

School of Engineering and Computer Science

Title of Programme: Modular Masters Programme in Computer Science  
(Online / Tutored e-Learning)

Programme Code: ECWCSM

## Programme Specification

This programme specification is relevant to students entering:  
01 September 2020

Associate Dean of School (Academic Quality Assurance):  
Susan Murray

Signature



A programme specification is a collection of key information about a programme of study (or course). It identifies the aims and learning outcomes of the programme, lists the modules that make up each stage (or year) of the programme, and the teaching, learning and assessment methods used by teaching staff. It also describes the structure of the programme, its progression requirements and any programme-specific regulations. This information is therefore useful to potential students to help them choose the right programme of study, to current students on the programme, and to staff teaching and administering the programme.

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### Summary of amendments to the programme

Date	Section	Amendment

If you have any queries regarding the changes please email [AQO@herts.ac.uk](mailto:AQO@herts.ac.uk)

# Programme Specification    Modular Masters Programme in Computer Science (Online/Tutored e-Learning)\*

This programme specification (PS) is designed for prospective students, enrolled students, academic staff and potential 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 he/she takes full advantage of the learning opportunities that are provided. More detailed information on the teaching, learning and assessment methods, learning outcomes and content for each module can be found in Definitive Module Documents (DMDs) and Module Guides.

## Section 1

<b>Awarding Institution/Body</b>	University of Hertfordshire
<b>Teaching Institution</b>	University of Hertfordshire (UH)
<b>University/partner campuses</b>	UH Online
<b>Programme accredited by</b>	Not Applicable see section D
<b>Final Award (Qualification)</b>	MSc
<b>All Final Award titles (Qualification and Subject)</b>	MSc Advanced Computer Science MSc Artificial Intelligence MSc Computer Science MSc Cyber Security MSc Data Science and Analytics MSc Software Engineering
<b>FHEQ level of award</b>	7
<b>Language of Delivery</b>	English

\* Tutored e-Learning is the mode of study where students study the online programme through Studynet, with tutorial support from a local partner institution (the Academic Support Partner). For a detailed comparison of delivery modes refer to section E of this document.

## A. Programme Rationale

The Programme is intended to serve the needs of computer science postgraduate students, and to offer a range of awards to suit their career development and to suit different backgrounds and circumstances. For the purpose of this document we divide the awards into three categories: Specialist, Generalist and Transitional. Our purpose is to provide those working towards each of the awards with opportunities to study a set of subjects from within Computer Science that will complement their existing qualifications and enhance their career prospects, and to do this via a set of learning experiences that will support their personal development.

### The Specialist Awards

- MSc Artificial Intelligence
- MSc Cyber Security
- MSc Data Science and Analytics
- MSc Software Engineering

These awards are targeted at students who have a good Honours degree in Computer Science or a very closely related discipline, and who have decided upon a specialist career path or are aiming to enter a PhD programme in one of the specialisms on offer. Those studying for one of these awards may concentrate on their chosen specialism, and will be expected to complete a major project that is clearly situated within that specialism.

Graduates obtaining these awards will be equipped to pursue research to PhD level, or to enter specialist employment in technically advanced and unpredictable working environments requiring sound judgment and the exercise of personal responsibility and initiative.

### The Generalist Award

- MSc Advanced Computer Science

This award also targets at students who have a good Honours degree in Computer Science or a very closely related discipline, and who wish to update, extend, and deepen their knowledge with a view to enhancing their career prospects or preparing for a programme of research.

Students who are studying for this award will have a wide range of taught modules from which to choose, and will be expected to complete a major project that extends and applies what they have learnt in one or more of the taught modules they have taken.

## **The Transitional Award**

### MSc Computer Science

This award is targeted at students with a good Honours degree in a discipline other than Computer Science with knowledge or experience of computing that goes beyond that of an end-user, and who wish to obtain core knowledge and skills in Computer Science that they can apply to problems drawn from the subject discipline of their first degree, and to problems that are relevant to their chosen career.

Students who are working towards this award will be required to follow a prescribed course of taught modules designed for non-computing entrants and will be expected to complete a major independent project that applies what they have learnt to a problem drawn from the subject of their first degree, or from their chosen career path.

Graduates obtaining this award will be equipped to apply Computer Science knowledge and techniques in the context of PhD level research situated within the discipline area of their first degree, or to enter employment in working environments requiring sound judgment and the exercise of personal responsibility and initiative in computer science discipline.

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## **B. Educational Aims of the Programme**

The programme has been devised in accordance with the University's graduate attributes of programmes of study as set out in [UPR TL03](#).

### **Additionally this programme aims to:**

- build upon existing degree-level knowledge and practical experience;
- undertake a substantial programme of individual project work at postgraduate level;
- evaluate and further develop their skills in research, independent study and self-management, and prepare themselves for lifelong learning;
- develop an understanding of the social, legal and ethical context within which a computing professional is expected to operate, and of the standards that will be expected of them when they graduate;
- acquire the necessary skills to undertake further study or research at postgraduate level, and to secure employment in their chosen career.

### **Furthermore,**

#### **for the MSc Artificial Intelligence, to provide students with opportunities to:**

- develop awareness of current research and practice in artificial intelligence;
- acquire the knowledge and practical skills that are needed to contribute to the design and implementation of working systems in intelligent computing;
- extend their understanding of the scope and limitations of different computational paradigms in artificial intelligence.
- apply and critically evaluate artificial intelligent practices.

#### **for the MSc Cyber Security, to provide the students with the opportunity to:**

- develop awareness of current research and practice in cyber security;
- extend their knowledge and understanding of the theory, concept, principles, policies and standards in cyber security;
- extend their technical expertise and practical skills in the design, management and evaluation of methods and procedures employed in cyber defence;
- develop the ability to respond to rapid technological change in cyber security.

**for the MSc Data Science and Analytics, to provide the students with the opportunity to:**

- develop awareness of current research and practice in data science and analytics;
- extend their knowledge and understanding of the fundamental mathematical ideas behind data science and relevant computational algorithms
- extend their knowledge and understanding of the principles and practice of obtaining data from various sources, the essential methods for pre-processing and cleaning data, data analytics and modelling
- apply and critically evaluate data analysis practices

**for the MSc Software Engineering, to provide the students with the opportunity to:**

- develop awareness of current research and practice in software engineering;
- extend theoretical knowledge and practical skills of models, methodologies, measures and tools that can be employed in the software engineering process;
- apply and critically evaluate a variety of software engineering practices.

**for the MSc Advanced Computer Science, to provide students with opportunities to:**

- develop awareness of current research and practice in computer science;
- develop an understanding of a variety of paradigms within which programmed systems may be developed, and how the choice of paradigm affects the approach to solving problems and the nature of the solutions obtained;
- extend their knowledge and understanding of, and their practical skills in, a range of advanced computer science topics.

