

PROGRAMME SPECIFICATION

for the award of

BSc (Hons) Network Computing**Managed by the Faculty of Technology, Design and Environment****delivered by Department of Computing and Communication Technologies**

Date approved:	Date approval confirmed, on recommendation of University validation panel or other authorised body.
Applies to students commencing study in:	September 2016

RECORD OF UPDATES

Date amended*	Nature of amendment**	Reason for amendment**
July 2016	Transferred to new template, update graduate attribute from global to active citizenship, ordinary degree requirements.	CMA Compliance, Update to graduate attribute
October 2016	Checked for errors and amended by Subject Coordinator and Programme Lead.	Subject specialist knowledge.

SECTION 1: GENERAL INFORMATION

Awarding body:	Oxford Brookes University
Teaching institution and location:	Oxford Brookes University, Wheatley Campus
Language of study:	English
Final award:	BSc (Hons)
Programme title:	Network Computing
Interim exit awards and award titles available:	CertHE, DipHE, BSc
Brookes course code:	NK
UCAS code:	G420 BSc/NK
JACS code:	I100
HECoS code:	See guidance note G2.2, section 1
Mode of delivery:	Full-time (face to face/on-campus) Part-time (face to face/on-campus)
Mode/s and duration of study:	Full-Time 3 years Part Time 6 years Sandwich Mode (Full-Time) (placement in year 3) 4 years Sandwich Mode (Part-Time) (placement in year 3) 7 years In all cases the maximum length of registration is 8 years
QAA subject benchmark statement/s which apply to the programme:	Computing (2016) http://www.qaa.ac.uk/en/Publications/Documents/SBS-Computing-16.pdf
Professional accreditation attached to the programme:	BCS www.bcs.org CITP and CEng(partial fulfilment)
University Regulations:	The programme conforms to the University Regulations for the year of entry as published/archived at: http://www.brookes.ac.uk/regulations/

SECTION 2: WHY STUDY THIS PROGRAMME?

The combination of computers and telecommunications networks has changed our world. From the mobile phone in our pocket to the supercomputers used to model the earth's climate, computers are an integral part of our work and social life today. Coupled with a massive increase in our communications infrastructure, this has resulted in a society where people are used to interacting with information and other people from all round the globe.

This has opened up exciting opportunities for people who know how to create and manage these networks and the computers that use them and a degree in networking computing can help you utilise this potential. To be an effective practitioner in this area requires the ability to stay up to date with rapidly changing technologies and the competence to apply these technologies effectively. Studying network computing equips students with the professional skills, techniques and ways of thinking needed to be able to pursue a successful career in the discipline. Our Cisco academy status means that you will also learn practical skills on the type of equipment used in business and industry today. This practical grounding is underpinned with the theoretical concepts necessary to give the solid conceptual foundations on which to build a lifetime of learning.

The design of our programmes is informed by state of the art research being undertaken in the department. For example, the results of a recent project in collaboration with Nominet to protect parts the UK's internet infrastructure (which was graded outstanding in terms of its outcome) has fed directly into teaching and gave students the opportunity to attend a series of technical seminars and undertake projects on modelling key parts of the UK's internet. Students on our programmes have access to highly specialised computer laboratories where they learn the practical application of cutting edge theoretical skills and techniques.

Our aim is to provide you with an education in network computing that will enable you to develop the skills, knowledge and understanding necessary to pursue a career in industry, commerce or education. We also encourage you to adopt a critical and independent approach to learning.

In the first year you will study the fundamental principles of computing and networks. This includes an introduction to programming, some fundamental concepts in computing and the first two Cisco accredited modules. In later years you will build on this to study further Cisco accredited modules, advanced networking, systems management, programming and computer security.

On completion of the course you will have gained a knowledge and understanding of the foundations, techniques, limitations, developments, trends and applications of network computing and will have experience and skills in designing, creating, developing and maintaining networks and the computers and software that runs on top of them.

We consider that a work placement is central to your academic development. Organisations taking our placement students have indicated their satisfaction with them and the preparation they receive in the course prior to their placement. We also believe that our graduates will have developed a well-formed ability to interact effectively within and across discipline boundaries and thus to acquire new knowledge and to develop new skills as the needs arise.

