# University of Huddersfield

# Programme Specification

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|  1 | Awarding institution: | University of Huddersfield |
|  2 | Teaching institution: | University of HuddersfieldFujian Normal University, China (BSc (Hons) Computer Science only) |
|  3 | School and Department: | School of Computing and Engineering, Dept of Computer Science |
|  4 | Course accredited by: | British Computer Society (BCS) |
|  5 | Mode of Delivery: | FT/SW |
|  6 | Final Award | MEng, MSci, MComp, BSc (Hons) |
|  7 | Course titles: | Computing / Software Engineering Suite, comprising the following courses: MEng/BSc (Hons) Software Engineering,  MComp/BSc (Hons) Computing, MSci/BSc (Hons) Computer ScienceBSc (Hons) Computer Science with Games Programming  |
|  8 | UCAS code | MEng Software Engineering: G601 MEng/SE,MSci Computer Science: I104 MSci/CS,MComp Computing: I102 MComp/C, BSc (Hons) Software Engineering: G600 BSc/SoftEng,BSc (Hons) Computing: G407 BSc/Comp,BSc (Hons) Computer Science: G310 BSc/CS,BSc (Hons) Computer Science with Games Programming: l132 |
|  9 | Subject benchmark statement | QAA Computing 2019 |
|  10 | Date of Programme Specification | April 2011, May 2011, February 2012, November 2012,July 2014, February 2015, November 2015, January 2016, October 2016, May 2017, November 2017, May 2018,June 2018, November 2018, January 2019, March 2019,May 2019, September 2019, November 2019, August 2020, May 2021, June 2021, January 2022, March 2022, August 2022 |

###### 11 Educational aims of the Courses

The Computing / Software Engineering Suite is a set of related courses designed to offer students a wide range of programmes related around the core theme of high-quality Software Engineering. All of the courses share a common first year. Additionally, the three integrated master’s courses each share years one to four with a corresponding BSc course: the MEng Software Engineering with the BSc Software Engineering, the MSci Computer Science with the BSc Computer Science, and the MComp Computing with the BSc Computing.

The **BSc (Hons) Software Engineering** is designed to provide both the breadth of coverage and depth of treatment necessary to produce information systems professionals prepared to meet the challenges of the Software Engineering industry in this dynamic and rapidly changing discipline.

The **BSc (Hons) Computer Science** aims to produce graduates capable of working either as computer scientists within the science and engineering community, exploiting their mathematical knowledge in the development of computer-based systems and products, or within the broad range of the computing profession, performing tasks that require Software Engineering expertise coupled with a mathematical ability.

The **BSc (Hons) Computer Science** **with Games Programming** is designed to provide people of undergraduate status with the breadth of coverage and depth of treatment necessary to produce professional graduates prepared to meet the challenges of the computer games software development industry in this dynamic and rapidly changing discipline.

The **BSc (Hons) Computing** provides a course of study designed to provide both a thorough and detailed treatment of the state of the art in Software Engineering, and an opportunity to specialise in self-selected areas of computing.

Finally, the **MEng Software Engineering, MSci Computer Science and MComp Computing** are designed to provide the fundamental knowledge and skills required of a professional software/computing engineer/scientist, together with deeper specialist knowledge of particular fields in which they may be applied. Graduates are likely to find employment as software engineers or developers, or scientists moving rapidly into positions of responsibility, either in technical areas such as consultancy, or managerial areas such as project leadership. The content of the course will also provide a suitable foundation for postgraduate research and an eventual academic or research-based career.

All of the courses in the Suite are aimed at producing professional software engineers/scientists and are designed to meet the academic requirements for membership of the British Computer Society (MBCS). The MEng Software Engineering, MSci Computer Science and MComp Computing also meet all requirements for registration for Chartered Scientist (CSci) and Chartered Engineer (CEng) status.

The basic theme of all of the courses is the development of complete, high quality software systems for any application area, constructed to meet the users' requirements on time and within budget. This requires an extensive theoretical and practical treatment of the topics which comprise the discipline of Software Engineering/software engineering. In addition, the individual courses will then provide their own specialisms, as defined by the course aims specified below.

The common first year on all of the courses in the Suite allows for flexibility should students wish to change between the courses. In addition, the (BSc Software Engineering and the MEng Software Engineering), the (BSc Computer Science and MSci Computer Science), and the (BSc Computing and MComp Computing) are, pairwise, essentially the same course through to Honours Degree level (year 3/4), with the most able students then being offered the extra year of study to achieve the corresponding integrated master’s qualification.

The courses share a number of core aims which are:

* To provide the students with the knowledge and skills necessary to prepare them for a career in the computing / Software Engineering industry.
* To equip students with the critical and analytical skills necessary to prepare them for the rapidly changing nature of the Software Engineering discipline.
* To develop in the student the ability to construct reliable software products and recognise and meet the needs of real users, by applying sound scientific, mathematical, management and engineering principles.
* To foster an understanding of the nature and role of information, both from the perspective of the user and the organisation, and from theoretical and mathematical perspectives.
* To develop a highly professional approach to information systems engineering.
* To expose students to current and future issues affecting the development of computer-based information systems.

The additional aims of the specialist courses within the Suite are:

For the BSc Computing:

* To allow the students to direct their own learning into self-selected inside and outside computing.

For the BSc Computer Science:

* To develop the student’s understanding of the underlying principles of computing.
* To develop the student’s understanding of the discipline of discrete mathematics.
* To develop the student’s numerical and mathematical problem-solving skills.
* To develop the student’s understanding of the role and scope of formal methods in the engineering of computer systems.
* To develop in the student a critical approach to the strengths and limitations of computing science as specified above.

For the BSc Computer Science with Games Programming:

* To provide the students with, in addition to general computing / Software Engineering knowledge and skills, the specific knowledge and skills necessary to prepare them for a career in the computer games industry.
* To expose students to current and developing issues in the computer games industry.

The three integrated master’s courses additionally aim:

* To develop in the student a systematic understanding of knowledge, and a critical awareness of current problems and new insights which are at or informed by the forefront of developments in Computing and Software Engineering.
* To develop in the student a comprehensive understanding of state-of-the-art techniques in Computing and Software Engineering.
* To lead the student to display originality in the application of knowledge, together with a practical understanding of research in Computing and Software Engineering.

The additional aims of the individual integrated master’s courses are:

For the MEng Software Engineering

* To enable students to study the general area of Software Engineering at an advanced level and to pursue specialist topics in greater depth.

For the MSci Computer Science:

* To enable students to study the general area of computer science and scientific computing at an advanced level and to pursue specialist topics in greater depth

For the MComp Computing:

* To allow the students to direct their own learning into self-selected areas inside and outside computing.

###### 12 Intended learning outcomes

The courses provide opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities, and other attributes in the areas listed below. The British Computer Society specifies the generic learning outcomes expected for Computing and Information Systems courses leading to full or partial CEng and/or CSci and/or CITP status. Consequently, it is sensible to adopt these BCS outcomes directly, with limited re-phrasing to provide subject emphasis, to specify the learning outcomes expected of the courses within this programme. Tables mapping the core modules for each course to these outcomes are provided in Appendix A.

Please note that all the BSc courses in this suite meet the BCS requirements for BSc courses and that the BCS learning outcomes for the BSc courses are identical across the suite. Similarly for the integrated master’s courses. For the differentiation between the courses see Appendices D and E in which similar listings and mappings to those below, but using outcomes from the Computing benchmark statement are given.

###### Knowledge and Understanding

| 2.1.1 Knowledge and understanding of facts, concepts, principles and theories.2.1.7 Knowledge and understanding of commercial and economic issues2.1.8 Knowledge of management techniques to achieve objectives2.1.9 Knowledge of information security issues3.1.2 Methods, techniques and tools for information modelling, management and security3.1.3 Knowledge of systems architecture4.1.1 Knowledge and understanding of scientific and engineering principles4.1.2 Knowledge and understanding of mathematical principles4.1.3 Knowledge and understanding of computational modelling4.2.3 Principles of appropriate supporting engineering and scientific disciplinesAdditional outcomes for the integrated master’s courses are:8.1.1 Systematic understanding of knowledge of the domain with depth in particular areas8.1.2 Comprehensive understanding of essential principles and practices9.1.1 Systematic understanding of knowledge at the forefront in development and implementation of systems9.1.2 Comprehensive understanding of the state of the art techniques10.1.1 Systematic understanding of knowledge at the forefront in computing science research10.1.2 Comprehensive understanding of scientific techniques10.2.1 Critical awareness of current research issues, problems and/or insights |  **Teaching/Learning Strategies:** Lectures will be used to deliver core material; tutorials will  allow discussion of ideas and work on small example  exercises to support the learning process; and practicals  will be used to reinforce the material through hands-on  laboratory based sessions. **Assessment Strategies:** Many modules are assessed by coursework and/or examination. Others often involve on-going  phased assessment or combination of presentation  and dissertation. Courseworks assess learning outcomes  through practical and creative work either individually or in  groups. Students are typically required to submit  evaluative and reflective reports and/or evidence of  planning and design as well as any finished product. |
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###### Skills and other attributes

| 2.1.2 Effective modelling and design2.1.3 Problem solving strategies2.1.4 Analyse if/how a system meets current and future requirements2.1.5 Deploy theory in design, implementation and evaluation of systems2.2.1 Specify, design or construct computer-based systems2.2.2 Evaluate systems in terms of quality and trade-offs2.2.4 Deploy tools effectively2.3.1 Work as a member of a development team2.3.2 Development of general transferable skills3.2.1 Specify, deploy, verify and maintain information systems3.2.2 Defining problems, managing design process and evaluating outcome3.2.3 System design4.2.1 Specify, deploy, verify and maintain computer-based systems4.2.2 Defining problems, managing design process and evaluating outcomes5.1 Application of practical and analytical skillsAdditional outcomes for the integrated master’s courses are:7.1.1 Critical review of literature7.1.3 Respond to opportunities for innovation7.1.4 Participate in the peer review process7.1.6 Use appropriate processes7.1.7 Investigate and define a problem8.2.1 Produce work informed by research at the forefront8.2.2 Tackling a significant technical problem9.2.1 Develop and apply new technologies9.2.2 Show originality and innovation10.2.2 Quantitative and qualitative research methods10.2.3 Evaluation of scientific risk |  **Teaching/Learning Strategies:** Lectures will be used to deliver core material and to  demonstrate, where appropriate, use of tools and best  practice; tutorials may be used either to facilitate a  theoretical treatment of a topic or as preparation for  practicals; the practicals themselves give students the  opportunity to apply and hone their skills via the  application of material to a given problem scenario and/or  through practice with particular tools, languages,  environments, etc. **Assessment Strategies:** Many of the modules' assignments include the solution of  problems via the application of methods, techniques, and  tools to a given problem scenario, thus giving the students  opportunities to display the technical skills they have  developed. |
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###### Professional Practical Skills

| 2.1.6 Recognise legal, social, ethical & professional issues2.2.3 Recognise risk/safety for safe operation of computing equipment3.1.1 Deploy systems to meet business goals5.4 Awareness of wider customer contexts.Additional outcomes for the integrated master’s courses are:7.1.5 Undertake risk management8.1.3 Understand and participate in the professional, legal and ethical framework9.1.3 Understand and participate in the professional, legal and ethical framework in systems, software or information engineering9.2.3 Evaluation of commercial risk10.1.3 Understand and participate in the professional, legal and ethical framework in computing science |  **Teaching/Learning Strategies:** Professional skills are taught in a number of modules including the final year project and in the supervised  work experience year. **Assessment Strategies:** Many modules, including the final year project,  involve these issues in their assessment. This may  include, for example, a reflective critique of work  undertaken or an evaluation/application of these skills as  part of an assignment. |
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###### Transferable/Key Skills

| 2.1.3 Problem solving strategies2.3.1 Work as a member of a development team2.3.2 Development of general transferable skills3.2.2 Defining problems, managing design process and evaluating outcomes4.1.1 Knowledge and understanding of scientific and engineering principles4.1.2 Knowledge and understanding of mathematical principlesAdditional outcomes for the integrated master’s courses are:7.1.1 Critical review of literature7.1.2 Development of the self-directed learner9.2.2 Show originality and innovation10.1.2 Comprehensive understanding of the scientific techniques10.2.2 Quantitative and qualitative research methods |  **Teaching/Learning Strategies:** Key skills are developed throughout the programme through a combination of lectures, tutorials, practical, laboratory work, projects/studio work, guided study, and case studies.  **Assessment Strategies:** Key skills are assessed as part of coursework, projects, written examinations, and presentations. |
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###### 13 Course structures and requirements, levels, modules, credits and awards

