**KINGSTON UNIVERSITY**

**For programmes franchised to**

**ESOFT METRO CAMPUS, ESOFT Group, Sri Lanka**

**Programme Specification**

**Title of Course: MSc Network and Information Security**

**Date Specification Produced: May 2016**

**Date Specification Last Revised: May 2019**

This Programme Specification is designed for prospective students, current students, academic staff and employers. It provides a concise summary of the main features of the programme and the intended learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if they take full advantage of the learning opportunities that are provided. More detailed information on the teaching, learning and assessment methods, learning outcomes and content of each module can be found in the Course Guide, on Canvas and in individual Module Descriptors.

**SECTION 1: GENERAL INFORMATION**

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| --- | --- |
| **Title:** | MSc Network and Information Security |
| **Awarding Institution:** | Kingston University |
| **Teaching Institution:** | ESOFT METRO CAMPUS – ESOFT Group |
| **Location:** | Sri Lanka: Colombo, Kandy |
| **Programme Accredited by:** | Non-accredited programme |

**SECTION2: THE PROGRAMME**

1. **Programme Introduction**

In recent years, Network and Information Security has experienced a dramatic increase in importance (due to the emergence of highly specialised IT systems and the widespread use of the Internet) to society as a whole. The confidentiality of personal information, the security of transactions carried out during online banking and the concerns about personal data stored on the cloud are examples of issues that everyone is facing in our modern digital world. Understanding these issues requires specialist knowledge, and a readiness for constant evaluation of a growing number of threats such as computer viruses, e-mail scams and computer criminals compromising networked systems with devastating effects to businesses and individuals.

This course equips students with a thorough technical understanding of how to secure information, networks and networked systems. At the same time, the opportunity to study examples and discover practical tools is given. To achieve its aims, all topics are introduced by highly qualified members of staff who also bring in external speakers from academia and industry, in order to maximise the student experience. Furthermore, research-informed teaching ensures up-to-date course content students' exposure to cutting-edge research insights.

Academic staff research expertise and knowledge feeds directly into the taught courses, and the final dissertations are wherever possible frequently undertaken within one of the active research groups. During their final dissertation projects, students will be able to interact with other researchers and form local industry links.

Students undertake practical project based exercises during the course, which culminates in an individual ‘capstone’ project at the end of the year. Students’ projects may be for external clients. It will be ensured that the students have access to the latest knowledge and technology that meet the industry requirements and recent developments.

1. **Aims of the Field/Course**

*The Aims of the Course are to:*

* provide students with knowledge, skills and a critical appreciation of technical, professional, legal and ethical aspects of Network and Information Security;
* enable students to analyse a system and design an appropriate, custom solution;
* develop subject related practical skills;
* provide students with the opportunities to develop their written and oral communication skills;
* prepare students for employment, research, further study and lifelong learning by developing their intellectual, problem-solving, practical and key (transferable) skills.
* provide students with an in-depth knowledge and understanding of the core elements of Network Security, Cryptography and Network Technologies for both secure and dependable computing;
* enable students to critically analyse a scenario, evaluate a range of solutions, and adapt and exploit a variety of strategies to ensure optimum system performance;
* enable students to identify, locate and critically appraise secondary and primary sources as a basis for independent study, technical papers and a major research project.

1. **Intended Learning Outcomes**

The field/course provides opportunities for students to develop and demonstrate knowledge and understanding specific to the subject, key skills and graduate attributes in the following areas. The programme outcomes are referenced to the QAA subject benchmarks for Postgraduate Computing and the [Framework for Higher Education Qualifications of UK Degree-Awarding Bodies (2014)](http://www.qaa.ac.uk/quality-code/the-existing-uk-quality-code/part-a-setting-and-maintaining-academic-standards), and relate to the typical student. The course provides opportunities for students to develop and demonstrate knowledge and understanding specific to the subject, key skills and graduate attributes in the following areas:

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| **Programme Learning Outcomes** | | | | | |
|  | **Knowledge and Understanding**  On completion of the course students will be able to: |  | **Intellectual Skills**  On completion of the course students will be able to |  | **Subject Practical Skills**  On completion of the course students will be able to |
| A1 | Demonstrate a critical awareness of the current developments and future trends in cryptography and network security | B1 | Depth of knowledge in the complex and specialised areas of Network Security and Cryptography and considerable breadth of knowledge across networking and secure & dependable computing | C1 | Carry out subject related practical tasks |
| A2 | Design and deploy a secure and dependable network infrastructure showing a detailed understanding of the underlying principles and practical techniques | B2 | An ability to deal with complexity, lacunae and contradictions in a complex knowledge base using appropriate methods | C2 | Encode/decode data with a variety of algorithms appropriate for different situations |
| A3 | Analyse and specify security requirements, including: security polices and countermeasures for network services | B3 | Independent evaluation of alternative approaches (including their own) together with the ability to accurately report this | C3 | Use vulnerability assessment and auditing tools |
| A4 | Demonstrate knowledge and understanding of relevant data communications standards | B4 | A confident response to problems by autonomously synthesising information and ideas to provide appropriate solutions | C4 | Configure a firewall and other network security mechanisms |
| A5 | Awareness of the ethical, legal & professional issues in the deployment of security countermeasures & assessment tools |  |  | C5 | Configure network properties for different types of network nodes |

In addition to the programme learning outcomes identified overleaf, the programme of study defined in this programme specification will allow

students to develop a range of Key Skills as follows:

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| **Key Skills** | | | | | | |
| **Self-Awareness Skills** | **Communication Skills** | **Interpersonal Skills** | **Research and information Literacy Skills** | **Numeracy Skills** | **Management & Leadership Skills** | **Creativity and Problem Solving Skills** |
| Take responsibility for own learning and plan for and record own personal development | Express ideas clearly and unambiguously in writing and the spoken work | Work well with others in a group or team | Search for and select relevant sources of information | Collect data from primary and secondary sources and use appropriate methods to manipulate and analyse this data | Determine the scope of a task (or project) | Apply scientific and other knowledge to analyse and evaluate information and data and to find solutions to problems |
| Recognise own academic strengths and weaknesses, reflect on performance and progress and respond to feedback | Present, challenge and defend ideas and results effectively orally and in writing | Work flexibly and respond to change | Critically evaluate information and use it appropriately | Present and record data in appropriate formats | Identify resources needed to undertake the task (or project) and to schedule and manage the resources | Work with complex ideas and justify judgements made through effective use of evidence |
| Organise self effectively, agreeing and setting realistic targets, accessing support where appropriate and managing time to achieve targets | Actively listen and respond appropriately to ideas of others | Discuss and debate with others and make concession to reach agreement | Apply the ethical and legal requirements in both the access and use of information | Interpret and evaluate data to inform and justify arguments | Evidence ability to successfully complete and evaluate a task (or project), revising the plan where necessary |  |
| Work effectively with limited supervision in unfamiliar contexts |  | Give, accept and respond to constructive feedback | Accurately cite and reference information sources | Be aware of issues of selection, accuracy and uncertainty in the collection and analysis of data | Motivate and direct others to enable an effective contribution from all participants |  |
|  |  | Show sensitivity and respect for diverse values and beliefs | Use software and IT technology as appropriate |  |  |  |

1. **Entry Requirements**

Applicants for the MSc programme are normally required to have a good honours degree in a relevant area or academic equivalent such as Computer Science/Information Technology.

Exceptionally applicants who have substantial working experience in security or either the computing or data communications arena but no first degree may be considered if they can satisfy the Admissions Tutor of their motivation, evidence of their ability to work at this level and they are numerate.

Both of these types of applicants will benefit from the advanced and specialised nature of the technical and business knowledge covered in the course that is designed to build on the knowledge they already possess.

Overseas students are required to satisfy the Admissions Officer that they have reached an equivalent academic standard as those required for home students.

Language Requirements

IELTS – minimum 6.5 overall, including a minimum of 6.0 in writing, and a minimum of 5.5 in reading, listening and speaking

TOEFL IBT – overall score of 88, inc min score of 20/30 Writing, 20/30 Reading, 17/30 Listening and 20/30 Speaking.

