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## CA3: Course Specification

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Along with the Module Specifications, the Course Specification form the definitive description of any qualification awarded by the University. The Academic Quality and Standards Office (AQSO) is responsible for maintaining up to date records of all definitive documents (course and module specifications). **Any** amendments made to the Course Specification must be submitted to the AQSO via the formal Amendments process outlined in Section 4 of the Academic Quality and Standards Handbook – Course Amendments.

### **PART A: About the Course** (See Part B for other key information)

**1. Qualification** (award and title):

MSc Cyber Security

**2. Date of Approval** (month and year):

**31/07/2020**

**3. Delivery Partners, Sites and Recognition:** *who delivers this course, where? Is it accredited by any professional bodies?*

Campuses/Partners	Recognised/accredited by
UWL RAK Branch Campus	

**4. Course Description:** *a short descriptive statement used for publicity (max. 250 words):*

Cyber security is a key issue in today's digital world. People trained in cyber security are greatly sought after, and the course is designed to meet the huge market demand for cyber security professionals.

The MSc Cyber Security course provides professional education in both the theory and practice of cyber security, with excellent coverage to the key security disciplines and skill groups defined by prestigious information security professional bodies. The course helps students to gain comprehensive knowledge and critical skills of cyber security in both technical and human dimension.

Graduates of this course will be able to pursue careers as cyber security specialists within a wide range of both public and private sectors, including law enforcement, government agencies and security consultancies, or within commercial IT departments and other computing positions where computer security is an issue.

## 5. Course Structure Diagram: a visual overview of the programme of study

### LEVEL 7 (September start)

Semester 1 (September – January)	Semester 2 (January – May)	Semester 3 (May – August)
Core modules: <ul style="list-style-type: none"> <li>CP70042E: Network and Systems Security (20 credits)</li> <li>CP70044E: Security Operations and Assurance (20 credits)</li> </ul> Option modules (choose one): <ul style="list-style-type: none"> <li>CP7NEW: Machine Learning (20 credits)</li> </ul> Optional Support modules: <ul style="list-style-type: none"> <li>CP70047E: Learning and Professional Development (0 credits)</li> </ul>	Core modules: <ul style="list-style-type: none"> <li>CP70045E: Fundamentals of Cyber Security (20 credits)</li> <li>CP70011E: Research Methods (20 credits)</li> </ul> Option modules (choose one): <ul style="list-style-type: none"> <li>CP7NEW: Big Data Analytics (20 credits)</li> </ul> Optional Support modules: <ul style="list-style-type: none"> <li>CP70046E: Employability Skills and Employment (0 credits)</li> </ul>	Core module: <ul style="list-style-type: none"> <li>CP70017E Dissertation (60 credits)</li> </ul>

NB1: CP70047E (Learning and Professional Development) module is core for international students. For all other students CP40047E (Learning and Professional development), CP70046E (Employability Skills and Employment) module and CP70056E (Programming Support) module are optional and available to those who would like extra support in any of the areas addressed by these modules.

NB2: Part-Time students will take 2 modules per semester over 3 semesters and work on their dissertation in their fourth semester.

### LEVEL 7 (January start)

Semester 1 (January – May)	Semester 2 (September – January)	Semester 3 (January – May)
Core modules: <ul style="list-style-type: none"> <li>CP70045E: Fundamentals of Cyber Security (20 credits)</li> </ul> Option modules (choose two): <ul style="list-style-type: none"> <li>CP7NEW: Big Data Analytics (20 credits)</li> <li>CP70061E: Principles of Project Management (20 credits)</li> <li>CP70016E: Knowledge Management (20 credits)</li> </ul> Optional Support modules: <ul style="list-style-type: none"> <li>CP70047E: Learning and Professional Development (0 credits)</li> <li>CP70046E: Employability Skills and Employment (0 credits)</li> </ul>	Core modules: <ul style="list-style-type: none"> <li>CP70042E: Network and Systems Security (20 credits)</li> <li>CP70044E: Security Operations and Assurance (20 credits)</li> <li>CP70011E: Research Methods (20 credits)</li> </ul> Optional Support modules: <ul style="list-style-type: none"> <li>CP70056E: Programming Support (0 credits)</li> </ul>	Core module: <ul style="list-style-type: none"> <li>CP70017E Dissertation (60 credits)</li> </ul>

NB1: CP70047E (Learning and Professional Development) module is core for international students. For all other students CP40047E (Learning and Professional development), CP70046E (Employability Skills and Employment) module and CP70056E (Programming Support) module are optional and available to those who would like extra support in any of the areas addressed by these modules.