**for the MSc Computer Science, to provide students with opportunities to:**

- develop an understanding of, and practical skills in, the application of Computer Science principles and techniques to the modelling and solution of problems in other disciplines;
- develop an understanding of how different approaches to modelling, design and programming can affect the nature of solutions to computational problems, and their fitness for purpose;
- extend knowledge and understanding of, and practical skills in, a range of advanced computer science topics.
- deploy, articulate and evaluate key principles and techniques of computer science and be in a position to make critical responses and design decisions on the basis of those principles.

### C. Intended Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes in the following areas. The programme outcomes are referenced the Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies (2015). The outcomes relate to the typical student. In addition, the SEEC Credit Level Descriptors for Higher Education (2016) have been used to provide guidance for curriculum design at each level of the programme to reflect student development. The curriculum design has also taken into account UH Graduate Attributes.

A - Knowledge and Understanding	Teaching/learning methods & strategies	Assessment
<p><b>For all MSc awards, students should be able to:</b></p> <p><b>A1.</b> evaluate and reflect on professional, social, legal, and ethical issues related to contemporary practices in computer science.</p> <p><b>MSc Artificial Intelligence graduates should have knowledge and understanding of:</b></p> <p><b>A2.</b> the distinctive features of a variety of problem-solving</p>	<p>Acquisition of knowledge and understanding is through a combination of, for example, web-based presentations, simulations, practical activities, embedded formative assessment, written materials, online discussion groups and guided reading among specialist textbooks and journals as the means of acquainting students with topics at the forefront of the discipline. In online distance learning mode tutorial guidance will be by online discussion groups, whereas in tutored e-learning mode this will be augmented by conventional student/tutor communication.</p>	<p>Knowledge and understanding are assessed through a combination of coursework as appropriate for the modules in question, followed by the project, in which this knowledge and understanding must be shown to be applied to a substantial piece of independent investigative and/or developmental work.</p> <p>Coursework as set out in UPR AS12 Version 5.0 shall include, but is not limited to,</p>

paradigms within the sub-discipline area of Artificial Intelligence. Advanced principles and their practical implementation, underlying developments in Artificial Intelligence.

**MSc Cyber Security graduates should have knowledge and understanding of:**

**A3.** the fundamental and advanced aspects of cyber security in terms of theory, practice, policy and security standard to enable critical cyber security decision marking

**A4.** the extant threats to current and emerging systems and networks and the effective countermeasures to such threats in compliance with information security management standards

**A5.** the social, legal and ethical issues relating to cyber security in the context of secure system design and programming, information security management, penetrating testing and cyber operations

**MSc Data Science and Analytics graduates should have knowledge and understanding of:**

**A6.** the fundamental mathematical ideas behind data science and relevant computational algorithms

**A7.** the principles and practice of obtaining data from various sources, the essential methods for data pre-processing and cleaning, and data visualisation.

**A8.** the underlying ethical and legal issues and constraints on the holding and the use of data.

**MSc Software Engineering students should have the knowledge and understanding of:**

**A9.** the complex relationships between models of software engineering processes and the artefacts produced by such a process;

Students are progressively expected to integrate such leading-edge material into the core themes for their subject area with a minimum of support and to take responsibility for selection and use of advanced theories, particular contexts, developing their understanding of these independently. Subject-specific research methods are embedded in the taught modules. The general principles are covered explicitly in the supporting material for the project module. In the project, students learn how to apply these methods, where appropriate, to their chosen subject area, under the guidance of their project supervisor.

Throughout, the learner is encouraged to undertake independent study both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject.

essays, assignments, tests/quizzes (in-class or online under proper invigilation), projects, dissertations, demonstration, practical work, performance, designs, theses, artefacts, presentations, candidate-led seminars and exhibitions.

**A10.** the role of estimation and measurement data in making effective technical decisions in the software engineering process;

**A11.** the leading edge technical practices implemented within software engineering processes.

**MSc Advanced Computer Science graduates should have knowledge and understanding of:**

**A12.** the relationships between computational problems and the choice of programming paradigm to solve them.

**A13.** at least two specialist topics of computer science to advanced depth.

**MSc Computer Science students should have the knowledge and understanding of:**

**A14.** fundamental Computer Science concepts and how they may be applied to the solution of problems from outside computer science;

**A15.** principles and practices of software development methodologies.

**B – Computing-related intellectual and practical abilities**

Teaching/learning methods & strategies

Assessment

**MSc Artificial Intelligence students should be able to:**

**B1.** use and critically evaluate methods currently employed in fields covered by this route, such as neural computing, intelligent systems, and etc.

**B2.** carry out a significant independent investigation as part of their project, typically including software development.

**MSc Cyber Security students should be able to:**

**B3.** identify and critically evaluate vulnerabilities of and threats to the security and integrity of distributed systems

**B4.** conduct and manage a comprehensive risk assessment of the distributed systems in a complex and unpredictable environment.

Computing-related practical abilities are developed throughout the programme by the methods and strategies outlined in section A, above. There is a strong expectation that students independently will develop the capacity to evaluate and select suitable candidates for specific tasks. The major vehicle for this development is the final project, where they are guided by one-to-one supervision from a member of the academic staff.

Throughout, the learner is encouraged to develop intellectual skills further by independent study.

Computing related practical skills are assessed directly through coursework and project, but also indirectly, as necessary, through unseen tests where understanding developed through activity relying on these skills is required. Assessment will be aided, as appropriate, by communication via email, telephone, conferencing systems and web-cams.

The planning, analysis and design activities encompassed by B1 – B16 are also assessed by the individual project, within which development work applying practical skills to novel problems is also normally needed in order for students to demonstrate

**B5.** select, deploy, and critically evaluate context-appropriate countermeasures which may include but are not limited to the use of specific cryptographic technology, techniques in writing secure code, and designing and developing a cyber defence environment.

**B6.** individually pursue an investigation into an agreed area of study relating to cyber security such as security analysis, risk assessment, or cyber operations.

**MSc Data Science and Analytics students should be able to:**

**B7.** apply mathematical skills to simple data science problems, implement algorithms and programs to analyse a given dataset, and make sensible recommendations of the nature of the data analysed

**B8.** apply a commonly used data science software framework that provides the essential algorithms for data visualisation and analytics for various use cases

**B9.** individually pursue an investigation into an agreed area of study relating to data science and analytics

**MSc Software Engineering students should be able to:**

**B10.** produce models of software engineering processes and artefacts using appropriate modelling techniques;

**B11.** apply measures to software engineering processes and artefacts and use the data produced to evaluate software engineering activities;

**B12.** apply and evaluate appropriate software engineering practices with account taken of the contextual limitations of specific software development environments.

