

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### **ESCom6014. E-marketing (6 credits)**

This course considers how to create customer centric strategies for e-businesses. Marketing focuses on the interaction between the producer and the consumer. This focus remains unchanged in e-marketing, but our ability to foster this interaction with technology has been dramatically increased. The Internet provides new forms of communications like web sites, e-mail, social media, and mobile communications. However, these technologies do not necessarily replace traditional marketing vehicles like mass media, direct mail, and telephone marketing, but instead augment them to improve the customer experience. The basic premise of this course is that these technologies can be used to fulfill the goal of a customer-centered marketing strategy.

The goal for this course is to develop a set of principles so that managers can effectively develop and implement e-marketing strategies. A core framework that we will use in this course is an interactive marketing strategy. Interactive marketing goes by many names, including customer relationship management (CRM). E-marketing allows companies to interact with consumers on an individual basis and create customized products and services using personalized knowledge about a consumer. As part of this course we develop a compatible set of quantitative techniques to implement interactive marketing strategies. Throughout the course we explore examples and cases to understand how e-marketing is evolving in practice.

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#### **ECOM6016. Electronic payment systems (6 credits)**

The course covers banking systems, e-payment security, foreign exchange, Internet banking, wireless payments, stored-value cards, micropayments, peer-to-peer payments, electronic and virtual currencies such as Bitcoin, large-scale B2B payments and the future of money. Particular attention is given to Hong Kong and Mainland China banking and payment systems.

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#### **ECOM6020. Customer relationship management: business strategies and techniques (6 credits)**

The objectives of this course are to understand CRM concepts; CRM business strategies; typical business applications for CRM; and the process to implement CRM projects.

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#### **ECOM6022. Topics in electronic commerce (6 credits)**

This course covers advanced topics in areas in electronic commerce that are relevant at the time. Leaders in the field, expert practitioners and distinguished scholars in the field around the world will be invited to participate in this course.

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#### **ECOM6023. E-financial services (6 credits)**

This course provides students with the fundamentals of financial services in the context of e-Commerce and mobile devices. Payment systems in general and various payment transaction systems in particular will be examined. Similarly, eFinance has brought new concepts into e-Brokerage, e-Insurance, e-Lending and other fields. The course covers technology, operations, customer experience as well as demonstrates how regulations and security aspects are impacted by developments like Bitcoin and Blockchain. Studies of established banks as well as new FinTech Players serve as examples and reinforcements for many of the concepts.

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#### **ECOM6024. Mobile and pervasive commerce (6 credits)**

With over 4.5 billion mobile phone users worldwide, new wireless and pervasive computing applications and services are changing the way enterprises interact with their customers and employees. The explosion in smartphone ownership along with the deployment of 4G networks is leading to a slew of new mobile applications and services. They range from mobile commerce services to wireless enterprise apps and mobile social networking apps, all the way to more futuristic Internet of Things and intelligent assistant solutions.

Mutually exclusive with: ECOM7124 Mobile and IoT computing services and applications

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**ECOM6029. E-business transformation (6 credits)**

The Internet has shortened business transaction cycles, expanded market reach, and allowed companies to build and manage customer relationship more effectively. Today almost every company is trying to find out how best to deploy the Internet throughout its value chain to improve operational effectiveness, entrench strategic position, and ultimately create sustainable competitive advantage. Transformational initiatives, however, are difficult to implement and prone to failure as companies must grapple with a whole host of strategic, organizational, technical and increasingly global issues.

This course builds on the basic principles of business and economics to examine the role of the Internet as a strategic necessity. It provides a roadmap for transforming companies into inter-networked enterprises where proprietary and shared infrastructures are used to link customers, suppliers, partners and employees to create superior economic value. You will learn how the Internet can provide firms with the necessary infrastructure needed to align their business strategy with IT strategy, streamline front-end and back-end processes, manage relationships and partnerships, and adapt to emerging global issues such as outsourcing and offshoring.

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**ECOM6030. Web 2.0 strategy and innovation (6 credits)**

This course covers the fundamental principles of Web 2.0 Strategy and Innovation, providing a systematic framework, business cases and hands-on experience with the online Internet, mobile and social media business models that have transformed society, business, nonprofit and government worldwide.

Mutually exclusive with: ECOM7121 Dynamic digital capabilities

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**ECOM6032. E-discovery and digital forensics (6 credits)**

This course will give the students an in-depth understanding of the current IT management and e-business litigation practices involving e-discovery and digital forensics, and will help them to take a leading role in the management team to work with the legal counsel, auditor and department managers to prepare and implement an effective Incident Response Strategy to address various IT-business and legal problems in today's global competition and innovation driven economy.