Support) module are optional and available to those who would like extra support in any of the areas addressed by these modules.

NB2: Part-Time students will take 2 modules per semester over 3 semesters and work on their dissertation in their fourth semester.

**6. Course Aims and Content by Level:** *what is this course all about and how does the programme of study build and develop over time?*

<p><b>LEVEL 7</b></p> <p><b>Aims:</b></p> <ul style="list-style-type: none"> <li>• Provide a comprehensive understanding of state-of-the-art tools and techniques for cyber security systems development and operations</li> <li>• Develop the critical skills and techniques to appropriately solve typical cyber security problems.</li> <li>• Prepare students for work in a rapidly evolving and technologically diverse environment</li> <li>• Produce graduates who are informed and suitably equipped to meet the needs of the industry</li> <li>• Provide a solid foundation for applied research in cyber security</li> <li>• Develop the necessary competencies (including critical thinking skills and general skills) to achieve the appropriate level of a Masters award and to continue lifelong learning and development.</li> <li>• Through an extended internship in a UK organization, enable students to develop and demonstrate the application of academic knowledge and skills in real world settings so that a solid foundation can be built for future career (for Internship program of this course).</li> </ul> <p><b>Content:</b></p> <p>The MSc in Cyber Security aims to equip students for professional careers in this important field. It provides a practical understanding of the issues relating to the design, analysis and implementation of modern secure IT systems. This course is suitable for all students with a background in ICT and who want to specialize in Cyber Security. The course builds skills that are necessary to tackle modern secure systems in an industry context. It develops an appreciation of commercial and open source cyber security equipment, software and services based on industry standard technologies.</p>	<p><b>Reference Points:</b></p> <ul style="list-style-type: none"> <li>• The Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies</li> <li>• Subject Benchmark Statements</li> <li>• Characteristics Statements</li> </ul> <p>All available at:  <a href="http://qaa.ac.uk/quality-code/the-existing-uk-quality-code#">http://qaa.ac.uk/quality-code/the-existing-uk-quality-code#</a>          Apprenticeship standards Available at: <a href="https://www.gov.uk/topic/further-education-skills/apprenticeships/latest">https://www.gov.uk/topic/further-education-skills/apprenticeships/latest</a></p> <ul style="list-style-type: none"> <li>• PSRB standards (as appropriate)</li> </ul>
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**7. Course Contact Hours:** *how much time should I commit to this course?*

Learning hours are determined by credits. One credit is worth 10 learning hours, so a 20 credit module is 200 learning hours, a 30 credit module is 300 hours etc. This is the amount of time you should be prepared to commit to each module.

Learning hours are divided into: taught or 'contact' hours, ie, the amount of time students spend in contact with academic staff, whether through face-to-face classes or online learning; and independent study, ie, the amount of time students are expected to spend on their own study and assessment preparation. Some kinds of learning mix contact time and independent study, for instance presentations or workshops by invited experts, or sessions where you are working in groups on a project but can call on academic staff for advice or feedback on your work so far. You also have one-to-one time with academic staff in personal tutorials.

## **8. Academic Staff:**

Staff employed on UWL Academic contracts at Lecturer level have a minimum requirement to have a higher degree in an appropriate discipline and a teaching qualification (PG Cert or Academic Professional Apprenticeship) and/or HEA Fellowship. Senior Lecturers have a similar minimum level and in addition should either hold a PhD or be registered on a doctorate programme. Associate Professor and Professor levels are required to have a PhD. All staff on Academic contracts at UWL are required to undertake teaching. Hourly paid teaching staff are also used across UWL and these colleagues bring a wide range of professional, specialist and industry experience to the teaching of our students. The University has made an explicit commitment to supporting the professional development of its staff through the programme of continuing professional development (CPD) managed and delivered by the ExPERT Academy.

**9. Course Learning Outcomes:** *what can I expect to achieve on this course?*

	<b>Level 7</b>
<b>Knowledge and understanding</b>	<p>Upon completion students will be able to:</p> <ol style="list-style-type: none"> <li>1. Demonstrate a systematic understanding of the issues inherent in secure ICT systems and organisations</li> <li>2. Show a comprehensive familiarity with the ways in which cyber security skills and knowledge underpins the provision of information technology</li> <li>3. Demonstrate mastery and practical knowledge of methods and approaches to deliver Cyber Security</li> <li>4. Provide a comprehensive understanding of the activities necessary in implementing IT systems</li> <li>5. Show an advanced understanding of ICT systems and their use in organisations</li> </ol> <p>All core modules, all option modules</p>
<b>Intellectual skills</b>	<p>Upon completion students will be able to:</p> <ol style="list-style-type: none"> <li>1. Show a critical awareness of current issues and process that apply to the modelling, design, implementation, planning and control of Cyber Security</li> <li>2. Formulate strategies to utilize techniques that are applicable to their own research or advanced scholarship and be able to synthesise key results to draw well-argued conclusions that can be presented in a form suitable for publication</li> <li>3. Demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional or equivalent level</li> </ol>

