Faculty of Science

UNIVERSITY OF BATH

Department of Computer Science

MSc Computer Science
MSc Human Computer Interaction
MSc Software Systems
MSc Data Science
MSc Data Science and Statistics
MSc Machine Learning and Autonomous Systems

Programmes Handbook

2020-21

CONTENTS

ABOUT THIS HANDBOOK

This is the 2020-21 Handbook for postgraduate taught students on the postgraduate taught programmes.

The contents of this Handbook are accurate at the time of publication [Nov 2020] but information contained within may sometimes be subject to change after this Handbook has been issued.

The Important Links and Information section of this Handbook includes links to information online about both the topics covered in this Handbook and other key topics. It is important that you familiarise yourself with the online information as well as the contents of this Handbook.

In August 2020 we wrote to you to explain how your programme has been adapted in response to COVID-19 safety measures and our 'Bath Blend' approach to learning and teaching for academic year 2020/21.

Information about the structure of your programme (which units you take when, which units are compulsory etc), as well as key unit information (including learning outcomes, synopsis and assessment), for the upcoming academic year can be found online in the Unit and Programme Catalogues (see **Unit and Programme Catalogues** in this Handbook and www.bath.ac.uk/catalogues). You will also receive details about unit content and assessment via the University's online learning environment, Moodle.

You will be informed, normally by your Director of Studies or Unit Convenor, of any further changes that will affect your programme or a unit. See also **Unit and programme changes 2020/21** in this Handbook.

You will be informed via announcements if any services offered by the University will need to be changed as a result of changing circumstances during 2020/21.

While this Handbook signposts information about regulations for students, it does not have regulatory status itself, and the Regulations available online (Regulations for Students: http://go.bath.ac.uk/regulations and Assessment Regulations: www.bath.ac.uk/corporate-information/new-framework-for-assessment) are the most up-to-date and take precedence over the contents of this Handbook. It is your responsibility to take the time to familiarise yourself with the Regulations.

If in doubt about what applies to you, or if your circumstances change, please contact your Director of Studies for advice.

IMPORTANT LINKS AND INFORMATION

UNIVERSITY INFORMATION ONLINE

This Handbook is an accompaniment to important information available to all students on the University's website. It is expected that you will familiarise yourself with the online information signposted below.

If you cannot find the information you are looking for in this Handbook or on the web please contact your Director of Studies in the first instance.

SUPPORTING YOU

Student Support Services
https://www.bath.ac.uk/professional-services/student-services/

SU Advice and Support Service
www.thesubath.com/advice

Equality, Diversity and Inclusion
https://www.bath.ac.uk/professional-services/equality-diversity-and-inclusion/

Advice for specific groups of students:
International students
www.bath.ac.uk/topics/visas
www.bath.ac.uk/guides/student-immigration-appointments-and-drop-in-sessions
www.bath.ac.uk/campaigns/studying-at-bath-as-an-erasmus-exchange-or-visiting-student
www.bath.ac.uk/guides/academic-engagement-monitoring-for-tier-4-students
Care-leavers
https://www.bath.ac.uk/publications/university-and-leaving-care/
Estranged students
https://www.bath.ac.uk/publications/university-and-estranged-students/
Refugees
https://www.bath.ac.uk/publications/university-and-refugees/
Students with caring responsibilities
https://www.bath.ac.uk/publications/university-and-young-adult-carers/

Pregnancy and maternity

CORE UNIVERSITY SERVICES / INFORMATION

Dissatisfaction with a University service or facility (Complaints)
www.bath.ac.uk/guides/student-complaints-policy-and-procedure

Health and Safety
www.bath/ac/uk/guides/student-health-and-safety
Be Safe on Campus information (COVID-19)
https://www.bath.ac.uk/campaigns/be-safe-on-campus-and-in-bath-during-the-covid-19-pandemic/

Library and Study Spaces
https://library.bath.ac.uk/home
www.bath.ac.uk/campaigns/where-you-can-study-on-campus-and-in-the-city

Skills Support and Development
http://go.bath.ac.uk/my-skills
www.bath.ac.uk/campaigns/get-ahead-with-skills-at-bath

Learning Technologies & IT Support
https://www.bath.ac.uk/professional-services/digital-data-and-technology/

Careers Service
www.bath.ac.uk/professional-services/careers-service

Data Protection
www.bath.ac.uk/guides/data-protection-guidance

Bullying, harassment and victimisation

https://www.bath.ac.uk/guides/getting-advice-if-you-are-pregnant-while-studying-or-have-a-young-child/

Disabilities, long-term illness, and specific learning difficulties
http://go.bath.ac.uk/disability-service

https://www.bath.ac.uk/campaigns/report-and-support/

SU Code of Practice and membership
www.bath.ac.uk/corporate-information/code-of-practice-for-the-students-union-su

SUPPORTING YOUR LEARNING

Your Learning
www.bath.ac.uk/guides/your-learning
Bath Blend
Glossary
Year Dates and Timetables

Regulations for students
http://go.bath.ac.uk/regulations

Registration
www.bath.ac.uk/guides/registering-with-the-university

Withdrawing from or suspending your studies
www.bath.ac.uk/guides/suspending-your-studies-or-leaving-the-university

Placements
http://go.bath.ac.uk/placements-information-for-students

Personal Tutoring
www.bath.ac.uk/guides/personal-tutoring

Units and Programmes
www.bath.ac.uk/guides/about-units-and-programmes
Catalogues
Option choices
How your programme is reviewed and monitored

Student Representation and Engagement
www.bath.ac.uk/campaigns/student-engagement-shape-your-university

Assessment
www.bath.ac.uk/guides/assessment-guidance-for-students
Assessment processes
Understanding your results
External examiners
Supplementary assessment

Academic Integrity
www.bath.ac.uk/campaigns/academic-integrity-training-and-test

Assessment Regulations
www.bath.ac.uk/corporate-information/new-framework-for-assessment
Definitions of assessment terms

Individual Mitigating Circumstances
www.bath.ac.uk/guides/reporting-individual-mitigating-circumstances-to-the-university

Academic Appeals
www.bath.ac.uk/guides/appealing-against-an-academic-decision

DEPARTMENT WELCOME 2020/21

Welcome to the 2020-2021 academic session in the Department of Computer Science.

We hope that you will have an enjoyable and worthwhile time with us. Do not hesitate to contact me if you have any questions regarding your course, experience any problems or simply want to have a chat about your course. I am looking forward to meeting you all in the months to come.

Please take some time to read through this handbook and familiarise yourself with its contents. In this handbook we highlight and summarise key information that most students need to know. It will often point to other information sources, which contain more detail for those who need it. Many of these sources will be provided on-line.

Please do not hesitate to come and talk to me, your personal tutor or the professional services if you experience any difficulties that have an impact on your studies or student experience.

Dr Marina De Vos

Director of Studies (MSc Computer Science, Data Science, Data Science and Statistics, Machine Learning and Autonomous Systems, MSc Human Computer Interaction, MSc Software Systems)

ABOUT THE DEPARTMENT 2020/21

The Department began life in August 2001, emerging from the Computing Group of the Department of Mathematical Sciences. Priding itself on being research- led with strong interdisciplinary research and postgraduate teaching the Department continues to recruit new academic staff of an extremely high calibre. The Department also attracts a highly qualified student intake and frequently appears as a top UK Computer Science Department in the published League Tables.

The Department of Computer Science at the University of Bath has the highest quality staff and students engaged in leading edge research, teaching and learning.

The Computer Science Department is led by the Head of Department, Professor Mike Fraser. The Head of Department directs all aspects of the Department, operating through a number of nominated role-holders and through the deliberations of a number of committees. The following sections introduce some of these roles and committees.

Research Areas of the Department

The Department prides itself on a range of interdisciplinary research with a strong theoretical basis. Our work is concerned with conceptual issues in computer science ranging from mathematical foundations through visual and cognitive processes to artificial intelligence, human-centered design and collaborative systems. Our academic staff have various disciplinary backgrounds and collaborate widely with researchers in other disciplines (including engineering, mathematics, social sciences, policy research and psychology) both local, national and international.

Although there are many connections between the themes, our main research themes are:

- Artificial Intelligence
- Human-Computer Interaction
- Mathematical Foundations
- Visual Computing

We are home to the Centre Analysis of Motion, Entertainment Research and Applications (CAMERA), the Centre for Digital Entertainment (CDE) and the UKRI CDT in Accountable, Responsible and Transparent Artificial Intelligence (ART-AI).

KEY CONTACTS/STAFF LIST

A full list of staff in the Department of Computer Science is available on the web at: http://www.bath.ac.uk/comp-sci/contacts/

Staff within the Department have a number of different roles, which are concerned with teaching, administration and research. The role-holders that you are most likely to come across in the course of your studies are as follows:

Director of Studies
The Director of Studies, Dr Marina De Vos, manages all aspects of the taught postgraduate programmes and has general oversight of the Department's postgraduate teaching activities. This includes the development of the curriculum and its delivery, quality management and enhancement, the operation of the assessment processes and student support. She is the person to contact if you need a coursework extension, or need to submit individual mitigating circumstances.

