F2N3-CNS Master of Science in Network Security

PROGRAMME DETAILS
Programme Code: F2N3-CNS
Department: Computer Science
Main Award: MSC - Master of Science
Full Award Title: Master of Science in Network Security
Level: Postgraduate Taught

LOCATION OF STUDY
Edinburgh Y Scottish Borders N Orkney N
Dubai Y Malaysia N Approved Learning Partner N
Independent Distance Learners N Collaborative Learning Partner N Other N

ASSOCIATED AWARDS
Programme Code	Award	Title
F2A3-ZZZ	PGCERT	Postgraduate Certificate in Computer Science
F2N2-CNS	PGDIP	Postgraduate Diploma in Network Security
F2N3-CNS	MSC	MSc Network Security

ACCREDITATION
N/A

LEARNING OUTCOMES – SUBJECT MASTERY
Understanding, Knowledge and Cognitive Skills

- Critical understanding of the main theories, principles and concepts relating to the domain of computer network security including conventions, methodologies, standards and terminology.
- Understanding and use of a significant range of the main practices, skills and techniques in network security software engineering, and a range of specialised skills, research and investigation techniques, and practices in designing and validating computer network security solutions informed by current best practice.
- Broad and deep knowledge of the computer network security areas of access control, cryptography, means of authentication, network security tools, security policy management, as well as application-based knowledge and skills relating to known security exploits, malware and their detection and prevention, and specialist knowledge and skills in applications relating to a number of specialist areas such as biometrics, firewall management, intrusion detection, penetration testing, public key certificates and user education in good security practice.

Scholarship, Enquiry and Research (Research Informed Learning)

- Extensive, detailed and critical understanding of at least one specialist area within the domain of Computer Network Security application development obtained through researching the background to a substantial and challenging network security engineering project that addresses a real or simulated sets of threats by personal scholarship, design, development and testing of a detailed means of prevention.
- Detailed knowledge and understanding of network security software engineering techniques relating to authentication, authorisation and auditing as well as the practical skills in how to
exploit them in support of original and creative network security application development.

- Specialist and critical knowledge, understanding and skills in a number of mainstream and specialist areas within the domain of network security application development including cryptography, digital forensic techniques, malware analysis, network defence technologies and penetration testing.

**LEARNING OUTCOMES – PERSONAL ABILITIES**

**Industrial, Commercial and Professional Practice**

- Demonstrate critical awareness of current issues within network security application development, and make informed judgements about them in the light of relevant professional standards.
- Demonstrate an awareness of professional and research issues in the network security discipline, and an ability to critique current techniques and practice.

**Autonomy, Accountability and Working With Others**

- Work autonomously and within teams, as appropriate, demonstrating a capability for both taking and critically reflecting on roles and responsibilities.
- Develop and utilise advanced problem-solving skills and techniques in the shared development of original and creative solutions to general and specialist network security engineering issues.
- Develop and demonstrate skills and techniques in communication with peers and academic/industrial staff, using a range of appropriate methods to suit different levels of knowledge and expertise within the audience.

**Communication, Numeracy & Information and Communications Technology**

- Develop and demonstrate the ability to communicate and present the main issues involved in network security application development to a literate audience with appropriate use of modern presentational tools and aids.
- Demonstrate appropriate use of methods of calculation and estimation involved in planning network security engineering solutions and deploying and validating such solutions.

**APPROACHES TO TEACHING AND LEARNING**

This programme is offered in a traditional campus-based, cohort model. Within the timetable, courses offer traditional lecture-based materials, small group tutorials and a variety of laboratory-based practices. Students are expected to complete coursework in groups, teams and pairs, as well as individually, and courses offer a range of types of coursework for assessment, from discursive essay-style assignments to code design and generation. In some courses, team teaching approaches are adopted to provide additional support and variety, and electronic support, in the form of email lists, newsgroups and bulletin boards are widely used to disseminate information and support student communication and practice.
EDUCATIONAL AIMS OF THE PROGRAMME

- Detailed knowledge and critical understanding of the main areas of computer network security including theories, principles and concepts.
- Significant range of principal and specialist skills, techniques and practices in the computer network security domain.
- Specialist knowledge of security techniques as they apply to developing distributed and networked applications.
- Ability to critically review existing practice and develop original and creative solutions to problems requiring computer network security solutions.
- Ability to communicate and work effectively with peers and academic staff in a variety of tasks, demonstrating appropriate levels of autonomy and responsibility.
- Ability to plan and execute a significant project of research, investigation or development in a specialist area within computer network security, demonstrating extensive, detailed and critical understanding of that specialism.

ASSESSMENT POLICIES

Postgraduate programmes consist of two phases:

- **A taught phase**, consisting of a set of 8 taught courses, some mandatory and some optional, defined in the programme structure, which the students will study over two semesters. Assessment of the taught phase is through a variety of methods including coursework and/or examination. Students must submit all elements of assessment before being permitted to progress.
- **A dissertation phase**, consisting of two stages: an appropriate technical research project and project dissertation report, and a poster and demonstration-based presentation.
  
