University of Hertfordshire UH

School of Physics, Engineering and Computer Science

Title of Programme: Modular Masters Programme in Computer Science

Programme Code: CMCSM

Programme Specification

This programme specification is relevant to students entering:
01 September 2021

Associate Dean of School (Academic Quality Assurance):

Dr Mariana Lilley

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.

Summary of Amendments to the Programme

Date	Section	Amendment
24.03.2021	D	**7COM1033** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
24.03.2021	D	**7COM1018** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
24.03.2021	D	**7COM1076** adjusted from 70% exam/ 30% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
24.03.2021	D	**7COM1028** adjusted from 50% exam/ 50% practical to 50% coursework*/ 50% practical in the academic year 2021/22, due to the covid pandemic.
24.03.2021	D	**7COM1027** adjusted from 100% exam to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
24.03.2021	D	**7COM1024** adjusted from 67% exam/ 33% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
24.03.2021	D	**7COM1025** adjusted from 50% exam/ 50% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
24.03.2021	D	**7COM1078** adjusted from 100% exam to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
24.03.2021	D	**7COM1015** adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
24.03.2021	D	**7COM1082** adjusted from 50% exam/ 50% practical to 50% coursework*/ 50% practical in the academic year 2021/22, due to the covid pandemic.
24.03.2021	D	**7COM1083** and **7COM1087** (0-credit) Preparation for Project modules phased out, and academic content integrated into project module so that topics are covered in context, and student overheads are reduced.
24.03.2021	D	Placement duration for the academic year 2021/22, as defined in UPR AS11.
24.03.2021	D	Project enrolment rules adjusted so that the same requirements apply to all students.
24.03.2021	D	For students on the Advanced Computer Science route, 7COM1073 Foundations of Data Science will be their first default elective module. Students will have an opportunity to select a module other than 7COM1073 Foundations of Data Science up to the end of the first teaching week.

* Learning outcomes for this module will be assessed via coursework using alternative modes of assessment. Alternative modes of assessment include, but are not limited to, take-home coursework and online timed assessments.

If you have any queries regarding the changes, please email AQO@herts.ac.uk

Programme Specification

Modular Masters Programme in Computer Science

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

Awarding Institution/Body	University of Hertfordshire
Teaching Institution	University of Hertfordshire
University/partner campus	College Lane
Programme accredited by	Not applicable
Final Award (Qualification)	MSc
All Final Award titles (Qualification and Subject)	MSc Artificial Intelligence and Robotics MSc Computer Networks and Systems Security MSc Cyber Security MSc Data Science and Analytics MSc Software Engineering MSc Advanced Computer Science MSc Computer Science MSc Artificial Intelligence and Robotics (sandwich) MSc Computer Networks and Systems Security (sandwich) MSc Cyber Security (sandwich) MSc Data Science and Analytics (sandwich) MSc Software Engineering (sandwich) MSc Advanced Computer Science (sandwich) * Note: Sandwich award is NOT available for MSc Computer Science MSc Artificial Intelligence and Robotics with Advanced Research MSc Computer Networks and Systems Security with Advanced Research MSc Cyber Security with Advanced Research MSc Data Science and Analytics with Advanced Research MSc Software Engineering with Advanced Research MSc Advanced Computer Science with Research * Note: the 'with Advanced Research' award is NOT available for MSc Computer Science
FHEQ level of award	7
Language of Delivery	English

A. Programme Rationale

The Programme is intended to serve the needs of several kinds of postgraduate student, and offers a range of awards to suit their different backgrounds and circumstances. For the purposes of this document, we divide the awards into three categories: Specialist, Generalist, and Crossover. 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 and Robotics
- MSc Computer Networks and Systems Security
- 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 entirely on their chosen specialism, and will be expected to complete a major project that is clearly situated within that specialism.

Specialist Award students will pursue study within their chosen area informed by current research and recent technological developments, and will be provided with the opportunity to carry out independent project work that is close to the forefront of the discipline. Graduates obtaining these awards will be equipped 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 is targeted at those who have a good Honours degree in computer science or a very closely related discipline, and who wish to extend and deepen their knowledge in two or more different sub-discipline areas, with a view to enhancing their career prospects or preparing for a programme of research that requires knowledge of one or more of these sub-discipline areas. Those 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.

Within their taught modules Generalist students will pursue study informed by current research and recent technological and developments. They will also be given opportunities to carry out independent project work that is close to the forefront of the discipline. Graduates obtaining this award will be equipped to enter employment in technically advanced and unpredictable working environments requiring sound judgment and the exercise of personal responsibility and initiative.

The Crossover Award: MSc Computer Science

This award is targeted at those who have a good Honours degree (or equivalent knowledge and experience) in a numerate discipline other than computer science, 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. Those working towards this award will be required to follow a prescribed course of taught modules, 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.

The purpose of this award is to provide a pathway into employment for those seeking positions in which they will apply their knowledge of computer science to their previous discipline area, or apply aspects of their previous discipline to problems in computer science. They are required to follow a programme of studies that rapidly brings them up to an advanced standard in a set of key subject areas, with the aim of enabling them to execute a major project in which they apply their knowledge and skills in Computer Science to a problem taken from the domain of their first degree, from their recent work experience, or from some other area.

The Sandwich Awards

Applicable to all specialist awards and MSc Advanced Computer Science award:

- MSc Artificial Intelligence and Robotics (sandwich)
- MSc Computer Networks and Systems Security (sandwich)
- MSc Cyber Security (sandwich)
- MSc Data Science and Analytics (sandwich)
- MSc Software Engineering (sandwich)
- MSc Advanced Computer Science (sandwich)

All above awards offer the opportunity for students to undertake a period of industrial placement, and so develop their understanding and skills within a professional environment. In order to be eligible for a placement, students must have completed 120 credits if they are Semester A (September) entrants of the programme, or 60 credits if they are Semester B (January) entrants and achieved a pass from their first attempt at the first 60 credits.

All students who have become eligible for a placement will be issued a statement of eligibility from the Department of Computer Science. On top of the previous eligibility statement, students who have become eligible for a placement with a grade arithmetic mean of 60 or higher from their first attempt at the first 60 credits of study in the programme, will be issued a recommendation letter from the Department of Computer Science for them to present to their potential employers.

Students who do not pass at their first attempt all of the first 60 credits attempted are not eligible to continue on the placement route. Students who have outstanding deferrals from their first attempt at their first 60 credits, are not eligible to progress to a placement until they meet the placement eligibility criteria.

The 'with Advanced Research' Awards
Applicable to specialist awards and MSc Advanced Computer Science award

MSc Artificial Intelligence and Robotics with Advanced Research
MSc Computer Networks and Systems Security with Advanced Research
MSc Cyber Security with Advanced Research
MSc Data Science and Analytics with Advanced Research
MSc Software Engineering with Advanced Research
MSc Advanced Computer Science with Research

All above awards offer the opportunity for students to study advanced research topics in computer science, normally across multiple specialisms, and comprehensive research methods, and to undertake an extended masters project on a cutting-edge research topic.

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.

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. The framework aims to provide a modular structure for the following programmes, each with its own programme specification:

Additionally, this programme aims to:
- build upon their 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.

For the **MSc Artificial Intelligence and Robotics**, to provide students with opportunities to:
- develop awareness of current research and practice in artificial intelligence and robotics;
- 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, such as the way in which Symbolic AI or stochastic methods complement each other.

For the **MSc Computer Networks and Systems Security**, to provide students with opportunities to:

- develop awareness of current research in the areas of computer networking, distributed systems and security;
- extend their knowledge of the principles underpinning technologies used for computer networking, distributed systems and security;
- extend their technical expertise and practical skills in the design, management and evaluation of networks;
- extend knowledge of and critically evaluate, techniques and tools employed in system security;
- develop the ability to respond to rapid technological change in the area of distributed systems and networks.

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

- develop awareness of current research and practice in cybersecurity;
- extend their knowledge and understanding of the theory, concept, principles, policies and standards in cybersecurity;
- 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 cybersecurity.

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 and the fundamentals of probability, information and statistical methods
- 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
- develop their ability of producing appreciate algorithmic definitions to provide useful data science analysis

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;
- extend and deepen their knowledge and skills in the design and implementation of programmed systems;
- 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 two or more sub-discipline areas of 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:

- deploy, articulate and evaluate advanced and 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;
- develop a deep and systematic understanding of the application of computer science principles and techniques to the modelling and solution of problems in computer science and other disciplines;
- develop a deep understanding of, and practical skills in, the design and development of programmed systems that complex solve problems from within and outside computer science;
- develop a deep understanding of, and be able to critically evaluate how different approaches to modelling, design and programming can affect the nature of solutions to complex computational problems and their fitness for purpose.

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 (2014) and relate to the typical student. Additionally, the SEEC Credit Level Descriptors for Further and Higher Education (2016) have been used as a guiding framework for curriculum design.

Knowledge and Understanding:	Teaching/learning methods and strategies	Assessment
MSc Artificial Intelligence and Robotics graduates should have knowledge and understanding of: A1. The distinctive features of a variety of problem-solving paradigms within the sub-discipline area of Artificial Intelligence and Robotics Advanced principles and their practical implementation, underlying developments in Artificial Intelligence. **MSc Computer Networks and Systems Security graduates should have knowledge and understanding of:** A2. The complex interaction between different components in current and developing network technologies. A3. A range of leading-edge tools and techniques that can be used in developing and managing a network application/system. A4. The issues and problems of importance in the design and deployment of networks and distributed systems. A5. How research in the area of distributed systems and networks may be applied to modern computer systems and applications. **MSc Cyber Security graduates should have knowledge and understanding of:** A6. The fundamental and advanced aspects of cyber security in terms of theory, practice, policy and security standard to enable critical cyber security decision marking. A7. The extant threats to current and emerging systems and networks and the effective countermeasures to such threats in compliance with information security management standards. A8. The social, legal and ethical issues relating to cyber security in the context of secure system design	Acquisition of knowledge and understanding is through a combination of, initially, lecturer-led presentation of specific topics using lectures, tutorials and practical classes and later increasingly via guided reading among specialist textbooks and journals as the means of acquainting students with topics at the forefront of the discipline. Students are progressively expected to integrate 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, principles and methods in particular contexts, developing their understanding of these independently. There is a module in which investigative 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. The optional industrial placement provides the opportunity to contextualise knowledge and understanding in a working environment, and to develop through interaction with professionals in the discipline. 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. A20 is achieved through the full-time, industry work placement	Testing of knowledge and understanding is through a combination of in-course assessment and unseen examinations for taught modules, as deemed appropriate for the subject knowledge and skills under assessment. The capstone is a major project, in which knowledge and understanding must be evidenced, and must be shown to be applied in the context of a substantial piece of independent investigative and/or development work (depending upon the award being sought). The principal assessment of project outcomes is via a dissertation, which would normally include a review of relevant literature. To achieve A20, students on the Sandwich award reflect on knowledge gained from the placement: reconsidering theory in light of practice, the transferable skills that they have enhanced, and goals for further professional development.

and programming, information security management, penetrating testing and cyber operations

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

A9. The fundamental mathematical ideas behind data science and relevant computational algorithms and the fundamentals of probability, information and statistical methods.
A10. The principles and practice of obtaining data from various sources, the essential methods for data pre-processing and cleaning, and data visualisation.
A11. The underlying ethical and legal issues and constraints on the holding and the use of data.

MSc Software Engineering graduates should have knowledge and understanding of:

A12. The complex relationships between models of software engineering processes and the artefacts produced by such processes.
A13. The role of estimation and measurement in making effective technical decisions in the software engineering process.
A14. The leading-edge technical practices implemented within software engineering processes.

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

A15. The relationships between computational problems and the choice of programming paradigm to solve them.
A16. At least two specialist topics of computer science to advanced depth.