**Course Structure**

The courses have been designed to meet the QAA Benchmark Statement for Computing ver. October 2019. Appendix C contains a summary of the skills included in this statement and Appendix D provides a table showing how these skills map onto core modules in this course. There are no compulsory modules, all modules are core and optional (where appropriate).

Please note that for all courses, option module availability will depend on both demand and resources and will be published to students annually.

Year 3 of the programme comprises a monitored Professional Placement with a minimum duration of 48 weeks.

## BSc (Hons) Software Engineering

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Module Code** | **Module Name** | **Level** | **Credits** | **Term** | **Type** |
| **CFM2175** | Computing Science and Mathematics | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFS2101** | Computer Organisation and Architecture | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFP2125** | Project 1 | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2102** | Computer Network Fundamentals | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2160** | Software Design and Development | F (FHEQ 4) | 40 | Yearlong | Core |
| **CIS2205** | Introduction to Artificial Intelligence | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2206** | Algorithms and Data Structures | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2360** | Relational Databases and Web Integration | I (FHEQ 5) | 20 | Term 1 | Core |
| **CII2350** | Team Project | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIS2343** | Object-Oriented Systems Development | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIM2130** | Computational Mathematics 1 | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2201** | Cyber Security | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2207** | Language Translators | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2208** | Operating Systems | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **NIE2206** | Embedded Systems | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CHI2550** | Modern Database Applications | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHM2130** | Computational Mathematics 2 | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHS2406** | Data-driven Artificial Intelligence | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHT2520** | Advanced Web Programming | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHS2402** | Large-Scale Software Engineering | H (FHEQ 6) | 20 | Term 2 | Core |
| **CHS2546** | Distributed and Client Server Systems | H (FHEQ 6) | 20 | Term 2 | Core |
| **CHP2524** | Individual Project | H (FHEQ 6) | 40 | Yearlong | Core |

\*Students take 1 from OPTION-A, 2 from OPTION-B

## BSc (Hons) Computing

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| --- | --- | --- | --- | --- | --- |
| **Module Code** | **Module Name** | **Level** | **Credits** | **Term** | **Type** |
| **CFM2175** | Computing Science and Mathematics | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFS2101** | Computer Organisation and Architecture | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFP2125** | Project 1 | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2102** | Computer Network Fundamentals | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2160** | Software Design and Development | F (FHEQ 4) | 40 | Yearlong | Core |
| **CIS2206** | Algorithms and Data Structures | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2360** | Relational Databases and Web Integration | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2205** | Introduction to Artificial Intelligence | I (FHEQ 5) | 20 | Term 1 | Option-A\* |
| **CIT2202** | Web Development | I (FHEQ 5) | 20 | Term 1 | Option-A\* |
| **CII2202** | User Experience Design | I (FHEQ 5) | 20 | Term 1 | Option-A\* |
| **CII2350** | Team Project | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIS2201** | Cyber Security | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIM2130** | Computational Mathematics 1 | I (FHEQ 5) | 20 | Term 2 | Option-B\* |
| **CIS2207** | Language Translators | I (FHEQ 5) | 20 | Term 2 | Option-B\* |
| **CIS2208** | Operating Systems | I (FHEQ 5) | 20 | Term 2 | Option-B\* |
| **CIS2343** | Object-Oriented Systems Development | I (FHEQ 5) | 20 | Term 2 | Option-B\* |
| **CHI2400** | Information Architecture | H (FHEQ 6) | 20 | Term 1 | Core |
| **CHI2550** | Modern Database Applications | H (FHEQ 6) | 20 | Term 1 | Option-C\* |
| **CHM2130** | Computational Mathematics 2 | H (FHEQ 6) | 20 | Term 1 | Option-C\* |
| **CHS2406** | Data-driven Artificial Intelligence | H (FHEQ 6) | 20 | Term 1 | Option-C\* |
| **CHT2520** | Advanced Web Programming | H (FHEQ 6) | 20 | Term 1 | Option-C\* |
| **CHS2402** | Large-Scale Software Engineering | H (FHEQ 6) | 20 | Term 2 | Core |
| **CHS2546** | Distributed and Client Server Systems | H (FHEQ 6) | 20 | Term 2 | Core |
| **CHP2524** | Individual Project | H (FHEQ 6) | 40 | Yearlong | Core |

\*Students take 1 from OPTION-A, 1 from OPTION-B, 1 from OPTION-C

## BSc (Hons) Computer Science

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Module Code** | **Module Name** | **Level** | **Credits** | **Term** | **Type** |
| **CFM2175** | Computing Science and Mathematics | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFS2101** | Computer Organisation and Architecture | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFP2125** | Project 1 | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2102** | Computer Network Fundamentals | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2160** | Software Design and Development | F (FHEQ 4) | 40 | Yearlong | Core |
| **CIS2205** | Introduction to Artificial Intelligence | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2206** | Algorithms and Data Structures | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2360** | Relational Databases and Web Integration | I (FHEQ 5) | 20 | Term 1 | Core |
| **CII2350** | Team Project | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIS2208** | Operating Systems | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIM2130** | Computational Mathematics 1 | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2201** | Cyber Security | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2207** | Language Translators | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2343** | Object-Oriented Systems Development | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **NIE2206** | Embedded Systems | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CHI2550** | Modern Database Applications | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHM2130** | Computational Mathematics 2 | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHS2406** | Data-driven Artificial Intelligence | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHT2520** | Advanced Web Programming | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHS2546** | Distributed and Client Server Systems | H (FHEQ 6) | 20 | Term 2 | Core |
| **CHS2402** | Large-Scale Software Engineering | H (FHEQ 6) | 20 | Term 2 | Option-C\* |
| **NHE2530** | Parallel Computer Architecture Clusters and Grids | H (FHEQ 6) | 20 | Term 2 | Option-C\* |
| **CHP2524** | Individual Project | H (FHEQ 6) | 40 | Yearlong | Core |

\*Students take 1 from OPTION-A, 2 from OPTION-B, 1 from OPTION-C

## BSc (Hons) Computer Science with Games Programming

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Module Code** | **Module Name** | **Level** | **Credits** | **Term** | **Type** |
| **CFM2175** | Computing Science and Mathematics | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFS2101** | Computer Organisation and Architecture | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFP2125** | Project 1 | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2102** | Computer Network Fundamentals | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2160** | Software Design and Development | F (FHEQ 4) | 40 | Yearlong | Core |
| **CIS2205** | Introduction to Artificial Intelligence | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2206** | Algorithms and Data Structures | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIT2213** | Game Engine Architecture | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2203** | Real-time Graphics | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIT2121** | Team Project (Games) | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIM2130** | Computational Mathematics 1 | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2207** | Language Translators | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2208** | Operating Systems | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2343** | Object-Oriented Systems Development | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **NHE2422** | Advanced Computer Games Development | H (FHEQ 6) | 20 | Term 1 | Core |
| **CHM2130** | Computational Mathematics 2 | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHS2406** | Data-driven Artificial Intelligence | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **NHE2443** | Team Project (Games) | H (FHEQ 6) | 40 | Term 2 | Core |
| **CHP2524** | Individual Project | H (FHEQ 6) | 40 | Yearlong | Core |

\*Students take 1 from OPTION-A, 1 from OPTION-B

## MEng Software Engineering

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Module Code** | **Module Name** | **Level** | **Credits** | **Term (Block)** | **Type** |
| **CFM2175** | Computing Science and Mathematics | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFS2101** | Computer Organisation and Architecture | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFP2125** | Project 1 | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2102** | Computer Network Fundamentals | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2160** | Software Design and Development | F (FHEQ 4) | 40 | Yearlong | Core |
| **CIS2205** | Introduction to Artificial Intelligence | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2206** | Algorithms and Data Structures | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2360** | Relational Databases and Web Integration | I (FHEQ 5) | 20 | Term 1 | Core |
| **CII2350** | Team Project | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIS2343** | Object-Oriented Systems Development | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIM2130** | Computational Mathematics 1 | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2201** | Cyber Security | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2207** | Language Translators | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2208** | Operating Systems | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **NIE2206** | Embedded Systems | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CHI2550** | Modern Database Applications | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHM2130** | Computational Mathematics 2 | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHS2406** | Data-driven Artificial Intelligence | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHT2520** | Advanced Web Programming | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHS2402** | Large-Scale Software Engineering | H (FHEQ 6) | 20 | Term 2 | Core |
| **CHS2546** | Distributed and Client Server Systems | H (FHEQ 6) | 20 | Term 2 | Core |
| **CHP2524** | Individual Project | H (FHEQ 6) | 40 | Yearlong | Core |
| **CMS3416** | Semantic Web | M (FHEQ 7) | 15 | Term 1 (1) | Option-C\* |
| **CMS3407** | Web and Network Services | M (FHEQ 7) | 15 | Term 1 (2) | Core |
| **CMS3417** | Autonomous and Autonomic Intelligent Systems | M (FHEQ 7) | 15 | Term 1 (3) | Option-C\* |
| **CMS3504** | Big Data Analytics | M (FHEQ 7) | 15 | Term 1 (3) | Option-C\* |
| **CMI3507** | Data Mining | M (FHEQ 7) | 15 | Term 1 (4) | Option-C\* |
| **CMI3416** | Effective Research and Professional Practice | M (FHEQ 7) | 15 | Term 2 (1) | Core |
| **CMS3405** | Advanced Software Development | M (FHEQ 7) | 15 | Term 2 (2) | Core |
| **CMI3509** | Databases for Large Data-sets | M (FHEQ 7) | 15 | Term 2 (3) | Option-D\* |
| **CMS3503** | Machine Learning | M (FHEQ 7) | 15 | Term 2 (4) | Option-D\* |
| **CMP3410** | Group Project | M (FHEQ 7) | 30 | Yearlong | Core |