Students will normally complete the taught phase, at which point progression to the dissertation phase is dependent on assessed performance. To progress students must meet the criteria stipulated in point 9 below in the taught material.

Students meeting the required standards for Masters in the taught phase (set out in point 9 below) will be permitted to progress to the dissertation phase.

Students meeting the required standards for Postgraduate Diploma and Postgraduate Certificate (set out in point 9 below) in the taught phase, but not meeting the Masters standard, will not be permitted to progress to the dissertation phase. Students may be recommended to graduate with a Postgraduate Diploma or a Postgraduate Certificate at this point.

Students failing to meet the required standards for Postgraduate Diploma and Postgraduate Certificate (set out in point 9 below) in coursework and examination in the taught phase will not be permitted to progress to the dissertation phase, nor will they be eligible for any award.

Any student will be able to retake the assessment of up to a maximum of 3 courses at the next opportunity, subject to payment of the appropriate fees to the University, and may be required to do so to obtain the necessary credits for completion of their programme or for progression. Students may only resit courses for which their examination grade is E or F (or
a D but only if that is required for them to qualify for an MSc degree). The method of reassessment for each course is specified in the appropriate course descriptor.

1. To obtain an MSc Degree, candidates must gain 180 credits and must satisfy the examiners by achieving the required standards (set out in point 9 below) in two components:

   • Assessed taught material
   • Dissertation (set out in point 9 below)

2. To obtain a Postgraduate Diploma candidates must gain 120 credits and must satisfy the examiners by achieving the required standards (set out in point 9 below) in the assessed taught material

3. To obtain a Postgraduate Certificate candidates must gain 60 credits and must satisfy the examiners by achieving the required standards (set out in point 9 below) in one component:

   • Assessed taught material
   • The Examiners may specify certain courses as mandatory to achieve the award of Postgraduate Certificate, to properly reflect the nature of the course.

4. Taught courses will be assessed by a variety of techniques appropriate to the learning outcomes of the specific course. Where a course is assessed by more than one component (for example examination and coursework or more than one item of coursework) students must complete each element of the assessment to a satisfactory level (Grade D or higher) to be permitted to proceed.

5. All course work must be submitted before the due date. Late submissions will only be accepted with the prior permission of the Programme Director.

6. In exceptional personal or medical circumstances students may be granted leave by the examiners to resit part or all of the assessment on one occasion only and at a date decided by the examiners, as stated in university regulations 4 and 5. This provision is in addition to the provision that students may retake assessment for courses in which they have achieved a grade less than D.

7. Dissertations must be submitted on or before the publicised submission date; dissertations submitted after that date and without the prior consent of the Programme Director may be assessed at a penalty.
8. Allowance for poor performance in or non-submission of a component on medical grounds is normally made only where supported by written testimony from a professional health practitioner. Such testimony must be lodged with the Programme Director prior to the Examination Board meeting.

9. The level of achievement expected in each component is an average of:

- 40% for the Postgraduate Diploma and Certificate
- 50% for the MSc Degree
- MSc candidates displaying exceptional merit by obtaining a credit weighted average of 70% or more (at the first attempt) over 8 courses and the dissertation at grades A-C may be recommended for the award of MSc with Distinction. Postgraduate Diploma candidates displaying exceptional merit by obtaining a credit weighted average of 70% or more (at the first attempt) over 8 courses at grades A-C may be recommended for the award of Postgraduate Diploma with Distinction. Both distinction awards are at the discretion of the Exam Board.

**Required Standards:**

Candidates must achieve the following minimum levels of performance in:

**Assessed Taught Material**

- A credit weighted average across the 8 courses of 50% or better for Masters, with F21RP Research Methods at 45% or above and all others at grade D or above.
- A credit weighted average across the 8 courses of 40% or better for Postgraduate Diploma (120 credits) or a credit weighted average across 4 courses of 40% or better for Postgraduate Certificate (60 credits), with no course returning a result of less than grade E.
- All elements of assessment for each course must be completed to a satisfactory level (grade E).

**Dissertation**

- An average of 50% or better for Masters
- The Dissertation is conducted in two stages, these being:

  Stage 1: A write up in a dissertation report (90%)
Stage 2: A poster presentation and demonstration of the project work and results (10%)

<table>
<thead>
<tr>
<th>Mandatory Courses</th>
<th>Course Code</th>
<th>Course Title</th>
<th>SCQF Cr</th>
<th>SCQF Lvl</th>
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</thead>
<tbody>
<tr>
<td>Edinburgh</td>
<td>F21CN</td>
<td>Computer Network Security</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>F21SC</td>
<td>Industrial Programming</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>F21AN</td>
<td>Advanced Network Security</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>F21RP</td>
<td>Research Methods and Project Planning</td>
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<td>11</td>
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<tr>
<td></td>
<td>F21MP</td>
<td>Masters Project and Dissertation</td>
<td>60</td>
<td>11</td>
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</table>