Kingston University also approved the following mapping as equivalent alternatives to IELTS requirements for entry into franchised programmes to be delivered at ESOFT in Sri Lanka;

1. Local GCE O Level English language: Credit, Distinction or Very good pass
2. ESOFT English for Academic Purposes modules in reading, writing, listening and speaking: results which equate to our normal entry conditions in the following ways (\*NB: The overall grade to be an average of the four skills module results.)

|  |  |
| --- | --- |
| IELTS | ESOFT |
| 6.5 | 58+ |
| 6.0 | 50-57 |
| 5.5 | 42-49 |

1. **Field/Course Structure**

This programme is offered in full-time/part-time mode, and leads to the award of MSc Software Engineering. This course is part of Kingston University’s Postgraduate Regulations (PR). Courses in the PR are made up of modules that are designated at level 7. Single taught modules are valued at 30 credits and the course contains a project that has 60 credits. The minimum requirement for a Master`s Degree is 180 credits.

The awards available are detailed in section A and the requirements are outlined below. All students will be provided with the PR regulations in the student handbook.

The Courses are offered as 1 year full-time, and normally 2 years part-time. The modules are offered as two, 1-week blocks several weeks apart. The full MSc course consists of an induction programme, 4 modules, and the project.

Full-time students will complete the programme of study and assessment in 52 weeks. The normal study pattern for part-time students is that they should complete 4 modules over one year period and complete their project in the following year. Because of the structure of the course, part-time students may be able to commence the course at different times during the academic year after discussion with the Course Leader of relevant issues, including the need for specific preparatory study.

Normally, each module will include approximately 60 hours contact time, followed by directed learning resulting in a total of 300 hours of student effort. The project is the equivalent of two modules and requires 600 hours of student effort.

Planning meetings will take place at the beginning of each teaching block to ensure there is no assessment overloading or bunching.

The course design fully considers all student groups. Delivery in 1-week blocks separated by several week enables part-time students to study whilst also meeting their other commitments. Overseas students are also able to complete their degree within VISA limitations.

A January intake is accommodated by ensuring that two, technical core modules are delivered in the Spring semester, and that option modules and the Business in Practice module is delivered in the Autumn semester. This ensures that all students can complete the individual project in the summer without disadvantage.

To address advanced ethics and professional issues, these issues are addressed within the context of technical core modules taken before the project is conducted, specifically, within Modelling Enterprise Architectures, and the Project Dissertation.

**E1. Professional and Statutory Regulatory Bodies**

Not applicable

**E2. Work-based learning, including sandwich courses**

Not applicable

**E3. Outline Programme Structure**

**LEVEL 7 Core (30 credits) LEVEL 7 Recommended Options (30 credits) Take One Of**

CI7110

Data Communications

Not available in this programme

CI7100

Cryptography and Applications

CI7130

Network and Information Security

CI7150

Wireless Communications and Networks

**Level 7 Core (60 credits)**

CI7000

Project Dissertation

Full time students: Complete four modules over two Teaching Blocks (TB), two modules per TB. Complete the Core Modules and the Project Dissertation in the same academic year.

Part time students: Complete four modules over four TBs, one module per TB (Two modules per academic year) and project Dissertation in the second academic year. Complete the Core Modules and the Project Dissertation within two academic years.

TB1 for January intake is typically January to April, TB2 is September to December

TB1 for September intake is typically September to December, TB2 is January to April

Project Dissertation Start/End:

January intake: starts in May, Submission in January

September intake: starts in April, Submission in September

The programme is made up of four modules each worth 30 credit points plus a capstone project worth 60 credits. All students will be provided with the Kingston University regulations. Full details of each module will be provided in module descriptors and student module guides.

Level 7 requires the completion of the four compulsory modules.

