

Professional Masters Programme HANDBOOK

2024-25

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Welcome to the Professional Masters Programme at the University of Oxford

Welcome to the Professional Masters Programme in the Department of Computer Science, University of Oxford <u>http://www.cs.ox.ac.uk/softeng/</u>. The Department of Computer Science is one of the world's leading centres for research and teaching, with an international reputation built up over many years. Our current research ranges from exploring the fundamental issues of the meaning of programming languages to machine learning to the engineering of software systems at large-scale. The people that teach on the Professional Masters Programme are cutting edge researchers and industry leaders. This deep expertise influences and informs the courses we teach, which are continually evolving.

The Professional Masters Programme is designed to provide an advanced, part-time, course of study for working professionals looking to broaden and deepen their understanding of the state of the art in engineering modern information systems. Currently, two awards are offered:

- MSc in Software Engineering
- MSc in Software and Systems Security

Cognizant of the demands placed on working professionals, the Programme has specifically been designed with the following objectives in-mind:

- Part-Time: The teaching component of each module consists of an intensive weeklong immersion into a particular topic.
- Flexible: There is no set path students are free to choose modules, subject to the degree schedule, to customize their education.

This handbook is intended to act as a guide to the Department and the wider University. In addition to this handbook, you will find specific information on your course in a supplement on the Professional Masters Programme website. If you think that the handbook could be improved in some way, please let us know.

Key contacts

Directors: <u>Alessandra Cavarra</u> Director of Graduate Studies

<u>Ivan Flechais</u> Director of the MSc in Software and Systems Security

Programme Office:

<u>Shirley Sardar</u> Office Manager <u>Andrew Martin</u> Director of the Professional Masters Programme

<u>Andrew Markham</u> Director of the MSc in Software Engineering

<u>Henry Dartnall</u> Administrative Assistant

<u>Tracy Marshall</u> Graduate Studies Assistant <u>Sarah Wakefield</u> Administrative Assistant

Shirley, Tracy, Henry and Sarah can be reached at pro@cs.ox.ac.uk. Please use this email address for all queries regarding the programme.

Other contacts:

<u>Rachel Breward</u> Head of Academic Administration Disability Contact <u>Leslie Goldberg</u> Head of Department

IT support@cs.ox.ac.uk Library@cs.ox.ac.uk

For more information on who is doing what in the Department you can consult the Department intranet, <u>https://intranet.cs.ox.ac.uk</u>. If you cannot access this information, please contact the Programme Office, <u>pro@cs.ox.ac.uk</u>.

Disclaimer and Statement of Coverage

This handbook applies to students starting on the Professional Masters Programme in Michaelmas Term 2024 and applies to the following degree courses:

- MSc in Software Engineering
- MSc in Software and Systems Security

The information in this handbook may be different for students starting in other years. The information in this handbook is accurate as at October 2024, however it may be necessary for changes to be made in certain circumstances, as explained at (www.graduate.ox.ac.uk/coursechanges). If such changes are made the department will publish a new version of this handbook together with a list of the changes and students will be informed.

The Examination Regulations relating to this course are available at: <u>https://examregs.admin.ox.ac.uk</u>. If there is a conflict between information in this handbook and the Examination Regulations then you should follow the Examination

Regulations. If you have any concerns please contact the Head of Academic Administration (<u>academic.admin@cs.ox.ac.uk</u>).

Version	Action	Date
Version 24.0	Published in MT2024	November 2024

1. Sources of information

This handbook is designed to help you navigate the Department of Computer Science and the broader University of Oxford. It provides guidance as to what facilities are available to you, how teaching and learning are organised, how your course is structured, and how to find help if you've got any problems. The latest version of this handbook can be found at: http://www.cs.ox.ac.uk/pro/handbook

In addition to this handbook there are some other important sources of information that you should ensure you are familiar with.

1.1 Examination Regulations

The *Examination Regulations* are the authoritative document on the regulations for the University degrees and examinations. The regulations are available online at: <u>https://examregs.admin.ox.ac.uk</u>

1.2 University Student Handbook

Each year you will have access to the latest version of the *University Student Handbook*. It forms part of your contract with the University and can be found at: <u>https://www.ox.ac.uk/students/academic/student-handbook</u>

1.3 Oxford Students website

<u>https://www.ox.ac.uk/students</u> contains a wealth of information about anything concerning students – do have a look around!

In particular, visit <u>https://www.ox.ac.uk/students/new</u> for general information that is useful at the start of your course. Visit <u>https://www.ox.ac.uk/students/life/it</u> regarding IT information and <u>https://www.bodleian.ox.ac.uk/home</u> regarding information on the University's Libraries.

1.4 College Handbook

Your college will probably also have detailed guidance about its own regulations and requirements. Your college advisor and your college office will be able to point you in the right direction.

2. Finding your way around

Your academic life in Oxford will involve two intimately connected but distinct institutions.

You are a member both of a college and of the University; your supervisor is a member of the Department of Computer Science and possibly a member of a different college to you. Your college will also allocate a college advisor to you, with more of a pastoral role than an academic one.

In principle, the University enables you to study for a degree, monitors your progress, examines you at the end of that study, and awards you a degree. Your college exists to guide and advise you. Admission and supervision of graduate students to Oxford is the responsibility of the Department, and the Department looks out for your academic well-being. Your college is more concerned with personal well-being, but both the Department and college offer different resources to support students. If you are unsure who to contact, please get in touch with the Programme Office or your college office.

2.1.1The Department of Computer Science

2.2.1 Access to the Department of Computer Science

The Department of Computer Science is spread over several buildings. The biggest one is the Wolfson Building, which houses the teaching rooms you will be using. For details of our buildings please see our website: <u>https://www.cs.ox.ac.uk/aboutus/directions</u>

The Wolfson Building stands at the south-eastern corner of what is known as 'the Keble Road Triangle' consisting of Keble Road, Banbury Road and Parks Road. This building houses your teaching rooms, the Programme Office and the Department's Library. All rooms on the basement floor are numbered with a number beginning with 0-, rooms on the ground floor (Level 1) with a number beginning with 1-, rooms on the first floor (including the Library) with a number beginning with 2-, and so on. The teaching rooms are Rooms 478 and 479, and the Programme Office is Room 471.

The reception desk is at the main entrance, which is on Parks Road. The Wolfson Building reception opens at 08:30 and closes at 17:15 Monday to Friday.

An entry-card system controls access to the Wolfson Building outside normal opening hours. This applies to the main Parks Road entrance only.