Mutually exclusive with: ICOM7125 Digital forensics

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**ECOM6033. Geospatial information and technology for location-based services (6 credits)**

Location-based services (LBS) are the collection of data and technology that drive popular applications such as in-car navigation, mapping of nearby points of interest on cell phones, automatic notification of weather hazards as they impact travel along a highway route, location-based advertising, geosocial networking, and tracking of inventory in warehouses. These applications leverage the user's or object's physical location to locate and access additional relevant information. LBS is enabled by the nexus of the Internet, wireless and geospatial technology realms. While geospatial technology is perhaps the least understood of these, geospatial content and services comprise the majority of the value component in LBS. To help students explore the full value of LBS, this course examines how to identify, obtain and manage the location-based information that users need and the geospatial technology and content behind LBS called Geographic Information Systems (GIS).

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**ECOM6036. Entrepreneurship development (6 credits)**

The scope of this course would be mostly on Venture Design: the stages from idea creation to the formation of a start-up company, with successful venture capital funding and management team in place. The perspective should be that of a potential entrepreneur wanting to start up a company, or start up entrepreneurial activities within a large company. Special attention will be put into topics on people who make decisions, handle deals, analyze problems, allocate and mobilize scarce resources and succeed in a local and international context. Some Asian and China cases are carefully chosen to reflect the special situation of starting businesses in Asia/China.

Mutually exclusive with: ECOM7122 Entrepreneurship development and FinTech ventures in Asia

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**ECOM6037. Developing business models for digital media (6 credits)**

The course introduces digital media cases and platforms that are used as a foundation for student work to design business models for media concepts. The course specifically explores business models focused on social media and content apps for handheld devices. This means not only smart phones, but also notebooks and tablets such as the i-Pad as well as devices and controllers used for electronic games. Special attention will be paid to developments in Hong Kong and Mainland China.

Agile methods like effectuation and the business model development canvas are applied to identify, develop, and argue the case for launching an innovative digital media product. The aim of the course is therefore to ensure that students have the necessary competencies to select and further develop an appropriate business model for a digital media innovation of their choice should they want to join the media industry.

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**ECOM7121. Dynamic digital capabilities (6 credits)**

This course covers the fundamental business and economic principles of dynamic digital capabilities as well as mobile platform innovation. It provides a systematic framework, cases and hands-on experience. It is designed to guide managers, developers, engineers and graduate students in the development of transformative digital and smartphone business models and capability-building. Cases include multinational corporations, entrepreneurial startups, emerging unicorns, nonprofit and government worldwide.

Mutually exclusive with: ECOM6030 Web 2.0 strategy and innovation

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**ECOM7122. Entrepreneurship development and FinTech ventures in Asia (6 credits)**

This course provides an intense and mentored hands-on experiential learning opportunity where highly motivated entrepreneurial teams of students can be guided in Lean Startup techniques and learn interactively while helping analyze, expand and pivot already-award-winning early stage ventures.

We will focus on FinTech Ventures and Ecosystems in Asia, a high priority area for the Hong Kong government and China, where the online transaction volume of online giants like AliPay and WeChat already eclipses traditional banks and financial institutions.

Mutually exclusive with: ECOM6036 Entrepreneurship development

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**ECOM7123. Building smart cities: an information system approach (6 credits)**

Hong Kong, like a number of cities in China and overseas, is considering the transformational development into a smart city. The concept of a smart city is based on the application of ICT in various aspects of the city to connect and integrate the systems and services of the city for better synergy and efficient use of resources. The vast amount of real-time data generated by smart sensors can be integrated with the modern information and communication technologies, useful information and insights can then be derived by analytic techniques to optimize and automate city management. Productivity can be boosted and sustainability can be ensured based on the effective collection, delivery and manipulation of the information in smart cities by innovative applications. The ultimate goal of smart city development is to improve people's quality of life and support the development of innovation and business enterprises.

This course presents an overview and the core concepts and techniques of building smart cities by utilizing the technologies like Geographic Information Systems (GIS), Big Data analytics, Internet of Things (IoT), Artificial Intelligence (AI) etc., that are indispensable to the development and effective management of the key components of smart cities. Key components of smart cities in the Smart City Wheel will be discussed in details and current and potential technologies facilitating smart city development will be introduced. Students will not only learn the concepts but also real applications being developed or used in smart cities. A series of guest lectures will be arranged for our students to understand more about the actual implementations of smart city projects in various industries in Hong Kong.

**ECOM7124. Mobile and IoT computing services and applications (6 credits)**

With nearly 5 billion mobile phone users worldwide, including well over 2 billion smartphone users, new mobile and IoT technologies are driving the development of a slew of new products and services. This course introduces students to the technologies, applications, services and business models associated with the mobile Internet and the Internet of Things ("IoT"). This includes looking at underlying technologies as well as important usability, security, privacy and business considerations, and learning to appreciate and analyze the challenges and tradeoffs they entail. The course also provides an overview of future trends and ongoing research in this new and fast growing area.