Personal Tutor
During welcome week you will be assigned a Personal Tutor who will be the focus for academic and pastoral advice and guidance throughout your time within the Department. Personal Tutors act as an interface to the central support services should financial, medical or other personal problems arise. Personal Tutors are not permitted to act as counsellors for non-academic issues, and will identify the appropriate individuals or services for you to access in such circumstances. This does not prevent you from accessing these services directly, but it is important that you keep your Personal Tutor informed of your

circumstances so that you can be advised of any academic relief that might be available to you to help you in dealing with your other circumstances.

Unit Lecturers
A Unit Lecturer is a person who has been identified as having the responsibility for the delivery of all aspects of a Unit. This person will normally deliver the main lectures within a Unit and will normally have prepared the course materials to be delivered within the Unit. If you have problems with the running of a unit you should normally approach the Unit Lecturer about it in the first instance.

Unit Tutors
Unit tutors are postgraduate research students or research staff who are allocated the responsibility of delivering a number of tutorials or laboratory classes within a Unit. They will normally deliver material provided by the Unit Lecturer, and will provide a point of more personalised academic instruction. If you need additional tutorial support for a unit, you should normally approach the Unit Tutor in the first instance - time will be set aside in most classes for such help.

Administrators
The PGT administrator, Matthew Albertyn (facscipgtadmin@bath.ac.uk) , is responsible for coordinating postgraduate taught student support for Computer Science. Where students are taking units in common with undergraduate programmes, some aspects of that support will be dealt with by Susan Paddock, the Undergraduate Programmes Administrator (compsci-prog-admin@bath.ac.uk) . If in doubt, please contact Matthew (facscipgtadmin@bath.ac.uk).

Department Coordinator
The Department Coordinator, Claudia Emery, is responsible for all aspects of the Department Office administrative support and will be able to direct you to any help you require.

Chair of the Staff-Student Liaison Committee (SSLC)
The SSLC is a key location of staff-student contact for feedback and quality enhancement. The Chair of this committee has a key role in encouraging staff and student participation, in the representation of the concerns of SSLC to other committees, and in the communication of the work of SSLC to students and staff.

COMPUTING RESOURCES

MSc (Computing) Laboratory
Under normal circumstances, MSc students have access to a computing laboratory. The MSc Laboratory is room 1 West 2.56 and 1 West 2.61. You will need your library card to gain access. The MSc Laboratory is only available to MSc students and staff of the Department. You must not allow friends from other programmes to enter or use the lab. With the current pandemic and changing guidelines, we are working on mechanisms to make this room available in a safe manner. We will let students know when it becomes available and how it can be used/booked.

Reporting Problems with the PCs in the MSc Laboratory

The PCs in the MSc lab are all connected to the Computing Services network, and are used in exactly the same way as the Computing Services PCs in the library. Thus, problems with software packages (such as Microsoft Office not working correctly) should be reported to the Computing Services Help Desk in the Library.

However, the actual PCs are owned by the Department of Computer Science, so any problems with the hardware (such as broken monitors or mice) or with PCs not starting up correctly (e.g. not able to display the Computing Services login window), should be reported to the Computer Science Computer Support Staff, who are in the Department Office (email support@cs.bath.ac.uk).

Your own PC

This is year is an exceptional year. Because of the pandemic, a lot of the learning will take place online. You may also want to bring a device to the in person sessions, if you are able to attend them.

For coursework, you will be able to log-in to machines on campus that provide the necessary compute power.

If you do not currently own a computer or laptop and want to purchase a new PC, the Computing Services Shop, which is located within the Library, is able to supply computers (and computer components) at prices that are often lower than you would pay for equivalent machines on the high-street.

The following sections provide you with further information on how you can use your computer to access the University facilities whilst you study at the University.

Network Links

If you are able to obtain a place within a University residence you will find that each room is equipped with a network point that you can plug your PC into. Details on how to configure your PC to use the Computing Services network and how to configure your e-mail software and web-browser to operate through the Computing Services network are all available from the intranet: https://www.bath.ac.uk/professional-services/digital-data-technology-group-dd-t/

Further help and advice is available to you from the Computing Services Helpdesk (also located within the library) should you run into difficulties:
http://www.bath.ac.uk/bucs/help/helpdesk/contactus/

Operating Systems

The academic staff within the Department of Computer Science make use of a variety of operating systems and software, depending on personal preference - Windows, MacOS and Linux. Computing Services lab computers run Windows 7. The university has a site-licence for a number of Windows software packages. More details on these can be found on: www.bath.ac.uk/bucs/tools/software/ The campus computer shop in the Library has favourable deals for software and hardware. For more details, see: www.bath.ac.uk/bucs/services/itpurchasing/

E-Mail

The university is using Microsoft exchange for its email and calendar services. This is supported through Outlook and Outlook Web App. It is possible to use the service on Mac

and Linux as well. It is also possible to read mail and access your calendar on your smartphone.
For further details see: www.bath.ac.uk/bucs/email/

Productivity Software
The standard productivity software used within Bath University is Microsoft Office 365 (the standard versions are currently Office 2007 or Office XP). This is normally an expensive product, but the Computing Services Shop offers a special cut-price deal for full-time Bath University students. You should consult the Computing Services Shop for further details. You can also use Office 365 remotely through your web browser.
LibreOffice is free open source multi-platform productivity software suite offers file-compatible equivalents of Microsoft Word, Microsoft Excel, Microsoft Draw and Microsoft PowerPoint, with a very similar look-and-feel to these Microsoft products. They are available for download from: http://www.libreoffice.org/

ABOUT YOUR PROGRAMME

The academic year is divided into two 14-week semesters, with each semester consisting of 11 weeks of teaching followed by a 2- or 3-week assessment period. A unit is an assessable block of study which may be in the form of a lecture course or an approved project. A single unit (6 credits) should correspond to approximately 120 hours of study time.

This year your programme of study will be delivered through the Bath Blend. Each unit will provide independent learning materials and activities and organise Live Online Interactive sessions. The in-person teaching sessions will operate across units.

A large number of units will have coursework that requires self- directed study (programming assignments, essay writing, reading articles, papers, books, finding information for yourself on the web) You are expected to be able to schedule your time appropriately to undertake any coursework or problem sheets. We do not generally allocate time because, as a postgraduate student with experience of working for a first degree, you should be able to direct your own learning and work and learn without the supervision of a tutor. Failure to utilise your study time to gain the necessary knowledge, practice and experience will inevitably lead to poor performance when you come to attempt the assessed coursework for the Unit.

Unit lecturers and/or unit tutors sometimes book extra sessions for their units where they will be available to offer advice or help with problems. These sessions will be advertised in lectures, via Moodle or by email.

Computer science is a very practical subject so you can expect most of your assessment to take the form of coursework. It is therefore essential that you plan your time so that you start coursework as soon as they are set and do not leave them until the last minute.

PROGRAMME AIMS AND LEARNING OUTCOMES

MSc in Computer Science

Educational aims

The MSc Computer Science programme reflects a systems view of Computer Science. Grounded in an understanding of its representational models and methodologies, it provides a strong theoretical foundation, and builds this into the practice of Computer Science so both aspects are fully integrated in the understanding and creation of computer systems. The programme leads into advanced and emerging areas of Computer Science, encouraging students to apply their learning to discovery and experimentation in research areas that reflect the research interests of the Department.

Learning outcomes

Knowledge and understanding

- Demonstrate knowledge and understanding of the mathematical and theoretical underpinnings of computing, computability and computer languages, their application in building models at various levels of abstraction, and their importance in reasoning, communication and systems development;
- Identify, apply, critique and adjust the lifecycle of software development and the complexities of modern software systems, and recognise the need for modelling, abstraction, description and management techniques to control the process of development of software systems;
- Demonstrate the ability to evaluate and critique the technical, societal and management dimensions of computer systems;
- Demonstrate a critical understanding of professional, legal, social, cultural and ethical issues related to computing and an awareness of societal and environmental impact;
- Understand how the quality of development and software solutions to problems can be measured and objectively assessed
- Undertake an individual innovative (research or developmental) project and complete it to a professional standard;
- Understand and show critical awareness of the current state and future directions of technological advances.

Intellectual Skills

- Demonstrate understanding of essential facts, concepts, principles and theories relating to Computer Science, and their relationship to one another;
- Apply formal and rigorous methods of description to the specification, documentation, implementation and verification of systems;
- Integrate and critically evaluate information and data from a variety of sources in order to gain a coherent understanding of theory and practice;
- Demonstrate an ability to engage in a peer review process that involves the critical review of papers, software and proposals, coupled with positive advice for improvement.
- Critically analyse and evaluate existing systems and approaches to solving problems;
- Critically analyse, evaluate and reflect upon own contributions;

- Define safe and valid solutions to problems in computer science and undertake research and/or development in a particular area of the discipline.

Professional Practical Skills

- Match appropriate professional software development methods to given software problems, and to deploy effectively the tools used for the construction and documentation of software solutions, with particular emphasis on understanding the whole process involved in the effective use of computers to solve practical problems;
- Work effectively as part of a team in the analysis, design and development of software-based systems;
- Consider alternative models of problems and apply practical and theoretical understanding to select appropriate, possibly innovative, solutions;
- Present succinctly rational and reasoned arguments using appropriate conceptual tools to address a given systems problem;
- Understand and apply relevant ethical, legal and professional standards in the context of computer systems development.
- Make creative and innovative decisions in computer science research or development of a computer system.