**MSc Advanced Computer Science students should be able to:**

mastery of the computing-related practical abilities relevant to their award.

**B13.** use and critically evaluate a range of methods and tools currently employed in at least two specialist topics of computer science to advanced depth.

**B14.** individually pursue a significant independent investigation into an agreed area of study in computer science as part of their project, typically including software development.

**MSc Computer Science students should be able to:**

**B15.** plan, execute, monitor and reflect upon a substantial piece of independent development work or experimentation in computer science;

**B16.** use and evaluate a range of methods and tools currently employed in the design and/or development of computer systems.

**C - Transferable skills - able to:**

**C1.** undertake a substantial piece of practical work at postgraduate level, independent of close supervision;  
**C2.** evaluate and make critical use of relevant academic and technical literature;  
**C3.** utilise their knowledge in practical applications;  
**C4.** build upon and extend their knowledge with a minimum of guidance;  
**C5.** express themselves knowledgably and coherently, both in writing and orally;  
**C6.** be able to explain, justify and otherwise defend their work and ideas, both in its specific details and within a broader context.

**Teaching/learning methods & strategies**

Transferable skills are developed through the following:

Skill C1 is developed through the final project and supportive materials;

Skill C2 is developed through coursework assignments, the final project and supportive materials;

Skill C3 is developed through coursework assignments and the final project;

Skill C4 is developed through coursework assignments and the final project;

Skill C5 is developed through coursework assignments and the final project;

Skill C6 is developed through coursework assignments and the final project.

Throughout, the learner is encouraged to develop transferable skills by maintaining a record of evidence and completing a personal development plan.

**Assessment**

Transferable skills are assessed through the following:

Skill C1 is assessed through the final project;

Skill C2 is assessed through coursework assignments and the final project;

Skill C3 is assessed through coursework assignments and the final project;

Skill C4 is assessed through coursework assignments and the final project;

Skill C5 is assessed through coursework assignments and the final project.

Skill C6 is assessed through coursework assignments and the final project.

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## D. Programme Structures, Features, Levels, Modules, and Credits

The programme is offered in online and tutored e-learning modes and is available either full-time (12 or 16 months) or part-time (2 to 5 years). The full-time 12 months option is only available to Semester A entrants (i.e. September intake). Semester B full-time entrants (i.e. January intake) study 16 months. The typical rate of study for a full-time student is 60 credits per semester. The programme leads to one of the following awards:

- MSc Advanced Computer Science (Generalist award)
- MSc Artificial Intelligence (Specialist award)
- MSc Cyber Security (Specialist award)
- MSc Data Science and Analytics (Specialist award)
- MSc Software Engineering (Specialist award)
- MSc Computer Science (Transitional award)

Entry is normally at Masters (7) level with suitable recent Honours Degree qualifications.

Intake is normally Semester A (September) and B (January)

### Professional and Statutory Regulatory Bodies

Accreditation is being sought for all the awards on the Programme.

### Work-Based Learning, including Sandwich Programmes

None.

### Programme Structure

The programme structure and progression information below (Table 1a and 1b on next page) is provided for the award. Any interim awards are identified in Table 1b. The Programme Learning Outcomes detailed above are developed and assessed through the constituent modules. Table 2 identifies where each learning outcome is assessed.

**Table 1a Outline Programme Structure**

**Mode of study:** Full-time

**Entry point:** Semester A and semester B

<b>Taught Modules</b> Module Title	Online Module Code	*SDL Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Advanced Algorithms and Paradigms	7WCM0042	7WCM0068	30	English	0	100	0	A
Artificial Intelligence Programming	7WCM0043	7WCM0069	30	English	0	100	0	A
Big Data Analytics	7WCM0044	7WCM0070	15	English	0	100	0	B
Cyber Operations	7WCM0045	7WCM0071	15	English	0	100	0	B
Data Mining	7WCM0046	7WCM0072	15	English	0	100	0	B
Data Structure and Algorithms	7WCM0047	7WCM0073	30	English	0	100	0	A
Digital Forensics	7WCM0048	7WCM0074	15	English	0	100	0	A
Distributed Systems Security	7WCM0049	7WCM0075	15	English	0	100	0	A
Enterprise Databases	7WCM0050	7WCM0076	15	English	0	100	0	B
Foundations of Data Science	7WCM0051	7WCM0077	30	English	0	100	0	A,B
Information Security Management and Compliance	7WCM0052	7WCM0078	30	English	0	100	0	A
Information System Design	7WCM0053	7WCM0079	15	English	0	100	0	B
Machine Learning	7WCM0054	7WCM0080	30	English	0	100	0	A
Measures and Models for Software Engineering	7WCM0055	7WCM0081	30	English	0	100	0	A
Operation Systems and Networks	7WCM0056	7WCM0082	15	English	0	100	0	A
Penetration Testing	7WCM0057	7WCM0083	15	English	0	100	0	B
Programming and Program Design	7WCM0058	7WCM0084	15	English	0	100	0	A
Responsible Technology	7WCM0059	7WCM0085	30	English	0		0	A,B
Software Engineering Practice	7WCM0060	7WCM0086	30	English	0	100	0	B
Theory and Practice of Artificial Intelligence	7WCM0061	7WCM0087	30	English	0	100	0	B

<b>Project Modules</b> Module Title	Online Module Code	*SDL Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Advanced Computer Science Masters Project	7WCM0062	7WCM0088	60	English	0	100	0	B,C
Artificial Intelligence Masters Project	7WCM0063	7WCM0089	60	English	0	100	0	B,C
Computer Science Masters Project	7WCM0064	7WCM0090	60	English	0	100	0	B,C
Cyber Security Masters Project	7WCM0065	7WCM0091	60	English	0	100	0	B,C
Data Science and Analytics Masters Project	7WCM0066	7WCM0092	60	English	0	100	0	B,C
Software Engineering Masters Project	7WCM0067	7WCM0093	60	English	0	100	0	B,C

**\*SDL Module Mode:** SDL stands for Supported Distance Learning. Students under this study mode have the same curriculum and programme learning outcomes as the Online Module Mode. They receive extra support from a local Support Centre that has the collaborative agreement with the University of Hertfordshire. More information can be found in Section E Management of Programme & Support for Student Learning.

**Note:** Please note that from time to time, modules may be run in a different semester other than to the one indicated above. Furthermore, from time to time, a module may become unavailable if there are fewer than 10 students opting to take it or because of circumstances beyond the school's control, such as key staff becoming unavailable. However, these circumstances are exceptional and disruption to any student's programme will be kept to a minimum.