Mutually exclusive with: ECOM6024 Mobile and pervasive commerce

**ECOM7000. Dissertation (24 credits)#**

The dissertation project is to provide an opportunity for the student to dive in depth into either a business case and/or a technology development in the e-commerce and Internet computing, and apply their body of knowledge learned in the programme to implement the business plan and/or the relevant technology to demonstrate its feasibility in a real or simulated business environment. This would involve substantive research into the chosen business plan and/or technology, implement and evaluate the proposed business plan or technology. Finally consolidate the findings and conclusion in the dissertation, and demonstrate the project result.

**ECOM7001. Case study project (12 credits)#**

The case study project is to provide an opportunity for the student to dive in depth into either a business case or a technology development in the e-commerce and Internet computing, and apply their body of knowledge learned in the programme to understand and critically analysis the particular case. This would involve substantive research into the "Subject", collect appropriate data by suitable means,

research into reports and publicly available information, and consolidate their findings and conclusion in a case study report.

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*# Special approval has been given by the Senate for candidates admitted to curriculum in the academic year 2016-17 to take additional discipline courses of the same credit value in lieu of the capstone experience to satisfy the curriculum requirements.*

**ICOM6012. Internet infrastructure technologies (6 credits)**

This course takes a systematic approach to study the various components which form the infrastructure of the Internet. It provides a comprehensive coverage of existing and emerging Internet technologies and applications. Topics include: access and backbone network technologies; IP addressing and routing architectures; standard transport and application protocols; operating principles and internals of network entities. We will focus not only on how the Internet works but also its design rationale and engineering tradeoffs.

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**ICOM6027. E-crimes: digital crime scenes and legal sanctions (6 credits)**

This course helps participants to grapple with crimes in the electronic age from both technical and legal points of view. It addresses three important aspects of the subject, namely, technologies adopted in e-crimes, legal sanctions and management of e-crimes scenes. Topics covered include: trends in e-crimes; different types of e-crimes, tools and technologies for committing e-crimes; laws relating to e-crimes and criminal sanctions; digital forensics, post-incident and live-forensic crime scene management, chain of evidence, collecting and collating digital evidence.

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**ICOM6029. Topics in Internet computing (6 credits)**

This course covers advanced topics in areas in Internet computing that are relevant at the time. Leaders in the field, expert practitioners and distinguished scholars in the field around the world will be invited to participate in this course.

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**ICOM6034. Website engineering (6 credits)**

This course will introduce the standards, the software technologies and some good practices for implementing websites and web applications. It aims at covering an "end-to-end" picture of content delivery and presentation on the web, that is, from the "server-sides" where data is stored, adapted or integrated, to the "client-sides" with various demands and capabilities. It will suit students who wish to have a technical understanding on the subject or a career in website engineering, as it will introduce the techniques for building maintainable, extensible, interactive and mission-critical websites and web applications, using state-of-the-art standards and open-source tools.

The topics covered will be organized into four parts: (1) Website development basics (enabling standards and technologies, responsive web design, basic web security); (2) Design and implementation of web applications (rich Internet applications, client-side frameworks, MVC design patterns and libraries, content management systems); (3) Interoperability of web applications and services (web API protocols, mashups, cloud services for web development); and (4) Optimizations (traffic analysis, search engine and performance optimization techniques).

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**ICOM6041. An introduction to cloud computing (6 credits)**

This course offers an overview of current cloud technologies, and discusses some issues in the design and implementation of cloud systems, and the impact cloud computing on business.

Topics include Cloud Service models (SaaS, PaaS, and IaaS), virtualization techniques (Xen, KVM, VMWare, Linux Container), cluster and data center networking, software-defined network (SDN) and OpenFlow, Big Data processing frameworks (Hadoop and Spark), Map/Reduce and Spark programming paradigm for large-scale data analysis. Motivating examples from major cloud computing players such as Google, Amazon, and Microsoft will be discussed.

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**ICOM6042. Designing apps for smart mobile phones (6 credits)**

Smart phones have dominated the technology market in recent years, led by the major brands of iPhones, Android and Windows phones. These increasingly powerful phones are supported by a whole range of applications (abbreviated to “Apps”) developed and uploaded for commercial or free distribution by professional as well as aspiring programmers that a whole new worldwide market has sprung up. More and more of these apps have been specially designed and developed for corporations that they are now beginning to play an important role in e-business operations.

This course introduces the design principles of these apps, their development, testing, and marketing as well as the technology platforms and programming languages for use on small screens. Hands-on practice is provided for students to gain confidence and some expertise, so that they can be on their way to exploit this new emerging career opportunity.

