

Royal Holloway, University of London
Course specification for a postgraduate award
MSc Machine Learning with a Year in Industry (2629)

Section 1 – Introduction to your course

This course specification is a formal document, which provides a summary of the main features of your course and the learning outcomes that you might reasonably be expected to achieve and demonstrate if you take full advantage of the learning opportunities that are provided. Further information is contained in the University prospectus, and in various handbooks, all of which you will be able to access online. Alternatively, further information on the University's academic regulations and policies can be found [here](#). Further information on the University's Admissions Policy can be found [here](#).

Your degree course in MSc Machine Learning provides progressive structures in which you will be able to gain ever-wider knowledge and understanding, and appropriate skills. Machine learning is concerned with building algorithms that improve their performance by using data. Machine Learning has revolutionised the areas from healthcare to finance to transportation. In time, this form of artificial intelligence will have an even more profound impact on the way we interact with computer technology. This course gives you the set of crucial skills to assist in the development of the next generation of learning technologies. The flexible nature of the course allows you to tailor the content of the studies to your interests and needs. Teaching and learning in the course are closely informed by the active research of staff.

On successful completion of the course, you should have an understanding of the area of Machine Learning at a level appropriate for a postgraduate qualification. Whilst being a self-contained degree in its own right, each course provides suitable and recognised qualifications for entry to PhD study in the same or a closely related field.

While Royal Holloway keeps all the information made available under review, courses and the availability of individual modules, especially optional modules are necessarily subject to change at any time, and you are therefore advised to seek confirmation of any factors which might affect your decision to follow a specific course. In turn, Royal Holloway will inform you as soon as is practicable of any significant changes which might affect your studies.

The following is a brief description for some of the most important terminology for understanding the content of this document:

Degree course – Also referred to as 'programme', this term refers to the qualification you will be awarded upon successful completion of your studies. 'Courses' were formerly known as 'programmes' at Royal Holloway.

Module – This refers to the credits you will study each year to complete your degree course. Postgraduate taught degrees at Royal Holloway comprise 180 credits. On some degree courses a certain number of optional modules must be passed for a particular degree title. 'Modules' were formerly known as 'course units' at Royal Holloway.

| Section 2 – Course details | | | |
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| Date of specification update | May 2024 | Location of study | Egham |
| Course award and title | MSc Machine Learning with a Year in Industry | Level of study | Postgraduate |
| Course code | 2629 | Year of entry | 2024/25 |
| Awarding body | Royal Holloway, University of London | | |
| Department or school | Department of Computer Science, EPMS | Other departments or schools involved in teaching the course | None |
| Mode(s) of attendance | Full time | Duration of the course | Two years (104 weeks) full-time |
| Accrediting Professional, Statutory or Regulatory Body requirement(s) | N/A | | |
| Link to Coursefinder for further information: | https://www.royalholloway.ac.uk/studying-here/ | For queries on admissions: | https://royalholloway.ac.uk/applicationquery |

| Section 3 – Degree course structure | | | | |
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| 3.1 Mandatory module information | | | | |
| The following table summarises the mandatory modules which students must take in each year of study | | | | |
| Module code | Module title | Credits | FHEQ level | Module status (Mandatory Condonable MC or Mandatory Non-Condonable MNC) |
| CS5100 | Data Analysis | 30 | 7 | MC |
| CS5800 | Principles of Computation and Programming (*) | 15 | 7 | MC |
| CS5920 | Machine Learning | 15 | 7 | MC |
| CS5200 | Online Machine Learning | 15 | 7 | MC |
| CS5950 | Deep Learning | 15 | 7 | MC |
| CS5900 | Ethics in Advanced Computing and Artificial Intelligence | 15 | 7 | MC |
| CS5822 | Individual Project | 60 | 7 | MNC |

This table sets out the most important information for the mandatory modules on your degree course. These modules are central to achieving your learning outcomes, so they are compulsory, and all students on your degree course will be required to take them. You will be automatically registered for these modules each year. Mandatory modules fall into two categories: 'condonable' or 'non-condonable'.

In the case of mandatory 'non-condonable' (MNC) modules, you must pass the module before you can proceed to the next year of your course, or to successfully graduate with a particular degree title. In the case of mandatory 'condonable' (MC) modules, these must be taken but you can still progress or graduate even if you do not pass them. Please note that although Royal Holloway will keep changes to a minimum, changes to your degree course may be made where reasonable and necessary due to unexpected events. For example, where requirements of relevant Professional, Statutory or Regulatory Bodies have changed and course requirements must change accordingly, or where changes are deemed necessary on the basis of student feedback and/or the advice of external advisors, to enhance academic provision.