The rules for using this system are:

- Each card will be set to operate for the period of the student's course in Oxford.
- Cards will be issued on a personal basis and must not be loaned or passed on to another person.
- No-one should allow access to another person.
- When a card is used to gain access to the building, the system keeps a record of that use for a period of approximately six months.

2.1.2 Communication and electronic mail

The University IT Services automatically provides e-mail facilities for all new students, at the same time as you are given a University Card.

The Programme will use your University email address to contact you. If you regularly use a different email address then you must ensure that you have your emails forwarded to it. As a student it is your responsibility to read and respond to emails from the Programme in good time.

2.1.3 Connecting to the Internet

You can connect to eduroam Wi-fi whilst you are in most University buildings. Details of how to connect are here: <u>https://help.it.ox.ac.uk/how-to-connect-to-eduroam</u>. Some of the steps of the process you can do before arriving in Oxford.

2.2 Key Dates

2.2.1. Term Dates

The academic year is split into three terms:

Michaelmas (October–December) *Hilary* (January–March) *Trinity* (April–June)

Each term lasts eight weeks. The Professional Masters Programme runs modules throughout the year, not limited to term-time. Term dates set deadlines for submission of the dissertation and are used to calculate the length of time you have been registered in the Programme. The dates of term can be found here: <u>https://www.ox.ac.uk/about/facts-and-figures/dates-of-term</u>.

2.2.2. Matriculation

You will also be a member of one of the colleges of the University. Students who are already graduates of the University may request renewed membership of their previous college. Otherwise, students will become members of one of the colleges that admit students from the Professional Masters Programme.

You will be required to attend a matriculation ceremony within two terms of starting on the Programme. Failure to attend may result in the offer of college membership being withdrawn, and your status as a student lapsing. Your college will be in touch about the dates of Matriculation.

3. Understanding Oxford

As a student of the University of Oxford you will come across terminology that is unique to the institution and can cause confusion at first. In order to help you navigate these the University has produced a useful "Oxford Glossary":

https://www.ox.ac.uk/about/organisation/history/oxford-glossary?wssl=1

4. The University and you – guidance, responsibilities, reporting

4.1 Guidance for students and their supervisors

You will be allocated an academic supervisor, who is usually a member of academic staff in the Department of Computer Science. It is important that you remain in regular contact with your supervisor.

4.1.1. Responsibilities of the supervisor

The supervisor is responsible for assisting you in the selection of options and providing guidance about particular modules. Supervisors also provide guidance and feedback on the work undertaken by you in the project.

The supervisor is required to monitor your progress and report on your work at the end of each term. The report should also make clear whether you are making satisfactory progress.

4.1.2. Your responsibilities as a student

You must accept your obligation to act as a responsible member of the University's academic community. You are ultimately responsible for your studies and need to develop an appropriate working pattern, including a professional relationship with your supervisor. You should make appropriate use of the teaching and learning facilities available within the University, and aim to get the most out of your contact time when you are in Oxford for a module. It is your responsibility to seek out and follow the regulations relevant to your course, including faculty/departmental handbooks/notes of guidance, and to seek clarification from supervisors and elsewhere if this is necessary.

Don't hesitate to take the initiative in raising concerns or highlighting difficulties, however elementary they may seem. For administrative matters the Programme Office (pro@cs.ox.ac.uk) should be your first point of contact. You should ensure that any problems are drawn to the attention of your supervisor so that appropriate guidance may be offered.

If you feel there are good grounds for contemplating a change of supervision arrangements, this should first be discussed with your supervisor or, if this is difficult, with the Office Manager for Professional Masters Programme, the Head of Academic Administration, or the Director of Graduate Studies.

If you do not receive a reply from your supervisor after contacting them several times, please contact the Programme Office <u>pro@cs.ox.ac.uk</u>.

4.1.3 Responsibilities of the Director of Graduate Studies

The Director of Graduate Studies (DGS) is responsible for graduate studies and students. They manage the administrative arrangements for supervision, extensions of time, and dissertation submission. In the Professional Masters Programme the DGS is Dr Alessandra Cavarra.

4.2 Graduate Supervision Reporting

Graduate Supervision Reporting (GSR) is used by supervisors to review and comment on their students' academic progress each term. Students are also given the opportunity to comment on their progress prior to their supervisor submitting a report. Access to GSR is via Student Self Service <u>https://www.ox.ac.uk/students/selfservice</u>. You will receive an email notification with details of how to log in at the start of each reporting window.

You will be given an opportunity to complete a self-assessment report every term. Your selfassessment report will be used by your supervisor(s) when completing a report on your performance, for identifying areas where further work may be required, and reviewing your progress. The GSR system will alert you by email when your supervisor or DGS completes their report and it is available for you to view.

Self-assessment reporting gives you an opportunity to:

• Review and comment on your academic progress during the current reporting period;

- Measure progress against the requirements of your study programme;
- Raise any concerns regarding your academic progress to your supervisor;
- Outline your plans for the next term (where applicable).

If you have any issues with teaching or supervision please raise these as soon as possible so that they can be addressed promptly.

5. Your Course

The awards covered by this handbook are: Master of Science (MSc) in Software Engineering Master of Science (MSc) in Software & Systems Security

The above courses may be compared to national standards for higher education qualifications through the Framework for Higher Education Qualifications (FHEQ). The University awards framework (UAF) maps the awards of the University against the levels of the FHEQ. The FHEQ level for these courses is 7. The relevant subject benchmark statement for the course, which sets out expectations about standards of degrees in a given subject area, is Computing (<u>https://www.qaa.ac.uk/quality-code/subject-benchmark-statements/computing</u>). The Oxford Professional Masters Programme is accredited by the British Computer Society (BCS).

5.1 Aims

The Professional Masters Programme provides advanced education in the methods, principles, tools, and techniques connected with both Software Engineering and Software & Systems Security.

5.1.1 MSc in Software Engineering

Software Engineering is the use of engineering methods and scientific principles in the development of software systems. It is an interesting and challenging field of study: the methods are constantly evolving, and many of the principles start to make sense only when seen in the context of professional practice. It is an interdisciplinary endeavour, bringing together aspects of computer science, engineering, and management. Software Engineering is about developing software alone or within a team for use by other people; using appropriate tools and technologies, and allocating appropriate time and effort, at every stage of development; building systems that meet requirements and expectations of users, even when those requirements—or our understanding of them—may change.