	<p>4. Use initiative, creativity and innovation in the identification and solutions to problems arising in the development of ICT systems</p> <p>5. Have acquired experience in evaluating and discussing published work</p> <p>6. Exercise appropriate judgement in decision-making processes.</p> <p>All core modules, all option modules</p>
<b>Subject practical skills</b>	<p>Upon completion, students will be able to:</p> <p>1. Distinguish by critical analysis the appropriate tools and techniques for the protection and analysis of ICT systems.</p> <p>2. Design, build, test and critically analyse secure ICT systems</p> <p>3. Develop expertise in cyber security, including management and technical components</p> <p>4. Apply cyber security tools and techniques to improve ICT systems design and development</p> <p>5. Account for their professional code of conduct, particularly with respect to current ethical, legal and quality frameworks that apply within the ICT industry</p> <p>All core modules</p>
<b>Transferable skills</b>	<p>Upon completion students will be able to:</p> <p>1. Exercise initiative and personal responsibility</p> <p>2. Make decisions in complex and unpredictable situations</p> <p>3. Show the independent learning ability required for continued professional development and show the independent learning abilities required for continued professional development</p> <p>4. Present information in professional publication quality reports and presentations</p> <p>5. Reflect on professional practice and apply conclusions drawn from that reflection to subsequent practice</p> <p>All core modules, all option modules</p>

## **10. Learning, Teaching and Assessment Strategies:** *how will I learn, how will my learning be assessed, and why are these the most appropriate methods?*

### **Level 7**

#### **General strategy**

The underlying philosophical approach to teaching and learning on this course is consistent with that of the university. Design of the modules make up the course as assessment and practice driven: assessment driven in that they are designed from learning outcomes and assessment upwards; practice driven, in that the courses reflect industry practice and research taking place in the subject area. Students will be encouraged to take responsibility for their own learning whilst still being supported by subject tutors.

As would be expected at Masters level, there is an appropriate balance of theory and practice, and in order to be successful you will need to demonstrate high levels of analytical, critical and reflective skills alongside a professional level of practical skills and knowledge. Teaching methods include:

- lectures,
- whole group information-giving sessions,
- workshops,
- tutorials
- case studies
- practical work
- blended e-learning and
- group critiques

#### **Case Studies**

Many of the case studies reflect real-world applications that practitioners would encounter in industry. Some modules such as Research Methods, Big Data Analytics require students to select a research paper in an appropriate area of the subject and to produce a critique thereby providing an opportunity for students to specialize and be up-to-date with emerging trends. The industry-focused nature of the course also means that many if not all the modules will receive at least one invited talk from an IT practitioner in the relevant subject area

#### **Practical work**

The practical work will reflect real-world techniques that practitioners would encounter in industry. For example, modules such as Machine Learning, Big Data Analytics, Mobile Web Component Development have been developed in conjunction with industry to provide hands-on experience.

Teaching and learning on the course is underpinned by the research and development activities of the course team. The vast majority of teaching staff hold PhDs. Four members are Professors / Associate Professors.

The industry-focused nature of the course also means that many if not all the modules will receive at least one invited talk from an IT practitioner in the relevant subject area. For example, areas where our Industry advisors have indicated an interest include: Data Warehousing (Oracle); Heathrow Airport Innovation Unit; User-Centred Design (Siemens); Amazon Web Services (AWS).

#### **Blended E-Learning**

University of West London uses the E-Learning Platform – Blackboard – <http://online.uwl.ac.uk>. The School of Computing and Engineering is particularly interested in the application of blended learning models within the University. Additionally through the Blackboard system we use Turnitin, which is an e-assessment tool for electronic submission

and plagiarism detection. It can also be used for electronic marking and electronic feedback. On these courses the use of Blackboard will comprise the following:

- Delivery and availability of materials – from module study guides, lecture notes and other materials
- the use of discussion forums and peer working to establish a cohesive learning community
- Subject support via email response
- Electronic submission of written material, plagiarism detection and electronic feedback on major pieces of work

### **Assessment Strategy**

Assessment is designed, where possible to simulate the variety of tasks that graduates from the course may encounter in relevant employment. Assessments contain clear goals that are relevant to in-job requirements. Through our Industry Consultative Committee our assessment strategy is continuously revised so it remains current and in line with industry expectations.