Transferable/Key Skills

- Utilise directed problem solving and analytical skills in a wide variety of practical situations;
- Undertake decision making and evaluation in complex situations;
- Work effectively as part of a team and appreciate the key roles involved;
- Acquire skills and information needed for continuing professional development;
- Manage small-medium sized projects with resource and time constraints;
- Manage one's own learning and development including time management and organisational skills;
- Evaluate systems in terms of general and specific quality attributes and the possible trade-offs within a given problem.
- Managing a larger software/research project to completion
- Critical assessment of their own work through the dissertation project. Feedback is provided through the regular meetings with a supervisor.

MSc dissertation

- To apply high-level research in practice, by conducting a defined research project in their specialist subject and use a wide range of research techniques relevant to the specialist subject
- To achieve critical awareness of research literature and its application to current developments in the subject
- To be able to identify the tasks to be completed in a research project proposal, plan a scheme of work, and complete the project to a professional standard;

- To assemble and create the necessary analysis, design and development tools, carry out the development of the solution of a technical problem in computer science, and evaluate the effectiveness of the solution against common standards of quality;

MSc in Data Science (with or without placement)

Educational aims

The key educational aim is to equip the participating student with the core knowledge and skill-set that is required to undertake a career in data science (across a broad employer base), or to progress into a research role in the field. Delivery is focused on providing the most relevant knowledge in three key areas scientific foundations, analytic methodology, and software technology – alongside the provision of extensive hands-on practical experience.

Learning Outcomes

Knowledge and understanding

- Explain the core underlying statistical context that applies to the processing and modelling of data.
- Implement low-level data science functionality in a relevant programming language.
- apply a range of modern analytic methodologies, notably machine learning techniques, using relevant software libraries,
- Describe and demonstrate the processes involved in the effective practice of data science, from initial data handling through to presentation of output.
- Critically evaluate the relevance, reliability and robustness of analytic results.
- Discriminate between analytic techniques, summarise underlying concepts and justify applicability to data in varied contexts,
- Assess where and how to use relevant high-level software libraries and systems for data storage, management and processing.
- Undertake an individual project, demonstrating originality in the application and/or development of data science methodology.

Intellectual Skills

- Demonstrate the mathematical skills necessary for applying analytic models to data.
- Translate high-level analytic objectives into data scientific processes appropriate to given objectives.
- Express the essential principles of, and motivation for, a probabilistic approach to data science,
- Explain the importance of recognising and quantifying uncertainty in data analysis.
- Undertake review of relevant literature, assessing the applicability and capability of data scientific methods described therein.
- Critically evaluate current research in data science, applying and modifying new methodologies.

Professional Practical Skills

- Set up a baseline software environment for the practice of data science centred upon a relevant programming language.
- Implement general-purpose programming tasks using a relevant language.
- Apply core numerical, statistical and analytic libraries designed for data science and related applications,
- Handle, manage and analyse data in the context of legal, ethical and professional considerations.
- Deploy a large-scale analytic software solution in a relevant scenario and critically assess the consequent rationale, features and limitations,
- Informatively communicate numerate output using summaries, charts, tables and visualisations.
- Write a structured technical report coherently summarising the varied output of an individual project.

Transferable/Key Skills

- Address generic data-driven problems in a programmatic manner,
- Effectively communicate technical material in written form.
- Deliver an effective oral presentation of technical material,
- Manage time in a project delivery context.
- Undertake project work demonstrating a significant degree of individual initiative in both its specification and organisation.

MSc dissertation

- To apply high-level research in practice, by conducting a defined research project in their specialist subject and use a wide range of research techniques relevant to the specialist subject
- To achieve critical awareness of research literature and its application to current developments in the subject
- To be able to identify the tasks to be completed in a research project proposal, plan a scheme of work, and complete the project to a professional standard;
- To assemble and create the necessary analysis, design and development tools, carry out the development of the solution of a technical problem in computer science, and evaluate the effectiveness of the solution against common standards of quality;
- To demonstrate the successful completion of these tasks in a well- structured and coherently written dissertation. This will include a discussion of the research outcomes of the work, and future directions.

MSc in Human Computer Interaction (with or without placement)

Educational aims

Interactive systems pose significant design and research challenges for computer science. They must be flexible, usable and safe. Innovative approaches are required that build on established human-computer interaction principles, to meet the needs of the next

generation of computer users and to address emerging requirements for new forms of interactive system.

These degrees provide theoretical, empirical, practical and system perspectives on the design and evaluation of the technological and social context of interactive systems. In particular, it focuses on Human-Computer Interaction design and usability evaluation.

Specific Aims

- To provide students with the knowledge, techniques and skills necessary to undertake professional work or research on interactions between people and technologies.
- To give a foundation in design issues arising from the individual usage of interactive technologies and classes of user and their background and experience.
- To equip students with critical analysis skills for examining contexts of ICT usage, and professionally communicate findings.
- To account for the interaction between ICT developments and their cognitive, social, contextual and cultural settings.

Generic Aims

- To enable students to establish a coherent body of computer science knowledge within a theme specialised in system and informational terms, such that they have the skills necessary to become practitioners in this field of computer science or to move into a research or academic career.
- To provide a framework within which students may select, deploy and evaluate relevant scientific and engineering techniques to contemporary computer science problems.
- To equip students with a set of abilities for assessing the impact of an information system's principles, for the design and development on the system's usage and for the conceptualization of information.
- To enable graduates to contribute to a broad range of work in the development, design, deployment and integration of systems into their target application contexts.
- To contribute to the rapidly growing communication and information technology industries.
- To give some appreciation of the professional, ethical and legal obligations of a practitioner, and to understand the interaction between these developments and their social, contextual and cultural effect.
- To develop individual research skills by using and developing primary source material.
- To generate in students an enthusiasm for the application of computer science in science, industry and commerce.

Learning outcomes

Knowledge and understanding

- An understanding of the relevance, advantages and problems with the advanced use of computers and the human and technical aspects of such usage.
- An understanding and critical awareness of the current state and future directions of technological advances in computer science, and an appreciation of how current research directions might influence computer technology.
- To be able to undertake a research project and complete the project to a professional standard.
- To be able to demonstrate research outcomes, analyse the results and be able to indicate potentially fruitful future directions.
- An understanding of how the quality of development and software solutions to problems can be measured and objectively assessed.
- An appreciation of the ethical and legal obligations of a computer practitioner.

Intellectual skills

- The ability to recognise and distinguish the fundamental concepts, principles and theories of human-computer interaction;
- The ability to draw on a comprehensive and detailed knowledge of human-computer interaction;
- The ability to define safe and valid solutions to interactive system design problems, and aid in the development of research activity;
- The ability to integrate and evaluate information and data from a variety of sources in order to gain a coherent understanding of theory and practice;
- The ability to critically analyse and evaluate innovative approaches to designing and evaluating interactive systems.

Professional practical skills

- The ability to make creative and innovative decisions in the design and implementation of software-based systems.
- The ability to match appropriate professional software development methods to given software and research problems, and to deploy effectively the tools used for the construction and documentation of software solutions, with particular emphasis on understanding the whole process involved in the effective use of computers to solve practical problems.
- The ability to work effectively as part of a team in the analysis, design and development of software-based systems.

Transferable key skills

- Utilising self-directed problem solving and analytical skills in a wide variety of practical situations.
- Decision making and evaluation in complex situations.
- Working effectively as part of a team and appreciating the key roles involved.

- Independently acquiring skills and information needed for continuing professional development.
- Managing one's own learning and development including time management and organisational skills.

MSc dissertation

- To apply high-level research in practice, by conducting a defined research project in their specialist subject and use a wide range of research techniques relevant to the specialist subject
- To achieve Critical awareness of research literature and its application to current developments in the subject
- To be able to identify the tasks to be completed in a research project proposal, plan a scheme of work, and complete the project to a professional standard;
- To assemble and create the necessary analysis, design and development tools, carry out the development of the solution of a technical problem in computer science, and evaluate the effectiveness of the solution against common standards of quality;
- To demonstrate the successful completion of these tasks in a well- structured and coherently written dissertation. This will include a discussion of the research outcomes of the work, and future directions

MSc in Software Systems (with or without placement)

Educational aims

The design and implementation of complex software systems offers a significant challenge. The need to deliver large, reliable systems with the desired capability is a challenging engineering task. Practitioners need to develop stable and clear system requirements, deliver with software engineering skills, and, in particular, to apply established design techniques, including formal methods, to large complex systems.

These degrees provide theoretical, practical and system-wide perspectives on the design and development of software systems with particular emphasis on the engineering of systems for safety and security, the use of design techniques such as reuse, genericity, inheritance, delegation, and network issues. These concepts of software systems development will be of interest in industry, business and software engineering research.

Specific Aims

- To provide students with the knowledge, techniques and skills necessary to become practitioners or researchers in the field of software development.
- To give a foundation in professional standards of analysis, design, implementation, testing and documentation in software development.
- To give an appreciation of the use of computers as part of larger systems, and the technical aspects of such usage.
- To give an appreciation of the current state and future directions of technological advances in areas of computer science.

- To give an understanding of the legal, professional and ethical issues involved in the development of software systems.