<table>
<thead>
<tr>
<th>Optional Courses</th>
<th>Course Code</th>
<th>Course Title</th>
<th>SCQF Cr</th>
<th>SCQF Lvl</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>F21DF</td>
<td>Databases and Information Systems</td>
<td>15</td>
<td>11</td>
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<tr>
<td></td>
<td>F21MC</td>
<td>Mobile Communications &amp; Programming</td>
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<td>11</td>
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<tr>
<td></td>
<td>F21RS</td>
<td>Rigorous Methods for Software Engineering</td>
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<td>11</td>
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<tr>
<td></td>
<td>F21SF</td>
<td>Software Engineering Foundations</td>
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<td></td>
<td>F29DC</td>
<td>Data Communications and Networking</td>
<td>15</td>
<td>9</td>
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<td></td>
<td>F21AS</td>
<td>Advanced Software Engineering</td>
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<td></td>
<td>F21BD</td>
<td>Big Data Management</td>
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<td>11</td>
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<tr>
<td></td>
<td>F21DP</td>
<td>Distributed &amp; Parallel Technologies</td>
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<td>11</td>
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<tr>
<td></td>
<td>F21NA</td>
<td>Network Applications</td>
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<td>11</td>
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**COMPOSITION NOTES (PG)**

8 taught courses (4 mandatory + 4 optional) plus a dissertation.

<table>
<thead>
<tr>
<th>Mandatory Credits</th>
<th>60</th>
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<tbody>
<tr>
<td>Optional Credits</td>
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### Elective Credits

<table>
<thead>
<tr>
<th>Credits</th>
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### Total Credits

<table>
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<tr>
<th>Total</th>
<th>180</th>
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### AWARDS, CREDITS AND CRITERIA (PG)

#### Awards, Credits and Levels

<table>
<thead>
<tr>
<th>Awards, Credits and Levels</th>
<th>Overall Credits</th>
<th>Specific Requirements</th>
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</thead>
<tbody>
<tr>
<td>Masters Degree</td>
<td>180</td>
<td>180 SCQF credits including a minimum of 150 credit at Level 11</td>
</tr>
<tr>
<td>Postgraduate Diploma</td>
<td>120</td>
<td>120 SCQF credits including a minimum of 90 credit at Level 11</td>
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<tr>
<td>Postgraduate Certificate</td>
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<td>60 SCQF credits including a minimum of 40 credit at Level 11</td>
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#### Award Requirements

<table>
<thead>
<tr>
<th>Award Requirements</th>
<th>Total Course Passes</th>
<th>Overall Mark</th>
<th>Overall Grade</th>
<th>Basis of Overall Mark/Grade</th>
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<tbody>
<tr>
<td>Master (Distinction)</td>
<td>8+Dissertation</td>
<td>70</td>
<td>A</td>
<td>Credit Weighted Average greater than or equal 70% over 8 courses at grades A-C plus a Dissertation at grade A.</td>
</tr>
<tr>
<td>Master</td>
<td>8+Dissertation</td>
<td>50</td>
<td>C</td>
<td>Credit Weighted Average greater than or equal 50% over 8 courses at grades A-D plus a Dissertation at minimum grade C.</td>
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<tr>
<td>Diploma (Distinction)</td>
<td>8</td>
<td>70</td>
<td>A</td>
<td>Credit Weighted Average greater than or equal 70% over 8 courses at grades A-C</td>
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<tr>
<td>Diploma</td>
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<td>40</td>
<td>D</td>
<td>Credit Weighted Average greater than or equal 40% over 8 courses at grades A-E</td>
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<tr>
<td>Certificate</td>
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<td>40</td>
<td>D</td>
<td>Credit Weighted Average greater than or equal 40% over 4 courses at grades A-E</td>
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</tbody>
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#### DURATION OF STUDY

<table>
<thead>
<tr>
<th>IN MONTHS</th>
<th>Full-time</th>
<th>Part-time</th>
</tr>
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<tbody>
<tr>
<td>Masters</td>
<td>12</td>
<td>24</td>
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<tr>
<td>Diploma</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Certificate</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

#### RE-ASSESSMENT (PG)

1. A student who has been awarded a Grade E or F in a course may be re-assessed in that course. A student who has been awarded a Grade D in a course may be re-assessed in that course in order to proceed to or be eligible to receive the award of Masters.
2. A student shall be permitted only one re-assessment opportunity in a maximum of three taught courses. The opportunity for re-assessment in four or more taught courses shall be at the discretion of the Progression Board.
3. Any further re-assessment opportunities in a course will require the approval of the Postgraduate Studies Committee.
4. A student may be permitted, at the discretion of the Progression Board, to be re-assessed in the dissertation, project or other supervised research component of the course of study.

#### PROGRESSION TO DISSERTATION/PROJECT

In accordance with University Regulations, to progress to Masters level a minimum of Grade C is required.