

MSc in Statistics:

Guidelines for the summer research project – for students

Last updated: April 2024

1. Introduction

The statistics research project is the capstone module for all streams of the MSc Statistics programme. It takes place over the summer, following the completion of the taught modules and summer examinations. The statistics research project offers students the opportunity to work on state-of-the-art problems in different areas of statistics, ranging from theoretical to methodological and applied problems.

Students are given the opportunity to demonstrate their ability to synthesise and build upon the taught material of the programme by addressing a novel research question with suitable guidance from their project supervisor.

1.1 Intended learning outcomes

Upon successful completion of the Statistics Research Project, students should be able to:

- Present, by both a written thesis and an oral presentation, the research problem and conducted work for addressing the problem;
- Critically assess existing literature;
- Evaluate the performance and suitability of different methods for the studied problem;
- Design a research plan for addressing the studied problem;
- Synthesise new and existing knowledge;
- Design and conduct computational experiments;
- Analyse the related datasets/findings of the studied problem.

2. Important Dates

Research Projects Begin: Monday, 20 May 2024.

Introduction to the project: Thursday, 23 May 2024

Essential Information Sessions: Friday, 24 May 2024; Tuesday, 28 May; Wednesday, 19 June 2024.

Poster Presentation: Monday, 01 July 2024.

Report Draft Deadline: Monday, 12 August 2024.

Final Report Deadline Friday, 30 August 2024. 13:00 BST

Oral Presentations Tuesday, 10 September – Friday 13 September 2024. 09:00-18:00 BST, in person.

Bank Holidays 27 May 2024 and 26 August 2024 are bank holidays in the UK. There is no expectation that students and supervisors should meet or work on those days. Any regularly scheduled meetings should be rearranged accordingly.

3. Supervision Expectations

Statistics Research Projects are supervised either by an academic member of staff from the Statistics Section; and in some cases by an external expert (company, NGO, academic with a different background) in which case an academic member of staff acts as secondary supervisor.

Project supervision is designed flexibly to ensure that all students can progress well. In some cases where experience from different areas of Statistics are beneficial, additional supervisors from either within or outside of the Department may be included.

Where external experts supervise MSc in Statistics projects for the first time, the role of an additional supervisor from the Statistics Section is to ensure that the project evolves along the usual expectations for an MSc in Statistics research project in terms of statistical level, quantity, commitment, reproducibility and accountability, rather than providing in-depth input on the topic of research.

3.1 Internal Projects

Each internal supervisor from the Statistics Section at Imperial will normally supervise a group of approximately 2-4 students on projects within a common research theme. Supervision will normally be in the form of in-person group meetings between the supervisor and all students assigned to their theme, and typically take place in person approximately once per week for one hour.

This structure will allow students to share their progress and learn from each other's work. Students are expected to help each other with core ideas within the theme (concepts, code, or data). This structure is aimed at strengthening their ability to speak statistics and allow supervisors to cover more high-level content and spend less time repeating similar, more trivial points to multiple students in individual meetings.

Each student must develop their own, unique research question and set of milestones toward answering this question, and do their own original research towards their milestones and research question.

Students are encouraged to discuss their progress and share general ideas and code as applicable to their research theme. Any form of peer support and/or collaboration should be described precisely in the Acknowledgments section of the thesis. If original results from a different student are included

and expanded on in your thesis, then these must be cited as a personal communication as any other work that is not your own.

Overall, students can expect:

- 1 group meeting in the week before Easter to introduce the theme (1 hour).
- Approximately 14 group meetings after Easter until the submission deadline to cover progress on their research (1 hour each). Please note this is a guide and may vary depending on your level of independence, group dynamics, and annual leave periods.
- 1 individual meeting to provide feedback on their thesis drafts (30 minutes each).

3.2 Projects with an external partner

Students with an external supervisor can expect the same quality and amount of supervision as students supervised by an academic member of staff. Typically, projects with external partners are arranged in a flexible manner that works for both external partners and students, recognizing the commitments that external partners often have. For example, external partners and students may arrange shorter half-hour weekly meetings, or longer one-hour meetings every two weeks on average over the duration of the project.

Students with an external supervisor can expect to see their second supervisor from the Statistics Section once per month on average over the duration of the project. Students with external partners may join the research group of their second supervisor for peer support where they have one; though this is up to the second supervisor.

The main role of the primary external supervisor is to:

- set the scope and direction of the project,
- guide the student on the content and all technical aspects of the project,
- read and provide feedback on drafts of the research poster, thesis, and oral presentation.

The main role of the second supervisor is to:

- ensure that the project develops along our typical level for MSc in Statistics research projects;
- provide advice on the typical format of the research posters, the thesis, and the oral presentations;
- provide high-level technical advice to the student on their project;
- provide when requested advice to the external supervisor on the conduct of the project;
- read and provide comments on thesis drafts, and act as first marker of the final thesis.

3.3 All projects

Meeting location.

Meetings between the student and their Imperial supervisor are expected to take place in-person on campus. According to the College rules students are expected to be on campus for the entire duration of their course, including the out-of-term summer months. If a student is not attending regular in-person meetings, this is normally escalated to the personal tutor and programme director.