\*Students take 1 from OPTION-A, 2 from OPTION-B, 2 from OPTION-C, 1 from OPTION-D. Barred combinations: CMS3504 and CMS3417

## MComp Computing

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Module Code** | **Module Name** | **Level** | **Credits** | **Term (Block)** | **Type** |
| **CFM2175** | Computing Science and Mathematics | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFS2101** | Computer Organisation and Architecture | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFP2125** | Project 1 | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2102** | Computer Network Fundamentals | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2160** | Software Design and Development | F (FHEQ 4) | 40 | Yearlong | Core |
| **CIS2206** | Algorithms and Data Structures | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2360** | Relational Databases and Web Integration | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2205** | Introduction to Artificial Intelligence | I (FHEQ 5) | 20 | Term 1 | Option-A\* |
| **CIT2202** | Web Development | I (FHEQ 5) | 20 | Term 1 | Option-A\* |
| **CII2202** | User Experience Design | I (FHEQ 5) | 20 | Term 1 | Option-A\* |
| **CII2350** | Team Project | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIS2201** | Cyber Security | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIM2130** | Computational Mathematics 1 | I (FHEQ 5) | 20 | Term 2 | Option-B\* |
| **CIS2207** | Language Translators | I (FHEQ 5) | 20 | Term 2 | Option-B\* |
| **CIS2208** | Operating Systems | I (FHEQ 5) | 20 | Term 2 | Option-B\* |
| **CIS2343** | Object-Oriented Systems Development | I (FHEQ 5) | 20 | Term 2 | Option-B\* |
| **CHI2400** | Information Architecture | H (FHEQ 6) | 20 | Term 1 | Core |
| **CHI2550** | Modern Database Applications | H (FHEQ 6) | 20 | Term 1 | Option-C\* |
| **CHM2130** | Computational Mathematics 2 | H (FHEQ 6) | 20 | Term 1 | Option-C\* |
| **CHS2406** | Data-driven Artificial Intelligence | H (FHEQ 6) | 20 | Term 1 | Option-C\* |
| **CHT2520** | Advanced Web Programming | H (FHEQ 6) | 20 | Term 1 | Option-C\* |
| **CHS2402** | Large-Scale Software Engineering | H (FHEQ 6) | 20 | Term 2 | Core |
| **CHS2546** | Distributed and Client Server Systems | H (FHEQ 6) | 20 | Term 2 | Core |
| **CHP2524** | Individual Project | H (FHEQ 6) | 40 | Yearlong | Core |
| **CMS3416** | Semantic Web | M (FHEQ 7) | 15 | Term 1 (1) | Core |
| **CMI3411** | Information and Knowledge Management | M (FHEQ 7) | 15 | Term 1 (2) | Option-D\* |
| **CMS3407** | Web and Network Services | M (FHEQ 7) | 15 | Term 1 (2) | Option-D\* |
| **CMS3417** | Autonomous and Autonomic Intelligent Systems | M (FHEQ 7) | 15 | Term 1 (3) | Option-D\* |
| **CMS3504** | Big Data Analytics | M (FHEQ 7) | 15 | Term 1 (3) | Option-D\* |
| **CMI3507** | Data Mining | M (FHEQ 7) | 15 | Term 1 (4) | Option-D\* |
| **CMI3416** | Effective Research and Professional Practice | M (FHEQ 7) | 15 | Term 2 (1) | Core |
| **CMS3405** | Advanced Software Development | M (FHEQ 7) | 15 | Term 2 (2) | Core |
| **CMI3509** | Databases for Large Data-sets | M (FHEQ 7) | 15 | Term 2 (3) | Option-E\* |
| **CMS3503** | Machine Learning | M (FHEQ 7) | 15 | Term 2 (4) | Option-E\* |
| **CMP3410** | Group Project | M (FHEQ 7) | 30 | Yearlong | Core |

\*Students take 1 from OPTION-A, 1 from OPTION-B, 1 from OPTION-C, 2 from OPTION-D, 1 from OPTION-E. Barred combinations: CMS3407 and CMI3411; CMS3504 and CMS3417

## MSci Computer Science

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Module Code** | **Module Name** | **Level** | **Credits** | **Term (Block)** | **Type** |
| **CFM2175** | Computing Science and Mathematics | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFS2101** | Computer Organisation and Architecture | F (FHEQ 4) | 20 | Term 1 | Core |
| **CFP2125** | Project 1 | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2102** | Computer Network Fundamentals | F (FHEQ 4) | 20 | Term 2 | Core |
| **CFS2160** | Software Design and Development | F (FHEQ 4) | 40 | Yearlong | Core |
| **CIS2205** | Introduction to Artificial Intelligence | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2206** | Algorithms and Data Structures | I (FHEQ 5) | 20 | Term 1 | Core |
| **CIS2360** | Relational Databases and Web Integration | I (FHEQ 5) | 20 | Term 1 | Core |
| **CII2350** | Team Project | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIS2208** | Operating Systems | I (FHEQ 5) | 20 | Term 2 | Core |
| **CIM2130** | Computational Mathematics 1 | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2201** | Cyber Security | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2207** | Language Translators | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CIS2343** | Object-Oriented Systems Development | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **NIE2206** | Embedded Systems | I (FHEQ 5) | 20 | Term 2 | Option-A\* |
| **CHI2550** | Modern Database Applications | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHM2130** | Computational Mathematics 2 | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHS2406** | Data-driven Artificial Intelligence | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHT2520** | Advanced Web Programming | H (FHEQ 6) | 20 | Term 1 | Option-B\* |
| **CHS2546** | Distributed and Client Server Systems | H (FHEQ 6) | 20 | Term 2 | Core |
| **CHS2402** | Large-Scale Software Engineering | H (FHEQ 6) | 20 | Term 2 | Option-C\* |
| **NHE2530** | Parallel Computer Architecture Clusters and Grids | H (FHEQ 6) | 20 | Term 2 | Option-C\* |
| **CHP2524** | Individual Project | H (FHEQ 6) | 40 | Yearlong | Core |
| **CMS3416** | Semantic Web | M (FHEQ 7) | 15 | Term 1 (1) | Option-D\* |
| **CMS3407** | Web and Network Services | M (FHEQ 7) | 15 | Term 1 (2) | Core |
| **CMS3417** | Autonomous and Autonomic Intelligent Systems | M (FHEQ 7) | 15 | Term 1 (3) | Option-D\* |
| **CMS3504** | Big Data Analytics | M (FHEQ 7) | 15 | Term 1 (3) | Option-D\* |
| **CMI3507** | Data Mining | M (FHEQ 7) | 15 | Term 1 (4) | Option-D\* |
| **CMI3416** | Effective Research and Professional Practice | M (FHEQ 7) | 15 | Term 2 (1) | Core |
| **CMS3405** | Advanced Software Development | M (FHEQ 7) | 15 | Term 2 (2) | Core |
| **CMI3509** | Databases for Large Data-sets | M (FHEQ 7) | 15 | Term 2 (3) | Option-E\* |
| **CMS3503** | Machine Learning | M (FHEQ 7) | 15 | Term 2 (4) | Option-E\* |
| **CMP3410** | Group Project | M (FHEQ 7) | 30 | Yearlong | Core |

\*Students take 1 from OPTION-A, 2 from OPTION-B, 1 from OPTION-C, 2 from OPTION-D, 1 from OPTION-E. Barred combinations: CMS3504 and CMS3417

**Programme Awards:**

Students leaving with 120 credits at Foundation level can be awarded a Certificate of Higher Education (CertHE).

* Certificate of Higher Education Computing
* Certificate of Higher Education Computer Science
* Certificate of Higher Education Computer Science with Games Programming
* Certificate of Higher Education Software Engineering.

Students leaving with 240 credits of which 120 credits from I and/or H level can be awarded a Diploma of Higher Education (DipHE).

* Diploma of Higher Education Computing
* Diploma of Higher Education Computer Science
* Diploma of Higher Education Computer Science with Games Programming
* Diploma of Higher Education Software Engineering.

Students leaving with 300 credits from F, I and H level of which at least 60 credits from H level can be awarded a Bachelor of Science (BSc)

* BSc Computing
* BSc Computer Science
* BSc Computer Science with Games Programming
* BSc Software Engineering

Bachelor of Science Honours BSc (Hons) will be awarded to students on the successful completion of all academic modules totalling 360 credits. These credits must include 120 credits from the honour level and relevant final year individual project module.

* BSc (Hons) Computing
* BSc (Hons) Computer Science
* BSc (Hons) Computer Science with Games Programming
* BSc (Hons) Software Engineering

Students on an Integrated Master’s course, or a corresponding BSc course, who achieved an overall 60% or above from F, I and H level will be offered progression to the integrated master’s enhanced year of study. BSc students achieving a year average of 60% or better can be transferred to the corresponding integrated master’s course (i.e. BSc Software Engineering to MEng Software Engineering, BSc Computer Science to MSci Computer Science, and BSc Computing to MComp Computing). Students may opt to move from the integrated master’s course to the corresponding BSc at any time. Students may also transfer between courses (e.g. Software Engineering to Computer Science, Computing to Software Engineering). Transfer to Software Engineering requires a mark of at least 50% in CFS2160, transfer to Computer Science requires a mark of at least 50% in CFM2175, transfer to Computer Science with Games Programming requires a mark of at least 50% in both CFS2160 and CFM2175.

Students on the sandwich route who obtain 600 credits (which includes 120 M-level credits), or students on the full-time route who obtain 480 credits (which includes 120 M-level credits) will be awarded an integrated master’s (MEng, MSci or MComp) degree in their specific subject.

###### 14 Teaching, learning and assessment

A wide range of teaching and learning strategies are employed on the courses. These include but are not limited to lectures, tutor-led tutorials, tutor-led and student-led seminars, case-studies, workshops, problem-based learning scenarios, and directed unsupervised study facilitated through study packs, self-test exercises and directed reading.

All modules will include an element of formative assessment as well as the final summative assessment, though this may take several different forms depending on the module. Examples include mid-module coursework with a formative side as well as a contribution to the summative grade, tutorial exercises (with solutions) used to guide the learner through the module and prepare them for the assessment(s), or the provision of past examination papers with a mechanism for students to submit their answers for feedback from the module leader.

The University complies fully with the Special Educational Needs and Disabilities Act (2010) and all reasonable adjustments are taken to avoid disabled students being placed at a substantial disadvantage in comparison to students who are not disabled.