MSc Computer Science graduates should have knowledge and understanding of:

A17. Fundamental computer science concepts and how they may be applied to the solution of

experienced by students on the 'Sandwich' award.

complex problems from within and outside computer science. A18. Principles and practices of software development methodologies. **For all MSc Awards, students should be able to:** A19. Critically evaluate and reflect on professional, social, legal and ethical issues related to contemporary practices in computer science. For all **Sandwich Awards, students should be able to:** A20. Build contextual knowledge of practical and operational aspects of a CS or IT related role through a substantive work placement experience.		
Intellectual skills:	Teaching/learning methods and strategies	Assessment
MSc Artificial Intelligence and Robotics students should be able to: B1. Use and critically evaluate methods currently employed in fields covered by this route, such as neural computing, intelligent agents systems, robotics and artificial life. **MSc Computer Networks and Systems Security students should be able to:** B2. Use and critically evaluate a range of tools in designing and managing networks. B3. Critically evaluate the implications of different design and configuration decisions for particular scenarios. **MSc Cyber Security students should be able to:** B4. Identify and critically evaluate vulnerabilities of and threats to the security and integrity of distributed systems. B5. Conduct and manage a comprehensive risk assessment of the distributed systems in a	Intellectual skills are developed through 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. Throughout, the learner is encouraged to develop intellectual skills further by independent study.	Domain-specific Intellectual skills are assessed through in-course assignments and the project, but also indirectly through unseen examinations where understanding developed through activity relying on these skills is required.

complex and unpredictable environment. **MSc Data Science and Analytics students should be able to:** B6. 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. **MSc Software Engineering students should be able to:** B7. Produce models of software engineering processes and artefacts using appropriate modelling techniques. B8. Apply measures to software engineering processes and artefacts and use the data produced to evaluate software engineering activities. **MSc Advanced Computer Science students should be able to:** B9. Use and critically evaluate a range of methods and tools currently employed in at least two specialist topics of computer science to advanced depth. **MSc Computer Science students should be able to:** B10. Use and critically evaluate a range of methods and tools currently employed in the design and/or development of computer systems to solve problems from within or without computer science.		
Practical skills:	Teaching/learning methods and strategies	Assessment
MSc Artificial Intelligence and Robotics students should be able to: C1. Carry out a significant independent investigation as part of their project, typically including software development.	Practical skills are developed through 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,	Domain-specific practical abilities are assessed directly through in-course assignments and the project, but also indirectly through unseen examinations where understanding developed through activity relying on these skills is required.

MSc Computer Networks and Systems Security students should be able to:

C2. Apply the methods of computer science to various aspects of the analysis, design, implementation and evaluation of a range of networking technologies.
C3. Individually pursue an investigation into an agreed area of study relating to networking, distributed systems, or system security.

MSc Cyber Security students should be able to:

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C4. 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.
C5. 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:

C6. Apply a commonly used data science software framework that provides the essential algorithms for data visualisation and analytics for various use cases.
C7. Individually pursue an investigation into an agreed area of study relating to data science and analytics.

MSc Software Engineering students should be able to:

C8. Apply and critically evaluate appropriate software engineering practices with account taken of the contextual limitations of specific software development environments.
C9. Individually pursue an investigation into an agreed area of study relating to software engineering, typically including software development.

where they are guided by one-to-one supervision from a member of the academic staff.

The optional industrial work placement provides the opportunity to enhance the development of computing related practical abilities through interaction with professionals in the discipline.

Planning, analysis and design activities 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 mastery of the computing-related practical abilities relevant to their award.

MSc Advanced Computer Science students should be able to: C10. 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:** C11. Plan, execute, monitor and reflect upon a substantial piece of independent development work or experimentation solving problems from within or without computer science.		
Transferable skills:	Teaching/learning methods and strategies	Assessment
D1. Undertake a substantial piece of practical work at postgraduate level, independent of close supervision. D2. Evaluate and make critical use of relevant academic and technical literature. D3. Utilise their knowledge in practical applications. D4. Build upon and extend their knowledge with a minimum of guidance. D5. Express themselves knowledgably and coherently, both in writing and orally. D6. Explain, justify and otherwise defend their work and ideas, both in its specific details and within a broader context. D7. Examine and apply advanced skills in computer science research.	Transferable skills are developed through the programme by the following: Skill D1 is developed through the final project and supporting lectures. Skill D2 is developed through guided reading, coursework assignments, the final project and supporting lectures. Skill D3 is developed through coursework assignments and the final project. Skill D4 is developed through coursework assignments and the final project. Skill D5 is developed through coursework assignments and the final project. The optional industrial placement period offers enhanced opportunities for developing either a wider range of skills, or developing specific skills to higher levels of proficiency. Students on the 'with Advanced Research' award study 'Advanced Research Topics in Computer Science' and 'Research Methods' in their second year, alongside their dissertation. These two	Transferable skills are assessed through the following: Skill D1 is assessed through the final project. Skill D2 is assessed through examinations, coursework assignments and the final project. Skill D3 is assessed through coursework assignments and the final project. Skill D4 is assessed through examinations, coursework assignments and the final project. Skill D5 is assessed through examinations, coursework assignments and the final project. Skill D6 is assessed through coursework assignments and the final project. Skill D7 is assessed by coursework assignments in 'Advanced Research Topics in Computer Science' and 'Research Methods', requiring students to demonstrate knowledge in a variety of advanced research and skills

	double modules provide a strong grounding in application of research and analysis, project management, and soft skills including creative problem solving. Students are encouraged to develop transferable skills by maintaining a record of evidence and completing a personal development plan.	areas through portfolio assessment.

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

The programme is offered in 1-year full-time (12 or 16 months), 2-year sandwich (24 months), part-time (up to 32 months) modes. In addition, the programme also offers 2-year full time (24 months) 'with Advanced Research' awards. The study on the programme leads to the award of:

The Standard Awards
MSc Artificial Intelligence and Robotics
MSc Computer Networks and Systems Security
MSc Cyber Security
MSc Data Science and Analytics
MSc Software Engineering
MSc Advanced Computer Science
MSc Computer Science

The duration of 1-year full time programmes, in full-time study mode is 12 months for Semester A (September) entrants and 16 months for Semester B (January) entrants. Part time students can take up to 32 months to complete the study.

The Sandwich Awards
MSc Artificial Intelligence and Robotics (sandwich)
MSc Computer Networks and Systems Security (sandwich)
MSc Cyber Security (sandwich)
MSc Data Science and Analytics (sandwich)
MSc Software Engineering (sandwich)
MSc Advanced Computer Science (sandwich)

* Note: Sandwich award is NOT available for MSc Computer Science

The duration of sandwich programmes, which incorporates a substantive work placement, in full-time study mode is 24 months for Semester A (September) entrants and 24 months for Semester B (January) entrants. Sandwich awards are for full time study only.

The 'with Advanced Research' Awards
MSc Artificial Intelligence and Robotics with Advanced Research
MSc Computer Networks and Systems Security with Advanced Research
MSc Cyber Security with Advanced Research
MSc Data Science and Analytics with Advanced Research
MSc Software Engineering with Advanced Research
MSc Advanced Computer Science with Advanced Research

* Note: the 'with Advanced Research' award is NOT available for MSc Computer Science

The duration of programmes with advanced research, which incorporates a second year of modules on advanced research and longer period of MSc dissertation, is 24 months for Semester A (September) entrants and 24 months for Semester B (January) entrants. Awards with advanced research are for full time study only.

Entry is normally at Masters (level 7) with related and appropriate degree qualifications. Intake is normally Semester A (September) and Semester B (January).

Professional and Statutory Regulatory Bodies

The previous incarnation of this programme and its awards achieved accreditation from the BCS (British Computer Society) as shown in the table below.

Award Title (for all study modes including full-time, sandwich and part-time)	BCS Accreditation in previous incarnation of this programme
MSc Artificial Intelligence and Robotics	Accredited by BCS, accredited under the award title **MSc Artificial Intelligence with Robotics** as below. Accredited by BCS, The Chartered Institute for IT for the purposes of fully meeting the further learning academic requirement for registration as a Chartered IT Professional. Accredited by BCS, The Chartered Institute for IT on behalf of the Engineering Council for the purposes of partially meeting the academic requirement for registration as a Chartered Engineer.
MSc Software Engineering **MSc Advanced Computer Science**	Accredited by BCS, The Chartered Institute for IT for the purposes of fully meeting the further learning academic requirement for registration as a Chartered IT Professional Accredited by BCS, The Chartered Institute for IT on behalf of the Engineering Council for the purposes of partially meeting the academic requirement for registration as a Chartered Engineer.
MSc Computer Networks and Systems Security	Accredited by BCS, accredited under the award title **MSc Computer Networking Principles and Practice** as below. Accredited by BCS, The Chartered Institute for IT for the purposes of fully meeting the further learning academic requirement for registration as a Chartered IT Professional Accredited by BCS, The Chartered Institute for IT on behalf of the Engineering Council for the purposes of partially meeting the academic requirement for registration as a Chartered Engineer.
MSc Cyber Security	Not accredited: The department is currently in touch with the BCS regarding accreditation.
MSc Data Science and Analytics	Not accredited: The department is currently in touch with the BCS regarding accreditation.
MSc Computer Science	Accredited by BCS, The Chartered Institute for IT for the purposes of partially meeting the academic requirement for registration as a Chartered IT Professional.

This new version of the programme has been carefully designed to achieve appropriate levels of accreditation, and the department is currently in touch with the BCS regarding continued accreditation.

Work-Based Learning, including Sandwich Programmes

A sandwich award requires the successful completion of at least 30 weeks full-time equivalent placement activity from a maximum of two separate approved placements, neither of which will be normally less than 12 weeks in duration as defined in UPR AS11. Students are supported by the Careers and Placements Office in finding a placement.

Programme Structure

The programme structure and progression information below (Table 1a and 1b) 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

The programme structure and progression information below (Table 1a and 1b) is provided for the MSc award. Any interim awards are identified in Table 1b.

Module Title **Taught Modules**	**Module Code**	**Credit Points**	**Language of Delivery**	**% Examination**	**% Coursework**	**% Practical**	**Semester**
Artificial Life with Robotics	7COM1032	30	English	0	100	0	A
Theory and Practice of Artificial Intelligence	7COM1034	30	English	0	100	0	B
Neural Networks and Machine Learning	7COM1033	30	English	0	100	0	B
Data Mining	7COM1018	15	English	0	100	0	A, B
Applied Data Science and Analytics	7COM1074	15	English	0	100	0	A, B
Foundations of Data Science	7COM1073	30	English	0	100	0	A, B
				0	100	0	
Wireless Mobile and Multimedia Networking	7COM1076	30	English	0	100	0	A
Network System Administration	7COM1029	15	English	0	100	0	B
Secure Systems Programming	7COM1028	15	English	0	50	50	B
Distributed Systems Security	7COM1027	30	English	100	0	0	B
Penetration Testing	7COM1068	15	English	0	100	0	B
Digital Forensics	7COM1067	15	English	0	100	0	B
Cyber Operations	7COM1069	15	English	0	100	0	A
Information Security Management and Compliance	7COM1066	15	English	0	100	0	A
				0	100	0	
Measures and Models for Software Engineering	7COM1024	30	English	0	100	0	A
Software Engineering Practice and Experience	7COM1026	30	English	0	80	20	B
Programming for Software Engineers	7COM1025	30	English	0	100	0	B
				0	100	0	
Computational Algorithms and Paradigms	7COM1078	30	English	0	100	0	B
				0	100	0	
Team Research and Development Project	7COM1079	15	English	0	100	0	A
Legal and Ethical Practice Exercise	7COM1080	15	English	0	100	0	A
				0	100	0	
Advanced Research Topics in Computer Science	7COM1084	30	English	0	100	0	A, B
Research Methods	7COM1085	30	English	0	100	0	B, C
				0	100	0	
Programming and Program Design	7COM1015	30	English	0	100	0	A
Operating Systems and Networks	7COM1012	15	English	0	100	0	A
Computer Architectures	7COM1013	15	English	0	100	0	B
Multi-User Database Systems	7COM1082	15	English	0	50	50	B
Software Development Exercise	7COM1081	30	English	0	100	0	B

Note: 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 control of the School, such as key staff becoming unavailable. However, these circumstances are exceptional and disruption to any student's programme will be kept to a minimum.