5.1.2 MSc in Software & Systems Security

The systems of modern life are centred at the interface of physical, social, and technological domains. Ensuring their security requires strong technical measures, as well as an understanding of the behaviour of their users, together with an idea of the motives and methods of attackers. This field is variously called Cyber Security and Security Engineering: it aspires to be an engineering discipline, but necessarily incorporates theories, tools, and techniques which are still maturing. A central theme is the reduction of risk—through inhibiting unwanted outcomes or through lessening the impact of security events. This is often achieved through the careful design of hardware and software, but also depends on the construction of suitable procedures, training, and frameworks for regulation.

5.1.3 Learning Outcomes

During the course you will develop a knowledge and understanding of:

- The application of scientific and engineering principles to the development of software systems—principles of design, analysis, and management—with the aim of:
- developing software that meets its requirements, even when these requirements change;
- completing the development on time, and within budget;
- producing something of lasting value—easy to maintain, re-use, and re-deploy.

The Programme teaches the principles of modern software engineering, together with the tools, methods, and techniques that support their application.

It offers working professionals the opportunity to learn more about the technological advances that are changing their lives, through a course of part-time study at one of the world's leading universities.

5.2 Induction Arrangements

You will be invited to attend an induction session in your first Michaelmas Term.

5.3 Length of Course and Course Structure

This is a part-time Masters course. You should complete the course in no less than 2 years, and no more than 4 years. You are required to attend 10 modules and submit assignments for them. You are also required to attend a project week (which helps you plan your project in discussion with your supervisor) and undertake a project and submit a corresponding dissertation. At the core of each module is a single, intensive teaching week, requiring the same period of absence from the workplace as a typical week-long training course. Modules are taught in small class settings with varying approaches to the design of each module.

If your commitments allow you to complete the course in two years, you should aim at completing five to seven modules in the first year and three to five in the second. You should set two terms aside for working on your project and dissertation.

If you aim at completing the course in three years, you should aim at completing four modules in each of your first two years, attending the project week in your second year also, and set the last year aside for two modules and your project and dissertation.

If you plan to complete the course in four years, you should aim at completing at least three modules per year for the first three years, and set the last year aside for your tenth module and your project and dissertation.

5.4 Module Selection and Course Structure

You can choose freely from a wide range of courses and put together an individual programme of study that best reflects your own interests and experience. Your supervisor will be able to discuss the choice with you.

If you are enrolled in the MSc in Software Engineering, six of your ten courses have to come from Schedule I. If you are enrolled in the MSc in Software and Systems Security, six of your ten courses have to come from Schedule II. The schedules are available at http://www.cs.ox.ac.uk/softeng/courses/subjects.html. In either case, you have free choice of the remaining four modules.

Please discuss your plans for your course with your supervisor.

You should have a project proposal approved by the end of your third year at the latest. This proposal must include a timeline of when you plan to have completed each stage of your project work.

Each subject is taught as a single, separate module, delivered normally at least once a year. You can book a place on a specific module in advance (once the course is advertised) allowing you to plan your studies around other commitments. You are permitted to cancel bookings, but are required to give at least 4 weeks notice or you will be charged for the course. Module bookings are restricted to 5 registered and 5 waiting list bookings per student. This is inclusive of the project week.

Each module is examined by an assignment, for which the submission deadline is six weeks from the end of the module. More information about examinations can be found below.

You can attend modules before deciding to apply for postgraduate study on a stand alone basis, and still use these modules and the assignments (up to a maximum of 2) as credit towards a subsequent qualification, subject to agreement by the DGS, within two years of taking the modules. This allows you to determine, in advance, whether the Programme is a good match for your requirements, experience, and circumstances.

5.5 Booking and availability

Modules can be booked via the Programme website. Full instructions can be found at: <u>http://www.cs.ox.ac.uk/softeng/courses/booking.html</u>

The module fee is charged for each module attendance (except for Projects Week), and is payable strictly in advance. A set of terms and conditions for payment are published at: <u>http://www.cs.ox.ac.uk/pro/courses/terms.html.</u>

To ensure the quality of course delivery, class sizes are limited, and we do not permit overbooking. You may join a waiting list and will be informed by the Programme Office if a space becomes available. The Programme monitors module demand on a regular basis. The Programme calendar can be found at: http://www.cs.ox.ac.uk/pro/courses/calendar.html.

5.6 Teaching Arrangements

The current list of modules is posted on the Programme website at: <u>http://www.cs.ox.ac.uk/softeng/courses/subjects.html</u>. Each module consists of three parts:

- pre-study: a period of preparatory study—this may entail reading chapters from a set text, studying relevant research articles, attempting preliminary exercises, gathering data, or preparing a brief presentation.
- teaching week: a single, intensive week—comprising lectures, classes, workshops, and practical sessions; the balance between different types of activity depends upon the subject being taught.
- assignment: a written assignment, completed during the six weeks following the teaching week, allowing students to develop and demonstrate their understanding of the material.

If you have any issues with teaching or supervision please raise these as soon as possible so that they can be addressed promptly.

5.6.1 Pre-study

To get the most out of one of these weeks, some preparation is advised. A pre-study exercise will be sent to participants with confirmed registrations about a month in advance of the teaching week. Depending upon the subject, it may comprise a piece of recommended reading, some questions to answer, or a task to attempt. This part of the module represents a notional 10 hours of study time.

All pre study information is available on the student portal 4 weeks prior to course commencement. We might also send you electronic files, which maybe research papers or

extracts from a text book, or we will ask you to use the online library system SOLO, for which you will need to use your Single Sign On (SSO) to gain access:

http://solo.bodleian.ox.ac.uk/primo-explore/search?vid=SOLO&lang=en_US&sortby=rank

5.6.2 Teaching week

The teaching weeks allow staff and students to explore a subject in depth, focusing exclusively upon a particular topic, and building up considerable momentum as the week goes by.

For courses in Oxford, please arrive at the teaching centre on the 4th floor of the Department of Computer Science before the start of the first teaching session: usually 9 a.m. on a Monday morning. Late arrivals should contact the Programme Office, <u>pro@cs.ox.ac.uk</u> to gain admission, to be given a brief introduction to the facilities, and to be informed of any change in the module arrangements.

The schedule for the week includes 27 classroom hours which will be spent in the same, dedicated teaching suite. Teaching is normally from 9.00 to 17.00. Monday to Thursday, and from 9.00 to 12.30 on Friday. There are short breaks in the morning and afternoon, and a longer break over lunchtime—for courses held in Oxford, lunch is provided.

You are expected to attend every morning and afternoon session of each teaching week. Students who are absent for more than two sessions will not normally be considered to have attended that course. In exceptional circumstances, with the approval of the Director of Graduate Studies, a longer period of absence may be allowed. Please approach the Programme Office, <u>pro@cs.ox.ac.uk</u> in the first instance.