Please refer to the following link to view the staff profiles within the Department of Computing and Communication Technologies:

<http://cct.brookes.ac.uk/staff/index.html>

SECTION 3: PROGRAMME LEARNING OUTCOMES

On successful completion of the programme, graduates will demonstrate the following Brookes Attributes:

3.1 ACADEMIC LITERACY

A1	Contribute to the creation of new software artefacts by applying the key concepts and ways of working derived from a deep understanding of the fundamental principles of Network Computing as informed by an operational context.
A2	Incorporate risk management and an understanding of information security issues in the design, development, maintenance and use of information systems.
A7	Demonstrate a thorough understanding of fundamental network technologies and concepts through the analysis and evaluation of network simulations and the creation and maintenance of network systems.
A8	Evaluate new and existing data transmission technologies to create innovative solutions to practical networking problems.

3.2 RESEARCH LITERACY

B1	Apply the scientific method and report findings using accepted formalisms.
B2	Identify and utilise trustworthy information sources, such as the ACM Digital Library to develop a coherent understanding of issues in the domain.

3.3 CRITICAL SELF-AWARENESS AND PERSONAL LITERACY

C1	Evaluate and reflect on the evolution of their strengths and weaknesses across the range of subject based competences involved in their chosen domain through the creation and implementation of a discipline based personal development plan.
C2	Apply self-awareness in evaluating their impact in team based work and utilise appropriate communication and problem resolution strategies.

3.4 DIGITAL AND INFORMATION LITERACY

D1	Use appropriate technologies such as online libraries and databases to find, critically evaluate and utilise both non specialist (e.g. reports) and technical (e.g. APIs and RFCs) information.
D2	Demonstrate proficiency in a range of formal and informal modes of communication such as giving presentations to groups, writing reports and writing software documentation.

3.5 ACTIVE CITIZENSHIP

E1	Demonstrate an awareness of, and work in a manner guided by, the legal, professional, ethical and social issues relevant to the IT and telecommunications industry.
E2	Evaluate the impact of the development, use and maintenance of information systems in commercial, economic and social contexts in both national and international settings.

SECTION 4: CURRICULUM CONTENT & STRUCTURE

4.1 PROGRAMME STRUCTURE AND REQUIREMENTS:

Code	Module Title	Credits	Level	Status	Coursework: Exam ratio
U08007	Professional Software System Design	30	4	Compulsory	100:0
U08008	Understanding Programming	30	4	Compulsory	100:0
U08009	Introduction to Object Oriented Programming	15	4	Compulsory	50:50
U08606	Discrete Mathematics	15	4	Compulsory	50:50
U08906	Basic Communications and PC Networking	15	4	Compulsory	50:50

U08907	Introduction to Networks	15	4	Compulsory	50:50
U08010	Software Development Environments	15	4	Optional	100:0
U08055	Professional Issues and Computer Risks	15	5	Compulsory	100:0
U08025	Foundations of Computation	15	5	Compulsory	30:70
U08027	Current Research	15	5	Compulsory	100:0
U08226	Foundations of Security	15	5	Compulsory	100:0
U08029	Communication Technologies	15	5	Compulsory	50:50
U08028	Software Development with C and C++	15	5	Compulsory	50:50
U08933	Network Technologies	15	5	Compulsory	50:50
U08934	WAN Technologies	15	5	Compulsory	50:50
U08041	Systems Administration	15	5	Compulsory	100:0
U08026	Further Object Oriented Programming	15	5	Optional	100:0
U08928	Approaches to Mobile Software Development	15	5	Optional	100:0
U08225	Foundations of Operating Systems	15	5	Optional	100:0
U08868	Independent Study level 5	15	5	Optional	100:0
U08065	Work Experience Placement	0	5	Optional	100:0
U08096	Project	30	6	Compulsory	100:0
U08076	Trends and Directions	15	6	Compulsory	100:0
U08972	Network Security	15	6	Compulsory	50:50
U08077	Advanced Networking	15	6	Alternative Compulsory	30:70
U08078	Network Systems Management	15	6	Alternative Compulsory	100:0
U08971	Advanced Mobile Software Development	15	6	Optional	100:0
U08075	Device Hardware	15	6	Optional	50:50
U08088	Independent Study level 6	15	6	Optional	100:0
U08085	Communicating and Teaching Computer Science	15	6	Optional	100:0

4.2 PROGRESSION AND AWARD REQUIREMENTS

All awards must meet the usual university rules for undergraduate programmes at this link <http://www.brookes.ac.uk/studying-at-brookes/how-to-apply/entry-requirements/undergraduate-courses/>

In addition to these the course and the possible interim exit awards have the following specific requirements.