Generic Aims

- To enable students to establish a coherent body of computer science knowledge within a theme specialised in system and informational terms, such that they have the skills necessary to become practitioners in this field of computer science or to move into a research or academic career.
- To provide a framework within which students may select, deploy and evaluate relevant scientific and engineering techniques to contemporary computer science problems.
- To equip students with a set of abilities for assessing the impact of an information system's principles, for the design and development on the system's usage and for the conceptualization of information.
- To enable graduates to contribute to a broad range of work in the development, design, deployment and integration of systems into their target application contexts.
- To contribute to the rapidly growing communication and information technology industries.
- To give some appreciation of the professional, ethical and legal obligations of a practitioner, and to understand the interaction between these developments and their social, contextual and cultural effect.
- To develop individual research skills by using and developing primary source material.
- To generate in students an enthusiasm for the application of computer science in science, industry and commerce.

Learning outcomes

Knowledge and understanding

- An understanding of the relevance, advantages and problems with the advanced use of computers and the human and technical aspects of such usage.
- An understanding and critical awareness of the current state and future directions of technological advances in computer science, and an appreciation of how current research directions might influence computer technology.
- To be able to undertake a research project and complete the project to a professional standard.
- To be able to demonstrate research outcomes, analyse the results and be able to indicate potentially fruitful future directions.
- An understanding of how the quality of development and software solutions to problems can be measured and objectively assessed.
- An appreciation of the ethical and legal obligations of a computer practitioner.

Intellectual skills

- The ability to choose and apply appropriate rigorous methods to the development of advanced experimental or research-based software solutions.
- The ability to make critical evaluations of the design, implementation and usage of advanced software-based systems.
- The ability to recognise and distinguish the fundamental concepts, principles and theories of complex software systems and their development.
- The ability to recognise connections between different areas of computer science when developing experimental or software solutions.
- The ability to draw on a comprehensive and detailed knowledge of software design and development.
- The ability to define safe and valid solutions to a wide range of general software system design problems, and aid in the development of research activity.
- The ability to integrate and evaluate information and data from a variety of sources in order to gain a coherent understanding of theory and practice for software system design and development.
- An understanding of how software interacts as part of larger systems.
- The ability to critically analyse and evaluate innovative approaches to designing and evaluating complex software systems.

Professional practical skills

- The ability to make creative and innovative decisions in the design and implementation of software-based systems.
- The ability to match appropriate professional software development methods to given software and research problems, and to deploy effectively the tools used for the construction and documentation of software solutions, with particular emphasis on understanding the whole process involved in the effective use of computers to solve practical problems.
- The ability to work effectively as part of a team in the analysis, design and development of software-based systems.

Transferable key skills

- Utilising self-directed problem solving and analytical skills in a wide variety of practical situations.
- Decision making and evaluation in complex situations.
- Working effectively as part of a team and appreciating the key roles involved.
- Independently acquiring skills and information needed for continuing professional development.
- Managing one's own learning and development including time management and organisational skills

MSc dissertation

- To apply high-level research in practice, by conducting a defined research project in their specialist subject and use a wide range of research techniques relevant to the specialist subject
- To achieve critical awareness of research literature and its application to current developments in the subject
- To be able to identify the tasks to be completed in a research project proposal, plan a scheme of work, and complete the project to a professional standard;
- To assemble and create the necessary analysis, design and development tools, carry out the development of the solution of a technical problem in computer science, and evaluate the effectiveness of the solution against common standards of quality;
- To demonstrate the successful completion of these tasks in a well- structured and coherently written dissertation. This will include a discussion of the research outcomes of the work, and future directions.

MSc in Data Science and Statistics (with or without placement)

Educational aims

The key educational aim is to equip the participating student with the core knowledge and skill-set that is required to undertake a career in data science and statistics (across a broad employer base), or to progress into a research role in the field. Delivery is focused on providing the most relevant knowledge in three key areas – scientific foundations, analytic methodology, and software technology – alongside the provision of extensive hands-on practical experience.

Learning outcomes

Knowledge and understanding

- Explain the core underlying statistical context that applies to the processing and modelling of data,
- Implement low-level data science functionality in a relevant programming language,
- Apply a range of modern analytic methodologies, notably machine learning and statistical techniques, using relevant software libraries,
- Describe and demonstrate the processes involved in the effective practice of data science and statistics, from initial data handling through to presentation of output.
- Critically evaluate the relevance, reliability and robustness of analytic results,
- Discriminate between analytic techniques, summarise underlying concepts and justify applicability to data in varied contexts,
- Assess where and how to use relevant high-level software libraries and systems for data storage, management and processing.
- Undertake an individual project, demonstrating originality in the application and/or development of data science and statistical methodology.

In addition to the above, students completing the MSc with placement programme would be able to demonstrate:

- A knowledge of the processes and products associated with the placement undertaken;
- Ability to critically evaluate the difference between commercial products and academic outputs.

Intellectual skills

- Demonstrate the mathematical skills necessary for applying analytic models to data,
- Translate high-level analytic objectives into data scientific processes appropriate to given objectives.
- Express the essential principles of, and motivation for, a probabilistic approach to data science and statistics,
- Explain the importance of recognising and quantifying uncertainty in data analysis,
- Undertake review of relevant literature, assessing the applicability and capability of data scientific and statistical methods described therein.
- Critically evaluate current research in data science, and statistics applying and modifying new methodologies.

In addition to the above, students completing the MSc with placement programme would be able to:

- Apply research methods and results appropriate to a commercial setting.

Professional practical skills

- Set up a baseline software environment for the practice of data science and statistics centred upon a relevant programming language,
- Implement general-purpose programming tasks using a relevant language,
- Apply core numerical, statistical and analytic libraries designed for data science and related applications,
- Handle, manage and analyse data in the context of legal, ethical and professional considerations.
- Deploy a large-scale analytic software solution in a relevant scenario and critically assess the consequent rationale, features and limitations,
- Informatively communicate numerate output using summaries, charts, tables and visualisations.
- Write a structured technical report coherently summarising the varied output of an individual project.

In addition to the above, students completing the MSc with placement programme would be able to:

- Apply research methods and results appropriate to a commercial setting.

Transferable key skills

- Address generic data-driven problems in a programmatic manner,
- Effectively communicate technical material in written form.
- Deliver an effective oral presentation of technical material,
- Manage time in a project delivery context.
- Undertake project work demonstrating a significant degree of individual initiative in both its specification and organisation.

In addition to the above, students completing the MSc with placement programme would be able to:

- Explain the commercial impact of systems development proposals made as part of their placement work.
- Deal with confidentiality and intellectual property issues.

MSc dissertation

- To apply high-level research in practice, by conducting a defined research project in their specialist subject and use a wide range of research techniques relevant to the specialist subject
- To achieve critical awareness of research literature and its application to current developments in the subject
- To be able to identify the tasks to be completed in a research project proposal, plan a scheme of work, and complete the project to a professional standard;
- To assemble and create the necessary analysis, design and development tools, carry out the development of the solution of a technical problem in computer science, and evaluate the effectiveness of the solution against common standards of quality;
- To demonstrate the successful completion of these tasks in a well- structured and coherently written dissertation. This will include a discussion of the research outcomes of the work, and future directions.

MSc in Machine Learning and Autonomous Systems (with or without placement)

Educational aims

The unique aspect of this programme is its combination of fundamental theoretical and computational knowledge with practical experience, industry relevant transferable skills and the application of specific industry standard tools and methods. The aim of this programme is to enhance the technical, scientific and innovation skills of graduates so that they can research, design and deploy technologies, products and processes which increase performance and efficiency in the machine learning and autonomous systems industry sector. Students learn how to design, implement and evaluate "best in class" autonomous systems, using cutting edge tools and techniques, and integrate the software elements into real systems. This will include advanced machine learning techniques, a range of approaches

to artificial intelligence and autonomous agents, systems integration and the use of industry standard tools and methods.

The programme will provide students with a whole systems approach, which takes into account the multiple criteria and stakeholders involved in the development of modern autonomous systems involving both human and non- human agents. Students will not only be taught to develop state-of-the art (software) techniques in the area of machine learning and autonomous systems but will also develop a skill set to enable them to analyse and evaluate the technical and resource aspects of the approach, tool, resource and process and be able to contrast with alternatives while taking into consideration ethical and social impact. The aim is accomplished through a complementary set of taught units and experience through applied design and research projects using systems platforms used widely in industry such as mobile devices, autonomous robots and systems, instantiated in a range of domains including aerospace and automotive applications.

The learning material is delivered using a range of selected pedagogic methods that enhance learning and teaching at Masters level. This includes face-to-face teaching mainly by academic staff and with input from industry, supplemented with flexible, interactive on-line learning and enquiry based learning, i.e. working in small groups, using case-studies to gain experience in solving industrially relevant problems, to reinforce subject knowledge and develop important professional skills. Through careful choice of activities and use of technologies, emphasis is placed on developing a closely-knit cohort of professionals. Learning is enhanced with guest speakers from industry and other organisations, tutorials and experimental work. Professional skills are embedded throughout the programme. Interdisciplinary team-work, effective communication, project management, networking, time and resource management are examples of these skills.

The units are assessed using a mixture of examination, coursework and lab- based assessments with formative assessment throughout the programme; tutorials, workshops and seminars will be used to provide ongoing feedback on progress.

