Buckinghamshire New University

PROGRAMME SPECIFICATION

1. Key Information

Programme Title:	MEng Computer Science
Awarding Institution:	Buckinghamshire New University
Teaching Institution(s):	Buckinghamshire New University
Subject Cluster:	Computing
Award Title (including separate Pathway Award Titles where offered):	MEng Computer Science
Pathways (if applicable)	N/A
FHEQ level of final award:	7
Other award titles available (exit qualifications):	Postgraduate Certificate Postgraduate Diploma
Accreditation details:	N/A
Length of programme:	1 year
Mode(s) of Study:	Full Time
Mode of Delivery:	In person (on-site) delivery
Language of study:	English
QAA Subject Benchmark(s):	Computing (including Master's) (2022)
Other external reference points (e.g. Apprenticeship Standard):	British Computer Society
Course Code(s):	MNCOMSFT
UCAS Code(s):	
Approval date:	01 December 2022
Date of last update:	

2. Programme Summary

Computer Science drive the fundamental technologies of today's connected world. Every area of our lives, from medicine and healthcare to industrial applications, global trade, transport, communications, entertainment and security, is dependent on computing technology. As a result, computer science is now one of the fastest growing job fields in the world and skilled computer scientists are very much in demand.

Our extensive and principled approach to computer science will give you a through appreciation in both the theory and practical skills, helping you to solve real-world, life-critical difficulties. You will study systems at a variety of levels of abstraction, including digital architectures, high level programming, operating systems, A.I. and cyber security.

The Computer Science master's programme aims to equip learners to work as professional computer scientists, particularly in environments where in-depth knowledge, critical awareness and competence in computer hardware, software engineering and advanced areas of computer science is required in support of creating complex computer-based systems.

Amongst a range of educational aims covered in this programme, we also intend enhancing the engineering aspects of the course via the incorporation of robots and robotic systems into the computer science and computer engineering master's curricula. Furthermore, an important educational directive is to bestow our postgraduates with the engineering essentials, alongside covering the chief hardware and software engineering skills associated with designing, programming, constructing, debugging, and testing complex systems. To underpin this goal, we have embedded multiple opportunities into the course curricula for learners to learn and practice the requisite skills, whilst increasing the complexity as learners advance in their course of study.

Furthermore, Robots play a vital role in providing such opportunities to our learners. Collectively, robotics is incorporated into our curricula at two stages. At the initial stage, we use robots to teach the key ideas such as digital logic, analogue-to-digital conversion, digital-to-analogue conversion, programming, and power management. These concepts then form the source for the development of more advanced skills such as microcontroller interfacing, control, and circuit design. At the more innovative level, robotics provides learners with multiple opportunities to work on sophisticated systems. At this higher system level, a robot is seen as a system consisting of multiple, interconnected subsystems. In addition to gaining specific engineering skills, system design provides learners with valuable experience in partitioning difficult design problems from both the hardwire and software perspectives and facilitates the development of effective teamwork skills, whilst incorporating elements of AI and Data Science.

3. Programme Aims and Learning Outcomes

Programme Aims

This programme aims to:

1. Provide learners with a deep advanced understanding of the methodologies, technologies and techniques used within the field of computer science provision with a solid underpinning and to develop the skills needed for a wide range of computing related professional engineering careers as a high-quality practitioner and leader in business, technology, research and development within the field
2. Enable learners to apply knowledge of Computer Science and related engineering principles to the development of systems and software for industrial, business, and commercial applications

3. Make our learners aware of the impact, challenges presented, and the increasing pervasiveness and ubiquity of Computer Science issues in our contemporary world. Develop learners who can systematically and critically analyse and discriminate between options

4. Develop learners to be flexible and learning independent to evaluate different approaches to solving problems and taking technical decisions when using Computer Science systems, within a constantly changing complex and dynamic professional environment. Enable the building of solutions using different technologies, architectures

and appropriate methodological approaches in Computer Science based problems and devise appropriate solutions within the context of varying organisational structures

5. Develop an appreciation of professional, moral and ethical issues involved in Computer Science systems development, within a legal framework, and a sensitivity to changes in the Computer Science sector through enhanced leadership, management skills and nascent sector research understanding.