###### 15 Support for students and their learning

All students are assigned a Personal Academic Tutor. The role of the personal academic tutor (PAT) in supporting students is seen as of primary importance. Students are encouraged to see their PAT about any problems they have which do or may affect their ability to study and learn. The tutor will keep track of any serious on-going issues, but respects student confidentiality. Students may see other staff about an issue if they feel more comfortable doing so; further information will be supplied in the Course Handbook. Students are encouraged to see academic tutors if they have difficulty understanding material or with coursework. Additional support includes:

**University Level**

A range of central facilities are provided to support students:

* Student Services provide specialist advice in the areas of counselling, disability, pastoral care and chaplaincy, accommodation, finance and careers; it also supports a day-care nursery and job shop for part-time work.
* The Learning Centre (library and computing facilities) provides induction and on-going support for students.
* The International Office provides help and support for overseas students.

**School Level**

* An Academic Skills Tutor is available to provide assistance with generic study, and other, skills.
* A central computer-based attendance monitoring scheme is operated and students with poor attendance are contacted and advised.
* Student Guidance and Support Officers are available to help students who are experiencing difficulties with attendance and/or other aspects of their studies.
* The Placement Unit provide support throughout the application and placement process.

**Programme Level**

* All students undertake an induction programme in year 1.
* All students have a Personal Academic Tutor, with whom they can discuss personal and academic difficulties and develop their Personal Development Planning. Appendix E details how PDP maps onto modules and is progressed through the course.
* Year Tutors are available to provide guidance on academic progress.
* Module Tutors are available to help with academic problems specific to the modules they deliver.
* Supporting documentation is provided in the form of student handbooks, module handbooks, programme specifications and module specifications.
* The virtual-learning environment, Brightspace, is used to support all modules and year groups.
* Lecture Capture is available for a large number of taught classes to aid student learning.

###### 16 Criteria for admission

The recruitment and admissions process endeavours to ensure a good match between the abilities and aptitudes of the applicants and the demands of the programme. The aim is to facilitate widening participation whilst ensuring that students can reasonably expect to succeed on their chosen course.

Indicative admissions requirements are: A-level BBB or DMM in BTEC Level 3 Extended Diploma for BSc courses and A-level AAB or DDD in BTEC Level 3 Extended Diploma for integrated masters courses. Since these may be subject to change, definitive admissions requirements, including UCAS points equivalence, will be as given on the University web site (<http://www.hud.ac.uk/courses>).

Candidates with non-standard qualifications and/or experience will be considered on a case-by-case basis. For candidates with supplementary qualifications and/or experience it may be possible to take this into account and offer these candidates exemption from specific modules, or entry onto a later year of the course.

The overriding consideration in admitting a student to any of these courses is evidence that the student is likely to be able to complete the course satisfactorily.

###### 17 Methods for evaluating and improving the quality and standards of teaching and learning

**Quality and Standards**

* The University’s Teaching and Learning Committee has ultimate responsibility for quality and standards of teaching and learning in the University.
* The School Board, via the School Teaching and Learning Committee has responsibility for implementing University policy through School-defined procedures.
* Periodic School and subject reviews take place on a rolling quinquennial programme and focus inter alia on the arrangements for quality management and enhancement, teaching, learning and assessment, C&IT strategies, the articulation and assurances of standards, external examiner reports and evaluation and links with professional bodies, employers and other external organisations.

**Monitoring, Development and Evaluation**

The Course Committee is responsible for the monitoring and development of the course or programme, taking account of feedback from staff, students and external examiners. Feedback is sought as follows:

* From students through annual course and module evaluation questionnaires, termly Student Panel meetings, input from student members of the Course Committee and the National Student Survey.
* From external examiners through annual reports, course assessment board minutes, assessment moderation reports and informal communication during the year.
* From Professional Standards and Review Bodies through quinquennial reaccreditation visits.

Annual evaluation of the programme is the responsibility of the School Board. The Course Committee prepares an annual evaluation report comprising reporting and evaluation, informed by feedback from staff, students and external examiners and by statistical data.

**Validation of Courses, Modules and Changes**

Course validation takes place under the University's [Quality Assurance Procedures for Taught Programmes](https://www.hud.ac.uk/policies/registry/qa-procedures/). Amendments to programme and module documents are validated by the School Accreditation and Validation Panel.

**Teaching and Learning**

The School Teaching and Learning Committee is tasked with implementing the University's teaching and learning strategy and with fostering innovation in teaching and learning and the dissemination of good practice.

**Staff Development Priorities Include**

* Staff Annual Appraisal and institutional staff development courses
* Fellowship of the Higher Education Academy
* Updating professional developments
* Regular course meetings and annual review and planning for subsequent academic year
* Engagement in subject specific research conferences, including pedagogical research.

###### 18 Regulation of assessment

The assessment regulations are as detailed in the University of Huddersfield Regulations for Awards, relevant sections of which are repeated in the Students' Handbook of Regulations. These regulations are not repeated here, since the University periodically changes the regulations.

Details of student regulations can be found in:

[www.hud.ac.uk/registry/regulationsandpolicies/studentregs/](https://www.hud.ac.uk/registry/regulationsandpolicies/studentregs/)

Course Specific Progression Requirements

* Year 2 to Year 3/4
* normally, a minimum average mark for the year of 60% or above.
* Year 4 to Year 5
* normally, a minimum average mark for the year of 60% or above,
* the Individual Project module to be passed at the first attempt.
* Year 4 students who are unable to progress to Year 5 or elect not to continue will be eligible for a Bachelor’s degree with honours award, as detailed in the University of Huddersfield Regulations for Awards.

Applicable for student entry from academic year 2020-2021.

* The Integrated Master’s Degrees (second cycle award) receive classification awards, using the same system for the Bachelor’s degree (first cycle), namely First Class, Upper Second Class, Lower Second Class, or Third Class.

On Master’s courses where the Placement year, is included and graded.

M-level:    weighting of 3- 120 credit average

H-Level:   weighting of 2 - ‘best’ 100 credit average

S-level:    weighting of 1 - 120 credit average

I-Level:    weighting of 1 - ‘best’ 100 credit average

On completion of a Master’s course where the Placement year is not undertaken, the classification will be determined by the weighted numerical year credit average, as follows:

M-level:    weighting of 3 - 120 credit average

H-Level:   weighting of 2 - ‘best’ 100 credit average

I-Level:     weighting of 1 - ‘best’ 100 credit average

The following course regulation will be applicable from academic year 2022-2023 for those students wanting to partially or fully meet the requirements for Chartered Engineer (CEng). The regulation is not applicable nor required for meeting requirements for Chartered IT Professional (CITP).

A maximum of 20 credits in a Bachelor’s or Integrated Master’s degree can be condoned (termed Compensation by the Engineering Council). If a module is available for Condonement, an opportunity will be given to undertake the appropriate referral assessment/s – if however the respective module is not subsequently assessed as an overall pass, then the condoned pass credits will be awarded, with no further module condonement available in subsequent levels of the course.

###### 19 Indicators of quality and standards

The following are used as indicators:

* Reports of validation panels
* Annual course reviews
* Annual evaluation report
* External examiners’ reports
* Qualifications and experience of staff
* Report on University Review

Professional body reviews:

* The MEng Software Engineering course was last accredited by the British Computer Society in January 2017 for full accreditation for the BCS's professional entry (CITP) examinations and full Chartered Engineer (CEng) / Chartered Scientist (CSci) accreditation.
* The BSc Software Engineering, BSc Computer Science and BSc Computing courses were last accredited by the British Computer Society in January 2017 for partial accreditation for the BCS's professional entry examinations (CITP) and partial Chartered Engineer (CEng) / Chartered Scientist (CSci) accreditation.
* The BSc Computer Science with Games Programming was last accredited (as the BSc Computer Games Programming) by the BCS in January 2017.
* The MSci Computer Science and MComp Computing were last accredited by the British Computer Society in January 2017 (as MEng Computing Science and MEng Computing, respectively) and the accreditation retroactively granted for these courses from their start date.

**Please note: This specification provides a concise summary of the main features of the Programme and the 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 learning outcomes, content and teaching, learning and assessment methods of each module can be found in the study module guide(s) and course handbook. The accuracy of the information contained in this document is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.**

**Key sources of information about the course can be found in:**

* Student Handbook (Issued yearly)
* University of Huddersfield Student Handbook of Regulations (issued yearly)
* University of Huddersfield Prospectus (issued yearly)
* University website ([http://www.hud.ac.uk](http://www.hud.ac.uk/))
* School of Computing and Engineering external web site (<http://www.hud.ac.uk/ce/>)
* School of Computing and Engineering intranet (<http://intranet.hud.ac.uk/ce-student/>), containing Year Handbooks and Module Specifications.