**Mode of study:** Part Time

**Entry point:** Semester and semester B

Project Modules Module Title	Online Module Code	*SDL Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Advanced Computer Science Masters Project	7WCM0062	7WCM0088	60	English	0	100	0	CA
Artificial Intelligence Masters Project	7WCM0063	7WCM0089	60	English	0	100	0	CA
Computer Science Masters Project	7WCM0064	7WCM0090	60	English	0	100	0	CA
Cyber Security Masters Project	7WCM0065	7WCM0091	60	English	0	100	0	CA
Data Science and Analytics Masters Project	7WCM0066	7WCM0092	60	English	0	100	0	CA
Software Engineering Masters Project	7WCM0067	7WCM0093	60	English	0	100	0	CA

**Note:** Please note that from time to time, modules may be run in a different semester other than to the one indicated above. Furthermore, from time to time, a module may become unavailable if there are fewer than 10 students opting to take it or because of circumstances beyond the school's control, such as key staff becoming unavailable. However, these circumstances are exceptional and disruption to any student's programme will be kept to a minimum.

Some modules are compulsory for certain awards as detailed in Programme-specific assessment regulations.

The award of an MSc requires 180 credit points with at least 150 points passed at level 7 plus the requirements specified in Section 2 (Programme-specific assessment regulations).

**Table 1b Final and interim awards available**

The programme provides the following final and interim awards:

Final Award	Award Title	Minimum requirements	Available at end of (normally):	Programme Learning Outcomes developed (see above)
Masters	MSc Advanced Computer Science	180 credit points at level 7, plus the requirements specified below in the "Programme-specific assessment regulations" *	3 Semesters for semester A full-time entrants	A1, A12, A13 B13, B14 C1, C2, C3, C4, C5, C6
	MSc Artificial Intelligence			A1, A2 B1, B2 C1, C2, C3, C4, C5, C6
	MSc Computer Science			A1, A14, A15 B15, B16 C1, C2, C3, C4, C5, C6
	MSc Cyber Security			A1, A3, A4, A5 B3, B4, B5, B6 C1, C2, C3, C4, C5, C6
	MSc Data Science and Analytics			A1, A6, A7, A8 B7, B8, B9 C1, C2, C3, C4, C5, C6
	MSc Software Engineering			A1, A9, A10, A11 B10, B11, B12 C1, C2, C3, C4, C5, C6
Interim Award: Postgraduate Diploma	Postgraduate Diploma Advanced Computer Science	120 credit points at level 7, plus the requirements specified below in the "Programme-specific assessment regulations" **	2, 3 Semesters for semester A full-time entrants	A1, A12, A13 B13 C2, C3, C4, C5, C6
	Postgraduate Diploma Artificial Intelligence			A1, A2 B1 C2, C3, C4, C5, C6
	Postgraduate Diploma Computer Science			A1, A14, A15 B16 C2, C3, C4, C5, C6
	Postgraduate Diploma Cyber Security			A1, A3, A4, A5 B3, B4, B5 C2, C3, C4, C5, C6
	Postgraduate Diploma Data Science & Analytics			A1, A6, A7, A8 B7, B8 C2, C3, C4, C5, C6
	Postgraduate Diploma Software Engineering			A1, A9, A10, A11 B10, B11, B12 C2, C3, C4, C5, C6
Interim Award: Postgraduate Certificate	Untitled	60 credit points at level 7, plus the requirements specified below in the "Programme-specific assessment regulations" ***	1-2 Semesters for full-time entrants	A1, A2/A3/A6/A9/A12/A14 B1/B3/B7/B10/B13/B16 C2, C3, C4, C5, C6

Masters and Diploma awards can be made "with Distinction" or "with Commendation" where criteria as described in [UPR AS14](#), Section D and the students' handbook are met.

### Programme-specific assessment regulations

The programme is compliant with the University's academic regulations (in particular, [UPR AS11](#), [UPR AS12/UPR AS13](#) and [UPR AS14](#)) with the exception of those listed below, which have been specifically approved by the University:

None.

Further points of clarification and interpretation to this specific programme are given below:

The award titles of Postgraduate Diploma and Master of Science are qualified with the name of a subject specialism. The taught modules that must be passed for such qualifications are given below.

**Table 1c. Modules on offer for each award**

Module Information		Specialist Award				Generalist Award	Transitional Award
Module Titles	Credit	MAI	MDSA	MCyS	MSE	MACS	MCS
Responsible Technology	30	Core	Core	Core	Core	Core	Core
Theory and Practice of Artificial Intelligence	30	Core	X	X	X	Elective	X
AI Programming	30	Core	X	X	Core	Elective	X
Machine Learning	30	Core	Core	X	X	Elective	X
Foundations of Data Science	30	X	Core	X	X	Elective	X
Data Mining	15	X	Core	X	X	Elective	X
Big Data Analytics	15	X	Core	X	X	Elective	X
Distributed Systems and Security	15	X	X	Core	X	Elective	X
Cyber Operations	15	X	X	Core	X	Elective	X
Penetration Testing	15	X	X	Core	X	Elective	X
Information Security Management and Compliance	30	X	X	Core	X	Elective	X
Digital Forensics	15	X	X	Core	X	Elective	X
Software Engineering Practice	30	X	X	X	Core	Elective	X
Measures & Models for Software Engineering	30	X	X	X	Core	Elective	X
Advanced Algorithms and Paradigms	30	X	X	X	X	Core	X
Programming and Program Design	15	X	X	X	X	X	Core
Data Structure and Algorithms	30	X	X	X	X	X	Core
Operating Systems and Networks	15	X	X	X	X	X	Core
Information Systems Design	15	X	X	X	X	X	Core
Enterprise Databases	15	X	X	X	X	X	Core
Various Award Specific Projects	60	Core	Core	Core	Core	Core	Core

**Core** indicates a module that is compulsory for an award.

**Elective** indicates an optional module for an award.

**X** indicates a prohibited module for an award.

With the prior approval of both the Programme Leader and the Chair of the Board of Examiners, students on specialist awards (MSc AI, MSc Cys, MSc DSA, and MSc SE) may substitute up to 30 credits of specialist modules with 30 credits of non-specialist modules after attempting all the 90 credits of specialist modules and passing at least 60 credits of them.

Students who receive 45 credits FNFA for their specialist subject in the specialist awards (MSc AI, MSc CyS, MSc DSA, or MSc SE) are to be transferred to MSc ACS award so that they are able to substitute these 45 credits with the electives modules for MSc ACS.