For most subjects, the activities during the teaching week are directed by academic staff of the Programme. For the others, the Programme employs an external, subject specialist: an authority on the specific topic. Attendance is limited to a maximum of between 12 and 20 students (depending on the subject), and assistants are employed to provide help with workshops and practical sessions.

Lecture or seminar sessions are used to structure the week, breaking the subject into a number of topics, and to introduce material for the first time. The small class size means that discussions can be conducted during lectures, and that each member of the class can be invited to participate.

The material introduced can then be explored through class exercises, workshops, and practical sessions. As well as promoting learning through application, these sessions provide feedback on individual progress; lecturers can then adapt their teaching to the needs of the current group of students.

At the beginning of the week, you will receive a copy of the course material. All other material will be made available on the Programme website. Students who attend will be able to download material at any time after the week begins. Any electronic resources, such as additional reading materials, reference documents, or software tools, will also be available from the website.

5.7 Written assignments

An assignment will be distributed to all attendees on the last day of the teaching week. This has a dual purpose: it continues the learning process of the week, allowing the student to test and extend their own understanding through application outside the classroom, in completing a personal "mini-project"; it also provides, through the subsequent submission, the basis for a formal assessment of ability and understanding.

The deadline for the submission will be set six weeks after the release date of the assignment. This is not the amount of time it should take to complete the assignments. As a very rough estimate, the assignments should take the equivalent of 2-3 full days work, though this will vary depending on the assignment and the student. It is your responsibility to set aside time in the six week period to complete the assignment, and it is recommended that you start early to be able to best estimate the time it will take you.

The length of the assignment period should be sufficient to allow you to address any backlog of work that might have resulted from your attendance on the teaching week, and to deal with any professional or personal commitments that might fall within the period, while also having time to complete and submit the assignment. Late submission of an assignment or the dissertation up to 15 minutes after the deadline will attract a penalty of 10 marks. Late submissions after 15 minutes will not be accepted.

If you have submitted work for an assignment, then you may not take a second assignment in the same subject, unless you withdraw your submission before the deadline. An exception to this applies in the case of failure to satisfy the Examiners in the first occasion of a final examination for an award.

You can find details on how assignments are marked in the Examination Conventions.

5.7.1 Submitting assignments

Assignments must be submitted via the Programme website no later than the deadline stated on the assignment coversheet. If you submit up to 15 minutes late, a penalty will be applied (see Examination Conventions for details). Later submissions will not be accepted. In exceptional circumstances, the Proctors can grant you an extension for the submission of the assignment. Extensions can only be granted for illness or another urgent cause that is unforeseeable, unavoidable and/or insurmountable. Your college office will be able to advise you.

You can view, replace, or delete any material you have uploaded at any time before the submission deadline. So you are advised to submit a draft early, and revise it frequently.

Submissions must be anonymised and may be handwritten, although you must ensure that the text is legible and that any diagrams or illustrations are clear. The same considerations apply to typeset submissions: a font size of at least 10pt is essential, as are adequate margins.

The assignment itself will include a clear specification of the allowed extent, and will detail any additional material to be submitted. The word count or page limit does not include images and diagrams, or any code submitted as part of appendices. Please submit your assignment as a Portable Document Format (.pdf) document. Source code and similar supporting material can be submitted as plain text files. If there are many supporting files, they can be submitted as a single zip archive. You should keep a copy of any material that you upload to the system.

The use of the Programme website for this (and for any other) purpose is subject to the University's standard regulations on the use of information systems. In particular, you must protect your passwords, and take care that only appropriate documents are uploaded to the system.

Assignments that you undertake are examinations of the University of Oxford. As such they should be entirely your own work; in particular, your supervisor will not be able to assist you with interpretation of questions or advise on how to approach the assignment. You will be asked to sign a declaration of authorship to confirm that you will comply with the relevant parts of the University's examination regulations. Specific guidance on the acknowledgement of sources is provided here <u>https://www.ox.ac.uk/students/academic/guidance/skills/plagiarism</u>. The full text of the University regulations is available at: <u>https://examregs.admin.ox.ac.uk</u>

Assignments are distributed at the end of a teaching week you attend. If work pressures or other difficult personal circumstances do not allow you to complete an assignment before the deadline, you may withdraw from the assignment by emailing the Programme Office, pro@cs.ox.ac.uk. You must then register to take the next assignment in the same subject, provided that another module in that subject is scheduled within your period of study, without the need to attend the teaching week for that module. Failure to submit that subsequent assignment, except when prevented by illness or other urgent cause that is unforeseeable, unavoidable and/or insurmountable, and is approved by the Proctors, will result in a grade of zero for the assignment. (This is only for the assignments for taught courses, and does not apply to the project proposal submitted after the Project Week.)

Please note that the Programme **<u>cannot</u>** guarantee that a future iteration of a module will occur within your period of study.

5.7.2 Assessment criteria

Detailed assessment criteria are published for each of the subjects taught in the Programme, and for the project and dissertation, in the examination conventions at: <u>http://www.cs.ox.ac.uk/pro/handbook/examinations.html</u>

5.8 Good Academic Practice

You should not show your work to, or discuss it with, any other student. You should not ask or seek to look at anybody else's work.

Please read the University's guidance on Good Academic Practice: <u>https://www.ox.ac.uk/students/academic/academicpractice.</u>

If you use material from any other source such as your own lecture notes then you must reference it explicitly at the relevant point. Your supervisor can give you guidance on proper referencing, or for more guidance see <u>http://www.cs.ox.ac.uk/files/3161/Referencing.pdf</u>

Plagiarism is a serious disciplinary offence. Please do read the University's dedicated website: www.ox.ac.uk/students/academic/guidance/skills/plagiarism. Plagiarism is presenting someone else's work or ideas as your own, with or without their consent, by incorporating it into your work without full acknowledgement. All published and unpublished material, whether in manuscript, printed or electronic form, is covered under this definition. It also includes the use of material generated wholly or in part through use of artificial intelligence (save when use of Al for assessment has received prior authorisation e.g. as a reasonable adjustment for a student's disability, or as part of the specific instructions of the assignment). Plagiarism may be intentional or reckless, or unintentional. Under the regulations for examinations, intentional or reckless plagiarism is a disciplinary offence. See the examination conventions for more details and associated penalties.

Good academic practice also applies to other areas such as collecting data: data should not be fabricated; results of analyses should be correctly represented; the methods used to collect data should be ethical.