Graduates from these courses will be employed in a variety of roles such as Business Analyst, Data Scientist, Functional Architect and Project Manager, Software Engineer, Usability Consultant and Network Specialist. In these roles, graduates will be expected to produce deliverables such as Requirements specifications; Functional Architecture specifications; Program code and Technical product evaluations. So, the assessment strategy supports the student with providing them appropriate experience.

Where necessary other academic assessment devices, such as a formal examination, defence of the proposal etc.) are also used.

The timings of all the assessments for the course are shown in the module study guides for each of the modules.

Module tutors are the assessors in the majority of cases, however peer and self-assessment are both used where appropriate.

Assessment types include:

- systems analysis and design and the production of appropriate artefacts
- presentations to tutors and peers
- development of design specifications
- research seminars
- critiques of own and peer work
- closed book examination
- annotated bibliography
- defence of a proposal
- written proposal
- major implementation project
- examinations

The assessment material for each module will be distributed to the students at the commencement of the module. This material will include a complete set of requirements and dates for completion as well as a marking scheme and associated performance criteria.

Assessment details for each module are recorded with the modules themselves.

During the delivery of each module students will receive feedback on their performance on class exercises. These exercises will not normally be graded for assessment purposes. However, the work completed during these exercises may form part of the work to be handed in for the module assessment at the completion of the module.

The overall assessment schedule is therefore governed by the fact that assessments' specifications are presented to the students at the start of each module and the assessed work is required to be completed by the end of the module. Modules also have feedback points stated in the Module Study Guides, where feedback will be given on particular interim assessment products.

**Students are advised to take advantage of this formative assessment rather than be tempted to start on the assessment only at the end of the module.**



A student is referred in a subject where the mark awarded is below 50%.

**11. Formal and Informal Links with External Organisations/Industrial Partners:**  
*what opportunities are there for me to interact with professional contacts?*

The School of Computing and Engineering is in constant contact with industry. We have an Industry Consultative Committee that meets twice per year in order to seek advice on how to best develop our courses. This course benefits from these contacts and other ongoing engagements through knowledge transfer projects. In addition, to the committee above, our ongoing industrial projects provide academics and students for rich and new insights on the development and implementation of new knowledge in the subject area. Our academics are also members of international and national organisations such as the International Federation for Information Processing and the British Computer Society. These connections allow the course team to contribute to and remain in touch with debates in the subject area research, practice and policy.

**12. Admissions Criteria:** *what qualifications and experience do I need to get onto the course?*

<ul style="list-style-type: none"> <li>• <b>UCAS Tariff (UG only)</b></li> <li>• <b>Subject-specific requirements</b></li> <li>• <b>Additional information</b></li> </ul>	<p>A degree (at least 2:2) in a computing subject, business or an engineering degree with a significant level of computing. Applicants with other qualifications will be considered, provided they can demonstrate significant, relevant work experience and the ability to benefit fully from the course. The key considerations for admissions in these cases will be focused on length of service in specified and relevant roles to the course, cogent motivations in line with a career plan and demonstration of transferable skills applicable to this course. The process of application for such applicants will be considered on an individual basis: first their motivation statement will be assessed in terms of the above considerations and more information will be required about these if needed. Second, if still necessary after the first assessment, the applicant will be invited for an interview. Some optional modules may not be available to students without a first degree in computing.</p>
<p><b>Arrangements for Recognition of Prior Learning</b></p>	
<p><b>IELTS Score for International Students</b></p>	<p><i>Standard PG (L7 entry): 6.5 - minimum 5.5 in each individual element</i></p>

**13. Student Support Arrangements:** *what kinds of academic and pastoral support and advice are available?*

## STUDENT SUPPORT

Throughout their course of study, each student will have access to a variety of sources of support depending on individual circumstances and needs. Apart from the University-wide support framework, which encompasses the course leaders, the module leaders, the personal tutors, in-course learning skills development and Personal Development Planning (PDP), all students will have at their disposal a variety of different support systems which depend on the nature of the course.

The development of learning skills includes such techniques and activities as critical appraisal, reflection, literature searching, information technology, peer review, group work, presentation, research, practice/professional skills, note-taking, writing skills, electronic information retrieval, communication skills and independent study at home. These skills will be an integral part of learning courses.

Students are expected to participate in an induction. This will introduce them to the requirements of their course of study and will provide an opportunity to receive all the relevant course documentation, visit the Library and meet and discuss requirements and expectations of their planned learning experience with the course team.