Sandwich Placement
Students enrolled on the sandwich version of their award will be enrolled on a zero credited module (7COM1064) during the Semester before they go for placement to prepare them for a placement, and support their efforts in securing an appropriate placement.

Module Title Taught Module	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semester
Preparation for Placement	7COM1064	0	English	0	100	0	B
Professional Work Placement for MSc Computer Science	7COM1065	0	English	0	100	0	CAB

Entry point	Study Plan
Semester A (September) Sandwich Entrants	Students will be enrolled on the 7COM1064 Preparation for Placement in Semesters B. The period of placement may only occur between the taught elements of the programme and the final Masters project period. The placement period will normally begin immediately after the end of Semester B (end of May) in the academic year of starting the programme and end just before Semester C (end of May) of the subsequent year. Immediately following the placement, students return to study for the final Masters project.
Semester B (January) Sandwich Entrants	Students will be enrolled on the 7COM1064 Preparation for Placement in Semester B. The period of placement may only occur between the first semester of taught modules and the final Masters project period. The placement period will normally begin immediately after the end of Semester B (end of May) in the academic year of starting the programme and end just before Semester C (end of May) of the subsequent year. Immediately following the placement, students return to study for the final Masters project, followed by their second semester of taught modules.

Module Title Project modules	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semester
Artificial Intelligence and Robotics Masters Project	7COM1086	60	English	0	100	0	A, B, C, AB, BC, CA
Computer Networks and Systems Security Masters Project	7COM1077	60	English	0	100	0	A, B, C, AB, BC, CA
Cyber Security Masters Project	7COM1070	60	English	0	100	0	A, B, C, AB, BC, CA
Data Science and Analytics Masters Project	7COM1075	60	English	0	100	0	A, B, C, AB, BC, CA
Software Engineering Masters Project	7COM1038	60	English	0	100	0	A, B, C, AB, BC, CA
Advanced Computer Science Masters Project	7COM1039	60	English	0	100	0	A, B, C, AB, BC, CA
Computer Science Masters Project	7COM1040	60	English	0	100	0	A, B, C, AB, BC

Some modules are compulsory for certain awards as detailed in Table 1c, Table 1d, and Table 1e in this Section and Section 2 (Programme-specific assessment regulations).

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

The programme provides the following final and interim awards shown in Table 1b.

Table 1b Final and Interim Awards Available

Award	Minimum requirements	Available at end of (normally)	Programme Learning Outcomes developed (see above)
Postgraduate Certificate (untitled)	60 credit points, including at least 45 at Level 7	1-2 Semesters	See UPR AS11, section 13: http://sitem.herts.ac.uk/secreg/upr/AS11.htm
Postgraduate Diploma Artificial Intelligence and Robotics	120 credit points, including at least 90 at level 7	2-3 Semesters	A1, A16, A19, B1, D2, D3, D4, D5, D6
Postgraduate Diploma Computer Networks and Systems Security			A2, A3, A4, A5, A16, A19, B2, B3, C2, D2, D3, D4, D5, D6
Postgraduate Diploma Cyber Security			A6, A7, A8, A16, A19, B4, B5, C4, D2, D3, D4, D5, D6
Postgraduate Diploma Data Science and Analytics			A9, A10, A11, A16, A19 B6, C6, D2, D3, D4, D5, D6
Postgraduate Diploma Software Engineering			A12, A13, A14, A16, A19, B7, B8, C8, D2, D3, D4, D5, D6

Postgraduate Diploma Advanced Computer Science			A15, A16, A19, B9, D2, D3, D4, D5, D6
Postgraduate Diploma Computer Science			A17, A18, A19, B10, D2, D3, D4, D5, D6
MSc Artificial Intelligence and Robotics	180 credit points including at least 150 at level 7	3 Semesters for Semester A (September) entrants. 1 Semester plus vacation plus 2 further Semesters for Semester B (January) entrants	A1, A16, A19, B1, C1, D1, D2, D3, D4, D5, D6
MSc Computer Networks and Systems Security			A2, A3, A4, A5, A16, A19, B2, B3, C2, C3 D1, D2, D3, D4, D5, D6
MSc Cyber Security			A6, A7, A8, A16, A19, B4, B5, C4, C5 D1, D2, D3, D4, D5, D6
MSc Data Science and Analytics			A9, A10, A11, A16, A19 B6, C6, C7 D1, D2, D3, D4, D5, D6
MSc Software Engineering			A12, A13, A14, A16, A19, B7, B8, C8, C9 D1, D2, D3, D4, D5, D6
MSc Advanced Computer Science			A15, A16, A19, B9, C10, D1, D2, D3, D4, D5, D6
MSc Computer Science			A17, A18, A19, B10, C11, D1, D2, D3, D4, D5, D6
MSc Artificial Intelligence and Robotics (sandwich)	180 credit points including at least 150 at level 7, and a year's approved and satisfactory industrial placement.	2 Semesters plus 1 year's placement plus a further Semester for Semester A (September) entrants 1 Semesters plus 1 year's placement plus two further Semesters for Semester B (January) entrants	A1, A16, A19, A20 B1, C1, D1, D2, D3, D4, D5, D6
MSc Computer Networks and Systems Security (sandwich)			A2, A3, A4, A5, A16, A19, A20 B2, B3, C2, C3 D1, D2, D3, D4, D5, D6
MSc Cyber Security (sandwich)			A6, A7, A8, A16, A19, A20 B4, B5, C4, C5 D2, D3, D4, D5, D6
MSc Data Science and Analytics (sandwich)			A9, A10, A11, A16, A19, A20 B6, C6, C7 D1, D2, D3, D4, D5, D6
MSc Software Engineering (sandwich)			A12, A13, A14, A16, A19, A20 B7, B8, C8, C9 D1, D2, D3, D4, D5, D6
MSc Advanced Computer Science (sandwich)			A15, A16, A19, A20 B9, C10, D1, D2, D3, D4, D5, D6
MSc Artificial Intelligence and Robotics with Advanced Research	180 credit points including at least 150 at level 7, and passing the module Advanced Research Topics in Computer Science (30	2 Years' programme which incorporates a second year of modules on advanced research and a double Semesters of MSc dissertation	A1, A16, A19, B1, C1, D1, D2, D3, D4, D5, D6, D7
MSc Computer Networks and Systems Security with Advanced Research			A2, A3, A4, A5, A16, A19, B2, B3, C2, C3 D1, D2, D3, D4, D5, D6, D7
MSc Cyber Security with Advanced Research			A6, A7, A8, A16, A19, B4, B5, C4, C5 D1, D2, D3, D4, D5, D6, D7

MSc Data Science and Analytics with Advanced Research	credits) and Research Methods (30 credits).		A9, A10, A11, A16, A19 B6, C6, C7 D1, D2, D3, D4, D5, D6, D7
MSc Software Engineering with Advanced Research			A12, A13, A14, A16, A19, B7, B8, C8, C9 D1, D2, D3, D4, D5, D6, D7
MSc Advanced Computer Science with Research			A15, A16, A19, B9, C10, D1, D2, D3, D4, D5, D6, D7

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.

Modules on Offer for Each Award:

Table 1c, 1d, and 1e below show the modules on offer for each award for different study mode:

Subject to availability, and with the prior approval of both the Programme Leader and the Chair of the Board of Examiners, a student may substitute up to 30 credits of modules with 30 credits of equivalent modules from the MSc Computer Science on-line programme (EIMASTW).

With the prior approval of both the Programme Leader and the Chair of the Board of Examiners, students on specialist awards 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.

Key to terminology used in Tables 1c, 1d and 1e

Awards	**MAIR** = MSc Artificial Intelligence and Robotics; **MCNSS** = MSc Computer Networks and Systems Security; **MCYS =** MSc Cyber Security; **MDSA =** MSc Data Science and Analytics; **MSE** = MSc Software Engineering; **MACS** = MSc Advanced Computer Science; **MCS** = MSc Computer Science
Core	A module that is compulsory.
Elective	An optional module for an award as prescribed in the table.
X	A prohibited module for an award.

Table 1c Modules on Offer for Each Award for the Standard Masters Awards

Module Titles (credit points)	The Standard Masters Awards (1-year full time route and part time route)						
	MAIR	MSDA	MCNSS	MCYS	MSE	MACS[1]	MCS
A. Taught Modules							
Theory and Practice of Artificial Intelligence	**Core**	X	X	X	X	*Elective*	X
Artificial Life with Robotics	**Core**	X	X	X	X	*Elective*	X
Neural Networks and Machine Learning	**Core**	**Core**	X	X	X	*Elective*	X
Data Mining	X	**Core**	X	X	X	*Elective*	X
Applied Data Science and Analytics	X	**Core**	X	X	X	*Elective*	X
Foundations of Data Science	X	**Core**	X	X	X	*Elective*	X
Wireless Mobile and Multimedia Networking	X	X	**Core**	X	X	*Elective*	X
Network System Administration	X	X	**Core**	X	X	*Elective*	X
Secure Systems Programming	X	X	**Core**	X	X	*Elective*	X
Distributed Systems Security	X	X	**Core**	**Core**	X	*Elective*	X
Cyber Operations	X	X	X	**Core**	X	*Elective*	X
Penetration Testing	X	X	X	**Core**	X	*Elective*	X
Information Security Management and Compliance	X	X	X	**Core**	X	*Elective*	X
Digital Forensics	X	X	X	**Core**	X	*Elective*	X
Software Engineering Practice and Experience	X	X	X	X	**Core**	*Elective*	X
Programming for Software Engineers	X	X	X	X	**Core**	*Elective*	X
Measures and Models for Software Engineering	X	X	X	X	**Core**	*Elective*	X
Computational Algorithms and Paradigms	X	X	X	X	X	**Core**	X
Team Research and Development Project	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**	X
Legal and Ethical Practice Exercise	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**
Programming and Program Design	X	X	X	X	X	X	**Core**
Multi-User Database Systems	X	X	X	X	X	X	**Core**
Computer Architectures	X	X	X	X	X	X	**Core**
Operating Systems and Networks	X	X	X	X	X	X	**Core**
Software Development Exercise	X	X	X	X	X	X	**Core**
B. Project Modules (each 60 credits)							
Artificial Intelligence with Robotics Masters Project	**Core**	X	X	X	X	X	X
Data Science and Analytics Masters Project	X	**Core**	X	X	X	X	X
Computer Networks and Systems Security Masters Project	X	X	**Core**	X	X	X	X
Cyber Security Masters Project	X	X	X	**Core**	X	X	X
Software Engineering Masters Project	X	X	X	X	**Core**	X	X
Advanced Computer Science Masters Project	X	X	X	X	X	**Core**	X
Computer Science Masters Project	X	X	X	X	X	X	**Core**

[1] For students on the Advanced Computer Science route, **7COM1073 Foundations of Data Science** will be their first default elective module. Students will have an opportunity to select a module other than 7COM1073 Foundations of Data Science up to the end of the first teaching week.