6. Projects

To obtain either of the MSc awards available from the Programme, you must complete an extended project. This differs from the module assignments—each of which contains an element of project work—in two important ways:

- it affords an opportunity to formulate your own problem or challenge;
- it may involve the application and integration of ideas taught in more than one module, or drawn from the wider curriculum.

A condition of the BCS's accreditation of the two MScs is that dissertations cannot be "research only". That is to say, if the focus of a project is a survey or a questionnaire, it is insufficient to simply report upon the results; there is a requirement that the dissertation places those into a context by, for example, establishing a prototype design, some requirements, guidelines or principles on the basis of those results. This requirement is discussed in detail during the Project Week.

This is a taught Programme, and although the project needs to be an original demonstration of ability and understanding, there is no requirement to advance the state of the art in the field. You need only choose and apply an appropriate selection of existing ideas and techniques—provided that your choice, the process of application, and any outcomes are properly explained. New ideas and techniques are welcome, but they are not expected; it suffices to apply standard techniques in a fresh context.

You must ensure that you cover certain aspects in addition to the actual technical content of your project: "The dissertation must include an account of risk and project management in relation to the work undertaken. This can be in the main dissertation body, or as an appendix. It must include also a discussion of ethical, legal, social, and professional issues arising either in the project, or in the broader application domain." Failure to include these aspects is a failure to meet the requirements to pass the degree.

You must seek Ethics approval if your project is concerned with human participants or involves complex ethical issues, noting that conducting interviews or surveys entails human participants. Please find more information on the Departmental website on research ethics: https://www.cs.ox.ac.uk/research-ethics/

Please also see appendix F (Ethics) for more information about social, legal and ethical issues.

6.1 Project week module

The project component involves compulsory attendance at a project module, at which you present and refine your proposal, and attend teaching sessions on: research skills; engineering in context; and social, legal and ethical issues. Six weeks later, you submit your proposal for formal approval.

6.2 Process

- You develop an idea for a project, discuss this idea with your supervisor, and book a place on a project week.
- The project week affords an opportunity for you to start work in earnest, to attend teaching sessions and workshops, and to have one-to-one meetings with your supervisor.
- Six weeks later, you submit your proposal for formal review. If this is approved, you may continue. If not, then you will need to revise the proposal, and submit it for assessment after the next project week.
- You provide your supervisor with further reports on progress as you complete the project and start to work on the dissertation.

 You prepare a final version of the dissertation, and submit it as soon as it's ready which must be before the submission deadline pertaining to your current final term of study.

6.3 Extent

As a rule of thumb, the project should represent the same amount of effort, and achievement, as two taught modules, complete with assignments: that is, two weeks fulltime—the equivalent of two teaching weeks—plus 18 weeks part-time—the equivalent of two pre-study and two assignment periods. This work is usually undertaken over a period of at least two terms, or up to one year.

Dissertations should be submitted in A4 format, with a font size no less than 10pt and no greater than 12pt, and margins no less than 2cm and no greater than 2.5cm. As stated in the regulations, they must not exceed 20,000 words in length, excluding diagrams and appendices. For further information please refer to the examination conventions.

Normally, you will start work on your project after attending most of your taught modules. The examiners will not usually consider a submitted dissertation until you have completed the taught part of the degree.

6.4 Subject

You may choose any topic that will allow you to demonstrate understanding of software engineering or software and systems security through the medium of a dissertation. The best way of doing this is usually to choose a topic related to one or more of the subjects taught on the Programme. Many students choose topics that are related to their current employment, allowing them to see how the ideas taught in the Programme may be applied alongside current practice.

6.5 Proposal

The work starts with a project proposal containing:

- a description of the subject matter: product, theory, application area, or problem domain;
- a brief account of the original contribution that the project work might be expected to make;
- a plan, or outline, of the dissertation, explaining how it will demonstrate your understanding;
- a list of resources that will be required;
- a suggested schedule of tasks and delivery dates; and
- an outline of any social, legal, or ethical issues relating to the work.

This should be prepared in consultation with your supervisor, and submitted via the website. Depending on the project topic, a change of supervisor may be appropriate, if there is another member of staff available with particular expertise in the proposed area of study.

While working on your project and dissertation, you should take care to keep your supervisor informed of progress. As the work progresses, there might be considerable variation from the original proposal: any significant change in topic will require approval. If this does occur, contact your supervisor in the first instance. Mere changes in scope generally do not require approval.

6.6 Report

The results of the project work are presented in a short report, of 15,000-20,000 words. This forms the basis for formal assessment of the project, just as the written assignments form

the basis for assessment of the taught modules. The report should be submitted once the taught part of the course is complete.

6.7 Resources

If you wish to use software with an education license, the Programme's Office Manager will be happy to provide confirmation of student status should this prove necessary. Oxford University IT Services can provide licenses for some software products.

6.8 Confidentiality

Many students choose a product-based project in which they will construct a model of a system or component that they have already encountered, or developed, as part of their employment. Alternatively, they may choose a process-based project in which they analyse existing practices within their organisation. The results of these projects will often be commercially sensitive: they may describe design features, or aspects of the development process that your employer would wish to keep confidential.

If your project includes, or is likely to include, confidential material owned by your employer, you should inform your supervisor as soon as you become aware of this. Your supervisor will discuss the specific requirements of your project and your employer with you and agree a strategy with you for protecting that confidential material. This strategy should be recorded in writing and may include, for example, consideration of the following matters:

- encryption and storage of electronic documents and messages;
- secure storage of hardcopy documents;
- reducing the number of individuals who need to see the confidential material;
- notification of confidentiality requirements to any member of staff likely to see the confidential material (e.g. your examiners).

Nobody other than you and your supervisor will have access to the work you do, beyond what is presented in your dissertation. In general, the dissertation is stored in our database, and is accessible to all staff on the Programme and the examiners; and we will ask your permission to show your dissertation to future students on the Programme. On request, we can mark the dissertation as "confidential", in which case only your supervisor, administrative staff (the office at the Programme Director), and the Examiners will have access to it, and we will not show it to other students.

6.9 Commercial exploitation

The University claims no rights to commercial exploitation of work submitted by students on the Programme.

6.10 Writing Skills

Overseas students whose first language is not English are encouraged to attend one of the courses on English for Academic Study given in the University Language Centre. See <u>http://www.lang.ox.ac.uk/</u>

If you think this would be suitable for you, please discuss it with your supervisor or the Office Manager for the Programme.

6.11 Proof Reading

Your dissertation must be your own work. You are responsible for the proof-reading of your work.