Programme Learning Outcomes

Knowledge and Understanding (K)

On successful completion of the programme, you will be able to:

ID	Learning Outcome
K1	Demonstrate the fundamentals and underlying theory of computer science, based systems in the world-wide context of computer science and information engineering systems.
K2	Describe and comment upon aspects relating to the computational principles that underpin computer science based systems, including computability, algorithmic complexity where appropriate related discipline areas.
K3	Recognise the need for the efficient as well as effective management of the process of computer science and information engineering systems and software construction within an ethical framework. Appreciating the uncertainty, ambiguity and limits of knowledge (business, industrial and commercial context) in which computer science is deployed, and its usability.
K4	Describe and comment upon aspects of current good practice, research, leadership and management through advanced scholarship prevalent in the computer science and information engineering systems life-cycle, alongside their outputs and dependencies between stages.

Analysis and Criticality (C)

On successful completion of the programme you will be able to:

ID	Learning Outcome
C1	Determine advanced level skills of an intellectual, analytical, creative and problem-solving nature in the context of computer science and information engineering systems.
C2	Deploy innovative plans, approaches and solutions to computer science and information engineering issues within a quality assurance and testing framework focused against the needs of computer science based system.
C3	Evaluate concepts and data, to make judgements, and to frame appropriate questions to achieve an appropriate solution to a problem in a logical, analytical and ethical manner across the spectrum of computer science and information engineering systems developments.
C4	Assess competently and critically the analyse and use of current and future technologies in the computer science and information engineering systems field. Apply theory to practice in the strategic management and technical solutions of computer science-based systems within organisations

Application and Practice (P)

On successful completion of the programme you will be able to:

ID	Learning Outcome
P1	Produce a dissertation involving the key processes of analysis, design, implementation and testing; underpinned by their associated product documentation. Applying the methods and techniques that they have learned to review, consolidate, extend and apply their knowledge and understanding of the unique challenges associated with the development and deployment of computer science and information engineering systems.
P2	Devise and sustain social, ethical and computational arguments and/to solve problems, using ideas and techniques, some of which are at the forefront of the computer science and information engineering systems discipline.
P3	Apply professional codes of conduct and appreciate the ethical considerations that underpin the acceptance and adoption of computer science and information engineering systems in society by professionals, individuals and society in general.
P4	Apply the methods and techniques of requirements analysis, specification and prototyping, implementation, testing, integration, documentation, delivery and maintenance and their roles in reviewing, consolidating, extending and applying their knowledge and understanding to identify practical computer science and engineering requirements.
P5	Critically evaluate arguments, assumptions, abstract concepts and data to provide best technical/managerial consultation, decisions and/or solutions. Synthesise and evaluate information from a wide variety of sources relating to computer science and business issues

Transferable skills and other attributes (T)

On successful completion of the programme you will be able to:

ID	Learning Outcome
T1	Communicate data, ideas, problems and solutions to both specialist and non-specialist audiences effectively in writing, speaking and in appropriate forms of presentation.
T2	Apply computational data using information technology to efficiently handle such data and simulations of systems for design and testing.
T3	Consolidate and expand on previous experience in order to enhance personal development or when leading/working as part of a team.

Graduate Attributes

The BNU Graduate Attributes of: Knowledge and its application; Creativity; Social and ethical awareness and responsibility; and Leadership and self-development focus on the development of innovative leaders in professional and creative capacities, who are equipped to operate in the 21st Century labour market and make a positive impact as global citizens.

Whilst developing as a cyber-security and information security advanced specialist on this programme, personal attributes are developed through the practical application of analytical skills, computational principles, algorithmic intricacy, computing technology systems in a variety of creative situations, including real-world scenarios, and life-critical Case Studies.

(K1, P3, P4, C1, C2). Analysis and evaluation approaches are embedded throughout the programme in individual and team tasks, through the appraisal of current and past computer science and information engineering systems supported by the feedback given to your own personal work. (P1, T1, T3, C4, P5). An understanding and awareness of operational applications fostered with a strong focus given to applying and assessing an appropriate life-cycle methodology. (K3, C4). This nurtures the self-efficacy to develop your own work opportunities and to adapt to a constantly evolving technological work environment (C4, K1, K2, K4). Through analysing the historical, social and cultural contexts of operational computer science and information engineering systems, alongside a growing social awareness is formed to ensure professional and ethical values are developed alongside the confidence to assess existing real-world, life critical systems, whilst appreciating the balance between the needs of computer science and its practice, embedded by information engineering fundamentals. (P1, P2, P3, C1, T3, T2, P4, P5).