For BSc (Hons): All compulsory modules and at least 1 level 5 alternative compulsory module and at least 1 level 6 alternative compulsory module must be passed.

For CertHE: All level 4 compulsory modules must be passed.

4.3 PROFESSIONAL REQUIREMENTS

Successful completion of the course meets the professional requirements.

SECTION 5: TEACHING AND ASSESSMENT

Formally scheduled teaching is generally in the form of lectures, tutorials, computer labs or apprentice mode sessions. Each 15 credit module has 150 learning hours associated with it, and of these, 36 (3 hrs x 12 weeks) are formally scheduled teaching. These figures are doubled for a double module, such as U08008. As students generally take 4 modules per semester, they are thus expected to attend 12 formally scheduled teaching hours per week.

The 3 contact hours per week on a module are broken down into either a 1 hour lecture and 2 hour practical session, or a 2 hour lecture and a 1 hour practical session, depending on the module. Lectures are attended by all the students on the module, and give students the opportunity to acquire knowledge and understanding of the key concepts in the subject. Practical sessions and tutorials are smaller groups of 1 tutor, with less than 20 students, and enable students to practice essential skills in a variety of contexts, as well as, build a wide set of experiences on which to reflect, and develop professional expertise. For more technical skills, including programming, the practical elements will be based around laboratory classes, allowing students to experiment with the technology in a controlled environment.

Some of our core programming modules are taught in an apprentice style. These use a different format which involves a 3 hour session where the time is made up of repeating a sequence of

- the lecturer giving a short presentation from slides,
- the lecturer working through examples where they use the technique or concept being taught
- the students carrying out exercises to practice the technique or concept for themselves with the lecturer providing help and feedback.

This style of teaching takes place mainly in computer labs with 1 tutor and less than 20 students but sometimes in a larger computer lab with 2 tutors and less than 35 students.

Outside of the 36 hours scheduled teaching, the remaining 114 hours associated with a module are split up roughly along the lines of a third of the module time being involved in directed work, or independent study, with the remainder used to prepare for assignments, background reading, research etc. The actual breakdown varies on a module by module basis.

In addition to formally scheduled teaching hours, all teaching staff provide 3 to 4 hours of "Office Hours", which are times that they schedule each week for students to turn up without an appointment to get help and advice with their work when needed. Appointments can also be made if a student wants to see a tutor outside of their "Office Hours", usually via email.

Coursework provides the majority of the assessment on this course in a ratio of approximately 75:25 coursework:exam though this can vary slightly depending on the optional modules chosen. It should be noted that timed computer based tests, such as write a piece of software to solve this problem, are regarded as coursework rather than exam, and these class tests take place on some of the programming related modules.

Several modules will include an element of team working, enabling students to collaborate with their peers, developing an awareness of their own abilities as reflected by feedback from others. Team work will also be used to assess the students' acquisition of personal and inter-personal skills, so important for this degree, and equally important for most career paths in the industry.

Core modules provide a balance of assessments, appropriate to the learning outcomes of the programme. In particular, early core modules are assessed on the basis of key technical, professional and learning skills, most likely to enable and enhance a student's aptitude for life-long learning. As students master core skills, the issues associated with quality products and processes will play an increasingly important part of the module content. Assessment tasks will be specified in the context of the importance of quality assurance in the IT and telecommunications industry, and criteria for success in assessments will mirror those needed in the work place.

By paying due regard to the Oxford Brookes University Assessment Compact, the assessments on this programme have been designed to develop learning of technical skills, shaped by the underlying theory, and requirements of the industry. Assessment does not present students with a set of hurdles, but rather guides them through the staged acquisition of a complex set of professional skills, so that, by the time they graduate, they are ready to play an effective role in their chosen career. Feedback on the assessment tasks will be provided in a timely manner, emphasizing achievement of the learning outcomes of the modules and the programme. Students will be encouraged to relate the assessment tasks with professional activities, and to relate their achievements with professional standards. Where appropriate, self- and peer- assessment will be used to encourage students to involve themselves in their own professional development.