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**ICOM6044. Data science for business (6 credits)**

The emerging discipline of data science combines statistical methods with computer science to solve problems in applied areas. In this case we focus on how data science can be used to solve business problems especially those in electronic commerce. By its very nature e-commerce is able to generate large amounts of data and data mining methods are quite helpful for managers in turning this data into knowledge which in turn can be used to make better decisions. These data sets and their accompanying quantitative methods have the potential to dramatically change decision making in many areas of business. For example, ideas like interactive marketing, customer relationship management, and database marketing are pushing companies to utilize the information they collect about their customers in order to make better marketing decisions.

This course focuses on how data science methods can be applied to solve managerial problems in marketing and electronic commerce. Our emphasis is developing a core set of principles that embody data science: empirical reasoning, exploratory and visual analysis, and predictive modeling. We use these core principles to understand many methods used in data mining and machine learning. Our strategy in this course is to survey several popular techniques and understand how they map into these core principles. These techniques are illustrated with case studies. However, the emphasis is not on the software for implementing these techniques but on understanding the inputs and outputs of these techniques and how they are used to solve business problems.

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**ICOM6045. Fundamentals of e-commerce security (6 credits)**

This course provides an in-depth understanding of basic security problems and relevant e-commerce solutions, while helping students implement today’s most advanced security technologies, such as designing secure Web, e-commerce, and mobile commerce applications, securing corporate internal network, and providing secure employee/user authentication.

Key topics include: Security mechanisms, key management and certificates, payment security services, communication network and network access layer security, Internet layer security and transport layer security, application layer security, hypertext transfer protocol, web server security, web client security, mobile code security, mobile agent security, mobile commerce security.

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**ICOM6046. Semantic data architecture (6 credits)**

This course covers the technical and strategic approaches for semantic data architectures that enable knowledge systems to gain a greater understanding and insights for enterprise data services. The course will develop critical skills to understand and apply semantic data architecture methodologies,

conceptual and logical frameworks, and best practices covering structured data, semantic modelling, metadata, linked open data, and ontologies. The course will also develop skills in analysing semantic data standards for shared interoperability and to support data architecture technology strategies and governance principles.

Mutually exclusive with: ICOM6043 Information architecture

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**ICOM7125. Digital forensics (6 credits)**

This course serves as an introduction to students about current concepts and methodologies in conducting digital forensics investigation. It gives an overview of post-mortem digital forensics analysis, network forensics analysis, mobile forensics analysis as well as live forensics analysis and provides students with hands-on experience of identifying, acquiring, preserving, analysing and presenting digital evidence.

Mutually exclusive with: ECOM6032 E-discovery and digital forensics

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**ICOM7000. Dissertation (24 credits)#**

The dissertation project is to provide an opportunity for the student to dive in depth into either a business case and/or a technology development in the e-commerce and Internet computing, and apply their body of knowledge learned in the programme to implement the business plan and/or the relevant technology to demonstrate its feasibility in a real or simulated business environment. This would involve substantive research into the chosen business plan and/or technology, implement and evaluate the proposed business plan or technology. Finally consolidate the findings and conclusion in the dissertation, and demonstrate the project result.

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**ICOM7001. Case study project (12 credits)#**

The case study project is to provide an opportunity for the student to dive in depth into either a business case or a technology development in the e-commerce and Internet computing, and apply their body of knowledge learned in the programme to understand and critically analysis the particular case. This would involve substantive research into the "Subject", collect appropriate data by suitable means, research into reports and publicly available information, and consolidate their findings and conclusion in a case study report.

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*# Special approval has been given by the Senate for candidates admitted to curriculum in the academic year 2016-17 to take additional discipline courses of the same credit value in lieu of the capstone experience to satisfy the curriculum requirements.*

## **SYLLABUS FOR THE DEGREE OF MASTER OF SCIENCE IN ELECTRONIC COMMERCE AND INTERNET COMPUTING**

(Applicable to students admitted to the curriculum in the academic year 2015-16 and before)

### **OBJECTIVES**

The Master of Science in Electronic Commerce and Internet Computing seeks to provide students with a comprehensive framework on the Internet infrastructure, e-commerce principles and a fundamental spectrum of Internet computing technology in order to enable them to enhance, transform and innovate both traditional and new businesses.

### **CURRICULUM STRUCTURE**

#### **Mode of Study**

The MSc(ESCom&IComp) curriculum is offered in both part-time and full-time mode. For the part-time mode of study, the curriculum shall normally span two academic years of study, and the maximum period of study is three years. For the full-time mode of study, the normal period is one academic year, and the maximum period is two years.

#### **Study Patterns**

Students are required to successfully complete 12 modules to graduate. They can do that by studying

- (a) 12 modules
- OR
- (b) 8 modules + Dissertation (equivalent to 4 modules)

#### **Curriculum**

The curriculum tries to provide an integration of technology with businesses, and consists of modules (courses) falling into two major and related areas: electronic commerce (ESCOM) modules and Internet computing (ICOM) modules. Students are encouraged to take modules in both areas, provided they have the necessary pre-requisite knowledge for the particular module. Extensive counselling will be provided to assist students to choose their modules.