Proof-reading by a third party is permitted, within narrow limits. Please find details on the University's website about third-party proof-readers: <u>https://academic.admin.ox.ac.uk/policies/third-party-proof-readers</u>

6.12 Submission of the project dissertation

Submission of the dissertation is through the SSTL student portal <u>www.cs.ox.ac.uk/signin/</u>. Upcoming submission deadlines are available after you log in, at the bottom right of the home screen is a link "dissertation deadlines". They are also found here: <u>https://www.cs.ox.ac.uk/pro/subjects/Projects.html.</u> The dissertation must be submitted no later than the submission deadline for your final term. Work may be submitted in advance of the deadline if you choose. In doing this you will also avoid any issues that may arise due to IT problems and lead to late submission.

We recommend that you take time to ensure you are fully familiar with the procedures given on the submissions portal, well in advance of the submission deadline.

Please note the following:

- It is your responsibility to ensure that your work is submitted by the deadline.
- Failure to submit a dissertation on time as a result of IT problems (e.g. computer malfunction, slow internet connection) will not be accepted as a valid reason for late submission. Neither will incorrect calculation of time zones resulting in a missed deadline. You should make regular back-up copies of all work and ensure that there is adequate time to submit your work. Do not leave submission until just before the deadline.
- Responsibility for the work rests with you at all times until issue of receipt, regardless of the method of submission.
- Once submission has been made, the dissertation cannot be withdrawn or altered.

All your work, including the project dissertation, will be marked anonymously. Your work will only be identified by your candidate number (available from student-self service). Please make sure not to include any material that could identify you (name, college, student number) in your submitted work.

The dissertation must be submitted via the Programme website no later than the deadline stated. If you submit up to 15 minutes late, a penalty will be applied (see Examination Conventions for details). Later submissions will not be accepted. In exceptional circumstances, due to illness or other urgent cause that is unforeseeable, unavoidable and/or insurmountable the Proctors may grant you an extension for the submission of the assignment. Your college office will be able to advise you.

7. Final Examination

The Master of Science requires you to attend and complete assignments for courses in ten subjects. It also entails the completion of a project and dissertation, involving participation in a project module and a dissertation module.

The Board of Examiners meets every term to consider marks for assignments and final awards for students who have completed the taught part of the degree and submitted a dissertation. Where students submit dissertations which have extensions beyond the deadline for that term, the final exam board may be in the following term to allow sufficient time for marking.

An External Examiner is appointed for each award programme. The External Examiner attends the final meeting and provides a separate report to the University.

Detailed information on how assignments and dissertations are marked can be found in the examination conventions.

The decision of the examiners may be contingent upon the results of a viva voce (oral) examination. In cases where there is any doubt as to a candidate's ability or the originality of their work, this part of the examination process is particularly important. You will be informed if you are required to attend a viva voce (oral) examination.

Please note that you must not under any circumstances make contact with internal or external examiners, or assessors.

7.1 Examination Conventions: Marking and Classification

Examination conventions are the formal record of the specific assessment standards for the course to which they apply. They set out how your examined work will be marked and how the resulting marks will be used to arrive at a final result and classification of your award. They include information on: marking scales, marking and classification criteria, progression, resits, use of viva voce examinations, penalties for late submission, and penalties for over-length work. They also list internal and external examiners.

The Examination Conventions can be found online at: <u>http://www.cs.ox.ac.uk/pro/handbook/examinations.html</u>

The *Examination Regulations* are the authoritative document on the regulations for the University degrees and examinations. The regulations are available online at: <u>https://examregs.admin.ox.ac.uk/</u>

7.2 Prizes

As set out in the Examination Conventions three prizes, each to the value of £200, may be awarded:

- The Hoare Prize for best overall performance in the examination;
- The Hoare Prize for best project; and
- The Richard Bird Prize for the dissertation that best presents a piece of software, an algorithm, or a mathematical theory pertaining to program construction.

If dissertations of sufficient merit are not submitted, the award may be withheld.

7.3 Examiners' Reports

You can use Examiners' Reports of the previous years to prepare for your upcoming examinations. Previous years' Examiners' Reports can be found online through the SSTL student portal: <u>https://www.cs.ox.ac.uk/signin/</u>

8. If things go wrong

The most common cause for a lack of progress on the course is the demands of professional employment. The Programme is designed for students who are in full-time employment, and the staff involved in delivering the course understand the demands that this brings. We recommend that you discuss with your employer the commitment that the Programme requires from you and them ahead of starting the Programme. We strongly believe that you and your employer will benefit hugely from you being part of this Programme, but it is an investment of time as well as a financial one.

If personal problems begin to affect your ability to work there are sources of advice and support: the Programme Office; your supervisor; your college office; your College Advisor. Nearly all problems, whether emotional, medical or psychological, can be solved or alleviated by those who have the experience and expertise to advise, *provided that they know early enough*.

Every college has their own systems of support for students, please refer to your College handbook or website for more information on who to contact and what support is available through your college. Details of the wide range of sources of support available more widely in the University are available from the Oxford Students website (www.ox.ac.uk/students/welfare), including in relation to mental and physical health and disability.

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A third possible reason for disappointment is a mismatch between the culture and content of the course and the experience and aspirations of the student. Every effort is made in course design, provision of options, and the selection of students; but there is no way to avoid the occasional mismatch. This must be regarded as failure of the system rather than the student, and it is sensible to treat the problem without allocating blame. The best solution is to recognise the situation as early as possible and avoid further waste of effort and disappointment.

If you have difficulty in understanding a lecture, please discuss it the lecturer for the course, or your supervisor. If you find the lectures unsatisfactory in any other way, please tell the lecturer or your supervisor; they are keen to make improvements where possible. If you find any aspect of your supervision unsatisfactory and you feel unable to discuss it with your supervisor, you should contact one or more of the following members of staff: your College Advisor; the MSc Course Director of your degree; Programme Office staff; the Director of the Programme; the Head of Academic Administration or (in exceptional circumstances) the Head of Department.

8.1 Progression

There are a number of University processes in place to help you if you find that illness or other personal circumstances are affecting your assessments or if you experience technical difficulties with an online exam or submission. Please contact the Programme Office, pro@cs.ox.ac.uk and your supervisor if there are difficulties with completing your studies. Full information is available on the Oxford students website: www.ox.ac.uk/students/academic/exams/problems-completing-your-assessment www.ox.ac.uk/students/academic/guidance/graduate/status

8.1.1 Suspension of Status

If increased work commitments, ill health, caring responsibilities or other difficult personal circumstances make it impossible for you to get on with your academic work, a suspension of status might be appropriate. For this course a student can take no more than 3 terms of suspension, during the whole period of study. More information is available on the University's <u>dedicated website</u>: <u>https://www.ox.ac.uk/students/academic/guidance/graduate/status</u>. Please discuss any change in your personal circumstances with your supervisor, the Director of Graduate Studies or the Programme Office as early as possible. Please note that you will have to provide supporting evidence.