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Annual leave.

As members of staff, supervisors are entitled to take annual leave over the summer and do not need to be available for supervision during that time. Students are also strongly encouraged to take time off during the project. It is recommended that students take between 1-2 weeks (5-10 working days) of time off during the project. Students and supervisors should inform each other of when they intend to take time off during the project, so that meetings can be scheduled accordingly; please ask your supervisors early on in the project to arrange your meeting schedule accordingly and plan ahead.

Supervision outside of scheduled meetings.

After meetings, students may sometimes wish to send follow-up emails to their supervisor or to ask questions via Teams if they are stuck on a particular issue. While supervisors might choose to answer some short questions, they are not expected to do so and will likely advise that longer queries should be added to the agenda for the next meeting.

Coding and debugging.

It is the student's responsibility to code and debug statistical analyses, as well as to ensure that these are reproducible and well documented. Supervisors do not need to help debug the code of their students.

Feedback.

Formative feedback will be provided to students by the project supervisor(s) throughout the project during individual or group meetings and towards all their deliverables including the research poster, thesis, and oral presentation.

With regards to their thesis, students can expect to receive feedback from their supervisor on one draft of their thesis before submission. If students have an external partner on their project, the Imperial supervisor will provide feedback to ensure that the style and length of the thesis is as expected, and the external partner will provide feedback on the content.

Supervisors will provide feedback on the style and focus of your writing but will not copy-edit or rewrite text on behalf of their students. For example, if there are grammar/syntax/spelling errors, the supervisor might point this out as a general comment, perhaps highlighting one or two examples. Student Will then need to find and correct similar errors throughout their thesis drafts.

The draft should be sent to the supervisor approximately 3 weeks before the submission deadline at the latest, to allow time for feedback to be provided and acted upon. It is usual that one or more sections of the draft report to be unfinished at the time of this feedback. This is generally fine; the student should use the supervisors' comments on the completed sections or experiments to inform their approach to those that are incomplete.

It is often sensible for students to first share a report outline with the supervisor, followed by drafts of one or two sections of the report, and finally to share the remaining sections for comment. This can help students to improve their writing as they go and avoids supervisors raising

similar comments in many parts of the report. This approach also helps the schedules, commitments and annual leave periods for students and supervisors.

Project supervisors will only comment once on each part of the report. Supervisors cannot be expected to provide last minute feedback on sections completed close (within 5 working days) to the submission deadline.

4. Guide on deliverables.

The statistics research project has two assessed deliverables:

- A written report in the format of an academic paper of up to 30 pages. (90%)
- A 20-minute presentation followed by Q&A by two academic members. (10%)

The research project also has one formative deliverable:

- A poster presentation at the end of summer term, approximately 6 weeks into the projects. This is a compulsory, but non-assessed part of the course.

4.1 Poster presentation.

At the end of the summer term, students present a poster outlining their project, describing the problem they are working on and what they plan to do over the final two months. The primary aim of the poster presentations is for students to have an opportunity to get additional “third party” feedback both from members of staff and from fellow students at an early stage of their summer research. As such, the posters are a formative assessment, and do not count towards the final grade. Participation is a required part of the statistics research project (exceptions under special circumstances can be provided by the Director) and prizes are awarded for the best posters.

The poster should clearly state and describe the aims, any background or exploratory work and the future directions of the project. You may very well not have any results of your own to present yet, but you can use this as a chance to outline what results you hope to achieve. There is no need to spend a lot of time “dressing up” the poster and do not overload the poster with material. On the day presentation day, your main job will be to communicate – i.e. pitch, clarify and explain the scope of the project, statistical approach and any results to others, using the poster as a “hook” to attract people, a “note” of notation and maths that is hard to talk about in plain air, and a “reminder” to yourself about the key points. Others should not be asked to “read” your poster; this would miss the purpose of the event.

A template for posters will be available on the course Blackboard page and the date of the poster session is listed in the important dates section.

4.2 Thesis.

General points.

The degree culminates in the submission of your MSc Statistics thesis. The thesis presents the original work you have conducted during your summer research project in written form, and should be presented in the form of a research paper.

Detailed tips on writing the thesis are available within the MSc in Statistics thesis template available on Blackboard. The tips are intended as guidance only and should be adapted for the needs of each project. Your project supervisor will be able to provide further guidance on how to write a successful research report.

The research report will be judged on the quality of the work it describes according to the marking criteria available on Blackboard.

The thesis must be submitted as PDF document via the Blackboard Virtual Learning Environment. The thesis submission deadline is strict, since the assessment process has then to be completed on a very short timescale. Late submission may be penalised and might considerably delay consideration of the report (and award of your degree).

Code and reproducibility.

All code used to generate the research in the thesis should be properly documented. This documentation should include a description of the software, input data and any other parameters needed to run the code and the expected output from running the code should be provided. You should expect that internal and external markers request full access to your code.

Documenting code.