#### **Module Selection**

- i. Students have to complete at least 4 modules from the following list of fundamental modules:

Module code	Title
ESCOM6004	Legal aspects of IT and e-commerce
ESCOM6008	Supply chain and e-logistics management
ESCOM6013	E-commerce technologies
ESCOM6029	E-business transformation
ICOM6012	Internet infrastructure technologies
ICOM6034	Website engineering
ICOM6043	Information architecture
ICOM6045	Fundamentals of e-commerce security
ICOM6046	Semantic data architecture

- ii. Students can select any modules in MSc(ESCom&IComp) discipline, which are listed in the module descriptions section below. They can be any mixture of modules from ESCOM and/or ICOM area(s).
  - iii. Students may also in exceptional circumstances select at most 2 Taught Postgraduate level modules offered by other curricula in the Faculty of Engineering as electives.
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## **MSc(ESCom&IComp) Module descriptions**

It is the goal of the programme to have a comprehensive and dynamic curriculum in order to meet the challenges and opportunities of the fast developing Internet world. Therefore the modules, both in terms of range and syllabus, are updated and revised continuously and are subject to the approval of the University's Senate. The list of modules below is not final and some modules may not be offered every year.

All modules are assessed through examination (0%-100%) and/or coursework assessment (0%-100%).

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## **SYLLABUS**

### **ECOM6004. Legal aspects of I.T. and e-commerce**

This module provides an introduction to some of the main legal problems generated by recent developments in information technology and e-commerce, and their possible solutions. Topics to be covered include, but are not limited to, copyright, domain name disputes and other intellectual property issues on the Internet, contractual issues of on-line trading, public key infrastructure and electronic transactions, privacy and data protection.

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### **ECOM6008. Supply chain and e-logistics management**

The module is designed to prepare you to apply business strategies, analytical methodologies and information technology in supply chain management. Traditionally industries have focussed on operation evaluation and performance improvement of mainly the manufacturing process; however, the deficiency of supply chain coordination results in severe downgrade of business competitiveness. With advent of information technology, computers not only improve manufacturing operation and management and also strategic decision-making as well. This module focuses on the systems approach to the planning, analysis, design, development, and evaluation of supply chain and e-logistics management.

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### **ECOM6009. Project (4 modules)**

(for students admitted in or before the academic year 2013-2014)

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### **ECOM6013. E-commerce technologies**

This module provides an overview of technologies currently used in electronic commerce and an introduction to some likely to play a major role in the future. Topics include (but are not limited to) Internet & e-commerce infrastructure, e-commerce presence & development life cycle, web design & implementation, mobile commerce technology, Internet & e-commerce security, electronic payment systems, blockchain & cryptocurrencies, AI & machine learning, smart city & IoT, e-commerce technology trends.

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### **ECOM6014. E-marketing**

This module considers how to create customer centric strategies for e-businesses. Marketing focuses on the interaction between the producer and the consumer. This focus remains unchanged in e-marketing, but our ability to foster this interaction with technology has been dramatically increased. The Internet provides new forms of communications like web sites, e-mail, social media, and mobile communications. However, these technologies do not necessarily replace traditional marketing

vehicles like mass media, direct mail, and telephone marketing, but instead augment them to improve the customer experience. The basic premise of this module is that these technologies can be used to fulfill the goal of a customer-centered marketing strategy.

The goal for this module is to develop a set of principles so that managers can effectively develop and implement e-marketing strategies. A core framework that we will use in this module is an interactive marketing strategy. Interactive marketing goes by many names, including customer relationship management (CRM). E-marketing allows companies to interact with consumers on an individual basis and create customized products and services using personalized knowledge about a consumer. As part of this module we develop a compatible set of quantitative techniques to implement interactive marketing strategies. Throughout the module we explore examples and cases to understand how e-marketing is evolving in practice.

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#### **ECOM6016. Electronic payment systems**

The module covers banking systems, e-payment security, foreign exchange, Internet banking, wireless payments, stored-value cards, micropayments, peer-to-peer payments, electronic and virtual currencies such as Bitcoin, large-scale B2B payments and the future of money. Particular attention is given to Hong Kong and Mainland China banking and payment systems.

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#### **ECOM6020. Customer relationship management: business strategies and techniques**

The objectives of this module are to understand CRM concepts; CRM business strategies; typical business applications for CRM; and the process to implement CRM projects.

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#### **ECOM6022. Topics in electronic commerce**

This module covers advanced topics in areas in electronic commerce that are relevant at the time. Leaders in the field, expert practitioners and distinguished scholars in the field around the world will be invited to participate in this module.