Table 1d Modules on Offer for Each Award for the 2-year Sandwich Masters Awards

Module Titles (credit points)	Masters Awards (Sandwich) (2-year full time routes)					
	MAIR sandwich	MSDA sandwich	MCNSS sandwich	MCYS sandwich	MSE sandwich	MACS[2] sandwich
Theory and Practice of Artificial Intelligence	**Core**	X	X	X	X	*Elective*
Artificial Life with Robotics	**Core**	X	X	X	X	*Elective*
Neural Networks and Machine Learning	**Core**	**Core**	X	X	X	*Elective*
Data Mining	X	**Core**	X	X	X	*Elective*
Applied Data Science and Analytics	X	**Core**	X	X	X	*Elective*
Foundations of Data Science	X	**Core**	X	X	X	*Elective*
Wireless Mobile and Multimedia Networking	X	X	**Core**	X	X	*Elective*
Network System Administration	X	X	**Core**	X	X	*Elective*
Secure Systems Programming	X	X	**Core**	X	X	*Elective*
Distributed Systems Security	X	X	**Core**	**Core**	X	*Elective*
Cyber Operations	X	X	X	**Core**	X	*Elective*
Penetration Testing	X	X	X	**Core**	X	*Elective*
Information Security Management and Compliance	X	X	X	**Core**	X	*Elective*
Digital Forensics	X	X	X	**Core**	X	*Elective*
Software Engineering Practice and Experience	X	X	X	X	**Core**	*Elective*
Programming for Software Engineers	X	X	X	X	**Core**	*Elective*
Measures and Models for Software Engineering	X	X	X	X	**Core**	*Elective*
Computational Algorithms and Paradigms	X	X	X	X	X	**Core**
Team Research and Development Project	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**
Legal and Ethical Practice Exercise	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**
Programming and Program Design	X	X	X	X	X	X
Multi-User Database Systems	X	X	X	X	X	X
Computer Architectures	X	X	X	X	X	X
Operating Systems and Networks	X	X	X	X	X	X
Software Development Exercise	X	X	X	X	X	X
B. Project Modules (each 60 credits)						
Artificial Intelligence with Robotics Masters Project	**Core**	X	X	X	X	X
Data Science and Analytics Masters Project	X	**Core**	X	X	X	X
Computer Networks and Systems Security Masters Project	X	X	**Core**	X	X	X
Cyber Security Masters Project	X	X	X	**Core**	X	X
Software Engineering Masters Project	X	X	X	X	**Core**	X
Advanced Computer Science Masters Project	X	X	X	X	X	**Core**

[2] For students on the Advanced Computer Science route, **7COM1073 Foundations of Data Science** will be their first default elective module. Students will have an opportunity to select a module other than 7COM1073 Foundations of Data Science up to the end of the first teaching week.

C. Placement Modules (each zero credit)						
Preparation for Placement	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**
Professional Work Placement for MSc Computer Science	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**

Table 1e Modules on Offer for Each Award for the 2-year Masters' Awards with Advanced Research

Module Titles (credit points)	Masters Awards with Advanced Research (2-year full time routes)					
	MAIR with AR	MSDA with AR	MCNSS with AR	MCYS with AR	MSE with AR	MACS with AR[3]
A. Taught Modules						
Theory and Practice of Artificial Intelligence	**Core**	X	X	X	X	*Elective*
Artificial Life with Robotics	**Core**	X	X	X	X	*Elective*
Neural Networks and Machine Learning	**Core**	**Core**	X	X	X	*Elective*
Data Mining	X	**Core**	X	X	X	*Elective*
Applied Data Science and Analytics	X	**Core**	X	X	X	*Elective*
Foundations of Data Science	X	**Core**	X	X	X	*Elective*
Wireless Mobile and Multimedia Networking	X	X	**Core**	X	X	*Elective*
Network System Administration	X	X	**Core**	X	X	*Elective*
Secure Systems Programming	X	X	**Core**	X	X	*Elective*
Distributed Systems Security	X	X	**Core**	**Core**	X	*Elective*
Cyber Operations	X	X	X	**Core**	X	*Elective*
Penetration Testing	X	X	X	**Core**	X	*Elective*
Information Security Management and Compliance	X	X	X	**Core**	X	*Elective*
Digital Forensics	X	X	X	**Core**	X	*Elective*
Software Engineering Practice and Experience	X	X	X	X	**Core**	*Elective*
Programming for Software Engineers	X	X	X	X	**Core**	*Elective*
Measures and Models for Software Engineering	X	X	X	X	**Core**	*Elective*
Computational Algorithms and Paradigms	X	X	X	X	X	**Core**
Team Research and Development Project	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**
Legal and Ethical Practice Exercise	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**
B. Project Modules (each 60 credits)						
Artificial Intelligence with Robotics Masters Project	**Core**	X	X	X	X	X
Data Science and Analytics Masters Project	X	**Core**	X	X	X	X
Computer Networks and Systems Security Masters Project	X	X	**Core**	X	X	X
Cyber Security Masters Project	X	X	X	**Core**	X	X
Software Engineering Masters Project	X	X	X	X	**Core**	X
Advanced Computer Science Masters Project	X	X	X	X	X	**Core**
C. Advanced Research Modules (each 30 credits)						
Advanced Research Topics in Computer Science	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**
Research Methods	**Core**	**Core**	**Core**	**Core**	**Core**	**Core**

The study patterns for each award and their mode of study are presented below.

[3] For students on the Advanced Computer Science route, **7COM1073 Foundations of Data Science** will be their first default elective module. Students will have an opportunity to select a module other than 7COM1073 Foundations of Data Science up to the end of the first teaching week.

MSc Artificial Intelligence and Robotics: Study Pattern of Semester A Entry, Full time

MSc Artificial Intelligence and Robotics (1-year) full time SA entry	**YEAR 1 (180 credits)**					
	SEMESTER A	**SEMESTER B**	**SEMESTER C**			
	7COM1032 Artificial Life with Robotics (30 credits)	**7COM1034 Theory and Practice of Artificial Intelligence (30 credits)**	**7COM1086 AIR Masters Projects (60 credits)**			
	7COM1079 Team Research and Development Project (15 credits)	**7COM1033 Neural Networks & Machine Learning (30 credits)**				
	7COM1080 Legal and Ethical Practice Exercise (15 credits)					
MSc Artificial Intelligence and Robotics (sandwich) (2-year) full time SA entry	**YEAR 1 (120 credits and placement)**			**YEAR 2 Year 2 (placement and 60 credits)**		
	SEMESTER A	**SEMESTER B**	**SEMESTER C**	**SEMESTER A**	**SEMESTER B**	**SEMESTER C**
	7COM1032 Artificial Life with Robotics (30 credits)	**7COM1034 Theory and Practice of Artificial Intelligence (30 credits)**	**7COM1065 Professional Work Placement (zero credit)**			**7COM1086 AIR Masters Projects (60 credits)**
	7COM1079 Team Research and Development Project (15 credits)	**7COM1033 Neural Networks & Machine Learning (30 credits)**				
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	**7COM1064 Preparation for placement (zero credit)**				
MSc Artificial Intelligence and Robotics with Advanced Research (2-year) full time SA entry	**YEAR 1 (120 credits)**			**YEAR 2 (120 credits)**		
	SEMESTER A	**SEMESTER B**	**SEMESTER C**	**SEMESTER A**	**SEMESTER B**	**SEMESTER C**
	7COM1032 Artificial Life with Robotics (30 credits)	**7COM1034 Theory and Practice of Artificial Intelligence (30 credits)**	**VACATION PERIOD**	**7COM1084 Advanced Research Topics in CS (30 credits)**	**7COM1085 Research Methods (30 credits)**	
	7COM1079 Team Research and Development Project (15 credits)	**7COM1033 Neural Networks & Machine Learning (30 credits)**			**AIR Masters Projects (60 credits)**	
	7COM1080 Legal and Ethical Practice Exercise (15 credits)					

MSc Artificial Intelligence and Robotics: Study Pattern of Semester B Entry, Full time

<table>
<tr><td rowspan="4">MSc Artificial Intelligence and Robotics (1-year) full time SB entry</td><td colspan="2">YEAR 1 (half year, 60 credits)</td><td></td><td colspan="2">YEAR 2 (120 credits)</td><td></td></tr>
<tr><td>SEMESTER A</td><td>SEMESTER B</td><td>SEMESTER C</td><td>SEMESTER A</td><td>SEMESTER B</td><td></td></tr>
<tr><td></td><td>7COM1034 Theory and Practice of Artificial Intelligence (30 credits)</td><td rowspan="3">VACATION PERIOD</td><td>7COM1032 Artificial Life with Robotics (30 credits)</td><td rowspan="3">7COM1086 AIR Masters Projects (60 credits)</td><td></td></tr>
<tr><td></td><td>7COM1033 Neural Networks & Machine Learning (30 credits)</td><td>7COM1079 Team Research and Development Project (15 credits)</td><td></td></tr>
<tr><td></td><td></td><td>7COM1080 Legal and Ethical Practice Exercise (15 credits)</td><td></td></tr>
<tr><td rowspan="4">MSc Artificial Intelligence and Robotics (sandwich) (2-year) full time SB entry</td><td colspan="2">YEAR 1 (half year, 60 credits)</td><td colspan="3">YEAR 2 (placement)</td><td>YEAR 3 (120 credits)</td></tr>
<tr><td>SEMESTER A</td><td>SEMESTER B</td><td>SEMESTER C</td><td>SEMESTER A</td><td>SEMESTER B</td><td>SEMESTER C</td><td>SEMESTER A</td></tr>
<tr><td></td><td>7COM1034 Theory and Practice of Artificial Intelligence (30 credits)</td><td rowspan="3">7COM1065 Professional Work Placement (zero credit)</td><td rowspan="3">7COM1086 AIR Masters Projects (60 credits)</td><td>7COM1032 Artificial Life with Robotics (30 credits)</td></tr>
<tr><td></td><td>7COM1033 Neural Networks & Machine Learning (30 credits)</td><td>7COM1079 Team Research and Development Project (15 credits)</td></tr>
<tr><td></td><td>7COM1064 Preparation for placement (zero credit)</td><td>7COM1080 Legal and Ethical Practice Exercise (15 credits)</td></tr>
<tr><td rowspan="4">MSc Artificial Intelligence and Robotics with Advanced Research (2-year) full time SA entry</td><td colspan="2">YEAR 1 (half year, 60 credits)</td><td colspan="2">YEAR 2 (120 credits)</td><td>YEAR 3 (half year, 60 credi</td></tr>
<tr><td>SEMESTER A</td><td>SEMESTER B</td><td>SEMESTER C</td><td>SEMESTER A</td><td>SEMESTER B</td><td>SEMESTER C</td><td>SEMESTER A</td></tr>
<tr><td></td><td>7COM1034 Theory and Practice of Artificial Intelligence (30 credits)</td><td rowspan="3">VACATION PERIOD</td><td>7COM1032 Artificial Life with Robotics (30 credits)</td><td rowspan="3">7COM1084 Advanced Research Topics in CS (30 credits)</td><td>7COM1085 Research Methods (30 credits)</td></tr>
<tr><td></td><td>7COM1033 Neural Networks & Machine Learning (30 credits)</td><td>7COM1079 Team Research and Development Project (15 credits)</td><td rowspan="2">7COM1086 AIR Masters Projects (60 credits)</td></tr>
<tr><td></td><td></td><td>7COM1080 Legal and Ethical Practice Exercise (15 credits)</td></tr>
</table>

MSc Computer Networks and Systems Security: Study Pattern of Semester A Entry, Full time