Students on the MSc Artificial Intelligence with a Year in Industry will take CS5822 Individual Project for Year in Industry (60 credits). This is completed in year 2, following the work placement.

Modules marked with (*) must be taken only by students with weaker skills on the academic subjects covered by the modules.

3.2 Optional modules

In addition to mandatory modules, there will be a number of optional modules available during the course of your degree. Although Royal Holloway will keep changes to a minimum, new options may be offered, or existing ones may be withdrawn. For example, where reasonable and necessary due to unexpected events, where requirements of relevant Professional, Statutory or Regulatory Bodies (PSRBs) have changed and course requirements must change accordingly, or where changes are deemed necessary on the basis of student feedback and/or the advice of External Advisors, to enhance academic provision. There may be additional requirements around option selection; please contact the Department for further information.

Optional modules are chosen from the list provided by the Department to complete each term to a total of 60 credits (for full-time students). Pre-requisites based on prior study or academic background may apply. The list of electives for each student must be approved by the Course Director. In exceptional cases, when timetabling or other administrative reasons prevent them from taking courses worth 60 credits in each term, students will be allowed to take courses worth 75 credits in one term and 45 in the other term.

Please note that not all optional modules may run each year. The full list of courses available for the current academic year can be obtained from the Department of Computer Science.

Section 4 - Progressing through each year of your degree course

For further information on the progression and award requirements for your degree, please refer to Royal Holloway's [Academic Regulations](#).

Progression throughout the year/s is monitored through performance in summative or formative coursework assignments. Please note that if you hold a Student Visa and you choose to leave (or are required to leave because of non-progression) or complete early (before the course end date stated on your CAS), then this will be reported to UKVI.

All postgraduate taught students are required to take and pass the non-credit bearing Moodle-based Academic Integrity module SS1001 in order to be awarded. The pass mark for the module assessment is stated in the on-line Academic Integrity Moodle module. Students may attempt the assessment as often as they wish with no penalties or capping. Students who otherwise meet the requirements for award as stipulated in the [Academic Taught Regulations](#) but fail to pass the Moodle-based Academic Integrity module will not be awarded.

The **Industrial Placement**, available only to the eligible Machine Learning with a Year with Industry students, normally takes up to one year starting in July. At the end of the placement, the student produces a report, which is submitted and assessed as part of the individual project. Details of the industrial placement are available from the placement handbook.

The decision on progression to the year in industry is taken by the examination sub assessment board. Normally, to progress to the year in industry a student must:

- engage with the activities run by the Careers service throughout the year;
- achieve a good result in CS5100 and show good performance in coursework assignments throughout the year (as detailed in the year in industry handbook);
- pass the taught part of the course at the first attempt, i.e., achieve in every taught course the aggregate mark of at least 50% (failure marks between 40-49% can be condoned for a specified number of credits as outlined in the Postgraduate Taught Regulations).

The students who did not satisfy the progression to year in industry requirements or failed to secure a placement in time are transferred to the MSc Machine Learning degree course not involving a year in industry.

Section 5 – Educational aims of the course

The overall aim of the course is to produce specialists in data science capable of handling and analysing different types of data in different fields and, thanks to a deeper understanding of machine learning, can create, innovate, and contribute to the definition of the next generations of search and analysis technologies.

The Year-in-Industry course further enables students to gain industrial experience and acquire skills that can only be fully picked up in a work environment. It also allows students to develop a better appreciation of how what they have learned relates to real-world problems or situations, and to put into practice the techniques that they will have been taught.