8.1.2 Extensions of Time

If ill health or a serious and unexpected change in your personal circumstances prevent you from completing your studies by the end of your current final term, you may request an extension to your period of study. For this course a student can take no more than 3 terms extension, except in exceptional circumstances. Please discuss any change in your personal circumstances with your supervisor, the Director of Graduate Studies or the Programme Office as early as possible. Please note that you will have to provide supporting evidence and a study plan.

8.1.3 Parental Leave

The University has a policy to support parental leave which can be found here: <u>https://www.ox.ac.uk/students/welfare/childcare</u> Students may apply for a Maternity/Paternity/Adoption suspension of Status as appropriate and can contact the Programme Office for further information.

8.1.4 Problems Completing your Assessment

There are several mechanisms that might to be suitable when there are problems with completing an assessment. If you are having difficulties please discuss with the Programme Office or your College. The following page gives details of the relevant processes: https://www.ox.ac.uk/students/academic/exams/problems-completing-your-assessment

8.2 Failure and Resits

The requirements that must be met to obtain the MSc in Software Engineering and MSc in Software & Systems Security are set out in the examination conventions, together with the consequences of failing to meet them.

A candidate who fails part of the examination, either the dissertation and/or taught courses, will be permitted to retake that element (or equivalent) on one further occasion only, in the three terms following the initial attempt.

8.3 Supplicating for a Postgraduate Diploma or Postgraduate Certificate

If for some reason you decide not to complete the MSc award, then you may be eligible to supplicate for a Postgraduate Diploma or Postgraduate Certificate, subject to the conditions in the Examination Conventions. If you have reached your maximum number of terms, but have not met the requirements of the MSc but have obtained enough to satisfy the Examiners in respect of the Diploma or Certificate, you will be given a choice between failure (and possible re-examination), and the award of that other qualification.

Part-time students for the MSc in Software Engineering, the MSc in Software and Systems Security, the Postgraduate Diploma in Software Engineering, Postgraduate Diploma in Software and Systems Security, the Postgraduate Certificate in Software Engineering, the Postgraduate Certificate in Software Engineering and the Postgraduate Certificate in Software and Systems Security shall pay all applicable module fees; students who receive tuition or supervision after attempting an examination shall continue to pay fees for each term in which they receive tuition or supervision, provided that they shall not pay more than four annual registration fees for the MSc courses, two annual registration fees for the Postgraduate Certificate courses.

8.4 Complaints and Appeals

The University, the MPLS Division and the Department of Computer Science all hope that provision made for students at all stages of their course of study will make the need for complaints (about that provision) or appeals (against the outcomes of any form of assessment) infrequent. If you do think you have grounds for a complaint or an academic appeal, you can find details about the University Complaints Procedure here https://www.ox.ac.uk/students/academic/complaints?wssl=1

However, nothing in the University's complaints procedure precludes an informal discussion with the person immediately responsible for the issue that you wish to complain about (and who may not be one of the individuals identified below). This is often the simplest way to achieve a satisfactory resolution. Many sources of advice are available within colleges, within faculties/departments and from bodies like Student Advice Service provided by OUSU or the Counselling Service, which have extensive experience in advising students. You may wish to take advice from one of these sources before pursuing your complaint.

Please note that for complaints about exams, you must contact the Programme Office, <u>pro@cs.ox.ac.uk</u> who can give advice, and not the examiners or the assessors.

General areas of concern about provision affecting students as a whole should be raised through Joint Consultative Committees or via student representation on the Department's committees.

The Department's full Complaints Procedure can be found here: <u>https://www.cs.ox.ac.uk/teaching/curstudents/documents/MPLS%20Division%20-</u> <u>%20Complaints%20Student%20Guidance.pdf</u>

9. The Department and You

9.1 Feedback

You will be asked to complete a questionnaire for each module you attend. Please take the time to complete this and return it, as feedback is extremely valuable in helping us to continue to improve the course and your learning experience.

Informal feedback can be given at any point: please feel free to contact your course tutor, supervisor or the Programme Office with informal feedback.

Students on full-time and part-time matriculated courses are surveyed once per year on all aspects of their course (learning, living, pastoral support, college) through the Student Barometer. Results of the barometer are considered at the PMP Supervisory Committee. Previous results can be viewed by students, staff and the general public at: www.ox.ac.uk/students/life/student-engagement

9.2 Student Representative

You will be invited to nominate a student representative(s) to sit on the Professional Masters Programme's Supervisory Committee which meets once a term in about week 2. Once confirmed, the names and email addresses of the student representative(s) will be circulated to the Cohort, and an additional reminder will be sent out prior to the Supervisory Committee each term. Please make sure that the representative is aware of any concerns or comments you have regarding the course.

9.3 Communications

Information about the Department of Computer Science, its staff and courses is available from the Department's home page (<u>www.cs.ox.ac.uk</u>).

9.4 Societies

The **Computer Science Graduate Society** (CoGS) <u>https://www.cs.ox.ac.uk/societies/COGS/</u> provides a platform for the academic and social life of post-graduates in the Department. This covers both student representation on academic committees as well as organization of a variety of social events to give postgraduate and postdoctoral students the opportunity to mingle, from weekly 'coffee and cake' gatherings, to pizza and games nights.

The **Oxford Women in Computer Science Society** (OxWoCS) <u>https://www.oxwocs.com/</u> aims to support and promote women in computer science. The society exists for all women in computer science, be they students, faculty, or staff. OxWoCS runs a number of academic, social, and career events throughout the year, including weekly coffee meetings, talks by distinguished female speakers, and industry sponsored events. The society provides networking opportunities and a support network comprising role models, mentors, and peers.

The **Oxford Computer Society** (CompSoc) <u>https://ox.compsoc.net/</u> is a student-run society which organises social events, talks, and practical courses.

10. Appendices

The University has a wide range of policies and regulations that apply to students. These are easily accessible through the A-Z of University regulations, codes of conduct and policies available on the Oxford Students website https://www.ox.ac.uk/students/academic/regulations

[A] Regulations Relating to the Use of Information Technology Facilities

https://governance.admin.ox.ac.uk/legislation/it-regulations-1-of-2002

[B] Policy on recording lectures by students

https://academic.admin.ox.ac.uk/educational-recordings-policy

[C] University Policy on Data Protection and Computer Misuse

https://compliance.admin.ox.ac.uk/data-protection-policy

The University regards computer misuse as a serious matter which may warrant disciplinary action.