#### Eligibility for Specific Awards:

\* **Masters Award:** to be eligible for a MSc award, students must have

- met the minimum requirements set out in table 1b, and
- passed 120 credits of taught modules that are illustrated in table 1c for the student's chosen award title including 30 credit module "Responsible Technology", and

- passed the respective Project module (without compensation) for the student's chosen award title

**\*\* PG Diploma Award:** to be eligible for a PG Diploma, students must have

- met the minimum requirements set out in table 1b, and
- passed 90 credits of taught modules including at least 60 credits of award specific core modules as listed in table 1c, and
- passed 30 credit module "Responsible Technology"

**\* PG Certificate Award:** to be eligible for a PG certificate, students must have

- met the minimum requirements set out in table 1b, and
- passed 30 credits of taught modules (without compensation) as listed in table 1c, and
- passed 30 credit module "Responsible Technology"

## Progression

To gain a Masters award a student requires passes (or accreditation through APCL or APEL) in 120 credits worth of taught modules and a 60 credit major project.

Normally, to proceed to the project stage, students must have studied 120 credits of taught modules from the programme (or gained credit that is deemed equivalent via an approved accreditation process) and satisfied regulations of UPR AS14, D5.2.3.

It is unlikely that a student who has not yet passed at least 90 credits on the programme will be allowed to proceed to the project stage.

In common with other Masters programmes the design of this programme assumes that the major project is the last element that the student will complete. However, in some cases students may be allowed to proceed to a project without having first attempted 120 credits worth of taught modules.

The Programme Board of Examiners will decide whether a student is ready to proceed to, or continue on, the project stage. In arriving at this decision the Board will consider:

- a) whether the student has passed a sufficient subset of the compulsory and core taught modules to support a project in the particular award;
- b) the imminence of any referral opportunities in the modules that the student has not passed;
- c) the total credit value and nature of taught modules passed at a satisfied level.

When deciding upon progression the Board will be concerned principally with the student's welfare, and the likelihood that the student will succeed in obtaining a Masters degree.

## Period of Registration

For registration to continue, students should have met the requirements for the PG Dip award within four years and the MSc award within five years (all periods calculated from date of registration on the Programme).

## Equivalence of modules with the Modular Masters Programme in Computer Science CMCSM

A separate Masters programme in Computer Science is the Modular Masters Programme CMCSM, often referred to below as the "campus-based" programme. The CMCSM programme provides an alternative route to some awards of the ECWCSM programme. Students may, with the approval of the Associate Dean (AQA), register on modules offered on the CMCSM programme to advance their studies on the online programme and vice versa. In these circumstances the following equivalences will apply as regards to completing the programme, to eligibility to repeat a module after the award of an FREN grade, and/or to the significance of an FNFA grade.

Table 1d. Modules equivalence in CMCSM and ELMASTW

Modular Masters Programme In Computer Science Module – CMCSM	Equivalent Modular Masters Programme In Computer Science Module (Online/Tutored E-Learning) Module(S) - ECWCSM
Computational Algorithms and Paradigms 30	Advanced Algorithms and Paradigms 30
Cyber Operations 15	Cyber Operations 15
Data Mining 15	Data Mining 15
Digital Forensics 15	Digital Forensics 15
Distributed Systems Security 30	Distributed Systems Security 15
Foundations of Data Science 30	Foundations of Data Science 30
Information Security Management and Compliance 30	Information Security Management and Compliance 30
Measures and Models for Software Engineering 30	Measures and Models for Software Engineering 30
Multi-user Database Systems 15	Enterprise Databases 15
Neural Networks and Machine Learning 30	Machine Learning 30
Operating Systems and Networks 15	Operating Systems and Networks 15
Penetration Testing 15	Penetration Testing 15
Programming and Program Design 30	Programming and Program Design 15
Software Development Exercises 30	Information Systems Design 15
Software Engineering Practice and Experience 30	Software Engineering Practice 30
Theory and Practice of Artificial Intelligence 30	Theory and Practice of Artificial Intelligence 30

## Academic Offence

### Cheating

On this Programme, the following, inter alia, will be taken to constitute plagiarism and collusion.

### Plagiarism

Plagiarism is the act of passing off the work of another as one's own. In the context of in-course assessment, a student who makes a copy of another's work and then hands the work in as his or her own is committing plagiarism. It is legitimate to quote from published texts or sources such as the worldwide web, provided the sources are properly acknowledged and the rules of copyright are obeyed. Failure to make clear that the work is that of another is plagiarism. In the context of a test or examination, looking at someone else's answer paper and using their answers is plagiarism.

It is important to recognise that for students working with digital media and often within a context of creative reworking of material drawn from the media world, the full acknowledgement of all sources is required. A student failing to acknowledge the source of a sampled source or appropriated material is committing an act of plagiarism.

### Collusion

If the joint work of two or more individuals is passed off as the independent work of each, then each individual is guilty of collusion. They will also be guilty of collusion if one individual knowingly allows another to plagiarise his or her work.

The procedure for investigating cases of suspected assessment offences and the penalties in proven cases will be as laid down in version 05.0 Appendix III UPR AS14 Assessment Offences.

## E. Management of Programme & Support for student learning

### Management

The programme is managed and administered through:

- The Head of Department, who has the overall responsibility for programmes in the Department of Computer Science;
- The Head of Online Operations, who oversees all the online programmes in the Department of Computer Science;

- The Programme Leader, who is responsible for day to day management. Management is conducted through the Programme Committee, which includes representation from each cohort of students;
- A Link Tutor based at UH, who provides support and facilitate communication between UH and the Support Partner;
- An Admissions Tutor, who has specific responsibility for selection;
- Module leaders who are responsible for the delivery of individual modules.

## Support

Students are supported by:

- Online induction materials to assist in starting the programme and settling into it;
- A range of online learning materials and activities specially designed to support students in their studies;
- StudyNet/Canvas VLE (Virtual Learning Environment); a student intranet and personal portal recognised for the programme of study with all the learning material and communications facilities for delivery of the programme;
- Provision of other learning resources at the start of modules, as appropriate, for instance CDs providing programming environments or modelling tools, text-based material via suitable media, and downloadable software from a centralised school online resource;
- Student handbook provided online to explain the programme and give the calendar of events for an academic year;
- Module delivery information provided online at the commencement of each module;
- Programme support infrastructure provided through the University managed learning environment, StudyNet/Canvas, telephone, email and other digital communications media;
- Methods of access to the web-site and the managed learning environment which are compliant with recognised standards for access for disabled students;
- The University's managed learning environment, providing access to online study resources of the University's Learning Resources Centre;
- Student representation in the procedures for management and delivery of the programme, through the online programme forum, the University's managed learning environment and the student feedback questionnaire mechanisms;
- Tutorial support which will be provided by tutors who have individual responsibility for a group of students on a module;
- A project tutor who offers one-to-one tutoring during the 60-credit project module;
- Extensive guidance for overseas students about studying in the English language, provided online at: <http://www.uefap.co.uk>;
- Study materials specially designed and developed by a team of Educational Technologists taking into account the online delivery and who advise on the use of technology to enhance delivery and assessment;
- Access to a Disability Adviser at: [DisabilityServices@herts.ac.uk](mailto:DisabilityServices@herts.ac.uk) through the University Disability Services department that provides specialist services and support for disabled students.