A year's industrial placement is an optional part of the programme and if chosen is taken in the third year of study before returning to Brookes for a final year to complete the degree

The department is committed to inclusivity and diversity in its teaching. By the very nature of the discipline, virtually all of our teaching material is available in an accessible format and where possible we follow best practice guidelines and make our electronic material available before the lectures. We also use electronic references and ebooks to further enhance accessibility. Inclusivity and diversity is also embedded in what we teach. As such all new students have a lecture on inclusivity and diversity as part of their induction and important inclusivity and diversity topics such as the need for accessibility and internationalization and how to achieve them are taught on a variety of modules throughout the degree.

SECTION 6: ADMISSION TO THE PROGRAMME

6.1 ENTRY REQUIREMENTS

Prior qualifications necessary for entry to the programme, including English language requirements.

From 2017 entry, typical offers:

- A-LEVEL BBC or equivalent
- IB 30 points, preferably including science
- BTEC DDM profile, preferably in a science subject
- UCAS 112 points

Points may be counted from qualifications equivalent to 3 A-levels only.

Please follow this link for details of the new UCAS Tariff: <http://www.brookes.ac.uk/studying-at-brookes/how-to-apply/ucas-tariff---achieving-120-points/>

Specific entry requirements

- GCSE: Mathematics at grade B minimum, and English Language at grade C minimum.

Students for whom English is not their main language also need to show that their English is at a high enough level to succeed in their studies. The minimum English language requirements are specified at: <http://www.brookes.ac.uk/studying-at-brookes/courses/undergraduate/2014/network-computing/>

SECTION 7: PREPARATION FOR EMPLOYMENT

Graduates from the programme will be ideally equipped for a career in the computing industry. Graduates are employed across a whole range of careers from development roles in small software houses, to the activities of IT departments in large, multinational corporations, to more specialist roles for providers of IT and telecommunications services. These include technical development roles, including software design and development, specialist product support, and infrastructure and security management roles.

According to research conducted by e-skills UK, the National Sector Skills Council for IT and Telecommunications, the IT professional workforce in the UK, has almost doubled since 1994, and is likely to continue growing at 5-8 times the average employment growth for the coming decade. Recent graduates from this programme have been employed by, for example, Sophos, Logica, Jaguar/Land Rover and IBM. Specific job titles include Software Developer, Threat Researcher, Systems' Administrator, Project Manager, Network Engineer and Web Developer.

Many modules use guest speakers from industry to illustrate the practical application of the module material. U08906 Basic Communications and PC Networks, U08907 Introduction to Networks, U08933 Network Technologies, U08934 WAN Technologies and U08972 Network Security each has a syllabus that has been developed in conjunction with CISCO and tutors have undertaken CISCO professional

training. On completion of each module, students are ready to take the associated CISCO professional qualification if they so wish.

The department receives 'Guru' webcasts, for BSc (Hons) Information Technology Management for Business but available to all students. Topics complement a variety of technical and professional learning outcomes, and are delivered by senior employees of the employer consortium

All students may take a year out in industry. Employers are keen to promote their companies and the opportunities offered. Even for students who do not take a placement year, this can provide a good insight into the type of jobs available, and the skills employers are looking for. Students who do take a work placement may bring ideas for final year projects back with them, and are noticeably more able to contribute insights into industrial applications to the modules they take in their final year.

The department maintains close links with the university Careers Office. Themed 'mini' careers fairs are organised by this office – with technology being a common theme. Students are encouraged to use the facilities offered, including CV workshops, and practice interviews and assessment-centre activities.

An Industrial Advisory Board is run within the department, with senior employees of regional and representative organisations as members. The board is consulted on major initiatives within the department, including programme revalidations, possible research partnerships, future trends and directions, and the feasibility of new course offerings.

An alumni organisation has recently been formed in the department. The aim is to invite ex-students who are now in a variety of technical and managerial roles, to network with each other, and with our current students. It is anticipated that this organisation will be of great benefit to students starting out on their careers, as well as for more senior alumni looking to exploit the skills and expertise of the staff and students in the department.

Research centres within the department are actively involved with Knowledge Transfer Partnerships, and other links with employer organisations. For example, we have formed research links with Sony, Clearview Traffic, UKP World- wide, Nominet, WildKnowledge, Omnima and Engineer Arts Ltd. One of the spin-offs from these activities is the on-campus presence of industrial-based experts in fields closely related to our degree offerings.

Research within the department is strongly disseminated in the taught modules. Lectures and seminars by active researchers, both from within the department and external, are part of U08027 Current Research. Students have been actively involved in research projects, via final year projects, live projects, and independent studies.