The following student support services are available for students:

- Careers and Employment Services
- Advice Team
- Information Team
- Accommodation Team
- Counselling
- Students' Union

### **Further course specific information:**

**Induction:** To prepare students for the MSc course and to introduce students to the University, an induction week will be run for each intake. This will include an introduction to:

- the course, providing an opportunity to receive all the relevant course documentation,
- University and course specific regulations
- the library and library services
- the requirements and expectations of students and staff throughout the course
- student support services

Arrangements for the support of postgraduate students will be contained in the relevant Course Handbook.

### **UWL support roles:**

Students are treated like any others and have full access to university facilities

**Course Leader:** Academic lead with overall responsibility for the higher education course and the apprenticeship standard, including quality assurance, teaching, learning, assessment, preparation of modules results for exam board, coordination for end point assessment and reporting to associate head degree apprenticeships.

**Module leaders:** who are the first point of contact for the operation of modules

**Personal tutor:** The UWL personal tutor scheme applies to all students including apprentices. A personal tutor offers pastoral support and guidance on matters relating to the student's academic progression and choices, understanding assessment and feedback, translating feedback into tangible actions to take forward to the next assignment, producing academic development plans and other matters arising.

**14. Assessment Matrix:** a list of all the assessments on the course, along with how much they count for and where they come in the year.

Module Title and Code	Core /Optional (write C or O)	Credit	Assessment Type (choose from the dropdown list)	Weighting (%)	Overall pass mark	Minimum percentage (PSRBs and Apprenticeships only)	Apprenticeships Only: contributes to 'End-Point Assessment' (write YES or NO)	Submission: Week Number (indicative)
<b>Level 7:</b>								
Network and Systems Security CP70042E	C	20	Written assignment	50	50			7
			Written examination	50	50			13
Security Operations and Assurance CP70044E	C	20	Written assignment	50	50			7
			Written examination	50	50			13
Fundamentals of Cyber Security CP70045E	C	20	Portfolio	100	50			14
Research Methods CP70011E	C	20	Written assignment	100	50			13
Dissertation CP70017E	C	60	Written assignment	100	50			14
Consultancy and Technology Innovation CP70028E	O	20	Written assignment	50	50			9
			Written assignment	50	50			12
Machine Learning CP7NEW	O	20	Written assignment	100	50			13

Mobile Web Component Development CP70055E	O	20	Artefact	100	50			13
Big Data Analytics CP7NEW	O	20	Written assignment	40	50			7
			Written assignment	60	50			14
Knowledge Management CP70016E	O	20	Written assignment	60	50			12
			Written examination	40	50			14

**15. External Examiner Arrangements:** *who checks the standards and quality of the course?*

Dr Ben Sanders, Head of Department of Digital Futures, University of Winchester

## PART B: Key Information

1.	<b>Awarding Institution</b>	University of West London
2.	<b>UWL School/College</b>	SCE
3.	<b>Subject Area within School/College</b>	
4.	<b>Academic Partners and type of arrangement</b>	UWL RAK Branch Campus
5.	<b>Course recognised by</b>	
6.	<b>Sites of delivery</b>	UWL RAK Branch Campus
7.	<b>Modes and duration of delivery</b>	24 months part-time (September Start); 27 months part-time (January Start)
8.	<b>Sequencing</b>	<i>September and January start</i>
9.	<b>Final enrollable award(s)</b>	<i>MSc Cyber Security</i>
10.	<b>Level of final award</b>	7

11.	<b>Credit for final award (CATS and ECTS)</b>	MSc = 180 CATS/90 ECTS		
12.	<b>Exit awards and credits</b>	Postgraduate Certificate in Cyber Security (60 credits) Postgraduate Diploma in Cyber Security (120 credits)		
13.	<b>UCAS code(s) (UG programmes)</b>			
14.	<b>QAA Subject Benchmarking Statement</b>	Masters Degree in Computing 2011		
15.	<b>Apprenticeship Standard title and code</b>	<i>Not applicable for courses which do not include an apprenticeship</i>		
16.	<b>Course-specific Regulations</b>	UWL Standard Regulations apply		
17.	<b>Language of study</b>	English		
18.	<b>Original approval Date</b>		<b>Last Revision Date</b>	



## PART C: Record of Approved Amendments

Use the following table to list all amendments made to the programme between approval/review events. Add rows as necessary.

Approved Amendments to Course Specification since original approval/last review					
Course Specification Title	Module Level and title	Brief Outline of Amendment	Approval by School/College Quality Committee	Approval effective from	Student cohort affected
<i>Specify award titles/routes affected by change</i>			<i>Date and meeting minute</i>		<i>e.g. students entering Level 5 from AY2018</i>