### Support of students in modes of study

This programme supports two study modes: online and tutored e-learning. The online mode is fully managed by the programme, and the tutored e-learning mode is managed by the programme but supported by a local Support Centre (this mode is also called Supported Distance Learning (SDL)). Student support for a variety of activities on the two modes is shown below.

**Table 1e. Support of students in different modes of study**

ACTIVITY	STUDY MODE	
	ONLINE MODE	TUTORED E-LEARNING MODE <sup>1</sup>
Delivery of primary teaching material	"Anywhere, anytime" study of materials prepared by UH staff obtainable electronically	By study of materials prepared by UH staff obtainable electronically
Tutorial support	By electronic communication with UH staff ("anywhere, anytime" subject to reasonable delays in response)	By Support Centre academic staff in class contact and electronically <sup>2</sup>
Practical work	By "anywhere, anytime" private study supported by UH staff	By Support Centre staff (academic and technical) in class contact <sup>2</sup> and by private study by the student

	(academic and technical) subject to reasonable delays in response	
Setting and marking of assessed work	By UH staff	By UH staff
Delivery of assessment	By UH staff	By Support Centre academic staff in class contact
Books and Journals	eBooks are supplied by the UH Learning and Information Services	eBooks are supplied by the UH Learning and Information Services
Pastoral care	UH staff	Support Centre staff
Student administration	UH staff	UH staff
Private study	By the student at their residence or elsewhere by their choice	By the student at the study centre, their residence or elsewhere by their choice
Project supervision	By UH staff	By UH staff

<sup>1</sup>A full-time student is expected to study for approximately 30 hours per week, some of which will be at the Support Centre. The Support Centre will be expected to provide facilities for students to study on site for at least 15 hours per week for a full-time student.

<sup>2</sup>This support will mirror the level of support provided on the equivalent campus programme which in the case of full-time study is typically 12 hours per week in total for practical and tutorial support.

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## F. Other sources of information

In addition to this Programme Specification, the University publishes guidance to registered students on the programme and its constituent modules:

- A Programme (or Student) Handbook;
- A Definitive Module Document (DMD) for each constituent module;
- A Module Guide for each constituent module.

The [Ask Herts](#) website provides information on a wide range of resources and services available at the University of Hertfordshire including academic support, accommodation, fees, funding, visas, wellbeing services and student societies.

As a condition of registration, all students of the University of Hertfordshire are required to comply with the University's rules, regulations and procedures. These are published in a series of documents called 'University Policies and Regulations' (UPRs). The University requires that all students consult these documents which are available on-line, on the UPR web site, at: <http://www.herts.ac.uk/secreg/upr/>. In particular, [UPR SA07](#) 'Regulations and Advice for Students' Particular Attention - Index' provides information on the UPRs that contain the academic regulations of particular relevance for undergraduate and taught postgraduate students.

In accordance with section 4(5) of the Higher Education and Research Act 2017 (HERA), the UK Office for Students (OfS) has registered the University of Hertfordshire in the register of English higher education providers. The Register can be viewed at: <https://www.officeforstudents.org.uk/advice-and-guidance/the-register/the-ofs-register/>. Furthermore, the OfS has judged that the University of Hertfordshire delivers consistently outstanding teaching, learning and outcomes for its students. It is of the highest quality found in the UK. Consequently, the University received a Gold award in the 2018 Teaching Excellence and Student Outcomes (TEF) exercise. This award was made in June 2018 and is valid for up to 3 years. The TEF panel's report and conclusions can be accessed at: <https://www.officeforstudents.org.uk/advice-and-guidance/teaching/tef-outcomes/#/provider/10007147>

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## G. Entry requirements

For current entry tariff point requirements, please refer to the relevant page for the Course on the University website or on the online prospectus.

The programme is subject to the University's Principles, Policies and Regulations for the Admission of Students to Undergraduate and Taught Postgraduate Programmes (in [UPR SA03](#)), along with associated procedures. These will take account of University policy and guidelines for assessing accredited prior certificated learning (APCL) and accredited prior experiential learning (APEL).

If you would like this information in an alternative format please contact: UHOnline Programme Administrator at [AskUHOnline@herts.ac.uk](mailto:AskUHOnline@herts.ac.uk).

If you wish to receive a copy of the latest Programme Annual Monitoring and Evaluation Report (AMER) and/or the External Examiner's Report for the programme, please email a request to [aqo@herts.ac.uk](mailto:aqo@herts.ac.uk)

## Modular Masters Programme in Computer Science (Online/Tutored e-Learning)

### Table 2: Development of Programme Learning Outcomes in the Constituent Modules (Part 1)

This map identifies where the programme learning outcomes are assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses.

Module Title	Module Code	Programming Learning Outcomes																														
		Knowledge & Understanding													Computer Related Intellectual & practical Abilities																	
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16
Responsible Technology	7WCM0059/85	X																														
Artificial intelligence programming	7WCM0043/69		X										X				X	X								X	X					
Machine Learning	7WCM0054/80		X				X	X		X		X	X			X	X															
Theory and practice of Artificial Intelligence	7WCM0061/87		X										X			X																
Cyber Operations	7WCM0045/71			X	X	X							X						X	X	X	X										
Digital Forensics	7WCM0048/74			X	X	X							X						X	X	X											
Distributed Systems and Security	7WCM0049/75			X	X	X							X						X	X	X	X										
Information Security Management and Compliance	7WCM0052/78			X	X	X							X						X	X		X										
Penetration testing	7WCM0057/83			X	X	X							X						X	X	X											
Big Data Analytics	7WCM0044/70							X	X				X									X	X									
Data Mining	7WCM0046/72						X	X					X									X	X	X								
Foundations of Data Science	7WCM0051/77						X	X	X				X									X	X									
Measures and Models for Software Engineering	7WCM0055/81									X	X	X	X												X	X						
Software Engineering Practice	7WCM0060/86									X	X	X	X											X		X						
Advanced Algorithms and Paradigms	7WCM0042/68												X	X															X			
Data Structure and Algorithms	7WCM0047/73													X	X															X	X	
Enterprise Databases	7WCM0050/76														X															X		
Information Systems Design	7WCM0053/79													X	X															X	X	
Operating Systems and Networks	7WCM0056/82													X																X		
Programming and Program Design	7WCM0058/84													X	X															X		
Artificial Intelligence Masters Project	7WCM0063/89	X	X										X					X														
Cyber Security Masters Project	7WCM0065/91	X		X	X	X							X								X											
Data Science & Analytics Masters Project	7WCM0066/92	X					X	X	X				X												X							



## Modular Masters Programme in Computer Science (Online/Tutored e-Learning)

### Table 2: Development of Programme Learning Outcomes in the Constituent Modules (Part 2)

This map identifies where the programme learning outcomes are assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses.