<table>
<tr><td rowspan="5">MSc Computer Networks and Systems Security (1-year) full time SA entry</td><td colspan="2">YEAR 1 (180 credits)</td><td></td></tr>
<tr><td>SEMESTER A</td><td>SEMESTER B</td><td>SEMESTER C</td></tr>
<tr><td>7COM1076 Wireless, Mobile and Multimedia Networking (30 credits)</td><td>7COM1027 Distributed Systems Security (30 credits)</td><td rowspan="3">7COM1077 CNSS Masters Projects (60 credits)</td></tr>
<tr><td>7COM1079 Team Research and Development Project (15 credits)</td><td>7COM1028 Secure Systems Programming (15 credits)</td></tr>
<tr><td>7COM1080 Legal and Ethical Practice Exercise (15 credits)</td><td>7COM1029 Network System Administration (15 credits)</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td rowspan="5">MSc Computer Networks and Systems Security (sandwich) (2-year) full time SA entry</td><td colspan="3">YEAR 1 (120 credits and placement)</td><td colspan="3">YEAR 2 Year 2 (placement and 60 credits)</td></tr>
<tr><td>SEMESTER A</td><td>SEMESTER B</td><td>SEMESTER C</td><td>SEMESTER A</td><td>SEMESTER B</td><td>SEMESTER C</td></tr>
<tr><td>7COM1076 Wireless, Mobile and Multimedia Networking (30 credits)</td><td>7COM1027 Distributed Systems Security (30 credits)</td><td rowspan="3" colspan="3">7COM1065 Professional Work Placement (zero credit)</td><td rowspan="3">7COM1077 CNSS Masters Projects (60 credits)</td></tr>
<tr><td>7COM1079 Team Research and Development Project (15 credits)</td><td>7COM1028 Secure Systems Programming (15 credits)</td></tr>
<tr><td rowspan="2">7COM1080 Legal and Ethical Practice Exercise (15 credits)</td><td>7COM1029 Network System Administration (15 credits)</td></tr>
<tr><td></td><td>7COM1065 Preparation for placement (zero credit)</td></tr>
<tr><td colspan="7"></td></tr>
<tr><td rowspan="5">MSc Computer Networks and Systems Security with Advanced Research (2-year) full time SA entry</td><td colspan="3">YEAR 1 (120 credits)</td><td colspan="3">YEAR 2 (120 credits)</td></tr>
<tr><td>SEMESTER A</td><td>SEMESTER B</td><td>SEMESTER C</td><td>SEMESTER A</td><td>SEMESTER B</td><td>SEMESTER C</td></tr>
<tr><td>7COM1076 Wireless, Mobile and Multimedia Networking (30 credits)</td><td>7COM1027 Distributed Systems Security (30 credits)</td><td rowspan="3">VACATION PERIOD</td><td rowspan="3">7COM1084 Advanced Research Topics in CS (30 credits)</td><td>7COM1085 Research Methods (30 credits)</td><td rowspan="2">7COM1077 CNSS Masters Projects (60 credits)</td></tr>
<tr><td>7COM1079 Team Research and Development Project (15 credits)</td><td>7COM1028 Secure Systems Programming (15 credits)</td></tr>
<tr><td>7COM1080 Legal and Ethical Practice Exercise (15 credits)</td><td>7COM1029 Network System Administration (15 credits)</td><td></td></tr>
</table>

MSc Computer Networks and Systems Security: Study Pattern of Semester B Entry, Full time

	YEAR 1 (half year, 60 credits)			YEAR 2 (120 credits)	
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B
MSc Computer Networks and Systems Security (1-year) full time SB entry		7COM1027 Distributed Systems Security (30 credits)	VACATION PERIOD	7COM1076 Wireless, Mobile and Multimedia Networking (30 credits)	7COM1077 CNSS Masters Projects (60 credits)
		7COM1028 Secure Systems Programming (15 credits)		7COM1079 Team Research and Development Project (15 credits)	
		7COM1029 Network System Administration (15 credits)		7COM1080 Legal and Ethical Practice Exercise (15 credits)	

	YEAR 1 (half year, 60 credits)			YEAR 2 (placement)			YEAR 3 (120 credits)
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A
MSc Computer Networks and Systems Security (sandwich) (2-year) full time SB entry		7COM1027 Distributed Systems Security (30 credits)	7COM1065 Professional Work Placement (zero credit)			7COM1077 CNSS Masters Projects (60 credits)	7COM1076 Wireless, Mobile and Multimedia Networking (30 credits)
		7COM1028 Secure Systems Programming (15 credits)					7COM1079 Team Research and Development Project (15 credits)
		7COM1029 Network System Administration (15 credits)					7COM1080 Legal and Ethical Practice Exercise (15 credits)
		7COM1064 Preparation for placement (zero credit)					

	YEAR 1 (half year, 60 credits)			YEAR 2 (120 credits)			YEAR 3 (half year, 60 credit
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A
MSc Computer Networks and Systems Security with Advanced Research (2-year) full time SB entry		7COM1027 Distributed Systems Security (30 credits)	VACATION PERIOD	7COM1076 Wireless, Mobile and Multimedia Networking (30 credits)	7COM1084 Advanced Research Topics in CS (30 credits)	7COM1085 Research Methods (30 credits)	7COM1077 CNSS Masters Projects (60 credits)
		7COM1028 Secure Systems Programming (15 credits)		7COM1079 Team Research and Development Project (15 credits)			
		7COM1029 Network System Administration (15 credits)		7COM1080 Legal and Ethical Practice Exercise (15 credits)			

MSc Cyber Security: Study Pattern of Semester A Entry, Full time

MSc Cyber Security (1-year) full time SA entry	**YEAR 1 (180 credits)**		
	SEMESTER A	**SEMESTER B**	**SEMESTER C**
	7COM1066 Information Security Management and Compliance (15 credits)	7COM1027 Distributed Systems Security (30 credits)	7COM1077 CYS Masters Projects (60 credits)
	7COM1069 Cyber Operations (15 credits)		
	7COM1079 Team Research and Development Project (15 credits)	7COM1067 Digital Forensics (15 credits)	
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	7COM1068 Penetrating Testing (15 credits)	

MSc Cyber Security (sandwich) (2-year) full time SA entry	**YEAR 1 (120 credits and placement)**			**YEAR 2 Year 2 (placement and 60 credits)**		
	SEMESTER A	**SEMESTER B**	**SEMESTER C**	**SEMESTER A**	**SEMESTER B**	**SEMESTER C**
	7COM1066 Information Security Management and Compliance (15 credits)	7COM1027 Distributed Systems Security (30 credits)	7COM1065 Professional Work Placement (zero credit)			7COM1077 CYS Masters Projects (60 credits)
	7COM1069 Cyber Operations (15 credits)	7COM1067 Digital Forensics (15 credits)				
	7COM1079 Team Research and Development Project (15 credits)	7COM1068 Penetrating Testing (15 credits)				
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	7COM1064 Preparation for placement (zero credit)				

MSc Cyber Security with Advanced Research (2-year) full time SA entry	**YEAR 1 (120 credits)**			**YEAR 2 (120 credits)**		
	SEMESTER A	**SEMESTER B**	**SEMESTER C**	**SEMESTER A**	**SEMESTER B**	**SEMESTER C**
	7COM1066 Information Security Management and Compliance (15 credits)	7COM1027 Distributed Systems Security (30 credits)	VACATION PERIOD	7COM1084 Advanced Research Topics in CS (30 credits)	7COM1085 Research Methods (30 credits)	
	7COM1069 Cyber Operations (15 credits)					
	7COM1079 Team Research and Development Project (15 credits)	7COM1067 Digital Forensics (15 credits)			7COM1077 CYS Masters Projects (60 credits)	
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	7COM1068 Penetrating Testing (15 credits)				

MSc Cyber Security: Study Pattern of Semester B Entry, Full time

	YEAR 1 (half year, 60 credits)			YEAR 2 (120 credits)	
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B
MSc Cyber Security (1-year) full timeSB entry		7COM1027 Distributed Systems Security (30 credits)	VACATION PERIOD	7COM1066 Information Security Management and Compliance (15 credits)	7COM1070 CYS Masters Projects (60 credits)
		7COM1067 Digital Forensics (15 credits)		7COM1069 Cyber Operations (15 credits)	
		7COM1068 Penetrating Testing (15 credits)		7COM1079 Team Research and Development Project (15 credits)	
				7COM1080 Legal and Ethical Practice Exercise (15 credits)	

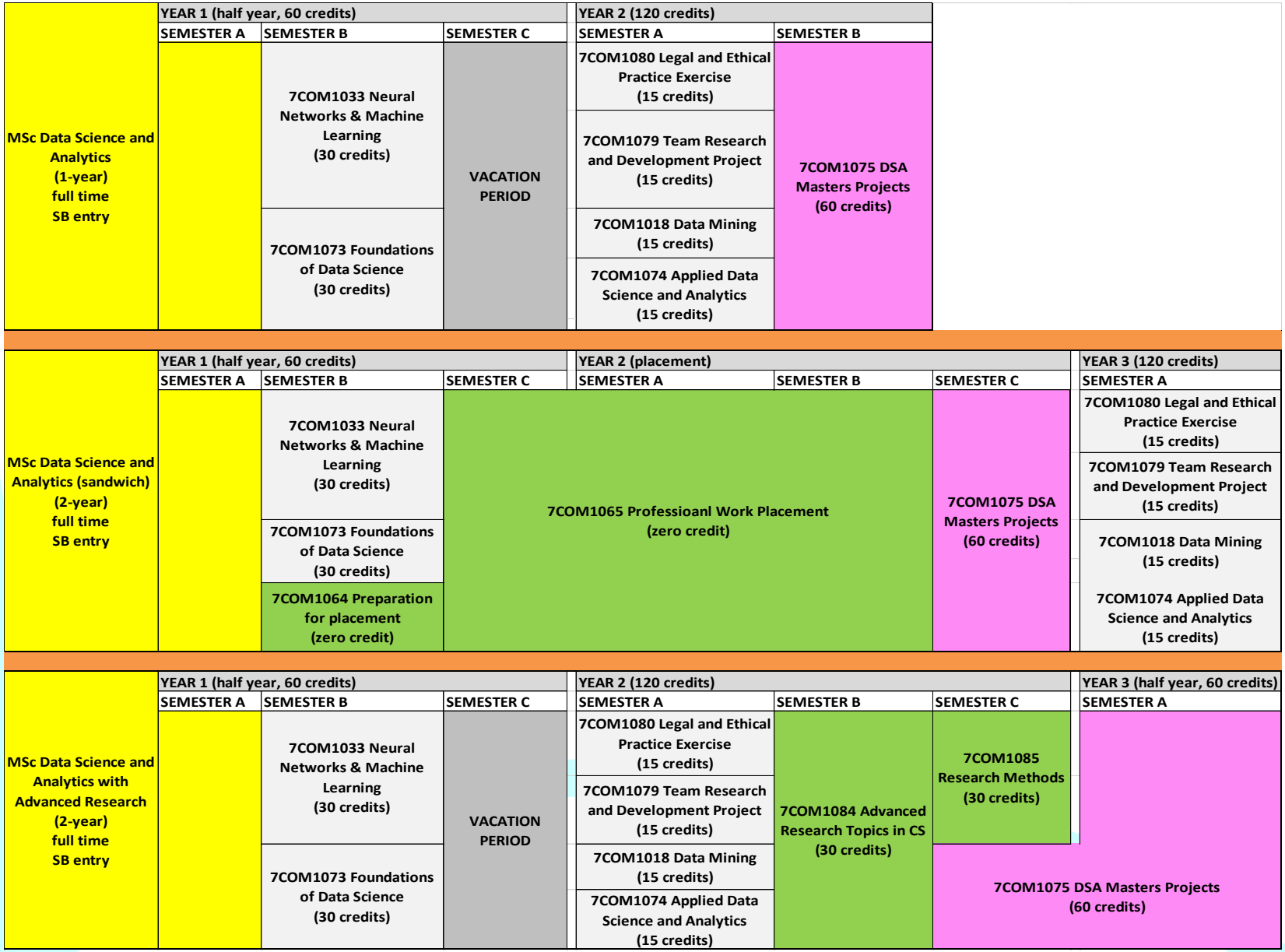
	YEAR 1 (half year, 60 credits)			YEAR 2 (placement)			YEAR 3 (120 credits)
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A
MSc Cyber Security (sandwich) (2-year) full time SB entry		7COM1027 Distributed Systems Security (30 credits)	7COM1065 Professional Work Placement (zero credit)			7COM1070 CYS Masters Projects (60 credits)	7COM1066 Information Security Management and Compliance (15 credits)
		7COM1067 Digital Forensics (15 credits)					7COM1069 Cyber Operations (15 credits)
		7COM1068 Penetrating Testing (15 credits)					7COM1079 Team Research and Development Project (15 credits)
		7COM1064 Preparation for placement (zero credit)					7COM1080 Legal and Ethical Practice Exercise (15 credits)

	YEAR 1 (half year, 60 credits)			YEAR 2 (120 credits)			YEAR 3 (half year, 60 credits)
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A
MSc Cyber Security with Advanced Research (2-year) full time SB entry		7COM1027 Distributed Systems Security (30 credits)	VACATION PERIOD	7COM1066 Information Security Management and Compliance (15 credits)	7COM1084 Advanced Research Topics in CS (30 credits)	7COM1085 Research Methods (30 credits)	7COM1070 CYS Masters Projects (60 credits)
		7COM1067 Digital Forensics (15 credits)		7COM1069 Cyber Operations (15 credits)			
		7COM1068 Penetrating Testing (15 credits)		7COM1079 Team Research and Development Project (15 credits)			
				7COM1080 Legal and Ethical Practice Exercise (15 credits)			