Specific Programme Aims:

- To prepare students for a professional career in the autonomous systems industry at a level which requires the exercise of sound judgement, personal responsibility and initiative, and the ability to make ethically and technically sound decisions in complex and unpredictable professional environments.
- To equip students with a detailed understanding of the principles of machine learning, autonomous systems and artificial intelligence, many aspects of which will be at, or informed by, the current boundaries of the discipline.
- To equip students with skills to systematically employ state of the art technical and engineering principles to produce original analyses of, and solutions to, autonomous systems design, implementation and evaluation problems.
- To provide an in-depth understanding of the operation, components and techniques of machine learning, autonomous systems and artificial intelligence.
- To enable students to work and lead successfully in multidisciplinary teams.

It is intended that all graduates will satisfy the UK SPEC (2010) Learning Outcomes to M Level and will have experienced a wide range of delivery and assessment strategies.

For the MSc with placement programme:
Students who have not achieved the minimum overall average of 50% across the taught units or are unable to find a suitable placement will have to transfer to the MSc without placement programme.

Students who fail the placement will be eligible to transfer to the MSc without placement.

Learning outcomes

Knowledge and understanding

- Systematic, detailed and critical understanding of machine learning, autonomous systems and their design ranging from well-established principles to new techniques, many of which are informed by the current boundaries of the discipline;
- Critical understanding of the uncertainty, ambiguity and limits of their knowledge and how these may affect analyses of, and solutions to, relevant real world problems;
- Knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations;
- A critical awareness of current problems and/or new insights most of which is at, or informed by, the forefront of autonomous systems design and machine learning;
- An understanding of concepts relevant to the discipline, some from outside computer science, and the ability to evaluate them critically and to apply them effectively, including in systems development projects.
- Show an advanced level knowledge and understanding of a wide range of the practical technologies currently used in autonomous systems design;
- Show an advanced level of knowledge and understanding of current machine learning and artificial intelligence techniques and practices
- Demonstrate an ability to apply appropriate techniques taking into account the ethical, commercial and financial constraints that designers and developers may have to work under.
- Knowledge of the research literature relating to the individual project undertaken;
- An understanding of the interaction between the state of the art and the work completed by the student during their individual project.

In addition to the above, students completing the MSc with placement programme would be able to demonstrate:

- A knowledge of the processes and products associated with the placement undertaken;
- An understanding of the difference between commercial products and academic outputs.

Intellectual skills

- An ability to extend prior learning to an advanced level and apply this prior learning to problems at the advanced level;
- An awareness of the interplay between system level requirements and the design of specific subsystems.
- Critically reflect on one's own work, methods and practices within the context of the programme.
- Generate an innovative design for products, systems, components or processes to fulfil new requirements in autonomous system design;
- Apply the fundamental concepts and principles of machine learning and artificial intelligence to the solution of engineering and computer science problems in both familiar and in complex and unpredictable professional environments;
- Collect, analyse and critically evaluate information or research data in the form of arguments, assumptions and/or technical data (that may or may not be complete) in order to produce solutions to problems in machine learning and autonomous systems design that may either be of a routine nature or require the development of new and original techniques.
- Formulate a research project based upon the critical evaluation of research literature and/or analysis of existing systems or products;
- Conduct research activity independently;
- Analyse and critically report on their own work in the context of existing research.

In addition to the above, students completing the MSc with placement programme would be able to:

- Apply research methods and results appropriate to a commercial setting.

Professional practical skills

- Employ a range of established and new techniques to review and critically analyse information concerning theoretical and practical problems in the context of autonomous systems and machine learning, and to propose and implement solutions in a professional manner.
- An awareness of the need for a high level of professional and ethical conduct in systems design, development and evaluation;
- An awareness that system developers need to take account of the commercial and social contexts in which they operate;
- A knowledge and understanding of management and business practices, their limitations, and how these may be applied in the context of autonomous systems and machine learning;
- An awareness of relevant regulatory requirements governing professional activities in the context of autonomous systems and machine learning;
- An awareness of and ability to make general evaluations of risk issues in the context of autonomous systems and machine learning, including health and safety, environmental and commercial risk;

- An understanding of different roles within a systems development team and the ability to exercise initiative and personal responsibility which may be as a team leader or member;
- An understanding of methods for resolving complex machine learning and autonomous systems design issues, both systematically and creatively, make sound judgements in the absence of complete data, and communicate their conclusions clearly to both specialist and non- specialist audiences.
- Work independently to a deadline and pre-determined goal seeking advice where appropriate;
- Present results in a balanced way with appropriate comparisons to the work of others.

In addition to the above, students completing the MSc with placement programme would be able to:

- Apply commercial constraints to individual work activities.

Transferable key skills

- Complete work to pre-determined deadlines;
- Manage their own activities in the presence of multiple demands on their time.
- Show an understanding management and business practices, their limitations, and how these may be applied in the context of the specialisation;
- Demonstrate an awareness that systems development activities should promote sustainable development;
- Demonstrate the ability to apply quantitative techniques where appropriate;
- Plan, control and execute a project independently;
- Work effectively as a part of a team working to a common goal.
- Write balanced and succinct reports describing the student's work in the context of the state of the art;
- Critically compare the work of others managing disparity of information in a clear and coherent manner;
- Execute a significant research activity independently;
- Present work orally providing an appropriate and scientific justification of the work when questioned.

In addition to the above, students completing the MSc with placement programme would be able to:

- Explain the commercial impact of systems development proposals made as part of their placement work.
- Deal with confidentiality and intellectual property issues.

MSc dissertation

- To apply high-level research in practice, by conducting a defined research project in their specialist subject and use a wide range of research techniques relevant to the specialist subject
- To achieve critical awareness of research literature and its application to current developments in the subject
- To be able to identify the tasks to be completed in a research project proposal, plan a scheme of work, and complete the project to a professional standard;
- To assemble and create the necessary analysis, design and development tools, carry out the development of the solution of a technical problem in computer science, and evaluate the effectiveness of the solution against common standards of quality;
- To demonstrate the successful completion of these tasks in a well- structured and coherently written dissertation. This will include a discussion of the research outcomes of the work, and future directions.

PROGRAMME DESCRIPTION: STRUCTURE OF YOUR PROGRAMME

The structure for your programme year for 2020/21 can be found in the 2020/21 Unit and Programme Catalogues (see below). This is where you find important information on which units you are taking in which semester and if any units are 'designated essential units' (DEUs) that you must pass.

The content of the Programme Catalogues is correct at the time of publication. Programmes and units may be subject to reasonable change (see also **Unit and programme changes 2020/21** in this Handbook).

UNIT AND PROGRAMME CATALOGUES

This is where you will find details about all years of your programme as well as details about individual units for the current academic year.

The Catalogues also provide links to the relevant areas of the University's assessment regulations, showing how these are applied to this programme of study.

For the online Catalogues, please refer to **Important Links and Information** in this Handbook. See also the section in this Handbook on **Assessment.**

PROFESSIONAL BODY ACCREDITATION

Our programmes are accredited through BCS: The Chartered Institute for IT. Students successfully completing:

- MSc Computer Science will be awarded Partial Chartered IT Professional (CITP).
- Msc Human Computer Interaction, MSc Data Science will be awarded Partial Chartered IT Professional (CITP and Partial Chartered Engineering (CENG)

All students successfully completing a placement will receive Professional Registration for IT Technicians (RITTech)

For students on MSc Software Systems and Machine Learning and Autonomous Systems, We received initial Partial CITP and Partial Ceng last year. We hope to have this confirmed again for this year. The department will keep you informed through SSLC.

YOUR LEARNING

For 2020/21, the University has developed a blended learning approach called 'The Bath Blend' which combines in-person activities on campus, live interactive learning, and structured independent study.

The Bath Blend approach to programme delivery has been developed to be flexible in the face of possible changes in law, including measures on social distancing, which may occur through the course of this academic year.

Information on IT support and key software for this academic year is available online. Please refer to **Important Links and Information** in this Handbook.

YOUR TIMETABLE

Using MyTimetable, you can access your personal timetable and download it into an electronic calendar.

Your In-Person Teaching (IPT) day and Live Online Interactive Learning (LOIL) sessions will show in your timetable. Links to LOIL sessions can also be accessed through the relevant unit page on the University's online learning environment, Moodle.

When you start your units, you will be able to access associated online material at a time that suits your schedule.

MyTimetable updates regularly, so should there be a change to your timetable, it will be reflected in MyTimetable.

Full information is available online. Please refer to **Important Links and Information** in this Handbook.

PHYSICAL STUDY SPACE – 2020/21

As in previous years, you will be able to book study space on campus and in the city for individual or group study. Information on how to book, and the COVID-19 requirements, is available online. Please refer to **Important Links and Information** in this Handbook.

OPTION CHOICES

If your programme has option choice then information about how and when to choose your option units can be found online (please refer to **Important Links and Information**). If applicable, you will receive an email notification at the relevant point in the year when online unit selection is available and if you need to discuss option choices, please contact your Director of Studies.

RESEARCH ETHICS

In adherence to university's Code of Good Practice in Research Integrity all students doing their dissertation project should discuss ethical implications with their project supervisor.

PLACEMENT SUPPORT

The University is committed to enhancing students' vocational outcomes and learning experiences by supporting placements. We have a dedicated placements team to support and guide you through the process of applying for, securing and successfully completing a placement.