Module Title	Module Code	Programme Learning Outcomes (as identified in Section 1)					
		Transferable Skills					
		C1	C2	C3	C4	C5	C6
Responsible Technology	7WCM0059/85		X	X	X	X	X
Artificial intelligence programming	7WCM0043/69		X	X	X	X	X
Machine Learning	7WCM0054/80		X	X	X	X	X
Theory and practice of Artificial Intelligence	7WCM0061/87		X	X	X	X	X
Cyber Operations	7WCM0045/71		X	X	X	X	X
Digital Forensics	7WCM0048/74		X	X	X	X	X
Distributed Systems and Security	7WCM0049/75		X	X	X	X	X
Information Security Management and Compliance	7WCM0052/78		X	X	X	X	X
Penetration testing	7WCM0057/83		X	X	X	X	X
Big Data Analytics	7WCM0044/70		X	X	X	X	X
Data Mining	7WCM0046/72		X	X	X	X	X
Foundations of Data Science	7WCM0051/77		X	X	X	X	X
Measures and Models for Software Engineering	7WCM0055/81		X	X	X	X	X
Software Engineering Practice	7WCM0060/86		X	X	X	X	X
Advanced Algorithms and Paradigms	7WCM0042/68		X	X	X	X	X
Data Structure and Algorithms	7WCM0047/73		X	X	X	X	X
Enterprise Databases	7WCM0050/76		X	X	X	X	X
Information Systems Design	7WCM0053/79		X	X	X	X	X
Operating Systems and Networks	7WCM0056/82		X	X	X	X	X
Programming and Program Design	7WCM0058/84		X	X	X	X	X
Artificial Intelligence Masters Project	7WCM0063/89	X	X	X	X	X	X
Cyber Security Masters Project	7WCM0065/91	X	X	X	X	X	X
Data Science & Analytics Masters Project	7WCM0066/92	X	X	X	X	X	X
Software Engineering Masters Project	7WCM0067/93	X	X	X	X	X	X
Advanced Computer Science Masters Project	7WCM0062/88	X	X	X	X	X	X
Computer Science Masters Project	7WCM0064/90	X	X	X	X	X	X

**Key:** X = Learning Outcome which is assessed as part of the module

## KEY TO PROGRAMME LEARNING OUTCOMES

### A. Knowledge and Understanding of

- A1. Evaluate and reflect on professional, social, legal, and ethical issues related to contemporary practices in computer science.
- A2. The distinctive features of a variety of problem-solving paradigms within the sub-discipline area of Artificial Intelligence. Advanced principles and their practical implementation, underlying developments in Artificial Intelligence.
- A3. The fundamental and advanced aspects of cyber security in terms of theory, practice, policy and security standard to enable critical cyber security decision making
- A4. The extant threats to current and emerging systems and networks and the effective countermeasures to such threats in compliance with information security management standards
- A5. The social, legal and ethical issues relating to cyber security in the context of secure system design and programming, information security management, penetrating testing and cyber operations
- A6. The fundamental mathematical ideas behind data science and relevant computational algorithms
- A7. The principles and practice of obtaining data from various sources, the essential methods for data pre-processing and cleaning, and pattern discovery.
- A8. The practical implementation and development, and underlying ethical and legal issues and constraints on the holding and the use of data.
- A9. The complex relationships between models of software engineering processes and the artefacts produced by such a process;
- A10. The role of estimation and measurement data in making effective technical decisions in the software engineering process;
- A11. The leading edge technical practices implemented within software engineering processes.
- A12. The relationships between computational problems and the choice of programming paradigm to solve them.
- A13. At least two specialist topics of computer science to advanced depth.
- A14. Fundamental Computer Science concepts and how they may be applied to the solution of problems from outside computer science;
- A15. Principles and practices of software development methodologies.

### B. Computing Related Intellectual and Practical Abilities

- B1. Use and critically evaluate methods currently employed in fields covered by this route, such as neural computing, intelligent systems, and etc.
- B2. Carry out a significant independent investigation as part of their project, typically including software development.
- B3. Identify and critically evaluate vulnerabilities of and threats to the security and integrity of distributed systems
- B4. Conduct and manage a comprehensive risk assessment of the distributed systems in a complex and unpredictable environment.
- B5. Select, deploy, and critically evaluate context-appropriate countermeasures which may include but are not limited to the use of specific cryptographic technology, techniques in writing secure code, and designing and developing a cyber defence environment.
- B6. Individually pursue an investigation into an agreed area of study relating to cyber security such as security analysis, risk assessment, or cyber operations.
- B7. Apply mathematical skills to simple data science problems, implement algorithms and programs to analyse a given dataset, and make sensible recommendations of the nature of the data analysed
- B8. Apply a commonly used data science software framework that provides the essential algorithms for data visualisation and analytics for various use cases
- B9. Individually pursue an investigation into an agreed area of study relating to data science and analytics
- B10. Produce models of software engineering processes and artefacts using appropriate modelling techniques;

- B11. Apply measures to software engineering processes and artefacts and use the data produced to evaluate software engineering activities;
- B12. Apply and evaluate appropriate software engineering practices with account taken of the contextual limitations of specific software development environments.
- B13. Use and critically evaluate a range of methods and tools currently employed in at least two specialist topics of computer science to advanced depth.
- B14. Individually pursue a significant independent investigation into an agreed area of study in computer science as part of their project, typically including software development.
- B15. Plan, execute, monitor and reflect upon a substantial piece of independent development work or experimentation in computer science;
- B16. Use and evaluate a range of methods and tools currently employed in the design and/or development of computer systems.

### **C. Transferable Skills**

- C1. Undertake a substantial piece of practical work at postgraduate level, independent of close supervision;
- C2. Evaluate and make critical use of relevant academic and technical literature;
- C3. Utilise their knowledge in practical applications;
- C4. Build upon and extend their knowledge with a minimum of guidance;
- C5. Express themselves knowledgably and coherently, both in writing and orally;
- C6. Be able to explain, justify and otherwise defend their work and ideas, both in its specific details and within a broader context.