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#### **ECOM6023. E-financial services**

This module provides students with the fundamentals of financial services in the context of e-Commerce and mobile devices. Payment systems in general and various payment transaction systems in particular will be examined. Similarly, eFinance has brought new concepts into e-Brokerage, e-Insurance, e-Lending and other fields. The course covers technology, operations, customer experience as well as demonstrates how regulations and security aspects are impacted by developments like Bitcoin and Blockchain. Studies of established banks as well as new FinTech Players serve as examples and reinforcements for many of the concepts.

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#### **ECOM6024. Mobile and pervasive commerce**

With over 4.5 billion mobile phone users worldwide, new wireless and pervasive computing applications and services are changing the way enterprises interact with their customers and employees. The explosion in smartphone ownership along with the deployment of 4G networks is leading to a slew of new mobile applications and services. They range from mobile commerce services to wireless enterprise apps and mobile social networking apps, all the way to more futuristic Internet of Things and intelligent assistant solutions.

Mutually exclusive with: ECOM7124 Mobile and IoT computing services and applications

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**ECOM6029. E-business transformation**

The Internet has shortened business transaction cycles, expanded market reach, and allowed companies to build and manage customer relationship more effectively. Today almost every company is trying to find out how best to deploy the Internet throughout its value chain to improve operational effectiveness, entrench strategic position, and ultimately create sustainable competitive advantage. Transformational initiatives, however, are difficult to implement and prone to failure as companies must grapple with a whole host of strategic, organizational, technical and increasingly global issues.

This module builds on the basic principles of business and economics to examine the role of the Internet as a strategic necessity. It provides a roadmap for transforming companies into inter-networked enterprises where proprietary and shared infrastructures are used to link customers, suppliers, partners and employees to create superior economic value. You will learn how the Internet can provide firms with the necessary infrastructure needed to align their business strategy with IT strategy, streamline front-end and back-end processes, manage relationships and partnerships, and adapt to emerging global issues such as outsourcing and offshoring.

**ECOM6030. Web 2.0 strategy and innovation**

This module covers the fundamental principles of Web 2.0 Strategy and Innovation, providing a systematic framework, business cases and hands-on experience with the online Internet, mobile and social media business models that have transformed society, business, nonprofit and government worldwide.

Mutually exclusive with: ECOM7121 Dynamic digital capabilities

**ECOM6032. E-discovery and digital forensics**

This module will give the students an in-depth understanding of the current IT management and e-business litigation practices involving e-discovery and digital forensics, and will help them to take a leading role in the management team to work with the legal counsel, auditor and department managers to prepare and implement an effective Incident Response Strategy to address various IT-business and legal problems in today's global competition and innovation driven economy.

Mutually exclusive with: ICOM7125 Digital forensics

**ECOM6033. Geospatial information and technology for location-based services**

Location-based services (LBS) are the collection of data and technology that drive popular applications such as in-car navigation, mapping of nearby points of interest on cell phones, automatic notification of weather hazards as they impact travel along a highway route, location-based advertising, geosocial networking, and tracking of inventory in warehouses. These applications leverage the user's or object's physical location to locate and access additional relevant information. LBS is enabled by the nexus of the Internet, wireless and geospatial technology realms. While geospatial technology is perhaps the least understood of these, geospatial content and services comprise the majority of the value component in LBS. To help students explore the full value of LBS, this module examines how to identify, obtain and manage the location-based information that users need and the geospatial technology and content behind LBS called Geographic Information Systems (GIS).

**ECOM6036. Entrepreneurship development**

The scope of this module would be mostly on Venture Design: the stages from idea creation to the formation of a start-up company, with successful venture capital funding and management team in place. The perspective should be that of a potential entrepreneur wanting to start up a company, or start up entrepreneurial activities within a large company. Special attention will be put into topics on people who make decisions, handle deals, analyze problems, allocate and mobilize scarce resources and succeed in a local and international context. Some Asian and China cases are carefully chosen to reflect the special situation of starting businesses in Asia/China.

Mutually exclusive with: ECOM7122 Entrepreneurship development and FinTech ventures in Asia

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**ECOM6037. Developing business models for digital media**

The module introduces digital media cases and platforms that are used as a foundation for student work to design business models for media concepts. The module specifically explores business models focused on social media and content apps for handheld devices. This means not only smart phones, but also notebooks and tablets such as the i-Pad as well as devices and controllers used for electronic games. Special attention will be paid to developments in Hong Kong and Mainland China.

Agile methods like effectuation and the business model development canvas are applied to identify, develop, and argue the case for launching an innovative digital media product. The aim of the module is therefore to ensure that students have the necessary competencies to select and further develop an appropriate business model for a digital media innovation of their choice should they want to join the media industry.

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**ECOM7121. Dynamic digital capabilities**

This module covers the fundamental business and economic principles of dynamic digital capabilities as well as mobile platform innovation. It provides a systematic framework, cases and hands-on experience. It is designed to guide managers, developers, engineers and graduate students in the development of transformative digital and smartphone business models and capability-building. Cases include multinational corporations, entrepreneurial startups, emerging unicorns, nonprofit and government worldwide.