###### APPENDIX A Mapping of Learning Outcomes to Modules

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **MEng (Y1-4) / BSc (Hons) Software Engineering** | **Year 1** | CFS2160 | CFM2175 | CFS2101 | CFS2102 | CFP2125 | **Year 2** | CII2350 | CIS2206 | CIS2360 | CIS2343 | CIS2205 | **Year 3** | CSP2010 | CSP2020 | **Year 4** | CHS2402  | CHS2546 | CHP2524 |
| 2.1.1 Knowledge and understanding of facts, concepts, principles & theories |  | \* | \* | \* | \* |  \* |  |   | \* | \* | \* | \* |   |   |   |  | \* | \* | \*  |
| 2.1.2 Use of such knowledge in modelling and design |  | \* |   |   |  | \* |  | \* | \* | \* | \* | \* |   |   |   |  | \* | \* | \* |
| 2.1.3 Problem solving strategies |   | \* | \* |   |   |   |   |   | \* |   |   | \* |   |   |   |   |   | \* |   |
| 2.1.4 Analyse if/how a system meets current and future requirements |   |   |   |   |  \* | \* |   | \* | \*  | \* | \* | \*  |   |   |   |   |  | \* | \* |
| 2.1.5 Deploy theory in design, implementation and evaluation of systems |   | \* |   |   |  | \* |   | \* |  | \* | \* |   |   |   |   |   |  | \* | \* |
| 2.1.6 Recognise legal, social, ethical & professional issues |   |   |   |   |   |  \* |   |  \* |   |   |   |   |   |   |   |   |   |   | \*  |
| 2.1.7 Knowledge and understanding of commercial and economic issues |   |   |   |   |   |  \* |   |  \* |   |   |   |   |   |   |   |   |   |   | \*  |
| 2.1.8 Knowledge of management techniques to achieve objectives |  |   |   |   |   |  \* |  |  \* |   |   |   |   |   |   |   |  | \* |   | \*  |
| 2.1.9 Knowledge of information security issues |  |   |   |  | \* |  |  |   |   | \* |   |   |   |   |   |  | \*  | \*  |   |
| 2.2.1 Specify, design or construct computer-based systems |  | \* |   | \* | \* | \* |  | \* | \* | \* | \* | \* |   |   |   |  | \* | \* | \* |
| 2.2.2 Evaluate systems in terms of quality and trade-offs |   |   |   |   |   | \* |   | \* |   |   | \*  | \* |   |   |   |   |  |   | \* |
| 2.2.3 Recognise risk/safety for safe operation of computing equipment |   |   |   |   | \*  |   |   | \*  |   |   |   |   |   |   |   |   | \*  |   | \*  |
| 2.2.4 Deploy tools effectively |   |   |   |   |  | \* |   | \* |   |  | \* |   |   |   |   |   |  | \* | \* |
| 2.3.1 Work as a member of a development team |   |   |   |   |   | \* |   | \*  |   |   |   |   |   | \* | \* |   | \*  |   |   |
| 2.3.2 Development of general transferable skills |   | \*  | \*  | \*  | \*  | \* |   | \*  | \*  | \*  | \*  | \*  |   | \* | \* |   | \*  | \*  | \* |
| 3.1.1 Deploy systems to meet business goals |   |   |   |   |   |  \* |   |   |   | \*  |   |  |   |   |   |   |  |   | \* |
| 3.1.2 Methods, techniques and tools for information modelling, management and security |  |   |   |  |  \* |  \* |   |   |   | \* |   | \*  |   |   |   |   | \*  | \*  |   |
| 3.1.3 Knowledge of systems architecture |   |  \* |   | \* |  \* |   |   |   |   | \*  |   | \*  |   |   |   |   |   | \* | \*  |
| 3.2.1 Specify, deploy, verify and maintain information systems |   |   |   |   |   | \*  |   | \*  |   |  |  \* |   |   |   |   |   |   | \*  | \*  |
| 3.2.2 Defining problems, managing design process and evaluating outcomes |   |  |   |   |   | \* |   | \* |   |   |   |   |   |   |   |   |   |   | \* |
| 3.2.3 System Design |   |  |   |   |   | \*  |   |   |  |  \* |   |   |   |   |   |   |   |   | \* |
| 4.1.1 Knowledge and understanding of scientific and engineering principles |   |  \* | \* |  \* | \*  |  \* |   | \*  | \* | \*  | \*  | \*  |   |   |   |   | \*  | \*  | \* |
| 4.1.2 Knowledge and understanding of mathematical principles |   |   | \* |   |   |   |   |   | \* |   |   | \* |   |   |   |   |   |   | \*  |
| 4.1.3 Knowledge and understanding of computational modelling |   |  |   |   |   |   |   |  |  \* |  |  | \* |   |   |   |   | \* |  |   |
| 4.2.1 Specify, deploy, verify and maintain computer-based systems |   | \* |   |   |   | \*  |   | \*  |   |  |  \* |   |   |   |   |   |   | \*  | \*  |
| 4.2.2 Defining problems, managing design process and evaluating outcomes |   | \* |   |   |   | \* |   | \* |   |   |   |   |   |   |   |   |   |   | \* |
| 4.2.3 Principles of appropriate supporting engineering and scientific disciplines |   |   |  |   |   |   |   |   | \* |   |   | \* |   |   |   |   | \*  |   |   |
| 5.1 Application of practical and analytical skills |   | \* |   |   |   | \* |   | \* | \* | \* | \* | \* |   | \* | \* |   | \* | \* | \* |
| 5.2 Innovation and/or creativity |   |   |   |   |   | \*  |   | \*  |   |   |   |   |   |   |  |   |   |   | \* |
| 5.3 Synthesis of information, ideas and practices |   |   |   |   |   |   |   | \* |   |   |   |   |   |   |   |   |   |   | \* |
| 5.4 Awareness of wider customer contexts |   |   |   |   |   |  \* |   |  \* |   |   |   |   |   |   | \* |   | \* |   | \*  |
| 5.5 The ability to work co-operatively |   |   |   |   |   | \*  |   | \* |   |   |   |   |   |   | \* |   |   |   | \*  |
| 5.6 Critical self evaluation of the process |   |   |   |   |   | \*  |   | \* |   |   |   |   |   |   | \* |   | \* | \* | \* |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **MComp (Y1-4) / BSc (Hons) Computing** | **Year 1** | CFS2160 | CFM2175 | CFS2101 | CFS2102 | CFP2125 | **Year 2** | CII2350 | CIS2206 | CIS2360 | CIS2201 | **Year 3** | CSP2010 | CSP2020 | **Year 4** | CHI2400 | CHS2402 | CHS2546 | CHP2524 |
| 2.1.1 Knowledge and understanding of facts, concepts, principles & theories |  | \* | \* | \* | \* |  \* |  |   | \* | \* | \*  |   |   |   |  | \* | \* | \* | \*  |
| 2.1.2 Use of such knowledge in modelling and design |  | \* |   |   |  | \* |  | \* | \* | \* |   |   | \* |   |  | \* | \* | \* | \* |
| 2.1.3 Problem solving strategies |   | \* | \* |   |   |   |   |   | \* |   |   |   | \* |   |   |  |   | \* |   |
| 2.1.4 Analyse if/how a system meets current and future requirements |   |   |   |   |  \* | \* |   | \* | \*  | \* |   |   | \* |   |   | \* |  | \* | \* |
| 2.1.5 Deploy theory in design, implementation and evaluation of systems |   | \* |   |   |  | \* |   | \* |  | \* | \* |   | \* |   |   |  |  | \* | \* |
| 2.1.6 Recognise legal, social, ethical & professional issues |   |   |   |   |   |  \* |   |  \* |   |   | \* |   | \* | \* |   |  |   |   | \*  |
| 2.1.7 Knowledge and understanding of commercial and economic issues |   |   |   |   |   |  \* |   |  \* |   |   | \*  |   | \* |   |   |  |   |   | \*  |
| 2.1.8 Knowledge of management techniques to achieve objectives |  |   |   |   |   |  \* |  |  \* |   |   |   |   | \* | \* |  |  | \* |   | \*  |
| 2.1.9 Knowledge of information security issues |  |   |   |  | \*  |   |  |   |   | \* | \* |   |   |   |  | \* | \*  | \*  |   |
| 2.2.1 Specify, design or construct computer-based systems |  | \* |   | \* | \* | \* |  | \* | \* | \* |  |   | \* |   |  | \* | \* | \* | \* |
| 2.2.2 Evaluate systems in terms of quality and trade-offs |   |   |   |   |   | \* |   | \* |   |   |   |   | \* |   |   | \* |  |   | \* |
| 2.2.3 Recognise risk/safety for safe operation of computing equipment |   |   |   |   | \*  |   |   | \*  |   |   | \* |   | \* |   |   |  | \*  |   | \*  |
| 2.2.4 Deploy tools effectively |   |   |   |   |  | \* |   | \* |   |  |   |   | \* | \* |   |  |  | \* | \* |
| 2.3.1 Work as a member of a development team |   |   |   |   |   | \* |   | \*  |   |   |   |   |   |   |   |  | \*  |   |   |
| 2.3.2 Development of general transferable skills |   | \*  | \*  | \*  | \*  | \* |   | \*  | \*  | \*  | \*  |   | \* |   |   | \* | \*  | \*  | \* |
| 3.1.1 Deploy systems to meet business goals |   |   |   |   |   |  \* |   |   |   | \*  |   |   | \* |   |   |  |  |   | \* |
| 3.1.2 Methods, techniques and tools for information modelling, management and security |  |   |   |  |  \* |  \* |   |   |   | \* | \*  |   |   |   |   | \* | \*  | \*  |   |
| 3.1.3 Knowledge of systems architecture |   |  \* |   | \* |  \* |   |   |   |   | \*  | \*  |   |   |   |   | \* |   | \* | \*  |
| 3.2.1 Specify, deploy, verify and maintain information systems |   |   |   |   |   | \*  |   | \*  |   |  |   |   | \* |   |   |  |   | \*  | \*  |
| 3.2.2 Defining problems, managing design process and evaluating outcomes |   |  |   |   |   | \* |   | \* |   |   |   |   | \* | \* |   |  |   |   | \* |
| 3.2.3 System Design |   |  |   |   |   | \*  |   |   |  |  \* |   |   |   |   |   |  |   |   | \* |
| 4.1.1 Knowledge and understanding of scientific and engineering principles |   |  \* | \* |  \* | \*  |  \* |   | \*  | \* | \*  | \*  |   |   |   |   | \* | \*  | \*  | \* |
| 4.1.2 Knowledge and understanding of mathematical principles |   |   | \* |   |   |   |   |   | \* |   |   |   |   |   |   |  |   |   | \*  |
| 4.1.3 Knowledge and understanding of computational modelling |   |  |   |   |   |   |   |  |  \* |  |   |   |   |   |   |  | \* |  |   |
| 4.2.1 Specify, deploy, verify and maintain computer-based systems |   | \* |   |   |   | \*  |   | \*  |   |  |   |   | \* |   |   |  |   | \*  | \*  |
| 4.2.2 Defining problems, managing design process and evaluating outcomes |   | \* |   |   |   | \* |   | \* |   |   |   |   | \* |   |   |  |   |   | \* |
| 4.2.3 Principles of appropriate supporting engineering and scientific disciplines |   |   |  |   |   |   |   |   | \* |   |   |   | \* |   |   |  | \*  |   |   |
| 5.1 Application of practical and analytical skills |   | \* |   |   |   | \* |   | \* | \* | \* | \* |   | \* |   |   | \* | \* | \* | \* |
| 5.2 Innovation and/or creativity |   |   |   |   |   | \*  |   | \*  |   |   |   |   | \* |   |   |  |   |   | \* |
| 5.3 Synthesis of information, ideas and practices |   |   |   |   |   |   |   | \* |   |   |   |   | \* |   |   |  |   |   | \* |
| 5.4 Awareness of wider customer contexts |   |   |   |   |   |  \* |   |  \* |   |   |   |   | \* |   |   |  | \* |   | \*  |
| 5.5 The ability to work co-operatively |   |   |   |   |   | \*  |   | \* |   |   |   |   | \* |   |   |  |   |   | \*  |
| 5.6 Critical self evaluation of the process |   |   |   |   |   | \*  |   | \* |   |   |   |   | \* | \* |   |  |  |  | \* |