## Section 2

### Programme management

<b>Relevant QAA subject benchmarking statements</b>	Masters in Computing
<b>Type of programme</b>	Taught postgraduate
<b>Date of validation/last periodic review</b>	December 19
<b>Date of production/ last revision of PS</b>	September 2019
<b>Relevant to level/cohort</b>	Level 7 entering September 2020
<b>Administrative School</b>	School of Engineering and Computer Science

**Table 3 Course structure**

Course details		
Course code	Course description	HECOS
ECWCSM	MSc Computer Science (Modular) - Online/Tutored E-Learning	100366

**Modular Masters Programme in Computer Science (Online/Tutored e-Learning)**

**Table 4: Indicative Patterns of Study (Part 1) – Full-time Semester A and Semester B intakes**

The table below provides a set of examples of the modules that students may choose to study. The Full-time study mode permits 60 credits per semester.

Award (Intakes)	Semester A	Semester B	Semester C	Semester A	Semester B
MSc Artificial Intelligence (Semester A intake)	AI Programming (30) Machine Learning (30)	Responsible Technology (30) Theory and Practices of Artificial Intelligence (30)	Artificial Intelligence Masters Project (60)		
MSc Artificial Intelligence (Semester B intake)		Responsible Technology (30) Theory and Practices of Artificial Intelligence (30)		AI Programming (30) Machine Learning (30)	Artificial Intelligence Masters Project (60)
MSc Cyber Security (Semester A intake)	Information Security Management and Compliance (30) Distributed Systems and Security (15) Digital Forensics (15)	Responsible Technology (30) Penetration Testing (15) Cyber Operation (15)	Cyber Security Masters Project (60)		
MSc Cyber Security (Semester B intake)		Responsible Technology (30) Penetration Testing (15) Cyber Operation (15)		Information Security Management and Compliance (30) Distributed Systems and Security (15) Digital Forensics (15)	Cyber Security Masters Project (60)
MSc Data Science & Analytics (Semester A intake)	Foundations of Data Science (30) Machine Learning (30)	Responsible Technology (30) Data Mining (15) Big Data Analytics (15)	Data Science & Analytics Masters Project (60)		
MSc Data Science & Analytics (Semester B intake)		Foundations of Data Science (30) Data Mining (15) Big Data Analytics (15)		Responsible Technology (30) Machine Learning (30)	Data Science & Analytics Masters Project (60)
MSc Software Engineering (Semester A intake)	Measures & Models for Software Engineering (30) AI Programming (30)	Responsible Technology (30) Software Engineering Practice (30)	Software Engineering Masters Project (60)		

MSc Software Engineering (Semester B intake)		Responsible Technology (30) Software Engineering Practice (30)		Measures & Models for Software Engineering (30) AI Programming (30)	Software Engineering Masters Project (60)
MSc Advanced Computer Science (Semester A intake)	Responsible Technology (30) Advanced Algorithms and Paradigm (30)	Elective (30) Elective (30)	Advanced Computer Science Masters Project (60)		
MSc Advanced Computer Science (Semester B intake)		Responsible Technology (30) Elective (30)		Advanced Algorithms and Paradigm (30) Elective (30)	Advanced Computer Science Masters Project (60)
MSc Computer Science (Semester A intake)	Programming and Program Design (15) Operating Systems and Networks (15) Data Structure and Algorithms (30)	Responsible Technology (30) Enterprise Databases (15) Information Systems Design (15)	Computer Science Masters Project (60)		
MSc Computer Science (Semester B intake)		Responsible Technology (30) Enterprise Databases (15) Information Systems Design (15)		Programming and Program Design (15) Operating Systems and Networks (15) Data Structure and Algorithms (30)	Computer Science Masters Project (60)

## Modular Masters Programme in Computer Science (Online/Tutored e-Learning)

**Table 4: Indicative Patterns of Study (Part 2) – Part-time Semester A and Semester B intakes**

The table below provides a set of examples of the modules that students may choose to study. The Part-time study mode permits 30 credits per semester.

Award (Intakes)	Semester A	Semester B	Semester C	Semester A	Semester B	Semester C	Semester A	Semester B	Semester C
MSc Artificial Intelligence (Semester A intake)	Machine Learning (30)	Responsible Technology (30)		AI Programming (30)	Theory and Practices of Artificial Intelligence (30)	Artificial Intelligence Masters Project (60)			
MSc Artificial Intelligence (Semester B intake)		Responsible Technology (30)		Machine Learning (30)	Theory and Practices of Artificial Intelligence (30)		AI Programming (30)		Artificial Intelligence Masters Project (60)
MSc Cyber Security (Semester A intake)	Information Security Management and Compliance (30)	Responsible Technology (30)		Distributed Systems and Security (15) Digital Forensics (15)	Penetration Testing (15) Cyber Operation (15)	Cyber Security Masters Project (60)			
MSc Cyber Security (Semester B intake)		Responsible Technology (30)		Information Security Management and Compliance (30)	Penetration Testing (15) Cyber Operation (15)		Distributed Systems and Security (15) Digital Forensics (15)		Cyber Security Masters Project (60)
MSc Data Science & Analytics (Semester A intake)	Foundations of Data Science (30)	Responsible Technology (30)		Machine Learning (30)	Data Mining (15) Big Data Analytics (15)	Data Science & Analytics Masters Project (60)			
MSc Data Science & Analytics (Semester B intake)		Responsible Technology (30)		Foundations of Data Science (30)	Data Mining (15) Big Data Analytics (15)		Machine Learning (30)		Data Science & Analytics Masters Project (60)

MSc Software Engineering (Semester A intake)	AI Programming (30)	Responsible Technology (30)		Measures & Models for Software Engineering (30)	Software Engineering Practice (30)	Software Engineering Masters Project (60)			
MSc Software Engineering (Semester B intake)		Responsible Technology (30)		AI Programming (30)	Software Engineering Practice (30)		Measures & Models for Software Engineering (30)		Software Engineering Masters Project (60)
MSc Advanced Computer Science (Semester A intake)	Advanced Algorithms and Paradigm (30)	Responsible Technology (30)		Elective (30)	Elective (30)	Advanced Computer Science Masters Project (60)			
MSc Advanced Computer Science (Semester B intake)		Responsible Technology (30)		Advanced Algorithms and Paradigm (30)	Elective (30)		Elective (30)		Advanced Computer Science Masters Project (60)
MSc Computer Science (Semester A intake)	Programming and Program Design (15) Operating Systems and Networks (15)	Responsible Technology (30)		Data Structure and Algorithms (30)	Enterprise Databases (15) Information Systems Design (15)	Computer Science Masters Project (60)			
MSc Computer Science (Semester B intake)		Responsible Technology (30)		Programming and Program Design (15) Operating Systems and Networks (15)	Enterprise Databases (15) Information Systems Design (15)		Data Structure and Algorithms (30)		Computer Science Masters Project (60)