4. Entry Requirements

The University's general entry requirements will apply to admission to this programme with the following additions / exceptions:

- An academic qualification equivalent to a BSc (Hons) Degree in a relevant subject area, 2:2 classification or better
- English Language level according to current IELTS requirement

Where an applicant does not meet the standard entry requirement with regards to academic qualification, their suitability for the programme will be assessed based upon their previous studies, professional and/or vocational experiences. An interview will likely be necessary in such cases.

The accreditation of prior learning (APL) process may be utilised to determine if any exemptions from studying modules are appropriate.

5. Programme Structure

Level	Modules (Code, Title and Credits)	Exit Awards
Level 7	**Core modules:** COM7010 Computer Science Overview (20) COM7011 Data Science (20) COM7002 Project (60) **Option modules:** Choose modules to the total of 80 credits: COM7012 Expert and Fuzzy Systems System Management (20) COM7013 Real-time Safety Critical Systems (20) COM7014 Natural Language Processing (20) COM7001 Cyber Security Assurance and Risk Management (20) COM7016 Robots and Robotic Systems (20) COM7018 Machine Learning and Intelligent Agents (20)	**Postgraduate Certificate,** awarded on achievement of 60 credits **Postgraduate Diploma**, awarded on achievement of 120 credits

6. Learning, Teaching and Assessment

Learning and teaching

Our adopted teaching and learning styles in the subject of computing reflect the role and importance that the various disciplines of the sector undertake in the modern world of today. Increasing emphasis on capability, competency and performance is woven into our approach to all aspects of our teaching and learning methods. They can reflect traditional workplace environments – placements and live projects with clients - as well as newer approaches like online evaluations, role-playing scenarios and gig-economy/commissioned work. Practical coursework, both individual and in teams, features heavily in our computing programmes.

The teaching and learning approaches in our programmes are designed to provide meaningful opportunities for applied learning in authentic or simulated work contexts, such as industrial placements. Working in teams on bigger projects simulates real-world environments and exposes learners to complexity. Ideally, projects can collaborate with industrial partners or research groups, enhancing learning and self-regulation and can expose learners to legal or ethical issues.

The focus is to provide for learners the opportunity to improve control of their own educational journey, giving them the tools and techniques to enable them to self-regulate and to optimise their personal performance: self-reflection, performance monitoring, evaluation and feedback within learning to support a more personalised journey. The teaching and learning approaches also aim to imbue the ability to work autonomously, both individually and in teams, reflecting the key desired professional attributes employers value in the field of computing.

Modules on this programme will be taught in line with best practice across the university and in the sector. A variety of approaches, and good use of the latest technology, will be blended to engage learners in learning in class, labs and beyond, and to encourage full learner participation. Meanwhile, the Course Team will strive to ensure that all modules embrace

current industrial practice wherever possible. The teaching and learning strategies employed throughout the course are those judged to be the most appropriate for each module at each stage and level of the course. The strategies have been designed to ensure that there is progression from formal teaching through to learner centred independent learning as the learner progresses through the levels of the course(s).

A range of teaching methods will be used including:

Lectures

This is the most formal teaching strategy employed in teaching the modules. It is generally used to deliver a body of theoretical information to a large group of learners and is most effective when followed up by a seminar or tutorial session to consolidate learning.

The lecture format may be supported by written handouts, web or library references which serve to reinforce and expand the audio-visual information presented. In addition, staff will make appropriate use of the University's VLE (Virtual Learning Environment) and rich-media facilities. This will enable lecturers to enhance the traditional communication and learning mediums, as well as making material available to learners off-site and at the university.

Tutorials / Practical Sessions

Often in smaller groups, tutorials are guided learning sessions, which can either support a formal lecture by learners working through tutorial sheets with the help of a lecturer or by learners working through practical exercises in say a computing room.

Seminars

These can vary from large group seminars, which provide an opportunity for the learner-led formal debate of topic areas, to 'impromptu' discussion sessions with smaller groups, which may for example follow the showing of a video.

Other techniques such as industrial visits, guest lectures and computer aided learning tools will be used where appropriate. This variety of techniques is aimed at stimulating learner learning. The teaching and learning strategies for individual modules are detailed in the relevant module proforma.