MSc Data Science and Analytics: Study Pattern of Semester A Entry, Full time

MSc Data Science and Analytics (1-year) full time SA entry	YEAR 1 (180 credits)					
	SEMESTER A	SEMESTER B	SEMESTER C			
	7COM1073 Foundations of Data Science (30 credits)	7COM1033 Neural Networks & Machine Learning (30 credits)	7COM1075 DSA Masters Projects (60 credits)			
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	7COM1018 Data Mining (15 credits)				
	7COM1079 Team Research and Development Project (15 credits)	7COM1074 Applied Data Science and Analytics (15 credits)				
MSc Data Science and Analytics (sandwich) (2-year) full time SA entry	YEAR 1 (120 credits and placement)			YEAR 2 Year 2 (placement and 60 credits)		
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C
	7COM1073 Foundations of Data Science (30 credits)	7COM1033 Neural Networks & Machine Learning (30 credits)	7COM1065 Professioanl Work Placement (zero credit)			7COM1075 DSA Masters Projects (60 credits)
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	7COM1018 Data Mining (15 credits)				
	7COM1079 Team Research and Development Project (15 credits)	7COM1074 Applied Data Science and Analytics (15 credits)				
		7COM1064 Preparation for placement (zero credit)				
MSc Data Science and Analytics with Advanced Research (2-year) full time SA entry	YEAR 1 (120 credits)			YEAR 2 (120 credits)		
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C
	7COM1073 Foundations of Data Science (30 credits)	7COM1033 Neural Networks & Machine Learning (30 credits)	VACATION PERIOD	7COM1084 Advanced Research Topics in CS (30 credits)	7COM1085 Research Methods (30 credits)	7COM1075 DSA Masters Projects (60 credits)
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	7COM1018 Data Mining (15 credits)				
	7COM1079 Team Research and Development Project (15 credits)	7COM1074 Applied Data Science and Analytics (15 credits)				

MSc Data Science and Analytics: Study Pattern of Semester B Entry, Full time



MSc Software Engineering: Study Pattern of Semester A Entry, Full time

MSc Software Engineering (1-year) full time SA entry	**YEAR 1 (180 credits)**					
	SEMESTER A	**SEMESTER B**	**SEMESTER C**			
	7COM1024 Measures and Models for Software Engineering (30 credits)	**7COM1026 Software Engineering Practice & Experience (30 credits)**	**7COM1038 SE Masters Projects (60 credits)**			
	7COM1079 Team Research and Development Project (15 credits)	**7COM1025 Programming for Software Engineers (30 credits)**				
	7COM1080 Legal and Ethical Practice Exercise (15 credits)					
MSc Software Engineering (sandwich) (2-year) full time SA entry	**YEAR 1 (120 credits and placement)**			**YEAR 2 Year 2 (placement and 60 credits)**		
	SEMESTER A	**SEMESTER B**	**SEMESTER C**	**SEMESTER A**	**SEMESTER B**	**SEMESTER C**
	7COM1024 Measures and Models for Software Engineering (30 credits)	**7COM1026 Software Engineering Practice & Experience (30 credits)**	**7COM1065 Professional Work Placement**			**7COM1038 SE Masters Projects (60 credits)**
	7COM1079 Team Research and Development Project (15 credits)	**7COM1025 Programming for Software Engineers (30 credits)**				
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	**7COM1064 Preparation for placement (zero credit)**				
MSc Software Engineering with Advanced Research (2-year) full time SA entry	**YEAR 1 (120 credits)**			**YEAR 2 (120 credits)**		
	SEMESTER A	**SEMESTER B**	**SEMESTER C**	**SEMESTER A**	**SEMESTER B**	**SEMESTER C**
	7COM1024 Measures and Models for Software Engineering (30 credits)	**7COM1026 Software Engineering Practice & Experience (30 credits)**	**VACATION PERIOD**	**7COM1084 Advanced Research Topics in CS (30 credits)**	**7COM1085 Research Methods (30 credits)**	
	7COM1079 Team Research and Development Project (15 credits)	**7COM1025 Programming for Software Engineers (30 credits)**			**7COM1038 SE Masters Projects (60 credits)**	
	7COM1080 Legal and Ethical Practice Exercise (15 credits)					

MSc Software Engineering: Study Pattern of Semester B Entry, Full time

	YEAR 1 (half year, 60 credits)			YEAR 2 (120 credits)	
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B
MSc Software Engineering (1-year) full timeSB entry		7COM1026 Software Engineering Practice & Experience (30 credits)	VACATION PERIOD	7COM1024 Measures and Models for Software Engineering (30 credits)	7COM1038 SE Masters Projects (60 credits)
				7COM1079 Team Research and Development Project (15 credits)	
		7COM1025 Programming for Software Engineers (30 credits)		7COM1080 Legal and Ethical Practice Exercise (15 credits)	

	YEAR 1 (half year, 60 credits)			YEAR 2 (placement)			YEAR 3 (120 credits)
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A
MSc Software Engineering (1-year) full time SB entry		7COM1026 Software Engineering Practice & Experience (30 credits)	7COM1065 Professional Work Placement			7COM1038 SE Masters Projects (60 credits)	7COM1024 Measures and Models for Software Engineering (30 credits)
		7COM1025 Programming for Software Engineers (30 credits)					7COM1079 Team Research and Development Project (15 credits)
		7COM1064 Preparation for placement (zero credit)					7COM1080 Legal and Ethical Practice Exercise (15 credits)

	YEAR 1 (half year, 60 credits)			YEAR 2 (120 credits)			YEAR 3 (half year, 60 credits
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A
MSc Software Engineering (1-year) full time SB entry		7COM1026 Software Engineering Practice & Experience (30 credits)	VACATION PERIOD	7COM1024 Measures and Models for Software Engineering (30 credits)	7COM1084 Advanced Research Topics in CS (30 credits)	7COM1085 Research Methods (30 credits)	7COM1038 SE Masters Projects (60 credits)
		7COM1025 Programming for Software Engineers (30 credits)		7COM1079 Team Research and Development Project (15 credits)			
				7COM1080 Legal and Ethical Practice Exercise (15 credits)			

MSc Advanced Computer Science: Study Pattern of Semester A Entry, Full time

MSc Advanced Computer Science (1-year) full time SA entry	**YEAR 1 (180 credits)**					
	SEMESTER A	**SEMESTER B**	**SEMESTER C**			
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	**7COM1078 Computational Algorithms and Paradigms (30 credits)**	**7COM1039 ACS Masters Projects (60 credits)**			
	7COM1079 Team Research and Development Project (15 credits)					
	Elective Modules (30 credits)	**Elective Modules (30 credits)**				
MSc Advanced Computer Science (sandwich) (2-year) full time SA entry	**YEAR 1 (120 credits and placement)**			**YEAR 2 Year 2 (placement and 60 credits)**		
	SEMESTER A	**SEMESTER B**	**SEMESTER C**	**SEMESTER A**	**SEMESTER B**	**SEMESTER C**
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	**7COM1078 Computational Algorithms and Paradigms (30 credits)**	**7COM1065 Professional Work Placement**			**7COM1039 ACS Masters Projects (60 credits)**
	7COM1079 Team Research and Development Project (15 credits)					
	Elective Modules (30 credits)	**Elective Modules (30 credits)**				
		7COM1064 Preparation for placement (zero credit)				
MSc Advanced Computer Science with Research (2-year) full time SA entry	**YEAR 1 (120 credits)**			**YEAR 2 (120 credits)**		
	SEMESTER A	**SEMESTER B**	**SEMESTER C**	**SEMESTER A**	**SEMESTER B**	**SEMESTER C**
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	**7COM1078 Computational Algorithms and Paradigms (30 credits)**	**VACATION PERIOD**	**7COM1084 Advanced Research Topics in CS (30 credits)**	**7COM1085 Research Methods (30 credits)**	
	7COM1079 Team Research and Development Project (15 credits)				**7COM1039 ACS Masters Projects (60 credits)**	
	Elective Modules (30 credits)	**Elective Modules (30 credits)**				

MSc Advanced Computer Science: Study Pattern of Semester B Entry, Full time

MSc Advanced Computer Science (1-year) full time SB entry	YEAR 1 (half year, 60 credits)			YEAR 2 (120 credits)		
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	
		7COM1078 Computational Algorithms and Paradigms (30 credits)	VACATION PERIOD	7COM1080 Legal and Ethical Practice Exercise (15 credits)	7COM1039 ACS Masters Projects (60 credits)	
				7COM1079 Team Research and Development Project (15 credits)		
		Elective Modules (30 credits)		Elective Modules (30 credits)		

MSc Advanced Computer Science (sandwich) (2-year) full time SB entry	YEAR 1 (half year, 60 credits)			YEAR 2 (placement)			YEAR 3 (120 credits)
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A
		7COM1078 Computational Algorithms and Paradigms (30 credits)	7COM1065 Professional Work Placement			7COM1039 ACS Masters Projects (60 credits)	7COM1080 Legal and Ethical Practice Exercise (15 credits)
		Elective Modules (30 credits)					7COM1079 Team Research and Development Project (15 credits)
		7COM1064 Preparation for placement (zero credit)					Elective Modules (30 credits)

MSc Advanced Computer Science with Research (2-year) full time SB entry	YEAR 1 (half year, 60 credits)			YEAR 2 (120 credits)			YEAR 3 (half year, 60 credits)
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A
		7COM1078 Computational Algorithms and Paradigms (30 credits)	VACATION PERIOD	7COM1080 Legal and Ethical Practice Exercise (15 credits)	7COM1084 Advanced Research Topics in CS (30 credits)	7COM1085 Research Methods (30 credits)	7COM1039 ACS Masters Projects (60 credits)
				7COM1079 Team Research and Development Project (15 credits)			
		Elective Modules (30 credits)		Elective Modules (30 credits)			

MSc Computer Science: Study Pattern of Semester A Entry, Full time

	YEAR 1 (180 credits)		
	SEMESTER A	SEMESTER B	SEMESTER C
MSc Computer Science (1-year) full time SA entry	7COM1015 Programming and Program Design (30 cedits)	7COM1081 Software Development Exercise (30 credits)	7COM1040 CS Masters Projects (60 credits)
	7COM1012 Operating Systems and Networks (15 credits)	7COM1082 Multi-User Database Systems (15 credits)	
	7COM1080 Legal and Ethical Practice Exercise (15 credits)	7COM1013 Computer Architectures (15 credits)	

MSc Computer Science: Study Pattern of Semester B Entry, Full time

	YEAR 1 (half year, 60 credits)			YEAR 2 (120 credits)	
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B
MSc Computer Science (1-year) full time SB entry		7COM1013 Computer Architectures (15 credits)	VACATION PERIOD	7COM1015 Programming and Program Design (30 credits)	7COM1040 CS Masters Projects (60 credits)
		7COM1082 Multi-User Database Systems (15 credits)		7COM1080 Legal and Ethical Practice Exercise (15 credits)	
		7COM1081 Software Development Exercise (30 credits)		7COM1012 Operating Systems and Networks (15 credits)	

Study pattern for part time students on the standard MSc awards, Semester A Entry, Part Time

Note: the sandwich awards and 'with Advanced Research' awards are not available for part time students

MSc Artificial Intelligence and Robotics / MSc Computer Networks and Systems Security / MSc Cyber Security / MSc Data Science and Analytics / MSc Software Engineering / MSc Advanced Computer Science / MSc Computer Science part time, SA entry	YEAR 1 (60 credits)			YEAR 2 (60 credits)			YEAR 3 (completing 60 credits of project)	
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B
	Choose and study 30 credits from availale modules running in Semester A on the award title	Choose and study 30 credits from availale modules running in Semester B on the award title	VACATION PERIOD	Choose and study 30 credits from availale modules running in Semester A on the award title	Choose and study 30 credits from availale modules running in Semester B on the award title	VACATION PERIOD	Various Masters Project (60 credits)	

Study pattern for part time students on the standard MSc awards, Semester B Entry, Part Time

Note: the sandwich awards and 'with Advanced Research' awards are not available for part time students

MSc Artificial Intelligence and Robotics / MSc Computer Networks and Systems Security / MSc Cyber Security / MSc Data Science and Analytics / MSc Software Engineering / MSc Advanced Computer Science / MSc Computer Science part time, SB entry	YEAR 1 (30 credits)			YEAR 2 (60 credits)			YEAR 3 (90 credits)		
	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C	SEMESTER A	SEMESTER B	SEMESTER C
		Choose and study 30 credits from availale modules running in Semester B on the award title	VACATION PERIOD	Choose and study 30 credits from availale modules running in Semester A on the award title	Choose and study 30 credits from availale modules running in Semester B on the award title	VACATION PERIOD	Choose and study 30 credits from availale modules running in Semester B on the award title	Various Masters Project (60 credits)	

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).