Mutually exclusive with: ECOM6030 Web 2.0 strategy and innovation

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**ECOM7122. Entrepreneurship development and FinTech ventures in Asia**

This module provides an intense and mentored hands-on experiential learning opportunity where highly motivated entrepreneurial teams of students can be guided in Lean Startup techniques and learn interactively while helping analyze, expand and pivot already-award-winning early stage ventures.

We will focus on FinTech Ventures and Ecosystems in Asia, a high priority area for the Hong Kong government and China, where the online transaction volume of online giants like AliPay and WeChat already eclipses traditional banks and financial institutions.

Mutually exclusive with: ECOM6036 Entrepreneurship development

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**ECOM7123. Building smart cities: an information system approach**

Hong Kong, like a number of cities in China and overseas, is considering the transformational development into a smart city. The concept of a smart city is based on the application of ICT in various aspects of the city to connect and integrate the systems and services of the city for better synergy and efficient use of resources. The vast amount of real-time data generated by smart sensors can be integrated with the modern information and communication technologies, useful information and insights can then be derived by analytic techniques to optimize and automate city management. Productivity can be boosted and sustainability can be ensured based on the effective collection, delivery and manipulation of the information in smart cities by innovative applications. The ultimate goal of smart city development is to improve people's quality of life and support the development of innovation and business enterprises.

This module presents an overview and the core concepts and techniques of building smart cities by utilizing the technologies like Geographic Information Systems (GIS), Big Data analytics, Internet of Things (IoT), Artificial Intelligence (AI) etc., that are indispensable to the development and effective management of the key components of smart cities. Key components of smart cities in the Smart City Wheel will be discussed in details and current and potential technologies facilitating smart city development will be introduced. Students will not only learn the concepts but also real applications being developed or used in smart cities. A series of guest lectures will be arranged for our students to understand more about the actual implementations of smart city projects in various industries in Hong Kong.

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**ECOM7124. Mobile and IoT computing services and applications**

With nearly 5 billion mobile phone users worldwide, including well over 2 billion smartphone users, new mobile and IoT technologies are driving the development of a slew of new products and services. This module introduces students to the technologies, applications, services and business models associated with the mobile Internet and the Internet of Things ("IoT"). This includes looking at underlying technologies as well as important usability, security, privacy and business considerations, and learning to appreciate and analyze the challenges and tradeoffs they entail. The module also provides an overview of future trends and ongoing research in this new and fast growing area.

Mutually exclusive with: ECOM6024 Mobile and pervasive commerce

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**ECOM7000. Dissertation (4 modules)**

(for students admitted in or after the academic year 2014-2015)

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**ICOM6011. Project (4 modules)**

(for students admitted in or before the academic year 2013-2014)

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**ICOM6012. Internet infrastructure technologies**

This module takes a systematic approach to study the various components which form the infrastructure of the Internet. It provides a comprehensive coverage of existing and emerging Internet technologies and applications. Topics include: access and backbone network technologies; IP addressing and routing architectures; standard transport and application protocols; operating principles and internals of network entities. We will focus not only on how the Internet works but also its design rationale and engineering tradeoffs.

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**ICOM6027. E-crimes: digital crime scenes and legal sanctions**

This module helps participants to grapple with crimes in the electronic age from both technical and legal points of view. It addresses three important aspects of the subject, namely, technologies adopted in e-crimes, legal sanctions and management of e-crimes scenes. Topics covered include: trends in e-crimes; different types of e-crimes, tools and technologies for committing e-crimes; laws relating to e-crimes and criminal sanctions; digital forensics, post-incident and live-forensic crime scene management, chain of evidence, collecting and collating digital evidence.

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**ICOM6029. Topics in Internet computing**

This module covers advanced topics in areas in Internet computing that are relevant at the time. Leaders in the field, expert practitioners and distinguished scholars in the field around the world will be invited to participate in this module.

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**ICOM6034. Website engineering**

This module will introduce the standards, the software technologies and some good practices for implementing websites and web applications. It aims at covering an "end-to-end" picture of content delivery and presentation on the web, that is, from the "server-sides" where data is stored, adapted or integrated, to the "client-sides" with various demands and capabilities. It will suit students who wish to have a technical understanding on the subject or a career in website engineering, as it will introduce the techniques for building maintainable, extensible, interactive and mission-critical websites and web applications, using state-of-the-art standards and open-source tools.

The topics covered will be organized into four parts: (1) Website development basics (enabling standards and technologies, responsive web design, basic web security); (2) Design and implementation of web applications (rich Internet applications, client-side frameworks, MVC design patterns and libraries, content management systems); (3) Interoperability of web applications and services (web API protocols, mashups, cloud services for web development); and (4) Optimizations (traffic analysis, search engine and performance optimization techniques).