Assessment

The assessment of our Computing courses includes varied methods that are accessible to all learners. Assessments are, where possible, authentic and tied to real-world contexts and constraints, allowing learners to practically demonstrate the skills they have developed.

We aim to incorporate, where appropriate, the use of capstone activities (to encourage learners to think critically, solve challenging problems, and develop professional employability skills) when concluding the session. This brings together knowledge and practical and analytical skills that learners have developed throughout the course. This may take the form of a traditional project or end-point assessment, but other formats can be appropriate.

Where a learner may identify with disabilities that require further adjustments these will be handled, and adaptations made in accordance with the reasonable adjustment policy. The procedures used for assessment cover the subject knowledge, abilities and skills developed through the degree course.

Therefore, a variety of assessment vehicles will be used as appropriate to the module, including assignments carried out in the learner's own time, in-class assignment, workshops,

presentations and formal examination. The form of assessment has been chosen to motivate learners to achieve their best and create learning activities for the learners. The assessment vehicles for individual modules are detailed in the module descriptor.

Assessments will be appropriate to the task, achievable, motivating and vocationally focussed and will form a constructive part of the learning process.

Assessments will develop general transferable skills as well as academic skills.

Assessments will provide enough opportunity for the best learners to exhibit a level of innovation and creativity associated with excellence.

During the Foundation Year, learners will be exposed to a variety of summative and formative assessments whilst developing the academic skills to be a successful learner at university; course content and Learning Outcomes strongly relate to learners developing their knowledge and understanding of the subjects being studied and assessed.

Level 4 assessments will be primarily formative and will encourage the development of appropriate academic practice and concepts. The emphasis will be on frequent small-scale assessments wherever possible with a balance between formative and summative assessment.

Level 5 assessments will be more demanding, with the emphasis still on development of knowledge, skills, and concepts but now encouraging learning at greater depth, emphasising the fundamental principles. There will be a shift towards summative assessment.

Level 6 assessments are designed to allow learners to demonstrate their knowledge and skills so that they have become effective, independent learners. The emphasis is on summative assessment.

Advice, Feedback and Collaborative Learning

Assessment is an integral part of the education process, promoting learner learning by providing a focus for consolidating, applying and demonstrating understanding of the subject matter. The listed summative assessment regime essentially measures and grades learner development and achievement in relation to the intended Learning Outcomes. It also generates feedback information for learners about the strengths and weaknesses in their work, with tutors affirming what learners have done well whilst giving constructive and encouraging advice about areas requiring reflection and further improvement.

In fact, tutor feedback on formal assessment elements is just part of the ongoing dialogue with learners about their learning and personal development. Tutors will offer learners frequent opportunities to discuss their progress, where their work can be examined and reviewed, including the evaluation of plans and drafts for assignments prior to submission. This supportive engagement helps to clarify what "good performance" is, with reference to published criteria and expected standards; it also encourages, motivates and directs learners towards achieving their full potential.

Different strategies for timely advice and effective feedback will be adopted, according to what is fit-for-purpose for learners and modules. For instance: good or bad examples of previous learner work not only give learners clues about appropriate content, structure and presentation of assignments but also highlight common mistakes and omissions; mock exam papers and formative tests; work portfolios represent a collection of structured activities completed over a period of time with regular interactions with the tutor; individual and group tutorials; practising presentations with other learners can invite peer review; model answers can supplement and extend the feedback given on assessments; group discussions can

promote reflection and collaborative learning; audio and video recordings can be used at various points to explain topics and to give guidance; other technology (such as the VLE) can facilitate information sharing, and support learning and collaboration.

Contact Hours

One unit of credit is broadly equivalent to ten notional learning hours. Postgraduate learners will complete modules equivalent to 180 credits in total during their programme. This translates as 1800 notional learning hours. The combination of scheduled teaching (contact) activities, guided independent study and any opportunities for placement or work-based learning, will be defined at Module level.

7. Programme Regulations

This programme will be subject to the following assessment regulations:

- Academic Assessment Regulations

8. Support for learners

The following systems are in place to support you to be successful with your studies:

- The appointment of a personal tutor to support you through your programme
- A programme handbook and induction at the beginning of your studies
- Library resources, include access to books, journals and databases - many of which are available in electronic format – and support from trained library staff
- Access to Blackboard, our Virtual Learning Environment (VLE), which is accessible via PC, laptop, tablet or mobile device
- Access to the MyBNU portal where you can access all University systems, information and news, record your attendance at sessions, and access your personalised timetable
- Academic Registry staff providing general guidance on University regulations, exams, and other aspects of learners and course administration
- Central learner services, including teams supporting academic skills development, career success, learner finance, accommodation, chaplaincy, disability and counselling
- Support from the Bucks Learners' Union, including the Learners' Union Advice Centre which offers free and confidential advice on University processes.