The contact details for your Placements Manager and Placement Tutor can be found in the 'key contacts' section at the start of the handbook.

If you have any COVID-related concerns then please contact the placements team.

Many of the MSC programmes (Human Computer Interaction, Software Systems, Data Science, Data Science and Statistics, Machine Learning and Autonomous Systems) offer the option to take a one year placement. The MSc with placement degree includes a one-calendar-year placement comprising 60 credits.

The objective of the placement is to explain the commercial impact of systems development proposals made as part of their placement work.

The department will facilitate introductions to potential companies via the Faculty placements office.

The placement will be assessed on a pass/fail basis. It is assessed by:

- Completed log book,
- Student Placement Report,
- Student placement presentation,
- Employer competence summary reports

All components need to be successfully passed in order to pass the placement. Students who have not achieved the minimum overall average of 50% across the taught units or are unable to find a suitable placement will have to transfer to the MSc without placement programme.

Students who fail the placement will be eligible to transfer to the MSc without placement.

For this year you can opt to have your placement before or after the dissertation. If you have not started your dissertation in July, you will have to complete your dissertation first.

UNIT AND PROGRAMME CHANGES 2020/21

All programme and unit changes are managed through formal University processes. This is to ensure that changes are academically appropriate, properly supported and are done in a way that safeguards the interests of students.

In addition to the Bath Blend approach to delivery of your programme in 2020/21, which has already been put in place, it is possible that further changes to your programme may be required. These are more likely to be part of continual development aimed at enhancing your learning experience and maintaining high academic standards and quality. Such changes could be, for example, to update content to reflect latest developments in a particular field of study, or to respond to student feedback on delivery and/or assessment. Students who would be affected by proposed changes are consulted about them, either via their Staff/Student Liaison Committee or directly, depending on the nature of the change.

As we have already experienced, it is sometimes necessary to make changes due to unforeseen or unavoidable circumstances. Outside of the global pandemic, this could be for reasons such as:

- the accrediting body requiring changes to be made to the course, or,
- being unable to run an option unit because too few students selected it.

When this happens, we always try to ensure that the impact on students is minimised and that those affected are informed of the changes at the earliest opportunity.

Information on how we assure the quality and standards of your programme of study is available online. Please refer to **Important Links and Information** in this Handbook.

GIVING FEEDBACK ON YOUR PROGRAMME TO THE UNIVERSITY

The University is committed to continually improving its practice and aims to engage students as active partners in their education (Education Strategy 2016-21). The three main ways in which your feedback will be sought will be through:

- Staff / Student Liaison Committees (SSLCs)
- surveys and evaluations
- the Students' Union.

Full information is available online. Please refer to **Important Links and Information** in this Handbook.

ASSESSMENT

Full information is available online. For signposts to important information on many aspects of assessment, please refer to **Important Links and Information** in this Handbook.

Any exam-based assessment during the 2020/21 academic year will be online. More information on assessment arrangements for this year, including online assessment, will be provided via the University webpages and updated as necessary.

SUBMISSION DEADLINES

Units with coursework will normally announce the schedule for coursework specification and submission during the first lecture of the semester. Submission deadlines are discussed with the director of studies to provide a spread off deadlines where possible. While every effort is made to spread the deadlines as much as possible, submission deadlines will naturally fall towards the end of the semester.

Where possible we try to avoid changing days but when needed deadlines can be moved. The unit leader will announce this during the lecture and post it on Moodle where applicable.

A significant proportion of coursework on the Masters will need to be submitted through Moodle, our e-learning platform.

For paper-based coursework submissions, the Department of Computer Science uses special Coursework Boxes for submission of coursework. The Coursework Boxes for all Computer Science students are located in 1 West level 2.

Close to the submission date of a particular coursework, one or more of the individual posting slots will be labelled with the unit number and name, and the date and time of the coursework's hand-in deadline. All coursework must be submitted by posting it in the appropriate slot in the Coursework Boxes by the deadline identified on the coursework specification, unless otherwise specified by your Unit Lecturer.

If you need to submit after the original deadline (late submission or because of a deadline extension), submit your work at the faculty office in 3W2.03.

When submitting paper-based coursework, all students are required to complete a copy of the Coursework Submission Form. Copies of this form can be obtained from the Department Office. The completed form must be bound securely into the coursework submission as the first page of the coursework. These forms are used to ensure that all coursework has the required details to correctly identify the coursework to the student(s) who submitted it, and to provide a record of which students submitted coursework in each Unit.

Note: Submitting work that is substantially similar to that of another student or that merely regurgitates the content of a textbook is highly likely to result in the accusation of cheating/plagiarism/collusion and may lead to severe penalties. No coursework will be accepted that is not submitted securely bound. The only binding which is acceptable are forms of binding that allow all the content of each page to be read without having to remove any pages from the binding. DO NOT use plastic pockets or plastic covers to hold

your coursework - where possible, a single staple should be used. Sections of coursework that are inappropriately bound may not be marked.

All paper-based submissions must be in printed or legible hand-written form - submission of part or all of the coursework on computer disk, CD-ROM, DVD or any other electronic or magnetic storage media is not acceptable unless specified as part of the coursework submission. Submission by e-mail is not acceptable unless specified as part of the coursework submission. If you are unable to be present within the Department to submit your coursework, you may submit the coursework by surface mail. Any coursework submitted in this manner must normally be posted in time to arrive by the deadline date, and should always be post-marked before the deadline for coursework submission. You are responsible for ensuring that any coursework submitted by mail is delivered safely and on time, by using a recorded delivery or courier service if appropriate. Late submissions, without a deadline extension approved by the director of studies, will incur a penalty. Within 5 working days of the deadline, the mark will be capped to 40. After 5 working days the mark will be capped to 0.

You are required to retain a copy of any coursework that you have submitted. Most coursework is retained for scrutiny by internal and external examiners as a part of the quality assurance processes of the Department. In the rare case where a student may claim that a coursework was submitted and our submission records indicate that this was the case but no coursework has been marked for that student, the student will be required to produce the second copy for marking. Failure to submit a second copy on request may result in the award of zero for that coursework. Any coursework submitted by post that is not received will be deemed to have not been submitted and will normally be awarded a mark of zero unless you can produce formal proof of postage and you are able to provide a copy of the coursework on request.

LATE SUBMISSION OF COURSEWORK

To ensure fairness to all students, you will be expected to hand in all assessed coursework and dissertations/projects by a specified date and time, and there are penalties for submitting work after the specified deadline. If there are valid circumstances preventing you from meeting a deadline, your Director of Studies may grant you an extension to the specified submission date. Forms to request an extension are available from the Department.

Please note that:

- if you submit a piece of work after the submission date, and no extension has been granted, the maximum mark possible will be the pass mark
- if you submit work more than five working days after the submission date, you will normally receive a mark of 0 (zero), unless you have been granted an extension.
- It is not usually possible to mark coursework anonymously if it is submitted after the deadline.

It is important that you speak to your Director of Studies as soon as possible if you become concerned about your submission deadlines.

See also the section in this Handbook on Submission deadlines.

WORD COUNTS

Coursework tasks will normally have a word limit or word range. This, and the penalty for non-compliance, will be confirmed when you receive an assignment.

Written coursework tasks will normally have a word range or limit. This is in order to give an indication of the depth and detail of work required, and to ensure that students' submitted work is comparable. You will be required to declare the word count for your work when submitting it for assessment.

If you do not observe the given word range or limit for the coursework task, for example if you exceed the word limit, then a penalty will be applied. The penalty that would apply should be stated in writing when the assignment task is distributed. You should take note of what is included when calculating the total word count (e.g. whether or not contents pages, appendices, footnotes, bibliographies and other elements that are not part of the main text are included).

You should check with your Director of Studies if you have questions about word counts and penalties.

FEEDBACK ON ASSESSMENT

During your course, you will receive feedback on your assessed work. This feedback may take different forms, depending on the subject and type of assessment. You will be informed of the timing and nature of the feedback you will receive on each assessment, including whether the piece of work itself will be returned to you. For exam-type assessment, you may receive general feedback relevant to all who took the assessment rather than individual feedback. You can discuss feedback you receive on assessments alongside your performance and progress in your studies at meetings with your Personal Tutor. Individual feedback is normally provided either written on the submission, using a feedback sheet or via Moodle. While individual feedback is provided, some unit leaders will normally provide general feedback through Moodle or during a lecture. Students are encouraged to contact unit leaders if they would like further feedback or clarification. Feedback does not restrict itself to comments on formal assessment. Lab sessions, (informal) discussions with lecturers and tutors, meetings with your project supervisor also give you the opportunity to get valuable feedback on your progress. If you are unsure on how you getting on with your unit/course, talk to your lecturer, tutors and/or personal tutor. Talk to us! Feedback does not need to written down to be valuable.

ACADEMIC INTEGRITY

The University has a wide range of resources available to you to help you understand academic integrity and enhance your academic writing and practice.

It also has in place an Academic Integrity Test you are required to take and pass (the pass mark is 85% but you can take the test as many times as you need to). You will not be able to progress beyond the next progression point in your studies until you pass this test.

When you submit assessment, you will be expected to make a declaration that the work is your own and, where you have re-used your own work and/or used other sources of information, that you have referenced the material appropriately. The University uses a plagiarism detection service (currently Urkund), which searches the web and databases of reference material and content submitted by other students, to identify duplicated work. Where practical, all summative assessment is submitted to this service to check for similarities as an initial indicator of whether work has been plagiarised and an assessment offence committed.