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| **MSci (Y1-4) / BSc (Hons) Computer Science** | **Year 1** | CFS2160 | CFM2175 | CFS2101 | CFS2102 | CFP2125 | **Year 2** | CII2350 | CIS2206 | CIS2360 | CIS2208 | CIS2205 | **Year 3** | CSP2010 | CSP2020 | **Year 4** | CHS2546 | CHP2524 |
| 2.1.1 Knowledge and understanding of facts, concepts, principles & theories |  | \* | \* | \* | \* |  \* |  |   | \* | \* | \* | \* |   |   |   |  | \* | \*  |
| 2.1.2 Use of such knowledge in modelling and design |  | \* |   |   |  | \* |  | \* | \* | \* | \* | \* |   |   |   |  | \* | \* |
| 2.1.3 Problem solving strategies |   | \* | \* |   |   |   |   |   | \* |   |   | \* |   |   |   |   | \* |   |
| 2.1.4 Analyse if/how a system meets current and future requirements |   |   |   |   |  \* | \* |   | \* | \*  | \* |   | \*  |   |   |   |   | \* | \* |
| 2.1.5 Deploy theory in design, implementation and evaluation of systems |   | \* |   |   |  | \* |   | \* |  | \* | \* |   |   |   |   |   | \* | \* |
| 2.1.6 Recognise legal, social, ethical & professional issues |   |   |   |   |   |  \* |   |  \* |   |   |   |   |   |   |   |   |   | \*  |
| 2.1.7 Knowledge and understanding of commercial and economic issues |   |   |   |   |   |  \* |   |  \* |   |   |   |   |   |   |   |   |   | \*  |
| 2.1.8 Knowledge of management techniques to achieve objectives |  |   |   |   |   |  \* |  |  \* |   |   |   |   |   |   |   |  |   | \*  |
| 2.1.9 Knowledge of information security issues |  |   |   |  | \*  |   |  |   |   | \* | \* |   |   |   |   |  | \*  |   |
| 2.2.1 Specify, design or construct computer-based systems |  | \* |   | \* | \* | \* |  | \* | \* | \* | \* | \* |   |   |   |  | \* | \* |
| 2.2.2 Evaluate systems in terms of quality and trade-offs |   |   |   |   |   | \* |   | \* |   |   |   | \* |   |   |   |   |   | \* |
| 2.2.3 Recognise risk/safety for safe operation of computing equipment |   |   |   |   | \*  |   |   | \*  |   |   |   |   |   |   |   |   |   | \*  |
| 2.2.4 Deploy tools effectively |   |   |   |   |  | \* |   | \* |   |  | \* |   |   |   |   |   | \* | \* |
| 2.3.1 Work as a member of a development team |   |   |   |   |   | \* |   | \*  |   |   |   |   |   | \* | \* |   |   |   |
| 2.3.2 Development of general transferable skills |   | \*  | \*  | \*  | \*  | \* |   | \*  | \*  | \*  |   | \*  |   | \* | \* |   | \*  | \* |
| 3.1.1 Deploy systems to meet business goals |   |   |   |   |   |  \* |   |   |   | \*  |   |  |   |   |   |   |   | \* |
| 3.1.2 Methods, techniques and tools for information modelling, management and security |  |   |   |  |  \* |  \* |   |   |   | \* |   | \*  |   |   |   |   | \*  |   |
| 3.1.3 Knowledge of systems architecture |   |  \* |   | \* |  \* |   |   |   |   | \*  |   | \*  |   |   |   |   | \* | \*  |
| 3.2.1 Specify, deploy, verify and maintain information systems |   |   |   |   |   | \*  |   | \*  |   |  |   |   |   |   |   |   | \*  | \*  |
| 3.2.2 Defining problems, managing design process and evaluating outcomes |   |  |   |   |   | \* |   | \* |   |   | \* |   |   |   |   |   |   | \* |
| 3.2.3 System Design |   |  |   |   |   | \*  |   |   |  |  \* |   |   |   |   |   |   |   | \* |
| 4.1.1 Knowledge and understanding of scientific and engineering principles |   |  \* | \* |  \* | \*  |  \* |   | \*  | \* | \*  |   | \*  |   |   |   |   | \*  | \* |
| 4.1.2 Knowledge and understanding of mathematical principles |   |   | \* |   |   |   |   |   | \* |   |   | \* |   |   |   |   |   | \*  |
| 4.1.3 Knowledge and understanding of computational modelling |   |  |   |   |   |   |   |  |  \* |  |   | \* |   |   |   |   |  |   |
| 4.2.1 Specify, deploy, verify and maintain computer-based systems |   | \* |   |   |   | \*  |   | \*  |   |  |   |   |   |   |   |   | \*  | \*  |
| 4.2.2 Defining problems, managing design process and evaluating outcomes |   | \* |   |   |   | \* |   | \* |   |   |   |   |   |   |   |   |   | \* |
| 4.2.3 Principles of appropriate supporting engineering and scientific disciplines |   |   |  |   |   |   |   |   | \* |   |   | \* |   |   |   |   |   |   |
| 5.1 Application of practical and analytical skills |   | \* |   |   |   | \* |   | \* | \* | \* | \* | \* |   | \* | \* |   | \* | \* |
| 5.2 Innovation and/or creativity |   |   |   |   |   | \*  |   | \*  |   |   |   |   |   |   |  |   |   | \* |
| 5.3 Synthesis of information, ideas and practices |   |   |   |   |   |   |   | \* |   |   |   |   |   |   |   |   |   | \* |
| 5.4 Awareness of wider customer contexts |   |   |   |   |   |  \* |   |  \* |   |   |   |   |   |   | \* |   |   | \*  |
| 5.5 The ability to work co-operatively |   |   |   |   |   | \*  |   | \* |   |   |   |   |   |   | \* |   |   | \*  |
| 5.6 Critical self evaluation of the process |   |   |   |   |   | \*  |   | \* |   |   |   |   |   |   | \* |   |  | \* |

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| **BSc (Hons) Computer Science with Games Programming** | **Year 1** | CFS2160 | CFM2175 | CFS2101 | CFS2102 | CFP2125 | **Year 2** | CIS2206 | CIS2205 | CIS2203 | CIT2213 | CIT2121 | **Year 3** | CSP2010 | CSP2020 | **Year 4** | NHE2422 | NHE2443 | CHP2524 |
| 2.1.1 Knowledge and understanding of facts, concepts, principles & theories |  | \* | \* | \* | \* |  \* |   | \* | \* | \* | \* |   |   |   |   |   | \* |   |   |
| 2.1.2 Use of such knowledge in modelling and design |  | \* |   |   |  | \* |   | \* | \* | \* | \* | \* |   | \* |   |   |  \* | \* | \* |
| 2.1.3 Problem solving strategies |   | \* | \* |   |   |   |   | \* | \* |   | \* |   |   | \* |   |   |  \* |   |   |
| 2.1.4 Analyse if/how a system meets current and future requirements |   |   |   |   |  \* | \* |   | \*  | \*  |  \* |  \* | \* |   | \* |   |   |  \* | \* | \* |
| 2.1.5 Deploy theory in design, implementation and evaluation of systems |   | \* |   |   |  | \* |   |  |   | \* | \* | \* |   | \* |   |   |  \* | \* | \* |
| 2.1.6 Recognise legal, social, ethical & professional issues |   |   |   |   |   |  \* |   |   |   |  |   |  \* |   | \* | \* |   |   | \* | \*  |
| 2.1.7 Knowledge and understanding of commercial and economic issues |   |   |   |   |   |  \* |   |   |   |   |   |  \* |   | \* |   |   |   | \* | \*  |
| 2.1.8 Knowledge of management techniques to achieve objectives |  |   |   |   |   |  \* |   |   |   |  |   |  \* |   | \* | \* |   |   | \* | \*  |
| 2.1.9 Knowledge of information security issues |  |   |   |  | \*  |   |   |   |   |  |   |   |   |   |   |   |  \* | \* |   |
| 2.2.1 Specify, design or construct computer-based systems |  | \* |   | \* | \* | \* |   | \* | \* | \* | \* | \* |   | \* |   |   | \* | \* | \* |
| 2.2.2 Evaluate systems in terms of quality and trade-offs |   |   |   |   |   | \* |   |   | \* |  \* | \* | \* |   | \* |   |   |  \* | \* | \* |
| 2.2.3 Recognise risk/safety for safe operation of computing equipment |   |   |   |   | \*  |   |   |   |   |  |   |   |   | \* |   |   |   | \* | \*  |
| 2.2.4 Deploy tools effectively |   |   |   |   |  | \* |   |   |   | \* | \* | \* |   | \* | \* |   | \* | \* | \* |
| 2.3.1 Work as a member of a development team |   |   |   |   |   | \* |   |   |   |  |   |  \* |   |   |   |   |   | \* |   |
| 2.3.2 Development of general transferable skills |   | \*  | \*  | \*  | \*  | \* |   | \*  | \*  | \* | \* |  \* |   | \* |   |   |   | \* | \* |
| 3.1.1 Deploy systems to meet business goals |   |   |   |   |   |  \* |   |   |  |   |   |  \* |   | \* |   |   |   |  \* | \* |
| 3.1.2 Methods, techniques and tools for information modelling, management and security |  |   |   |  |  \* |  \* |   |   | \*  |   |   |   |   |   |   |   |  \* |   |   |
| 3.1.3 Knowledge of systems architecture |   |  \* |   | \* |  \* |   |   |   | \*  | \*  | \* |   |   |   |   |   | \* |   | \*  |
| 3.2.1 Specify, deploy, verify and maintain information systems |   |   |   |   |   | \*  |   |   |   |   |   |  \* |   | \* |   |   |   |  \* | \*  |
| 3.2.2 Defining problems, managing design process and evaluating outcomes |   |  |   |   |   | \* |   |   |   |   |   | \* |   | \* | \* |   |   |  \* | \* |
| 3.2.3 System Design |   |  |   |   |   | \*  |   |  |   |   |  |  \* |   |   |   |   | \* |  \* | \* |
| 4.1.1 Knowledge and understanding of scientific and engineering principles |   |  \* | \* |  \* | \*  |  \* |   | \* | \*  |  \* |   |   |   |   |   |   |  \* |  \* | \* |
| 4.1.2 Knowledge and understanding of mathematical principles |   |   | \* |   |   |   |   | \* | \* |   | \*  |   |   |   |   |   |   |   | \*  |
| 4.1.3 Knowledge and understanding of computational modelling |   |  |   |   |   |   |   |  \* | \* |   |   | \* |   |   |   |   |   |   |   |
| 4.2.1 Specify, deploy, verify and maintain computer-based systems |   | \* |   |   |   | \*  |   |   |   |   |   | \* |   | \* |   |   |   |  \* | \*  |
| 4.2.2 Defining problems, managing design process and evaluating outcomes |   | \* |   |   |   | \* |   |   |   |   |   | \* |   | \* |   |   |   |  \* | \* |
| 4.2.3 Principles of appropriate supporting engineering and scientific disciplines |   |   |  |   |   |   |   | \* | \* |  \* |   |   |   | \* |   |   |   |   |   |
| 5.1 Application of practical and analytical skills |   | \* |   |   |   | \* |   | \* | \* |   |   | \* |   | \* |   |   |   |   | \* |
| 5.4 Awareness of wider customer contexts |   |   |   |   |   | \*  |   |   |   |   |   |   |   | \* |   |   |   |  \* | \* |
| 5.5 The ability to work co-operatively |   |   |   |   |   | \*  |   | \* |   |   |   |   |   |   | \* |   |   | \*  | \*  |
| 5.6 Critical self evaluation of the process |   |   |   |   |   | \*  |   | \* |   |   |   |   |   |   | \* |   |  | \* | \* |