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| **Level 7** | | | | | |
| **Compulsory modules** | **Module code** | **Credit**  **Value** | **Level** | **Teaching Block** |  |
| Data Communications | CI7110 | 30 | 7 | 2 |  |
| Cryptography and Applications | CI7100 | 30 | 7 | 1 |  |
| Network and Information Security | CI7130 | 30 | 7 | 2 |  |
| Project Dissertation | CI7000 | 60 | 7 | 1 and 2 |  |
| Wireless Communications and Networks | CI7150 | 30 | 7 | 1 |  |

1. **Principles of Teaching, Learning and Assessment**

*Overarching Principles*

The course is designed to give students a balance of theoretical and practical experience. The programme is designed according to the KU Curriculum Design Principles and it utilises a wide range of teaching and learning methods to enable all students to be actively engaged throughout the course. The learning, teaching and assessment strategies reflect the programme aims and learning outcomes, student background, potential employer requirements, and the need to develop a broad range of technical skills with the ability to apply them appropriately.

*Teaching & Learning: Developing Knowledge and Skills through a Range of Means*

Formal lectures are used in order to give the students a good background understanding in the area and to develop the theoretical aspects. These are then often reinforced by practical sessions and/or industry specialists who contribute throughout the course in order to give informative insight into industry developments.

The practical workshops, open forums, newswires (e.g. CBDiForum, earthweb, ebiz) and group presentations are introduced into the modules to provide students with a detailed understanding of the approaches taken in industry. The students will often be given an opportunity to work with a client organisation on their coursework thus enabling them to experience a real-life work environment and enhancing their employability.

The course ensures that the students are exposed to team working through group presentations, joint report writing, joint research and lab work. The students develop presentation and communication skills through these activities as well as practise analytical thinking, focused literature reviewing and academic essay writing, as part of their coursework portfolio. In this way, they also improve their research and evaluation skills.

The student is required to further explore and exploit the information given in the modules through guided self-study.

*Capstone Project*

Students will be given close guidance to select a project that is relevant to their background and specialisation. During the project, the student will be expected to apply the knowledge acquired during the course. Key skills in communication, presentation, literature search, problem analysis, project planning, report writing and solution justification are all part of the learning outcomes defined in this course.

*Contact Time*

The programme consists of modules in which the learning outcomes are achieved through a combination of scheduled tutor lead activities and practice. Scheduled contact time with students given within each module guide consists of lectures, tutorials, and practical sessions. Contact with staff often takes place in the context of giving feedback on assessed work but will not necessarily be scheduled.

*Virtual Learning Environment (VLE)*

Kingston University has a learning management system (VLE), which is used extensively in all modules as a means of dissemination of lecture notes, worksheets, assignments, reference materials, links, videos and lecturer annotated slides. In this way it acts as a repository for learning materials to be used by the students for independent study and in addition in some modules, for formative and summative tests and surveys.

*Assessment and Feedback*

The use of a variety of assessment methods is adopted as an appropriate assessment strategy to ensure all aspects of learning outcomes are covered and achieved. In particular:

* A portfolio of coursework assignments is designed to develop analytical and practical skills in a student,
* An unseen exam is designed to develop skills required in problem solving situations, commonly found in practice.

The formative assessment is used to help students answer particular components of the assessment by giving them timely feedback on exercises specially designed to simulate the exam questions or elements of the coursework assignments. The feedback is provided in:

* A written form thus presenting an additional learning resource helping the student build the knowledge throughout the learning process and prepare for the summative assessment.
* The exercisesmay take various forms including:
  + small building projects,
  + essay writing or
  + analysing past exam questions

At the end of the course every student undertakes a project dissertation which is a significant activity that draws on and enhances the skills and knowledge developed throughout the programme. As such, the assessment places greater emphasis on the ability to plan work, manage time effectively, and research background information, culminating in portfolio of written reports and an interview.

In the programme as a whole, the assessment components as outlined in the Section C, under the Teaching/Learning and Assessment Strategies heading are used in all of the modules.