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

Eligibility for Specific Awards:

PG Cert Award
To be eligible for the award of PG Cert, students must have met the general requirements set out in Section 1D. In addition, they must pass 60 credits of taught modules from a set of modules listed in Table 1c above.

PG Dip Awards
To be eligible for the award of PG Dip, students must have met the general requirements set out in Section 1D. In addition, they must meet the requirements set out below for one of the three different types of award.

Requirements for Specialist Awards

- PG Dip Artificial Intelligence and Robotics
- PG Dip Computer Networks and Systems Security
- PG Dip Cyber Security
- PG Dip Data Science and Analytics
- PG Dip Software Engineering

Students must pass 120 credits worth of taught modules. All taught modules for each specialist award are **Core** (compulsory), though compensation may be allowed at the discretion of the Programme Board of Examiners.

Requirements for the Award of PG Dip Advanced Computer Science
Students must pass 120 credits worth of taught modules. This must include 60 credits worth of **Core** (compulsory) taught modules for the award (7COM1078, 7COM1079, 7COM1080) and a further 60 credits worth of taught modules that are **Elective** for the award. Compensation may be allowed at the discretion of the Programme Board of Examiners.

At the discretion of the Programme Board of Examiners, candidates with an FNFA in the Computational Algorithms and Paradigms module may be permitted to substitute an approved 30 credits of modules that are **Elective** for the award.

Requirements for the Award of PG Dip Computer Science
Students must pass 120 credits worth of taught modules. All taught modules for this award are **Core** (compulsory), though compensation may be allowed at the discretion of the Programme Board of Examiners.

Masters Awards
To be eligible for the award of MSc, students must have met the general requirements set out in Section 1D. In addition they must pass 120 credits of taught modules that meet the requirement (set out above) of the PG Dip award corresponding to their MSc award title, though compensation may be allowed at the discretion of the Programme Board of Examiners, **and must pass (without compensation) the corresponding 60 credit major project.**

Additional Requirements for the Sandwich Award
To be eligible for the award of MSc Sandwich Award, students must have met the general requirements set out in Section 1D and met the requirement for Masters Awards (set out above). In addition, graduates must pass the “Professional Work Placement for MSc Computer Science” module (7COM1065).

Additional Requirements for the ‘with Advanced Research’ Award
To be eligible for the award of MSc ‘with Advanced Research’ Awards or MSc Advanced Computer Science with Research Award, students must have met the general requirements set out in Section 1D and met the requirement for Masters Awards (set out above). In addition, graduates must pass the “Advanced Research Topics in Computer Science” module (7COM1084) and the “Research Methods” module (7COM1085).

If a student is not eligible for the MSc 'with Advanced Research' award, the Board of Examiners may offer the standard MSc award shall the student be eligible for the corresponding standard MSc award (see the above section, Eligibility for Specific Awards).

Enrolling on the project module

To gain a Masters award a student requires passes (or gained credit that is deemed equivalent via an approved accreditation process) in 120 credits worth of taught modules and a 60 credit major project.

To enrol on the project module, students must typically have studied 120 credits of taught modules from the programme and passed at least 60 credits of taught modules (in order to satisfy UPR AS14, D5.2.3). Semester B Sandwich Entrants will typically start their project when they return from placement, followed by their second semester of taught modules.

Progression to Industrial Placement

MSc placement awards offer the opportunity for students to undertake a period of industrial placement, and so develop their understanding and skills within a professional environment. In order to be eligible for a placement, students must normally have passed 120 credits if they are Semester A (September) entrants of the programme, or 60 credits if they are Semester B (January) entrants and achieved a pass in the first attempt at the first 60 credits. All students who have become eligible for a placement will be issued a statement of eligibility from the Department of Computer Science. Students who have not met these progression requirements, including those with outstanding deferrals from the first attempt at their first 60 credits, will normally be transferred from the sandwich course to the corresponding 2-year 'with Advanced Research' course.

Students are responsible for securing their placement. Students are usually required to secure their placement by the School's published deadline (typically the end of April). Students who do not secure a placement by the deadline, will normally be automatically transferred from the sandwich award to the corresponding 2-year 'with Advanced Research' course.

Period of Registration

Table 1d provides examples of indicative patterns of study. As can be seen in Table 1d, the typical duration of learning, teaching and assessment activities for the programme as follows:

- September starters on the fulltime route: 12 months (September to September, with the conferment of awards in late October or early November)
- September starters on the sandwich route: 24 months (September to September, with the conferment of awards in late October or early November)
- September starters on the 'with Advanced Research' route: 24 months (September to September, with the conferment of awards in late October or early November)
- January starters on the fulltime route: 16 months (January to June, with the conferment of awards in later June or early July)
- January starters on the sandwich route: 24 months (January to June, with the conferment of awards in later June or early July)
- January starters on the 'with Advanced Research' route: 24 months (January to June, with the conferment of awards in middle February)
- September starters on the part time route: 32 months (September to May, with the conferment of awards in later June or early July)
- January starters on the part time route: 32 months (January to September, with the conferment of awards in late October or early November)

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

Students who are registered on the standard 1-year fulltime course normally are not allowed to change their study pattern to the corresponding 2-year fulltime sandwich course or the 2-year fulltime 'with Advanced Research' course.

Academic Integrity
The University's definition of academic integrity and regulations relating to academic misconduct can be found in UPR AS14 Appendix III.

E. Management of Programme and Support for Student Learning

Management

The programme is managed and administered through:

- A Programme Leader to help students understand the programme structure and provide academic and pastoral support;
- Module Leaders;
- An induction week at the beginning of each new academic session;
- Student representatives on programme committees;
- Opportunities for student representation in the body that plans and monitors the programme;
- Opportunities to give formal feedback through representatives and to participate in an annual questionnaire about the staff, modules, the programme and University facilities as a whole;
- A Programme Team led by a Programme Leader to help students understand the course/programme structure;
- A Student Handbook to explain the programme, the support services available and to provide a calendar of events for the year;
- Module delivery information given out at the commencement of each module;
- Project Supervisors who provide one-to-one tutoring during the 60-credit project module
- A dedicated reception area based in the school of computer science;
- A student disability team, who can advise and offer assistance to those with a disability, dyslexia, or other special needs;
- An Information Manager, who specialises in the needs of computer science students and will guide those students in the use of the Learning Resources Centres.

Support

Students are supported by:

- Specialised computer laboratories and well-equipped learning resources centres on each campus;
- StudyNet, a versatile on-line inter-active intranet and learning environment;
- Access to extensive digital and print collections of information resources;
- Attractive modern study environments in 2 Learning Resources Centres;
- A substantial Student Centre that provides advice on issues such as finance, University regulations, legal matters, accommodation, international student support, etc;
- Office of Dean of Students, incorporating Chaplaincy, Counselling and nursery;
- Medical Centre;
- A Mathematics Drop-in Centre;
- University Disability Advisors;
- An Equal Opportunities Officer;
- The Students' Union;
- Guided student-centred learning through the use of StudyNet;
- A Careers Service for all current students and graduates to advise on opportunities for industrial placement, further study and employment;
- On-campus accommodation, University head-tenancy accommodation, on-site catering and entertainment facilities, permits for on-site parking (limited) and a Day Nursery for pre-school children;
- Help Desks in both the Learning Resources Centres and the more specialised Computing laboratories;
- A Student Counselling Service, that counselling and advice, and runs workshops to help with examination worries and other common concerns.

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

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:
Hutton Hub Student Administration Service hhaq@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

Table 2: Development of Intended Programme Learning Outcomes in the Constituent Modules

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.

MSc Artificial Intelligence and Robotics

		Programme Learning Outcomes (as identified in section 1 and the following page)												
		Knowledge and Understanding				Intellectual Skills	Practical Skills	Transferable Skills						
Module Title	Module Code	A1	A16	A19	A20	B1	C1	D1	D2	D3	D4	D5	D6	D7
Theory and Practice of Artificial Intelligence	7COM1034	×	×			×			×	×	×		×	
Artificial Life with Robotics	7COM1032	×	×			×			×	×	×		×	
Neural Networks and Machine Learning	7COM1033	×	×			×			×	×	×		×	
Team Research and Development Project	7COM1079		×						×	×	×	×	×	
Legal and Ethical Practice Exercise	7COM1080			×					×	×	×	×		
Artificial Intelligence and Robotics Masters Project	7COM1086	×	×			×	×	×	×	×	×	×	×	
And for the MSc Artificial Intelligence and Robotics (sandwich)														
Preparation for Placement	7COM1064	This module will prepare students on the sandwich awards for a placement and support their efforts in securing an appropriate placement.												
Professional Work Placement for MSc Computer Science	7COM1065				×					×				
And for the MSc Artificial Intelligence and Robotics with Advanced Research														
Advanced Research Topics in Computer Science	7COM1084	×	×						×		×			×
Research Methods	7COM1085	×	×						×		×			×

MSc Computer Networks and Systems Security

		Programme Learning Outcomes (as identified in section 1 and the following page)																	
		Knowledge and Understanding							Intellectual Skills		Practical Skills		Transferable Skills						
Module Title	Module Code	A2	A3	A4	A5	A16	A19	A20	B1	B2	C1	C2	D1	D2	D3	D4	D5	D6	D7
Wireless Mobile and Multimedia Networking	7COM1076	×	×	×	×	×			×	×	×								
Network System Administration	7COM1029	×	×			×			×	×	×								
Secure Systems Programming	7COM1028	×	×	×	×	×			×	×	×			×	×	×		×	
Distributed Systems Security	7COM1027	×	×	×	×	×			×	×	×			×	×	×		×	
Team Research and Development Project	7COM1079					×								×	×	×	×	×	
Legal and Ethical Practice Exercise	7COM1080						×							×	×	×	×		
Computer Networks and Systems Security Masters Project	7COM1077	×	×	×	×	×			×	×	×	×	×	×	×	×	×	×	
And for the MSc Computer Networks and Systems Security (sandwich)																			
Preparation for Placement	7COM1064	This module will prepare students on the sandwich awards for a placement and support their efforts in securing an appropriate placement																	
Professional Work Placement for MSc Computer Science	7COM1065							×							×				
And for the MSc Computer Networks and Systems Security with Advanced Research																			
Advanced Research Topics in Computer Science	7COM1084	×				×								×		×			×
Research Methods	7COM1085	×				×								×		×			×