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| **MEng Software Engineering (Y5)** | CMI3416 | CMS3405 | CMS3407 | CMP3410 |
| 7.1.1 Critical review of literature | **\*** |  | **\*** | **\*** |
| 7.1.2 Development of the self-directed learner | **\*** |  |  | **\*** |
| 7.1.3 Respond to opportunities for innovation |  |  |  | **\*** |
| 7.1.4 Participate in the peer review process | **\*** |  |  | **\*** |
| 7.1.5 Undertake risk management | **\*** |  |  | **\*** |
| 7.1.6 Use appropriate processes | **\*** | **\*** | **\*** | **\*** |
| 7.1.7 Investigate and define a problem |  |  |  | **\*** |
| 7.1.8 Apply principles of supporting disciplines |  |  |  | **\*** |
| 8.1.1 Systematic understanding of knowledge of the domain with depth in particular areas |  | **\*** | **\*** | **\*** |
| 8.1.2 Comprehensive understanding of essential principles and practices | **\*** | **\*** | **\*** | **\*** |
| 8.1.3 Understand and participate in the professional, legal and ethical framework | **\*** |  |  | **\*** |
| 8.2.1 Produce work informed by research at the forefront |  |  | **\*** | **\*** |
| 8.2.2 Tackling a significant technical problem |  |  |  | **\*** |
| 9.1.1 Systematic understanding of knowledge at the forefront in development and implementation of systems |  | **\*** | **\*** | **\*** |
| 9.1.2 Comprehensive understanding of the state of the art techniques |  | **\*** | **\*** | **\*** |
| 9.1.3 Understand and participate in the professional, legal and ethical framework in systems, software or information engineering | **\*** |  |  | **\*** |
| 9.2.1 Develop and apply new technologies |  | **\*** | **\*** | **\*** |
| 9.2.2 Show originality and innovation |  |  |  | **\*** |
| 9.2.3 Evaluation of commercial risk | **\*** |  |  | **\*** |
| 10.1.1 Systematic understanding of knowledge at the forefront in computing science research |  | **\*** | **\*** |  |
| 10.1.2 Comprehensive understanding of the scientific techniques |  | **\*** | **\*** | **\*** |
| 10.1.3 Understand and participate in the professional, legal and ethical framework in computing science | **\*** |  |  | **\*** |
| 10.2.1 Critical awareness of current research issues, problems and/or insights | **\*** |  | **\*** | **\*** |
| 10.2.2 Quantitative and qualitative research methods | **\*** |  |  | **\*** |
| 10.2.3 Evaluation of scientific risk | **\*** |  |  | **\*** |

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| **MComp Computing (Y5)** | CMI3416 | CMS3416 | CMS3405 | CMP3410 |
| 7.1.1 Critical review of literature | **\*** | **\*** |  | **\*** |
| 7.1.2 Development of the self-directed learner | **\*** |  |  | **\*** |
| 7.1.3 Respond to opportunities for innovation |  |  |  | **\*** |
| 7.1.4 Participate in the peer review process | **\*** |  |  | **\*** |
| 7.1.5 Undertake risk management | **\*** |  |  | **\*** |
| 7.1.6 Use appropriate processes | **\*** | **\*** | **\*** | **\*** |
| 7.1.7 Investigate and define a problem |  | **\*** |  | **\*** |
| 7.1.8 Apply principles of supporting disciplines |  |  |  | **\*** |
| 8.1.1 Systematic understanding of knowledge of the domain with depth in particular areas |  | **\*** | **\*** | **\*** |
| 8.1.2 Comprehensive understanding of essential principles and practices | **\*** | **\*** | **\*** | **\*** |
| 8.1.3 Understand and particpate in the professional, legal and ethical framework | **\*** |  |  | **\*** |
| 8.2.1 Produce work informed by research at the forefront |  | **\*** |  | **\*** |
| 8.2.2 Tackling a significant technical problem |  |  |  | **\*** |
| 9.1.1 Systematic understanding of knowledge at the forefront in development and implementation of systems |  | **\*** | **\*** | **\*** |
| 9.1.2 Comprehensive understanding of the state of the art techniques |  | **\*** | **\*** | **\*** |
| 9.1.3 Understand and particpate in the professional, legal and ethical framework in systems, software or information engineering | **\*** |  |  | **\*** |
| 9.2.1 Develop and apply new technologies |  | **\*** | **\*** | **\*** |
| 9.2.2 Show originality and innovation |  |  |  | **\*** |
| 9.2.3 Evaluation of commercial risk | **\*** |  |  | **\*** |
| 10.1.1 Systematic understanding of knowledge at the forefront in computing science research |  | **\*** | **\*** |  |
| 10.1.2 Comprehensive understanding of the scientific techniques |  | **\*** | **\*** | **\*** |
| 10.1.3 Understand and particpate in the professional, legal and ethical framework in computing science | **\*** |  |  | **\*** |
| 10.2.1 Critical awareness of current research issues, problems and/or insights | **\*** | **\*** |  | **\*** |
| 10.2.2 Quantitative and qualitative research methods | **\*** | **\*** |  | **\*** |
| 10.2.3 Evaluation of scientific risk | **\*** |  |  | **\*** |

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| **MSci Computer Science (Y5)** | CMI3416 | CMS3405 | CMS3407 | CMP3410 |
| 7.1.1 Critical review of literature | **\*** |  | **\*** | **\*** |
| 7.1.2 Development of the self-directed learner | **\*** |  |  | **\*** |
| 7.1.3 Respond to opportunities for innovation |  |  |  | **\*** |
| 7.1.4 Participate in the peer review process | **\*** |  |  | **\*** |
| 7.1.5 Undertake risk management | **\*** |  |  | **\*** |
| 7.1.6 Use appropriate processes | **\*** | **\*** | **\*** | **\*** |
| 7.1.7 Investigate and define a problem |  |  |  | **\*** |
| 7.1.8 Apply principles of supporting disciplines |  |  |  | **\*** |
| 8.1.1 Systematic understanding of knowledge of the domain with depth in particular areas |  | **\*** | **\*** | **\*** |
| 8.1.2 Comprehensive understanding of essential principles and practices | **\*** | **\*** | **\*** | **\*** |
| 8.1.3 Understand and particpate in the professional, legal and ethical framework | **\*** |  |  | **\*** |
| 8.2.1 Produce work informed by research at the forefront |  |  | **\*** | **\*** |
| 8.2.2 Tackling a significant technical problem |  |  |  | **\*** |
| 9.1.1 Systematic understanding of knowledge at the forefront in development and implementation of systems |  | **\*** | **\*** | **\*** |
| 9.1.2 Comprehensive understanding of the state of the art techniques |  | **\*** | **\*** | **\*** |
| 9.1.3 Understand and particpate in the professional, legal and ethical framework in systems, software or information engineering | **\*** |  |  | **\*** |
| 9.2.1 Develop and apply new technologies |  | **\*** | **\*** | **\*** |
| 9.2.2 Show originality and innovation |  |  |  | **\*** |
| 9.2.3 Evaluation of commercial risk | **\*** |  |  | **\*** |
| 10.1.1 Systematic understanding of knowledge at the forefront in computing science research |  | **\*** | **\*** |  |
| 10.1.2 Comprehensive understanding of the scientific techniques |  | **\*** | **\*** | **\*** |
| 10.1.3 Understand and particpate in the professional, legal and ethical framework in computing science | **\*** |  |  | **\*** |
| 10.2.1 Critical awareness of current research issues, problems and/or insights | **\*** |  | **\*** | **\*** |
| 10.2.2 Quantitative and qualitative research methods | **\*** |  |  | **\*** |
| 10.2.3 Evaluation of scientific risk | **\*** |  |  | **\*** |

###### APPENDIX B Assessment Strategy and Schedule

**YEAR ONE – FOUNDATION LEVEL MODULES**

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| --- | --- | --- | --- |
| **Module** **Code** | **Module Title** | **Assessment Weighting** | **Assessment Strategy and Indicative Schedule** |
| **Exam** | **C/W** |
| **practical** | **other** |
| CFS2160 | Software Design & Development | 40 | 60 |  | In-class test in guidance week of every termPortfolio of work in Weeks 12 and 24 |
| CFM2175 | Computing Science and Mathematics | 1090 |  |  | Four online quizzes, in Weeks 3, 6, 9 and 12End of term 2-hour exam |
| CFS2102 | Computer Network Fundamentals | 50 | 50 |  | Week 18: 1 hour in-class testWeek 24: Coursework |
| CFP2125 | Project 1 |  |  | 100 | Portfolio comprised of three components: group artefact conceptualisation (30%, Week 18), individual time-boxed activities (20%, Week 18), and group application development (50%, Week 24) |
| CFS2101 | Computer Organisation and Architecture | 50 | 50 |  | Week 6: 1 hour in-class testWeek 12: Coursework  |

**YEAR TWO – INTERMEDIATE LEVEL MODULES**

|  |  |  |  |
| --- | --- | --- | --- |
| **Module****Code** | **Module Title** | **Assessment Weighting** | **Assessment Strategy and Indicative Schedule** |
| **Exam** | **C/W** |
| **practical** | **other** |
| CIS2206 | Algorithms and Data Structures | 40 | 60 |  | In-class test in week 6Portfolio of programming and theoretical exercises (week 12) |
| CIM2130 | Computational Mathematics 1 | 50 | 50 |  | Week 18: 1 hour in-class testWeek 24: Coursework |
| CII2350 | Team Project  |  |  | 202060 | Week 18: Team proposal which outlines aims and objectives, team roles, time planning projections, project management, and deliverablesWeek 24: Showcase - small intensive team project based on an industrial briefWeek 24: Final product supported with team management documentation and peer assessment forms |
| CIS2360 | Relational Databases and Web Integration |  | 5050 |  | In-class test in week 6Portfolio of programming and theoretical exercises (week 12) |
| CIS2208 | Operating Systems |  | 100 |  | Week 24: Coursework examining general knowledge of principles of computer operating systems |
| CIS2201 | Cyber Security | 50 | 50 |  | Week 18: 1 hour in-class test examining general principles of cyber securityWeek 24: Coursework examining the student’s ability to translate knowledge into the development of cyber security considerate systems |
| CIS2343 | Object-Oriented Systems Development |  | 100 |  | Week 24: Coursework on designing, developing, testing and documenting an object-oriented system |
| CIS2205 | Introduction to Artificial Intelligence |  | 5050 |  | Week 18: Written assignment on knowledge engineeringWeek 24: Implementation of a knowledge-based intelligent system  |

**YEAR FOUR – HONOURS LEVEL MODULES**

|  |  |  |  |
| --- | --- | --- | --- |
| **Module****Code** | **Module Title** | **Assessment Weighting** | **Assessment Strategy and Indicative Schedule** |
| **Exam** | **C/W** |
| **practical** | **other** |
| CHS2546 | Distributed and Client Server Systems |  | 5050 |  | Week 6: Analysis, design, implementation and testing of a secure distributed information systemWeek 12: Design, development and evaluation of a client-server system |
| CHM2130 | Computational Mathematics 2 | 50 | 50 |  | Week 6: Coursework comprising a written element on matrix theory and a software component implementing a solution to a given problemEnd of term 2-hour exam |
| CHS2402 | Large-Scale Software Engineering |  | 6040 |  | Week 20: Group assignment on planning, designing and managing a large-scale project.Week 24: Individual assignment with a portfolio of theoretical and practical exercises. |
| CHP2524 | Individual Project |  | 100 |  | Week 24: Project report and presentation/demo |

**YEAR FIVE – MASTER’S LEVEL MODULES**

|  |  |  |  |
| --- | --- | --- | --- |
| **Module****Code** | **Module Title** | **Assessment Weighting** | **Assessment Strategy and Indicative Schedule** |
| **Exam** | **C/W** |
| **practical** | **other** |
| CMI3416 | Effective Research and Professional Practice |  | 5050 |  | Week 4: Analysis, design, implementation and testing of a secure distributed information systemWeek 6: Design, development and evaluation of a client-server system |
| CMS3416 | Semantic Web |  | 65 | 35 | Week 3: Group presentation on topic related to Semantic WebWeek 6: Practical implementation of Semantic Web standards |
| CMS3405 | Advanced Software Development | 50 | 50 |  | Week 20: In-class testWeek 24: Programming assignment |
| CMS3407 | Web and Network Services |  | 5050 |  | Week 4: Research paperWeek 6: Implementation of service-based application |
| CMP3410 | Group Project |  | 100 |  | Week 24: Project report and presentation/demo |

###### APPENDIX C Computing Benchmark Outcomes

The learning outcomes which have references to the QAA benchmark statement for Computing (ver. October 2019) are listed below. For simplicity the core outcomes shared by all courses in the Suite are listed first, the specialist outcomes of each course are then addressed. A table mapping core modules to these benchmark outcomes is shown in appendix D.