A policy statement, rules and guidelines on the use of the University's IT facilities are published by the ICT Committee with the approval of Council. They appear in the Proctors' and Assessor's Memorandum, and may also be found at <u>http://www.it.ox.ac.uk/policies-and-guidelines</u>

[D] Use of Department of Computer Science Equipment and Premises

The formal conditions under which use may be made of Computer Science equipment in the Department of Computer Science and users must abide by can be seen here: <u>https://wiki.cs.ox.ac.uk/support</u>

[E] University of Oxford Equality Policy

http://edu.admin.ox.ac.uk/equality-policy

The University of Oxford is committed to fostering an inclusive culture which promotes equality, values diversity and maintains a working, learning and social environment in which the rights and dignity of all its staff and students are respected. We recognise that the broad range of experiences that a diverse staff and student body brings strengthens our research and enhances our teaching, and that in order for Oxford to remain a worldleading institution we must continue to provide a diverse, inclusive, fair and open environment that allows everyone to grow and flourish.

The University embraces diversity amongst its members and seeks to achieve equity in the experience, progression and achievement of all students and staff through the implementation of transparent policies, practices and procedures and the provision of

effective support. It also seeks to ensure that its public engagement work and services benefit diverse audiences and communities.

The University recognises that equality and inclusion should be embedded in all its activities and seeks to promote awareness of equality and foster good practice. The University is committed to a programme of action to support its equality policy, to monitoring its effectiveness, and to publishing information on progress towards its equality aims.

The University seeks to ensure that no member of its community is unlawfully discriminated against on the basis of age, disability, gender reassignment, marital or civil partnership status, pregnancy and maternity, race (including colour, nationality and ethnic or national origins), religion or belief (including lack of belief), sex, or sexual orientation (hereafter referred to as the 'protected characteristics').

In exercising its policies, practices, procedures and other functions, the University will have due regard to its duties under the Equality Act 2010 and to the protected characteristics, as well as other relevant circumstances including parental or caring responsibilities, contract type, and working hours.

The University will seek to make a positive contribution to the advancement of equality through all its activities. In particular, the University will:

- Encourage applications for study and employment from the widest pool of potential candidates, especially where representation is disproportionately low, and take lawful positive action, for example with targeted scholarships, to improve diversity where appropriate.
- Take appropriate steps to meet the particular needs of individuals from protected groups where these are different from the needs of others, and work to eliminate any barriers to their success.
- In respect of students, seek to attract and admit students of outstanding potential whatever their background, and work to ensure that teaching and assessment provide an equal opportunity for all students to achieve and demonstrate their full academic potential. Decisions on the admission of students will be based solely on the individual merits of each candidate and the application of selection criteria appropriate to the course of study.
- In respect of staff, seek to ensure that entry into employment and progression within employment are determined solely by criteria which are related to the duties of a particular post and the relevant grade; and support career development and progression with the aim of ensuring diverse representation and participation at all levels.

The University understands inclusion to mean institutional and individual efforts and actions to foster an environment and institutional culture in which each member feels, and is, valued, listened to and respected, able to be themselves and empowered to participate fully in the life of the University.

The University expects all members of the University community to treat each other with respect, courtesy and consideration and does not tolerate any form of unlawful discrimination, bullying, harassment or victimisation. It has a Policy on Harassment, which includes examples of unacceptable behaviour, supported by a Harassment Advisory Service.

The Department's Equality and Diversity Committee meet once a term to ensure the university's policies are implemented at departmental level.

Departmental Disability Co-ordinator: Rachel Breward Tel: 73833 Email: <u>Rachel.breward@cs.ox.ac.uk</u>

[F] Policy on the Ethical Conduct of Research involving human participants and personal data

The University's aims:

The University of Oxford seeks to protect the dignity, rights and welfare of all those involved in research (whether they are participants, researchers or third parties) and to promote high ethical standards of research. The University achieves this by:

- fostering a culture within the University that embraces the principles set down in this
 policy and the obligations contained in relevant legislation to protect the rights, dignity
 and welfare of those involved in research;
- providing ethical guidance that communicates regulatory requirements and best practice, and offering ongoing support and training to staff and students to maintain high ethical standards;
- maintaining a review process that subjects research to a level of scrutiny in proportion to the risk of harm or adverse effect.

Full details of the policy can be read here: https://researchsupport.admin.ox.ac.uk/governance/ethics/committees/policy https://www.cs.ox.ac.uk/research-ethics/

[G] Schedule of Modules

Schedule I

Software Engineering Mathematics (SEM) Specification and Design (SDE) Concurrency and Distributed Systems (CDS) Model Checking (MCH) Performance Modelling (PMO) Software Development Management (SDM) Agile Methods (AGM) Interaction Design (IDE) Requirements Engineering (REN) Management of Risk and Quality (MRQ) Process Quality and Improvement (PRO) Safety Critical Systems (SCS) Enterprise Architecture (EAR) Deep Neural Networks (DNN) Quantum Computing (QUC) Classical Machine Learning (CML) Software Testing (STE) Database Design (DAT) Functional Programming (FPR) Concurrent Programming (CPR) Agile Engineering Practices (APE) Extensible Markup Language (XML) Mobile and Sensor Networks (MOB) Agile Engineering Practices (APE) Semantic Technologies (STC) Algorithms (ALG) Robust Programming (ROP)

Knowledge Graphs (KGS) Structured Data (STR) Cloud Computing and Big Data (CLO) Embedded Software and Systems (ESS) Things of the Internet (TOI) Object Orientation (OOR) Object-Oriented Design (OOD) Object-Oriented Programming (OOP) Design Patterns (DPA) Service Oriented Architectures (SOA)

Schedule II

Security Principles (SPR) Secure and Robust Programming (SRO) Trusted Computing Infrastructure (TCI) Design for Security (DES) Risk Analysis and Management (RIS) People and Security (PAS) Network Security (NES) Cloud Security (CLS) Forensics (FOR) Safety Critical Systems (SCS) Security and Incident Management (SIM) Data Security and Privacy (DAS) Building Information Governance (BIG) Mobile Systems Security (MSS) Security in Wireless Networks (SWN) Understanding and Mitigating Malware (MAL) Cyber Threat Intelligence (CTI)