MSc Cyber Security

		Programme Learning Outcomes (as identified in section 1 and the following page)																
		Knowledge and Understanding						Intellectual Skills		Practical Skills		Transferable Skills						
Module Title	Module Code	A6	A7	A8	A16	A19	A20	B4	B5	C4	C5	D1	D2	D3	D4	D5	D6	D7
Distributed Systems Security	7COM1027	×	×	×	×			×	×	×								
Cyber Operations	7COM1069	×	×	×	×			×	×	×								
Penetration Testing	7COM1068	×	×	×	×			×	×	×								
Information Security Management and Compliance	7COM1066	×	×	×	×			×	×	×								
Digital Forensics	7COM1067	×	×	×	×			×	×	×			×	×	×		×	
Team Research and Development Project	7COM1079				×								×	×	×	×	×	
Legal and Ethical Practice Exercise	7COM1080					×							×	×	×	×		
Cyber Security Masters Project	7COM1070	×	×	×	×			×	×	×	×	×	×	×	×	×	×	
And for the MSc Cyber Security (sandwich)																		
Preparation for Placement	7COM1064	This module will prepare students on the sandwich awards for a placement and support their efforts in securing an appropriate placement.																
Professional Work Placement for MSc Computer Science	7COM1065						×							×				
And for the MSc Cyber Security with Advanced Research																		
Advanced Research Topics in Computer Science	7COM1084	×			×								×		×			×
Research Methods	7COM1085	×			×								×		×			×

MSc Data Science and Analytics

		Programme Learning Outcomes (as identified in section 1 and the following page)															
		Knowledge and Understanding						Intellectual Skills		Practical Skills	Transferable Skills						
Module Title	Module Code	A9	A10	A11	A16	A19	A20	B6	C6	C7	D1	D2	D3	D4	D5	D6	D7
Neural Networks and Machine Learning	7COM1033		×	×	×			×	×								
Data Mining	7COM1018	×	×	×	×			×	×								
Foundations of Data Science	7COM1073	×	×	×	×			×	×								
Applied Data Science and Analytics	7COM1074	×	×	×	×			×	×								
Team Research and Development Project	7COM1079				×							×	×	×	×	×	
Legal and Ethical Practice Exercise	7COM1080					×						×	×	×	×		
Data Science and Analytics Masters Project	7COM1075	×	×	×	×			×	×	×	×	×	×	×	×	×	
And for the MSc Data Science and Analytics (sandwich)																	
Preparation for Placement	7COM1064	This module will prepare students on the sandwich awards for a placement and support their efforts in securing an appropriate placement.															
Professional Work Placement for MSc Computer Science	7COM1065						×						×				
And for the MSc Data Science and Analytics with Advanced Research																	
Advanced Research Topics in Computer Science	7COM1084	×			×							×		×			×
Research Methods	7COM1085	×			×							×		×			×

MSc Software Engineering

		Programme Learning Outcomes (as identified in section 1 and the following page)																
		Knowledge and Understanding						Intellectual Skills		Practical Skills		Transferable Skills						
Module Title	Module Code	A12	A13	A14	A16	A19	A20	B6	B7	C8	C9	D1	D2	D3	D4	D5	D6	D7
Software Engineering Practice and Experience	7COM1026	×	×	×	×			×	×	×								
Programming for Software Engineers	7COM1025	×	×	×	×			×	×	×								
Measures and Models for Software Engineering	7COM1024	×	×	×	×			×	×	×								
Team Research and Development Project	7COM1079				×								×	×	×	×	×	
Legal and Ethical Practice Exercise	7COM1080					×							×	×	×	×		
Software Engineering Masters Project	7COM1075	×	×	×	×			×		×	×	×	×	×	×	×	×	
And for the MSc Software Engineering (sandwich)																		
Preparation for Placement	7COM1064	This module will prepare students on the sandwich awards for a placement and support their efforts in securing an appropriate placement.																
Professional Work Placement for MSc Computer Science	7COM1065						×							×				
And for the MSc Software Engineering with Advanced Research																		
Advanced Research Topics in Computer Science	7COM1084	×			×								×		×			×
Research Methods	7COM1085	×			×								×		×			×

MSc Advanced Computer Science

		Programme Learning Outcomes (as identified in section 1 and the following page)												
		Knowledge and Understanding				Intellectual Skills	Practical Skills	Transferable Skills						
Module Title	Module Code	A15	A16	A19	A20	B9	C10	D1	D2	D3	D4	D5	D6	D7
Theory and Practice of Artificial Intelligence	7COM1034		×			×			×	×	×		×	
Artificial Life with Robotics	7COM1032		×			×			×	×	×		×	
Neural Networks and Machine Learning	7COM1033		×			×			×	×	×		×	
Data Mining	7COM1018		×			×			×	×	×		×	
Foundations of Data Science	7COM1073		×			×			×	×	×		×	
Applied Data Science and Analytics	7COM1074		×			×			×	×	×		×	
Wireless Mobile and Multimedia Networking	7COM1076		×			×			×	×	×		×	
Network System Administration	7COM1029		×			×			×	×	×		×	
Secure Systems Programming	7COM1028		×			×			×	×	×		×	
Distributed Systems Security	7COM1027		×			×			×	×	×		×	
Cyber Operations	7COM1069		×			×			×	×	×		×	
Penetration Testing	7COM1068		×			×			×	×	×		×	
Information Security Management and Compliance	7COM1066		×			×			×	×	×		×	
Digital Forensics	7COM1067		×			×			×	×	×		×	
Software Engineering Practice and Experience	7COM1026		×			×			×	×	×		×	
Programming for Software Engineers	7COM1025		×			×			×	×	×		×	
Measures and Models for Software Engineering	7COM1024		×			×			×	×	×		×	
Computational Algorithms and Paradigms	7COM1078	×	×			×			×	×	×		×	
Team Research and Development Project	7COM1079		×						×	×	×	×	×	
Legal and Ethical Practice Exercise	7COM1080			×					×	×	×	×		
Advanced Computer Science Masters Project	7COM1039	×	×			×	×	×	×	×	×	×	×	

And for the MSc Advanced Computer Science (sandwich)														
Preparation for Placement	7COM1064	This module will prepare students on the sandwich awards for a placement and support their efforts in securing an appropriate placement.												
Professional Work Placement for MSc Computer Science	7COM1065				×					×				
And for the MSc Advanced Computer Science with Research														
Advanced Research Topics in Computer Science	7COM1084	×	×						×		×			×
Research Methods	7COM1085	×	×						×		×			×

MSc Computer Science

		Programme Learning Outcomes (as identified in section 1 and the following page)												
		Knowledge and Understanding					Intellectual Skills	Practical Skills	Transferable Skills					
Module Title	Module Code	A16	A17	A18	A19	A20	B10	C11	D1	D2	D3	D4	D5	D6
Programming and Program Design	7COM1015		×	×			×							
Computer Architectures	7COM1013		×				×							
Operating Systems and Networks	7COM1012		×				×			×	×	×		×
Software Development Exercise	7COM1081		×	×			×			×	×	×		×
Multi-User Database Systems	7COM1082	×	×	×			×			×	×	×		×
Legal and Ethical Practice Exercise	7COM1080			×	×					×	×	×	×	
Computer Science Masters Project	7COM1040	×	×				×	×	×	×	×	×	×	×

KEY TO PROGRAMME LEARNING OUTCOMES

Knowledge and Understanding

MSc Artificial Intelligence and Robotics

A1. The distinctive features of a variety of problem-solving paradigms within the sub-discipline area of Artificial Intelligence and Robotics Advanced principles and their practical implementation, underlying developments in Artificial Intelligence

MSc Computer Networks and Systems Security

A2. The complex interaction between different components in current and developing network technologies

A3. A range of leading-edge tools and techniques that can be used in developing and managing a network application/system

A4. The issues and problems of importance in the design and deployment of networks and distributed systems

A5. How research in the area of distributed systems and networks may be applied to modern computer systems and applications

MSc Cyber Security

A6. The fundamental and advanced aspects of cyber security in terms of theory, practice, policy and security standard to enable critical cyber security decision marking

A7. The extant threats to current and emerging systems and networks and the effective countermeasures to such threats in compliance with information security management standards

A8. 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

A9. The fundamental mathematical ideas behind data science and relevant computational algorithms and the fundamentals of probability, information and statistical methods

Practical Skills

MSc Artificial Intelligence and Robotics

C1. Carry out a significant independent investigation as part of their project, typically including software development.

MSc Computer Networks and Systems Security

C2. Apply the methods of computer science to various aspects of the analysis, design, implementation and evaluation of a range of networking technologies.

C3. Individually pursue an investigation into an agreed area of study relating to networking, distributed systems, or system security

MSc Cyber Security

C4. 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

C5. 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

C6. Apply a commonly used data science software framework that provides the essential algorithms for data visualisation and analytics for various use cases

A10. The principles and practice of obtaining data from various sources, the essential methods for data pre-processing and cleaning, and data visualisation.
A11. The underlying ethical and legal issues and constraints on the holding and the use of data.

MSc Software Engineering

A12. The complex relationships between models of software engineering processes and the artefacts produced by such processes.

A13. The role of estimation and measurement in making effective technical decisions in the software engineering process.

A14. The leading-edge technical practices implemented within software engineering processes.

MSc Advanced Computer Science

A15. The relationships between computational problems and the choice of programming paradigm to solve them.

A16. At least two specialist topics of computer science to advanced depth.

MSc Computer Science

A17. Fundamental computer science concepts and how they may be applied to the solution of complex problems from within and outside computer science.
A18. Principles and practices of software development methodologies.

For all MSc Awards

A19. Critically evaluate and reflect on professional, social, legal and ethical issues related to contemporary practices in computer science

For all Sandwich Awards

A20. Build contextual knowledge of practical and operational aspects of a CS or IT related role through a substantive work placement experience

C7. Individually pursue an investigation into an agreed area of study relating to data science and analytics

MSc Software Engineering

C8. Apply and critically evaluate appropriate software engineering practices with account taken of the contextual limitations of specific software development environments
C9. Individually pursue an investigation into an agreed area of study relating to software engineering, typically including software development.

MSc Advanced Computer Science

C10. 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

C11. Plan, execute, monitor and reflect upon a substantial piece of independent development work or experimentation solving problems from within or without computer science

University of Hertfordshire UH

Intellectual Skills

MSc Artificial Intelligence and Robotics

B1. Use and critically evaluate methods currently employed in fields covered by this route, such as neural computing, intelligent agents systems, robotics and artificial life.

MSc Computer Networks and Systems Security

B2. Use and critically evaluate a range of tools in designing and managing networks.

B3. Critically evaluate the implications of different design and configuration decisions for particular scenarios.

MSc Cyber Security

B4. Identify and critically evaluate vulnerabilities of and threats to the security and integrity of distributed systems

B5. Conduct and manage a comprehensive risk assessment of the distributed systems in a complex and unpredictable environment.

MSc Data Science and Analytics

B6. 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

MSc Software Engineering

B7. Produce models of software engineering processes and artefacts using appropriate modelling techniques.

B8. Apply measures to software engineering processes and artefacts and use the data produced to evaluate software engineering activities.

MSc Advanced Computer Science

B9. Use and critically evaluate a range of methods and tools currently employed in at least two specialist topics of computer science to advanced depth.

MSc Computer Science

B10. Use and critically evaluate a range of methods and tools currently employed in the design and/or development of computer systems to solve problems from within or without computer science.

Transferable Skills

For all MSc Awards

D1. Undertake a substantial piece of practical work at postgraduate level, independent of close supervision.

D2. Evaluate and make critical use of relevant academic and technical literature

D3. Utilise their knowledge in practical applications.

D4. Build upon and extend their knowledge with a minimum of guidance.

D5. Express themselves knowledgably and coherently, both in writing and orally.

D6. Explain, justify and otherwise defend their work and ideas, both in its specific details and within a broader context.

For all Advanced Research Awards

D7. Examine and apply advanced skills in computer science research

University of Hertfordshire UH

Section 2

Programme Management

Relevant QAA subject benchmarking statements	Masters in Computing
Type of programme	Taught postgraduate
Date of validation/last periodic review	November 18
Date of production/ last revision of PS	April 21/ April 2020
Relevant to level/cohort	Level 7 entering September 2021
Administrative School	School of Physics, Engineering and Computer Science

Table 3 Course structure

Course details		
Course code	Course description	HECOS Code
CMCSM	Modular Masters Programme in Computer Science	100366
CMCSMARM	Modular Masters Programme in Computer Science with Advanced Research	100366