**Knowledge and Understanding:**

The outcomes common to all courses in the Suite are:

(1) programming language concepts; (2) computing hardware and networks; (3) modelling formalisms relevant to information systems analysis and design; (4) object oriented approaches to analysis, design and programming; (5) internet and web-based systems; (6) database management; (7) organisational and professional issues; (8) human aspects of computer systems; (9) mathematics applicable to software engineering; (10) computing science; (11) design approaches and their role in systems design and development; (12) common architectures and platforms; (13) operating systems.

The additional outcomes of the specialist courses within the Suite are:

For the BSc Software Engineering:

(14) formal and informal approaches to Software Engineering; (15) management of the software process; (16) software quality assurance; (17) software engineering of large scale systems; (18) development and management of distributed systems.

For the BSc Computing the additional aims will depend on the choice of options, but will include the following (note that this list is not exhaustive as it will depend on the options that are available at the current time):

(23) formal and informal approaches to Software Engineering; (24) artificial intelligence and knowledge representation formalisms; (25) business functions, organisation and use of information; (26) analysis and design of business information systems; (27) organisation and architecture of internet applications; (28) design of interactive systems for the web; (29) construction of secure and scalable distributed systems; (30) organisation and architecture of mobile applications; (31) construction of secure and reliable mobile applications.

For the BSc Computer Science:

(32) artificial intelligence and knowledge representation formalisms;

For the MEng Software Engineering/MSci Computer Science/MComp Computing:

(43) formal and informal approaches to Software Engineering; (44) management of the software process; (45) software quality assurance; (46) advanced techniques of Software Engineering (48) software engineering of large scale systems; (49) development and management of distributed systems.

**Skills and other attributes:**

The outcomes common to all courses in the Suite are:

(1) object-oriented and procedural programming; (2) object-oriented systems modelling and prototyping; (3) use and management of operating systems and networks; (4) programming language translation and compilation; (5) formal and rigorous specification and contract obligations; (6) database design and implementation; (7) internet and intranet systems development and programming for the web; (8) project and software lifecycle management; (9) enforcement of formally-agreed and de facto standards.

The additional outcomes of the specialist courses within the Suite are:

For the BSc Software Engineering:

(10) using distributed object technology; (11) software quality assurance.

Additionally, depending on the options chosen by the student, skills will also be gained in:

(12) artificial intelligence techniques; (13) developing neural networks for machine learning; (14) using and developing information retrieval systems; (15) developing Enterprise Systems; (16) developing Mobile Applications.

For the BSc Computing the additional skills may also be gained, depending on the choice of options (note that this list is not exhaustive as it will depend on the options that are available at the current time):

(25) artificial intelligence techniques; (26) developing neural networks for machine learning; (27) using distributed object technology; (28) using and developing information retrieval systems; (29) web based design and development; (30) information systems modelling; (31) implementation of information systems; (32) multi-media systems development; (33) design and production of interactive media; (34) using authoring packages; (36) developing Enterprise Systems; (37) developing Mobile Applications.

For the BSc Computer Science:

(38) artificial intelligence techniques.

Additionally, depending on the options chosen by the student, skills will also be gained in:

(39) developing neural networks for machine learning; (40) using distributed object technology; (41) using and developing information retrieval systems; (42) developing Enterprise Systems; (43) developing Mobile Applications.

For the MEng Software Engineering/MSci Computer Science/MComp Computing:

(51) using distributed object technology; (52) software quality assurance.

Additionally, depending on the options chosen by the student, skills will also be gained in:

(53) artificial intelligence techniques; (54) developing neural networks for machine learning; (55) using and developing information retrieval systems; (56) developing Enterprise Systems; (57) developing Mobile Applications.

**Professional Practical Skills**

The following professional skills are common to all courses in the Suite:

(1) professional ethics; (2) workplace practice; (3) application of data protection legislation; (4) copyright and intellectual property rights.

**Transferable/Key Skills**

The following transferable key skills are common to all courses in the Suite:

(4) information retrieval skills (including web browsing, search engines, and library skills).

###### APPENDIX D Mapping of Core Modules to Computing Benchmark Outcomes

|  |  Knowledge and Understanding Core Course Specific |  Skills and other attributes Core Course Specific  |  Professional  Practical Skills |  Transferrable /  Key Skills |
| --- | --- | --- | --- | --- |
| **Year 1** |
|  CFS2160 Software Design & Development | 1, 3, 4, 8, 11 |  | 1, 2 |  |  |  |
|  CFM2175 Computing Science & Maths | 1, 4, 9, 10 |  | 4, 5 |  |  |  |
|  CFS2101 Computer Organisation and Architecture | 2, 12, 13 | 34 | 3 |  |  |  |
|  CFS2102 Computer Network Fundamentals | 8, 9 |  |  |  | 1, 2, 3, 4 | 4 |
|  CFP2125Project 1 | 1, 4, 5, 8 |  | 1, 2 |  |  | 4 |
| **Year 2** |
|  CII2350 Team Project |  |  |  |  | 1, 2, 3, 4 | 4 |
|  CIS2206 Algorithms and Data Structures | 1, 3, 4, 11 |  | 1, 2 |  |  |  |
| CIS2201 | 9,13 |  |  |  | 1,2,3 |  |
|  CIS2360 Relational Database and Web  Integration | 5, 6 |  | 6, 7 |  |  | 4 |
|  CIS2343 Object Oriented Systems  Development | 1, 3, 4, 11 |  | 1, 2 |  |  |  |
|  CIS208 Operating Systems | 2, 12, 13, 14 | 23, 34 | 3 | 44, 46 |  |  |
| CII2202User Experience Design |  | 8, 26 |  | 32, 33, 35 |  |  |
| CIM2130 Computational Mathematics 1  |  | 33 |  |  |  |  |
| NIE2206 Embedded Systems  | 2 | 15 | 3, 4 |  |  |  |
|  CIS2205Introduction to Artificial Intelligence |  | 24, 32 |  | 12, 25, 26, 38, 39,48, 53, 54 |  |  |

|  |  Knowledge and Understanding Core Course Specific |  Skills and other attributes Core Course Specific |  Professional  Practical Skills |  Transferrable /  Key Skills |
| --- | --- | --- | --- | --- |
| **Year 3** (Supervised placement year) |
|  CSP2010 Personal, Social, and Technical  Skills  |  |  |  |  | 1, 2, 3, 4 | 4 |
|  CSP2020 Self-Assessment Skills |  |  |  |  | 1, 2, 3, 4 | 4 |
| **Year 4** |
| CHS2402 Large-Scale Software Engineering  |  | 15, 16, 17, 21, 41, 44, 45, 48 | 8, 9 | 11, 52 |  |  |
|  CHS2546 Distributed and Client Server  Systems |  | 18, 22, 29, 37, 40, 42, 49 | 7 | 10, 27, 40, 51 |  |  |
|  CHP2524 Individual Project |  Various, depending on the project chosen by the student |  | 4 |
|  CHM2130 Computational Mathematics 2 |  | 33 |  |  |  |  |
| CHI2550 Modern Database Applications |  | 6 |  | 14, 22, 28, 50, 55 |  | 4 |
| CHT2520Advanced Web Programming | 1, 4 | 22, 46, 49 |  |  |  | 4 |
| NHE2530Parallel Computer ArchitectureClusters and Grids | 1,2, 12, 13 | 17, 18 | 3 |  |  |  |
| **Year 5** |
| CMP3410 Group Project | 7, 11 | 44, 45, 46 | Dependent on project | Dependent on project | 1,2 | 4 |
| CMS3405 Advanced Software  Development | 1, 4 | 18, 22, 42, 46, 49 | 1,2,5 | 51 |  | 4 |
|  CMI3416 Effective Research and  Professional Practice | 7, plus others dependent on project | 47 | Dependent on project | Dependent on project | Dependent on project | 4 |
| CMS3416 Semantic Web | 1,3,6,7,11 | 26,46 | 6,7 | 14,28,29,30,31,41,55 |  | 4 |
|  CMS3407 Web and Network Services  | 2, 12 | 46 | 3,5 | 56 |  | 4 |

###### APPENDIX E Personal Development Planning (PDP)

|  |  |  |  |
| --- | --- | --- | --- |
| Competencies | Course Year | Areas where addressed | Evidence |
| Personal (including Communication Skills, Time Management and Self Organisation, Independent Learner and Group Working) | Year 1 | * CFP2125 Project 1
* CFS2160 Software Design & Development
* Personal Academic Tutor (PAT) PDP process
 | * Group assignment and poster for CFP2125
* Individual time-boxed activities for CFP2125
* Portfolio for CFS2160
* Completed notes from PAT PDP process
 |
|  | Year 2 | * CII2350 Team Project
* CIS2206 Algorithms and Data Structures
* PAT PDP process
 | * Team proposal, showcase and product for CII2350
* Portfolio for CIS2206
* Completed notes from PAT PDP process
 |
|  | Year 3 | * Professional Placement (CSP2010/CSP2020)
* PAT PDP process
 | * Experience gained through placement work
* Formal reports for CSP2010/CSP2020
* Completed notes from PAT PDP process
 |
|  | Year 4 | * CHP2524 Individual Project
* PAT PDP process
 | * CHP2524 poster, demo and report
* Completed notes from PAT PDP process
 |
| Career Planning | Year 2 | * CII2350 Team Project
* PAT PDP process
 | * Experience gained through working on a real-world industry brief for CII2350 showcase
* Completed notes from PAT PDP process
 |
| Year 3 | * Professional Placement (CSP2010/CSP2020)
 | * Formal reports for CSP2010/CSP2020
 |
| Year 4 | * Personal session with careers guidance officer – recommended
* PAT PDP process
 | * Personal research into professional competencies required for chosen career area.
* Completed notes from PAT PDP process.
 |
| Professional (Analytical, Practical, Technical & Managerial Skills) | All Years | * All modules
* PAT PDP process – further competence areas to be selected by the students as part of the PDP process throughout the studies
 | * Formal reports, portfolios, grades and feedback
* Examination results
* Completed notes from PAT PDP process
 |