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**ICOM6040. eHealth information technologies**

The module will cover core clinical modeling, terminology, and information concepts that drive the development of eHealth standards. It will also cover the future directions of eHealth in semantic-health data.

Prerequisites: Students must have completed ICOM6043 or can demonstrate to the instructor that they have equivalent knowledge.

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**ICOM6041. An introduction to cloud computing**

This module offers an overview of current cloud technologies, and discusses some issues in the design and implementation of cloud systems, and the impact cloud computing on business.

Topics include Cloud Service models (SaaS, PaaS, and IaaS), virtualization techniques (Xen, KVM, VMWare, Linux Container), cluster and data center networking, software-defined network (SDN) and OpenFlow, Big Data processing frameworks (Hadoop and Spark), Map/Reduce and Spark programming paradigm for large-scale data analysis. Motivating examples from major cloud computing players such as Google, Amazon, and Microsoft will be discussed.

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**ICOM6042. Designing apps for smart mobile phones**

Smart phones have dominated the technology market in recent years, led by the major brands of iPhones, Android and Windows phones. These increasingly powerful phones are supported by a whole range of applications (abbreviated to “Apps”) developed and uploaded for commercial or free distribution by professional as well as aspiring programmers that a whole new worldwide market has sprung up. More and more of these apps have been specially designed and developed for corporations that they are now beginning to play an important role in e-business operations.

This module introduces the design principles of these apps, their development, testing, and marketing as well as the technology platforms and programming languages for use on small screens. Hands-on practice is provided for students to gain confidence and some expertise, so that they can be on their way to exploit this new emerging career opportunity.

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**ICOM6043. Information architecture**

This module covers the technical and strategic approaches of Enterprise Information Architecture that cover the conceptual, logical and implementable views of information and data-driven applications and services to support effective enterprise and domain interoperability. This module will develop the critical skills to understand and apply information architecture techniques and frameworks from structured to semantic information modelling, data and metadata management, linked open data, ontologies and knowledge management, information governance principles, and to develop information architecture technology strategies.

Mutually exclusive with: ICOM6046 Semantic data architecture

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**ICOM6044. Data science for business**

The emerging discipline of data science combines statistical methods with computer science to solve problems in applied areas. In this case we focus on how data science can be used to solve business problems especially those in electronic commerce. By its very nature e-commerce is able to generate large amounts of data and data mining methods are quite helpful for managers in turning this data into knowledge which in turn can be used to make better decisions. These data sets and their accompanying quantitative methods have the potential to dramatically change decision making in many areas of business. For example, ideas like interactive marketing, customer relationship management, and database marketing are pushing companies to utilize the information they collect about their customers in order to make better marketing decisions.

This module focuses on how data science methods can be applied to solve managerial problems in marketing and electronic commerce. Our emphasis is developing a core set of principles that embody data science: empirical reasoning, exploratory and visual analysis, and predictive modeling. We use these core principles to understand many methods used in data mining and machine learning. Our strategy in this module is to survey several popular techniques and understand how they map into these core principles. These techniques are illustrated with case studies. However, the emphasis is not on the software for implementing these techniques but on understanding the inputs and outputs of these techniques and how they are used to solve business problems.

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**ICOM6045. Fundamentals of e-commerce security**

This module provides an in-depth understanding of basic security problems and relevant e-commerce solutions, while helping students implement today's most advanced security technologies, such as designing secure Web, e-commerce, and mobile commerce applications, securing corporate internal network, and providing secure employee/user authentication.

Key topics include: Security mechanisms, key management and certificates, payment security services, communication network and network access layer security, Internet layer security and transport layer security, application layer security, hypertext transfer protocol, web server security, web client security, mobile code security, mobile agent security, mobile commerce security.

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**ICOM6046. Semantic data architecture**

This module covers the technical and strategic approaches for semantic data architectures that enable knowledge systems to gain a greater understanding and insights for enterprise data services. The module will develop critical skills to understand and apply semantic data architecture methodologies, conceptual and logical frameworks, and best practices covering structured data, semantic modelling, metadata, linked open data, and ontologies. The module will also develop skills in analysing semantic data standards for shared interoperability and to support data architecture technology strategies and governance principles.

Mutually exclusive with: ICOM6043 Information architecture

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**ICOM7000. Dissertation (4 modules)**

(for students admitted in or after the academic year 2014-2015)

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**ICOM7125. Digital forensic**

This module serves as an introduction to students about current concepts and methodologies in conducting digital forensics investigation. It gives an overview of post-mortem digital forensics analysis, network forensics analysis, mobile forensics analysis as well as live forensics analysis and provides students with hands-on experience of identifying, acquiring, preserving, analysing and presenting digital evidence.

Mutually exclusive with: ECOM6032 E-discovery and digital forensics

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