| Section 6 - Course learning outcomes | | | |
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| In general terms, the courses provide opportunities for students to develop and demonstrate the following learning outcomes. (Categories – Knowledge and understanding (K), Skills and other attributes (S), and Transferable skills (*)) | | | |
| Theme | Term 1 | Term 2 | Term 3 |
| 1. Advanced background in data modelling and business intelligence | 1.1.1 Advanced background in machine learning, statistics, and data mining | 1.2.1 Advanced background in modern methods of machine learning | |
| 2. Advanced knowledge of both statistical and non-statistical methods of machine learning. | Advanced knowledge of methods and techniques such as clustering, regression, support vector machines, boosting, decision trees, and neural networks | 1.2.2 Advanced knowledge of methods and techniques of online machine learning and deep learning | |
| 3. Advanced ability to use effectively machine learning models and statistical models | Work with software and programming languages (including Python) to automate tasks and perform data analysis | 1.2.3 Work with structured, unstructured, and time-series data | 1.3.3 Implement a comprehensive machine learning system, apply it to real-world data, and analyse the results. |
| 4. Advanced knowledge of computational and statistical data analysis | 1.1.4 Advanced theoretical background in machine learning, statistics, and data mining | 1.2.4 Analyse and critically evaluate applicability of both machine learning and statistical models | |
| 5. Advanced ability to extract value and insight from data | 1.1.5 Apply supervised and unsupervised methods of machine learning to data and critically evaluate the results | 1.2.5 Apply methods of online and deep learning to data and critically evaluate the results | |
| 6. A highly analytical approach to problem solving | | | 1.3.6 First-hand experience of implementing a computational solution and analysing real-world data. |
| 7. Identify and analyse issues of ethical significance in applications of technology | 1.1.7 Comprehensive understanding of a range of recent ethical/social/political/economic issues in applications of machine learning and advanced computing | 1.2.7 Independent analysis of issues arising from applications of machine learning and advanced computing. | |
| 8. Advanced ability to present logical and coherent written arguments of varying lengths | | | 1.3.8 Enhanced time management and organisational skills including working to deadlines, prioritising tasks, organising worktime |

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| 9. Deep understanding of how the role of a data analyst or scientist fits into the functioning of an organisation based on first-hand experience | | | |
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Section 7 - Teaching, learning and assessment

Teaching and learning on the course is closely informed by the active research of staff, particularly in machine learning and data science.

Teaching and learning is mostly by means of lectures, small group tutorials, laboratory sessions, coursework assignments, and a supervised individual project. Assessment of knowledge and understanding is typically by coursework assignments, quizzes, examinations, and a dissertation. A coursework assignment is usually a problem solving exercise that consists of theoretical questions and practical tasks applying the methods to real data.

Contact hours come in various forms and may take the form of time spent with a member of staff in a lecture or seminar with other students. Contact hours may also be laboratory or, studio-based sessions, project supervision with a member of staff, or discussion through a virtual learning environment (VLE). These contact hours may be with a lecturer or teaching assistant, but they may also be with a technician, or specialist support staff.

The way in which each module on your degree course is assessed will also vary. Assessments designated as 'summative' will receive a mark which will count towards your overall mark for the module, and potentially your degree classification, depending on your year of study. On successful completion of the module, you will gain the credits listed.

More detailed information on modules, including teaching and learning methods, and methods of assessment, can be found via the online [Module Catalogue](#). The accuracy of the information contained in this document is reviewed regularly by the university and may also be checked routinely by external agencies.

Section 8 – Additional costs

There are no single associated costs greater than £50 per item on this degree course.

These estimated costs relate to studying this particular degree course at Royal Holloway. General costs such as accommodation, food, books and other learning materials and printing etc., have not been included, but further information is available on our website.

| Section 9 – Indicators of quality and standards | |
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| QAA Framework for Higher Education Qualifications (FHEQ) Level | 7 |
| Your course is designed in accordance with the FHEQ to ensure your qualification is awarded on the basis of nationally established standards of achievement, for both outcomes and attainment. The qualification descriptors within the FHEQ set out the generic outcomes and attributes expected for the award of individual qualifications. The qualification descriptors contained in the FHEQ exemplify the outcomes and attributes expected of learning that results in the award of higher education qualifications. These outcomes represent the integration of various learning experiences resulting from designated and coherent courses of study. | |
| QAA Subject benchmark statement(s) | http://www.qaa.ac.uk/quality-code/subject-benchmark-statements |
| Subject benchmark statements provide a means for the academic community to describe the nature and characteristics of courses in a specific subject or subject area. They also represent general expectations about standards for the award of qualifications at a given level in terms of the attributes and capabilities that those possessing qualifications should have demonstrated. | |

| Section 10– Intermediate exit awards (where available) | | |
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| You may be eligible for an intermediate exit award if you complete part of the course as detailed in this document. Any additional criteria (e.g. mandatory modules, credit requirements) for intermediate awards is outlined in the sections below. | | |
| Award | Criteria | Awarding body |
| PG Diploma | Passes in at least 120 credits, with fails of between 40% to 49% for up to 40 credits condonable (with the exception of any course specific requirements). | Royal Holloway and Bedford New College |
| PG Certificate | Passes in at least 60 credits with no condonable fails | Royal Holloway and Bedford New College |