Submission of your assessment to the Plagiarism Detection Service - Data Protection statement

The Plagiarism Detection Service complies with European Data Protection legislation. When you registered with the University, you gave it permission to process your personal data for a variety of legitimate purposes. This includes allowing the University to disclose such data to third parties for purposes relating to your studies. The University, at its sole discretion, may submit the work of any student to the Plagiarism Detection Service (in accordance with Regulation 15.3e) and may make, or authorise third parties to make, copies of any such work for the purposes of:

1) assessment of the work
2) comparison with databases of earlier work or previously available works to confirm the work is original
3) addition to databases of works used to ensure that future works submitted at this institution and others do not contain content from the work submitted.

The University will not make any more copies of your work than are necessary, and will only retain these for so long as remains necessary, for these purposes.

Please note that, if at any time the University submits any of your work to the Plagiarism Detection Service, the service will be provided with, and will retain, certain personal data relating to you – for example, your name, email address, programme details and the work submitted. Such data may be transferred by the Plagiarism Detection Service to countries worldwide (some of which may not be governed by EU data legislation) in order for the work to be checked and an originality report generated in accordance with the proper workings of the Plagiarism Detection Service. Personal data is retained indefinitely by the Plagiarism Detection Service upon submission of work. You may ask for your personal data to be removed by contacting the University's Data Protection Officer.

Assessment offences – penalties

Any student who is found to have used unfair means in an assessment procedure will be penalised. 'Unfair means' here include cheating, fabrication, falsification, plagiarism, unfair collaboration or collusion. Penalties for use of unfair means may include failure of the assessment unit or part of a degree, with no provision for reassessment or retrieval of that failure. Proven cases of plagiarism or cheating can also lead to an Inquiry Hearing or

disciplinary proceedings. Claims of inadvertence or ignorance will not be accepted as a basis for mitigation of a penalty.

If you are accused of an offence, the Students' Union's welfare services are available to support you. You have the right to appeal against the outcome of the investigation.

Important information on academic integrity, the Plagiarism Detection Service, assessment offences and penalties, and support, as well as the Academic Integrity Test itself, is available online. Please refer to **Important Links and Information** in this Handbook.

IF CIRCUMSTANCES IMPACT ON YOUR ASSESSMENT ATTEMPT

Individual Mitigating Circumstances (IMCs) are the conditions which temporarily prevent you from undertaking assessment or significantly impair your performance in assessment. As such, the measure of their severity is not about impact on you, but the impact on your affected assessment. Full information about IMCs is available online. Please refer to **Important Links and Information** in this Handbook. **It is strongly advised that you become familiar with the available guidance and related regulations.**

If you know of a potential IMC that may affect your assessment before you begin an examination period or before a submission date, it is important that you speak to your Director of Studies as soon as possible. After speaking to your Director of Studies, if you do intend to submit a formal IMC claim for the assessment(s) you feel were affected, you will still need to complete the form and follow procedures.

ASSESSMENT PROCESSES

Assessment and marking processes at the University are designed to ensure that assessment of your work is fair and consistent, and that academic standards are appropriate and comparable between the University and other higher education institutions. This is achieved in a number of ways.

Marking: Assessments you will complete during your programme are marked according to:

- *marking criteria (or assessment criteria)* - these are the knowledge, understanding and skills which it has been identified that students should demonstrate in the assessment and which are taken into account during marking. They are based on the learning outcomes being assessed
- *marking schemes* - these are detailed descriptions of how specific numbers of marks should be assigned against individual components of an answer within the assessment task
- *grade descriptors* - these are descriptions of the levels of achievement required in order to get a result within a given band of marks (e.g. 70% or more).

Anonymous marking: The University has adopted a principle of anonymous marking in order to protect students and staff from bias, and the perception of bias, in the marking process. It applies to all assessment where practicable. It is not possible to mark all coursework anonymously as in some types of assessment the student can be easily

identified by the marker (e.g. presentations, group work, laboratory work) or it might not be practical, or in the student interest, to do so. You will be informed when your coursework is to be marked anonymously.

Moderation: Both the setting and the marking of assessments are independently checked through a process known as moderation to ensure that questions test the learning outcomes and are set at the right standard, and that marking is consistent and fair. Moderation is conducted by internal examiners and also by your External Examiner (see below).
All our MSc programmes require a 50% Taught Stage Average (the weighted average across all taught units) in order to progress onto the dissertation stage of programme. Students not meeting this requirement will be transferred to the PG Dip. In compliance with NFA-PGT, all failed and non-condoned units need to be retrieved on a like-for-like basis.

Boards of Examiners: Assessment decision-making at the University is the responsibility of Boards of Examiners established at three levels: assessment outcomes go first to *Boards of Examiners for Units*, then *Boards of Examiners for Programmes*, then finally to *Boards of Studies*. Boards of Studies confirm decisions relating to student progression from one stage of the programme to the next and the final award. **The assessment marks you are given initially by markers are therefore provisional up until the point when they have been confirmed by the Board of Studies for your programme.** An official release date is set when your confirmed results will be made available to you via SAMIS (the University's student records system). An academic appeal can only be made in relation to a confirmed result (see the section in this Handbook on **Academic Appeals**).

Scaling: All marks for a unit are reviewed at a meeting of a Board of Examiners for Units which will verify that the assessment process has been conducted appropriately and that the marks are an accurate reflection of the standards achieved. A Board of Examiners can decide to recommend a change to the provisional marks, based on evidence that there was a problem with the assessment which means the initial marks do not reflect the standards achieved by students. This adjustment is known as scaling and under these circumstances the marks of all affected students will be changed.

External Examiner: An External Examiner is someone from another University or professional organisation who is qualified and experienced in the field of study. At least one External Examiner is appointed for each programme or group of programmes. The role of External Examiner is an important one in assuring that assessment processes are fair, academic standards are appropriate, and supporting the development of your programme. External Examiners review draft assessment and samples of assessed work, and attend Boards of Examiners. They are members of Boards of Examiners.

Once a year, the External Examiners will provide a written report. University staff, including the Head of Department and Director of Studies, will look at these reports and a response will be made to the External Examiner's comments. External Examiner reports and responses are made available to students. Staff/Student Liaison Committees (SSLCs) also discuss External Examiner reports as part of routine monitoring activity.

The External Examiner(s) for your programme is (are):

- Prof Wolfgang Faber, University of Huddersfield for MSc Computer Science, MSc Software Systems, MSc Human Computer Interaction
- Prof Richard Everson, University of Exeter for MSc Data Science, MSc Machine Learning and Autonomous Systems

It is not appropriate for students to make direct contact with External Examiners. If you are dissatisfied with the process or outcome of an assessment, and are considering whether to raise this either informally or formally, the sections of this Handbook on **Academic Appeals** and **Dissatisfaction with a University Service or Facility** (**Complaints)** give some more information about the University's procedures for student complaints and academic appeals. The University's mechanisms for student representation are designed to enable students to engage with the quality management process through which the University considers and responds to External Examiners' comments and suggestions.

Full information is available online. Please refer to **Important Links and Information** in this Handbook.

ASSESSMENT REGULATIONS

The University's New Framework for Assessment: Assessment Regulations: Phases 2 & 3 for postgraduate taught programmes ('NFAAR-PGT') specifies the rules governing students' progression from one stage of their programme to the next as well as for the award of degrees. The rules cover all areas of assessment, including supplementary assessment and the extent to which failure may be condoned.

If at any time you are in doubt about how NFAAR-PGT provisions apply to your work, please consult your Director of Studies.

This section highlights areas of the University's assessment framework for the type of programme you are undertaking. It explains the regulations that govern your assessment and outlines how the University makes decisions concerning your progression through your programme and award. Complete information is available in the NFAAR-PGT document.

The full NFAAR-PGT, and definitions of terms used in it, are available online. Please refer to **Important Links and Information** in this Handbook.

YOUR PROGRAMME AND HOW YOU ARE ASSESSED

Within a programme of study, there are *compulsory units* (i.e. those units in a programme which must be taken by every student registered on the programme), and there may also be *optional units* (i.e. those units students may choose from a range of options).

In the Programme and Unit Catalogues, there are links to the relevant appendices of the NFAAR-PGT which state exactly how the assessment rules operate for each stage of your programme.

The following points will help you to understand how the assessment rules relate to your specific programme, such as pass marks, averaging of marks and dealing with any failures:

Firstly, there are several references below to the persistent generic rules on the extent of any failures of units permitted overall. The rules are that you can only (1) fail and retrieve units, or (2) marginally fail units and have them condoned, **within set limits.** Breaking these rules results in failure of the programme.

- MSc Computer Science: Your programme has Designated Essential Units (DEUs) which you must pass to gain the award you seek; even marginal failure in these units cannot be condoned.
- MSc Software systems, MSc Human Computer Interaction, MSc Data Science: Your programme does not have any Designated Essential Units (DEUs).
- Your programme has units that constitute the Taught Stage(s) Credits in a separate phase before the period in which you will do the Dissertation/Project type unit(s), as indicated in the table at the end of this section. The Programme Progression Requirement to get from the taught phase to the Dissertation/Project phase is a minimum of 50%.