You may include pseudo-code for the most important functions or scripts in the Supplementary Material of your thesis, but it is not recommended that a large body of code is included in the thesis. For data and code that can be made publicly available, you might consider using a platform such as GitHub to host the code and include a link to this in the report.

Disseminating your thesis.

You are welcome to post your thesis on a personal webpage, and if so we recommend attaching a CC-BY-4.0 license. You may also post your thesis on a preprint server, and in this case very strongly recommend to consult with your supervisor first.

4.3 Oral presentation.

The oral presentation is an essential, assessed component of the statistics research project. It is not optional, and you must attend. The presentation will usually take place shortly after the submission deadline of the thesis, precise dates are listed in the Key Dates section.

The assessment consists of a 20-minute presentation and 10-minute questioning on your work and your findings. The purpose of the oral is not only to test your technical mastery of the material, but also to see how you can convey main ideas and results in your work to a general statistical public. You should be familiar with your work's details and provide clear and concise answers to the questions asked.

You are advised to prepare your presentation carefully, as it is an integral part of your training. Bear in mind that you only have 20 minutes: you should aim to have fewer than 20 slides in total and should not assume that the audience are experts in your project area. The presentation is

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worth 10% of the total project mark. It will be conducted and assessed by two faculty members. There is no requirement for the second marker be an assessor for the oral presentation.

A few more tips:

- Spend enough time at the beginning on setting the scene to make sure that the audience is on board. They have not been working on your research for the last 4 months.
- Be selective about what you present. You can always add a slide at the end ("other things I have been doing"). Having more slides than minutes is usually never a good idea (imagine sitting through a few high-speed talks in a row).
- The presentation aims at a reasonably educated statistician - essentially your fellow students. You do not have to introduce very basic material.
- Switch off your mobile phone or any devices with push notifications during the presentation.

5. Further tips.

Good practices.

The following good practices could be helpful for the successful completion of your IRP:

- Be punctual and prepared for meetings with your supervisor(s).
- Carefully consider all advice you receive from your supervisor(s).
- Keep a logbook of all the steps undertaken and their results.
- Start writing your reports early: you do not have to wait to finish all coding before you begin working on your report.
- Manage your time effectively.

Bad practices.

The following bad practices may lead to an unsuccessful project:

- Student spent the entire summer doing something else (for example another internship or job), and put together a submission within the last few weeks.
- Code not written by the student.
- Report written in poor English, which substantially compromises its clarity.
- Not enough code written.
- Findings/results are not clear.
- Analysis is poor, contributions of the student are not clear.
- Student did not follow instructions and advice from their supervisors.
- Code was not validated.
- No quantification of results.

Computing.

The Department of Mathematics has several research computing resources, and there will be a training session early on during the research Project. Discuss with your supervisor if you need to use those. For an overview, see: <https://www.imperial.ac.uk/mathematics/for-staff/research-computing-support/>.

Backups and repository usage.

Although infrequent, hardware failures occur, as does human error, rather more often. You are strongly recommended to keep multiple independent backups of your work under a proper versioning system, for example by taking full advantage of OneDrive cloud storage or by regularly pushing to a (private) GitHub repository. Mitigating circumstance claims regarding multiple weeks of lost work due to the lack of backup are unlikely to be accepted.

Plagiarism & AI Tools.

Plagiarism is presenting work created by someone else or generated by an AI tool as your own. It is taken very seriously and dealt with according to the [Academic Misconduct Policy and Procedure](#). Since the presentation is part of the same assignment as your final report, you can re-use text from your report in the presentation (if it is your intellectual property) without worrying about self-plagiarism. For further guidelines, please refer to [Imperial College Guidelines](#).

Using AI tools, e.g. ChatGPT, is permitted in the research and software development that you do for your Individual Research Projects. You must clearly acknowledge if and how you used them in all your submissions. The [SOP on using conversational AI tools](#) provide further details. In summary: students must cite each conversation similar to standard referencing of personal communications; students must be able to disclose the full chat upon request (such as a screenshot) along with your coursework or thesis; and may in line with emerging College policy be invited to attend an oral examination on their submitted work to ensure its authenticity, by asking them about the subject or how they approached their assignment.

6. Mitigating circumstances and pastoral support.

If there is anything that you wish to discuss that is substantially affecting your study, please reach out to your personal tutor and the postgraduate welfare team (o.adu-bofour@imperial.ac.uk) as soon as possible. Project supervisors meet regularly with the students during the project and are often best placed to offer immediate advice; if helpful, please consider reaching out to your supervisor, and they will signpost further as needed. If you are supervised by an external partner, please reach out to your supervisor from the Statistics section, your personal tutor, and/or the postgraduate welfare team.

Extensions may be provided to students that have mitigating circumstances once the programme director is informed. For more details, please refer to [Imperial College Guidelines](#) and our MSc in Statistics Welfare Guide.

7. Contact

Should you require any information or assistance, please contact the programme administrator (mathsmisc.administrator@imperial.ac.uk), project coordinator (z.varty@imperial.ac.uk) or programme director (msc.statistics.director@imperial.ac.uk).