*Research Informed Teaching*

Module leaders and teaching staff responsible for programme delivery at ESOFT are practitioners and experts in their respective fields, and are maintaining strong academic and industrial links locally and overseas. Kingston University’s School of Computer Science and Mathematics has a number of leading research teams and output from their work is used to inform the content of learning materials, case studies and practical exercises etc., used within the taught degree. This ensures that the currency of the content is maintained and that it reflects the latest technology, thinking and practice. For example, The Wireless Multimedia and Networking Research Group carries out fundamental and applied research on wireless communications, networking and media streaming. It investigates adaptive delivery of media information with an adequate quality of service. Research activity relies on the different fields of information theory, signal processing and applied mathematics, communication theory, wireless networking and security. The research group is internationally recognised and has a leading role in several international working groups and projects. The Digital Imaging Research Centre (DIRC) is one of the largest computer vision groups in the UK, with internationally recognised expertise in visual surveillance, medical imaging and intelligent environments. Therefore the expertise and research awareness of staff from both institutions feeds through to support learning in lectures and other forms of student engagement during contact time. It is also expected that both students and staff from the two institutions would be actively seeking opportunities to establish research collaborations.

1. **Support for Students and their Learning**

Students are supported by a highly qualified team of academic staff that includes individuals in the following roles:

* A Course Director to help students understand the programme structure
* A Personal Tutor to help and guide the student throughout the course
* A Module Leader for each module

Additional support is provided by the following specialist staff:

* Technical Support to advise students on IT and the use of software
* A designated Programme Administrator
* English language support if required

Matters outside the academic arena are supported by:

* Student support facilities that provide advice on issues such as finance, regulations, legal matters, accommodation, international student support etc.
* An induction week at the beginning of each new academic session
* Student Voice Committee
* Canvas – a versatile on-line interactive learning management system available on the university’s intranet

Support for Academic Skills

The Student Support Team help students with any problem which has an effect on their studies. This can range from illness, problems writing an assignment, questions about academic regulations to serious confidential issues.

The students are introduced to all these mechanisms during induction sessions at the beginning of each new academic year. It is here that the students first encounter the university’s computer network, which includes their personal access to Canvas and how to use it as a learning environment.

Students are expected to be involved in the development of their programme. On an individual level through meetings with their course director/personal tutor at which they can discuss their academic progress, personal development and can seek advice on course and module choices in the light of their career aspirations. As a cohort, students can contribute to many aspects of programme evolution, for example by student representation on committees including Student Voice Committees as well as by their formal and informal feedback such as the mid-module and end-of-module reviews.

*The Personal Tutoring Scheme*

A Personal Tutor is allocated to each MSc student. Personal Tutors are recruited from the Course team – to ensure the students have the opportunity to benefit from various aspects of the profession that each individual academic brings. The personal tutors will meet with their students sufficiently frequently to maintain close communication and manage to provide information/advise on the matters relevant at the start of the course, address the progression and advise on the personal development leading to relevant career choices. Typically, there will be at least 2 individual meetings per teaching block, specifically at:

* The start of the teaching block to discuss the work patterns on the course and/or the choice of electives
* At the end of the teaching block to review the progress of individual students

There are also planned group meetings – one per teaching block – to discuss issues of common interest. At each of these meetings the students are encouraged to raise issues of their concern so that they can be resolved effectively and timely in due course.

*Level 7: Getting the most out of the Masters*

* To help students to make the transition to Masters level study and understand how to use feedback on the postgraduate course
* To encourage students to be proactive in making links between their course and their professional and/or academic aspirations
* To explore students’ research aspirations
* To help students gain confidence in contributing to, and learning from, constructive peer review
* To encourage students to become part of a wider disciplinary and/or professional community
* To help students to prepare for the dynamics of supervision

1. **Ensuring and Enhancing the Quality of the Course**

The University has several methods for evaluating and improving the quality and standards of its provision. These include:

* External examiners
* Boards of study with student representation
* Annual Monitoring and Enhancement
* Periodic review undertaken at subject level
* Student evaluation including MEQs, level surveys and the NSS
* Moderation policies
* Feedback from employers

1. **Employability Statement**

Computing qualifications are amongst the most versatile and enable graduates to find employment in a wide spectrum of careers ranging from systems and business analysts, and software engineers, through to programmers and network specialists in a wide range of public and private sector industries. Graduates may pursue careers in academia joining PhD programmes in a related field.

Working on case studies designed to simulate the working environment, typically in teams, gives students experience of applying the theoretical concepts to practice in a professional manner. There is an opportunity for a student to develop communication and interpersonal skills throughout the course. They learn about time management and the value of prioritising and planning by involvement in such projects and in the learning activities outlined in Section F above.

