MSc in Statistical Science Projects

Student-led project proposal template

Projects can be proposed on a variety of statistical topics. The dissertation is expected to include evidence that a student is capable of independently applying methods and concepts of modern statistical science to solve problems of an applied/theoretical nature. We therefore welcome both dissertations that contain an account of the analysis of some body of real data, and dissertations that study theoretical questions from the broad field of statistical science.

The dissertation project is mainly carried out over the summer period from the end of Trinity term to the dissertation submission date in mid-September. Supervisors are generally expected to meet with the student about 6 times (remotely if necessary), with a minimum of 3 meetings, and read one draft of their work.

Students are expected to find out most things by themselves through independent reading.

It is not the a computational nature in which the supervisor agrees in advance to provide specialist supervisor's job to undertake computer programming for the student, or to debug code produced by the student, and it is not part of the department's function to provide detailed advice on statistical programming. There may occasionally be a project of software development.

In general students will be assumed to be able to complete their projects comfortably in the allotted time using a single machine in the computer laboratories. See below for more details on the computing section of the proposal.

Students interested in proposing their own topic should start getting in touch with prospective supervisors and find someone who agrees to act as their supervisor for the dissertation.

Please send your MSc projects proposals, **signed by the supervisor**, by the end of HT week 3, Friday 7th February 2025, to msc-dissertations@stats.ox.ac.uk, with the following details:

Title: Hybrid Bayesian Asset Management Framework: Integrating Macroeconomic and Fundamental Data

Supervisor: Desi R. Ivanova

Brief description: This thesis enhances the Black-Litterman model by integrating macroeconomic indicators and company fundamentals to derive more accurate portfolio return expectations. Instead of relying on historical stock price fluctuations, the model uses simulation-based approaches (e.g., Copula-GARCH) to estimate forward-looking mean and variance. Investor views are incorporated into the Bayesian framework, with the confidence matrix Ω being determined through macroeconomic indicators. This approach combines data science techniques and economic insights to improve the precision and reliability of asset allocation decisions.

Prerequisite courses/knowledge: Simulation, Data Science(ML,AI), Bayesian stat, macro/micro econ

Data availability:

      a. Bloomberg Professional(Oxford Sainsbury library)
      b. EIKON (Oxford Sainsbury library)

Computing: see below before filling in

1. Use one of the desktops in the IT Suite - this initial option has been sufficient for most past projects

2. Free to access cloud-based compute resource (e.g. Google Colab)

Supervisor Signature: *DRIvanova*

Computing

The main departmental computing resources available for MSc projects are the desktops in the IT Suite. Is a desktop computer in the IT Suite sufficient for this project? If not, the project would need computing resources from the supervisor/supervisor's research group/other.

Please indicate how much computing the project will require and how it is proposed that computing resource will be provided.

Possibilities for computing resources are:

3. Use one of the desktops in the IT Suite - this initial option has been sufficient for most past projects

4. Free to access cloud-based compute resource (e.g. Google Colab)

5. Compute resource (not including the SRF - see 4) owned by the supervisor or to which the supervisor can provide free access to the student – the supervisor would need to confirm that such resource is available

6. The department's small research facility (SRF) - this can provide some compute resource for some computationally intensive MSc projects, but not an unlimited amount

Students and supervisors should discuss and say how the compute resource required for the project will be provided, working down from the top of the list above. If one of the lower items on the list is proposed, please say why higher items on the list are not suitable.

A limited amount of SRF time is available, it is not guaranteed that all requests to use the SRF can be met - requests to use the SRF should be included in the project proposal and submitted for consideration at the same time as the project proposal.

The total amount of SRF time available for MSc projects is approximately 50,000 GPU hours and 350,000 CPU hours. The maximum amount available per student is 10% of this - if a student's usage exceeds this 10%, then their usage may need to be capped.