- Should you fail to qualify for the award of the degree of Master, you may be considered for the award of a related Postgraduate Diploma (subject to your having met the requirements) or Postgraduate Certificate (MSc Data Science, subject to your having met the requirements)

The normal pass mark for a unit is 40%. In some units, you might need to achieve a threshold mark in one or more component assessments in order to pass the unit overall. Particular rules apply to failure of units of the 'Taught type', or in the 'taught' stages. They are as follows:

- If you fail any DEUs, you will have to undertake supplementary assessment unless you have failed so many DEUs that you fail outright or the attempted retrieval would break the rule on how much failure can be retrieved.
- If you fail any non-DEU units badly (i.e. achieve less than 35%), you will have to undertake supplementary assessment unless you have failed so many units that you fail outright or the attempted retrieval would break the rule on how much failure can be retrieved.
- If you fail only non-DEU units marginally (i.e. achieve 35%-39%), you might be able to progress without supplementary assessment. Whether you do progress will depend on the total credit value of the failed units.

Dissertation/Project units have their own special rule on failure: only cases of marginal failure (i.e. 35%-39%) will be given permission for attempted retrieval through supplementary assessment, and any resubmission that is permitted for marginal failure must be made within a specified period. Ultimately, you must pass a Dissertation/Project unit (or have an average of at least 40% for them if there are more than one) for satisfactory completion of the requirements for Dissertation/Project elements.

Your unit results are combined as follows to make overall assessment/award decisions:

- The Taught Stage(s) Average (TSA) will be calculated by taking the credit-weighted average of marks for all units required to contribute to the taught stage(s), or by taking the credit-weighted average of marks for all units defined as of 'Taught type' required to contribute to the programme.
- The Dissertation/Project Average (DPA) will be calculated by taking the credit-weighted average of marks for the unit(s) required to contribute to the Dissertation/Project stage(s), or by taking the credit-weighted average of marks for the unit(s) defined as of
- 'Dissertation/Project type' required to contribute to the programme.
- The Overall Programme Average (OPA) will be calculated by taking the credit-weighted average of marks for all units required to contribute to the programme.

A Board of Examiners will decide at appropriate points whether you are continuing to meet the requirements for the programme (including not breaking persistent generic rules whereby you can only fail and retrieve, or marginally fail and have condoned, units within set limits), and/or whether you have met all the requirements for your target award or any alternative that might be available. The outcomes will depend on both your performance in individual units and your overall performance. Generally, if you pass each of your units, you will progress and, in due course, be recommended for an award.

If you fail units beyond certain credit values, or you fail some too badly, you might break one of the persistent generic rules whereby you can only fail and retrieve, or marginally fail and have condoned, units within set limits, and this will result in failure of the programme - without any opportunity for supplementary assessment. (Further information on supplementary assessment is provided below.)

The criteria for making awards with distinction or with merit are described in the relevant NFAAR-PGT rules (paras. 78-80).

Supplementary assessment

'Supplementary assessment' is the term normally used for an opportunity given to a student to retrieve failure before starting the next stage of a programme, or by the end of the programme if it is a single-stage programme or the failed units are not Stage Required Units (SRUs).

Academic year dates, including the supplementary assessment period, can be found online. See **Important Links and Information** in this Handbook.

Each unit's method of supplementary assessment is shown in the online Unit Catalogue.

More information on arrangements for the 2020/21 academic year will be provided via the University webpages and updated as necessary.

At supplementary assessment, students will normally have the opportunity to gain credit for units then successfully passed and to have the mark gained reported to them for feedback purposes, but a maximum mark of 40% will be awarded and used in the Overall Stage Average, the Overall Programme Average, the Taught Stage(s) Average, and any award calculation.

If you pass all your supplementary assessments, you will be able to progress onto the next stage of your programme and/or, as appropriate, be considered for an award. If you do not pass them all, the outcome will depend on your overall performance including consideration of the rules about passing particular types of units and the persistent generic rules (as set out above).

ACADEMIC APPEALS

If you wish to submit a request for an academic appeal you should refer to Regulation 17 (Conduct of Student Academic Reviews and Appeals), which outlines the process and grounds for an appeal against formal Board of Studies decisions.

You are also strongly advised to read the online guidance on Appeals provided by the Academic Registry.

Independent advice about academic appeals is offered by the Students' Union Advice and Support Centre.

Full information is available online. Please refer to **Important Links and Information** in this Handbook.

CORE UNIVERSITY INFORMATION

UNIVERSITY REGULATIONS FOR STUDENTS

All registered students of the University are subject to the University's Regulations for Students. The Regulations contain rules and other important information about being a student at the University of Bath, including regulations governing the payment of fees due to the University, student discipline, fitness to study and those governing attendance, conduct and progress in studies. They also form part of the formal contract between you and the University. **You are strongly advised to read them carefully as they contain a lot of important information.**

For a link to the full Regulations for Students, see **Important Links and Information** in this Handbook.

ACCESSING UNIVERSITY EMAIL

You will need to use your University username and password to access your University email account. Your username also forms your email address (**username@bath.ac.uk**).

The University will often communicate with you about a range of important matters requiring action from you, including registration, assessment, degree ceremonies, and matters such as tuition fees, via your University email account. It is a University regulation that you access your University email account regularly, even if you are out on placement or study abroad.

You therefore have a responsibility to ensure that your University email account can receive incoming mail and that you read your email regularly.

Once you graduate or withdraw from your course, you will receive an email stating exactly when your account will be closed. The email will give at least 30 days' notice.

STUDENTS' UNION MEMBERSHIP

All students registered with the University are automatically given membership of the Students' Union; however you have the right not to be a member. Information on opting out of this membership, and the Code of Practice for the Students' Union, are available online. Please refer to **Important Links and Information** in this Handbook.

DATA PROTECTION

The University's Data Protection Policy and Guidelines on Data Protection may be accessed via the data protection website (see **Important Links and Information** in this Handbook).

REGISTRATION STATUS

Note that only registered students may use the University's facilities, such as email, Moodle and the Library. You will be asked to register online at the start of your programme of study and then to re-register at the start of every academic year thereafter until you have completed your programme. It is a requirement that you register when asked to do so. Tuition fees for each academic year are payable at registration in full or in instalments.

Regulation 1.1 explains the requirement to register. Regulations 2.4 and 2.10 explain the consequences of non-payment of tuition fees.

ACADEMIC ENGAGEMENT MONITORING FOR TIER 4 STUDENTS

Guidance and requirements on academic engagement for students who are Tier 4 visa holders, including the University's **Academic Engagement Monitoring Policy for Tier 4 visa holders**, and information on when and how to request an authorised absence, are available online. Please refer to **Important Links and Information** in this Handbook.

CHANGE IN YOUR CIRCUMSTANCES

It is important to ensure that the University holds your correct, up-to-date, personal and academic details within SAMIS, the University's student records database. If you change your address – either your semester-time or home address – please update your details online (see **Important Links and Information** in this Handbook).

If you change your name, you will need to provide valid proof of the change. Please speak to your Department or Faculty/School administration, or Student Services, for advice on how to do this.

If you are considering suspending your studies, transferring from one programme to another, or withdrawing from your programme, please discuss your situation with your Director of Studies. They will be able to advise you on an appropriate course of action.

The financial implications of withdrawing from the University or suspending your studies can be significant. See **Important Links and Information** in this Handbook.

The Student Money Advice Team in Student Services and the Student Finance Office will be able to advise you on the implications for fees in your situation and on how to suspend any student funding you are receiving.

If you are an international student holding a Tier 4 visa, you should consult the advisers in the Student Immigration Service about the implications of suspending or withdrawing from your programme. See **Important Links and Information** in this Handbook.

You will need to register any change of academic circumstance, including a change of optional units, with the University. Please speak to your Department or Faculty/School administration who will advise you on how to do this.

DISSATISFACTION WITH A UNIVERSITY SERVICE OR FACILITY (COMPLAINTS)

We want to ensure that, if you have a problem concerning the University, it is resolved as quickly as possible. The University is committed to continuing review and improvement, and seeks regular feedback from students. There are student representatives on the University's formal decision-making committees who can raise issues so that they can be dealt with promptly. The University is also committed to providing an environment within which students are encouraged to raise any matters of concern in an informal manner as soon as they arise. This often removes the need for formal complaints.

It is expected that most complaints can be resolved at an early stage by discussing the matter informally at a local level. If you have a problem concerning the University, you should bring the matter to the attention of an appropriate member of staff, who will aim to resolve it by informal discussion. If you have attempted to resolve matters informally but are not satisfied with the outcome, you may elect to proceed to the next stage by submitting a formal complaint. You may also submit a formal complaint if the issue involved is too complex or serious for informal resolution.

If you do need to make a complaint, there are procedures in place to deal with it, outlined in the University's **Student Complaints Procedure**. These procedures are designed to ensure that your complaint will be dealt with in good faith and that you will not be penalised for complaining.

There are separate procedures for requesting a review of progression or award classification decisions. See the section in this Handbook on **Academic Appeals**.

The University recognises that making a complaint can be stressful. Students are therefore advised to seek advice and support before making a complaint, from Student Services, or from the Students' Union Advice and Support Centre, whose advice is independent of the University.

Full information is available online. Please refer to **Important Links and Information** in this Handbook.