**Curriculum, Employability and Practical Skills**

Employability is signposted in the curriculum where the emphasis is on applying knowledge, developing practical skills and applying them in mini-projects representing typical workplace issues. Aspects of employability and professional, legal, ethical etc. are covered in the Modelling of Enterprise Architectures module. The project dissertation enabling the student to showcase their ability to manage and develop their work. The course has several modules to choose from to cater to a broad range of careers ranging from software houses to large financial institutions.

1. **Approved Variants from the Postgraduate Regulations**

None

1. **Other sources of information that you may wish to consult**

QAA Benchmark statement website: <https://www.qaa.ac.uk/quality-code/subject-benchmark-statements>

Module guides

Guidance on Enterprise and Entrepreneurship (Draft)

<http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/EE_Draft_Guidance.pdf>

Student handbook

**Development of Field/Course Learning Outcomes in Modules**

This map identifies where the field/course learning outcomes are summatively assessed across the modules for this field/course. It provides an aid to academic staff in understanding how individual modules contribute to the field/course aims, a means to help students monitor their own learning, personal and professional development as the field/course progresses and a checklist for quality assurance purposes.

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| --- | --- | --- | --- | --- | --- | --- |
| **Module code** | | **Level 7** | | | | |
| **CI7110** | **CI7100** | **CI7130** | **CI7150** | **CI7000** |
| **Knowledge & Understanding** | A1 |  | X | X |  | X |
| A2 |  | X | X |  | X |
| A3 |  | X | X | X | X |
| A4 | X |  |  | X | X |
| A5 | X | X | X |  | X |
| **Intellectual Skills** | B1 |  | X | X | X | X |
| B2 | X | X | X | X |  |
| B3 | X | X | X | X | X |
| B4 | X | X | X |  | X |
| **Practical Skills** | C1 | X | X | X | X | X |
| C2 | X | X | X | X | X |
| C3 |  | X | X |  | X |
| C4 |  | X | X | X | X |
| C5 | X |  |  |  | X |

**Students will be provided with formative assessment opportunities throughout the course to practise and develop their proficiency in the range of assessment methods utilised.**

Assessment Calendar

This table indicates the weeks that summative assessments will be published and when they will be due to be submitted or sat (exams)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module Title** | **Assessment Element** | **Brief published** | **Submission Week** | **Feedback Week** |
| **Level 7** | | | | |
| Project Dissertation | Proposal and Interim Report | TW1/TW14 | Mar or Aug | Mar or Aug |
|  | Dissertation Report | TW1/TW14 | Jun or Jan | Jun or Jan |
|  | Practical (Viva presentation) | TW1/TW14 | Jun or Jan | Jun or Jan |
| Data Communications | Technical report | TW14 | TW18 | TW21 |
|  | Written examination |  | May/Jun exam | May/Jun exam |
| Cryptography and Applications | Technical report | TW1 | TW11 | TW14 |
|  | Written examination |  | Jan exam | Jan exam |
| Network and Information Security | Technical report | TW14 | TW22 | TW25 |
|  | Written examination |  | May/Jun exam | May/Jun exam |
| Wireless Communications and Networks | Technical report | TW1 | TW12 | TW15 |
|  | Written examination |  | Jan exam | Jan exam |

**Technical Annex**

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| --- | --- |
| **Final Award(s):** | MSc Network and Information Security |
| **Intermediate Award(s):** | None |
| **Minimum period of registration:** | 1 year / 2 years (part time) |
| **Maximum period of registration:** | 2 years / 4 years (part time) |
| **FHEQ Level for the Final Award:** | *7* |
| **QAA Subject Benchmark:** | Computing |
| **Modes of Delivery:** | Full-time, part-time |
| **Language of Delivery:** | English |
| **Faculty:** | Faculty of Science, Engineering & Computing |
| **School:** | School of Computer Science and Mathematics |
| **Department:** | Computer Science |
| **JACS code:** | G400 |
| **UCAS Code:** |  |
| **Course/Route Code:** |  |
|  |  |