9. Programme monitoring and review

BNU has a number of ways for monitoring and reviewing the quality of learning and teaching on your programme. You will be able to comment on the content of their programme via the following feedback mechanisms:

- Formal feedback questionnaires and anonymous module 'check-ins'
- Participation in external surveys
- Programme Committees, via appointed learner representatives
- Informal feedback to your programme leader

Quality and standards on each programme are assured via the following mechanisms:

- An initial event to approve the programme for delivery

- An annual report submitted by the External Examiner following a process of external moderation of work submitted for assessment
- The Annual Monitoring process, which is overseen by the University's Education Committee
- Review by the relevant PSRB(s)
- Periodic Subject Review events held every five years
- Other sector compliance and review mechanisms

10. Internal and external reference points

Design and development of this programme has been informed by the following internal and external reference points:

- The Framework for Higher Education Qualifications (FHEQ)
- The QAA Subject Benchmark Statement – see detailed mapping below
- The BNU Qualifications and Credit Framework
- The BNU Grading Descriptors
- The University Strategy

Mapping of Subject Benchmark Statement and any relevant Apprenticeship Standard to Programme Learning Outcomes

Subject Benchmark Statement / Apprenticeship Standard:	Knowledge and understanding (K)				Analysis and Criticality (C)				Application and Practice (P)					Transferable skills and other attributes (T)		
Benchmark / Standard requirement	**K1**	**K2**	**K3**	**K4**	**C1**	**C2**	**C3**	**C4**	**P1**	**P2**	**P3**	**P4**	**P5**	**T1**	**T2**	**T3**
Subject knowledge understanding and skills/ Demonstrate an exceptional understanding of the main body of knowledge for their subject and be able to exercise insightful and critical judgement in the use of that knowledge. Be creative and innovative in the application of the principles covered in the curriculum, and be able to go beyond what has been taught in classes	X	X			X	X		X	X		X					X
Intellectual skills/ Critically analyse and apply a wide range of concepts, principles and practices of the subject in the context of open scenarios, showing refined judgement and	X	X	X	X	X	X	X	X	X	X	X	X		X		

adaptability in the selection and use of tools and techniques																
Computational problem-solving/ Be able to demonstrate sophisticated judgement, critical thinking, research design, and well-developed problem-solving skills with a high degree of autonomy, and to create highly effective computational artefacts across complex and unpredictable circumstances		X		X	X	X	X	X	X		X		X		X	
Practical skills across the computing lifecycle/ Demonstrate the ability to undertake problem identification and analysis to appropriately design, develop, test, integrate or deploy a highly complex computing system and any associated artefacts; deeply understand the relationship between stages and be able to demonstrate related sophisticated problem-solving and evidence-informed evaluative skills	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X

Interpersonal and team working Skills/ Demonstrate the ability to work in a highly proactive and accomplished manner, including as a leading member of a team, making excellent use of tools and techniques to proficiently communicate, manage tasks and plan projects with minimum guidance	X	X		X			X	X		X	X	X					X
Professional practice covering Equality, diversity and inclusion, Sustainability and Entrepreneurship and enterprise education/ Identify best-of-kind practices and effect highly principled solutions within a professional, legal and ethical framework to consistently address a wide breadth of relevant considerations – including data management and use, security, equality, diversity and inclusion (EDI) and sustainability – in the work that they undertake	X				X	X	X	X	X		X				X	X	X

Mapping of Programme Learning Outcomes to Core Modules

Programme Learning Outcome	Knowledge and understanding (K)				Analysis and Criticality (C)				Application and Practice (P)					Transferable skills and other attributes (T)		
Module Code (Core)	K1	K2	K3	K4	C1	C2	C3	C4	P1	P2	P3	P4	P5	T1	T2	T3
Level 7																
Project	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Computer Science Overview	X	X		X			X	X					X			X
Data Science	X	X		X	X	X	X	X	X		X		X	X	X	X