Guidance for industrial co-supervision of an MSc in Advanced Computer Science

Introduction

The Department of Computer Science provides a single taught Masters Degree suitable for industry collaboration, the MSc in advanced Computer Science. It is a one-year full time course comprising of taught modules for the first 2 terms and culminating in the completion of a 4-month project. For this component, students choose from projects offered by faculty or industry affiliates that subsequently provides the basis for their final written thesis. More details of the course structure and module options can be found here;

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Students are encouraged to think early on about the topic of their final thesis and to explore a wide range of options. The department is therefore supportive of collaborations with industry where real world datasets and problems can be an interesting and career-defining contribution to students' education.

Co-Supervision of MSc student projects

Co-Supervision of an MSc student project is a collaborative undertaking and one which will be as unique as each student studying for the degree. This guidance is designed to answer common questions around the MSc process, and explain the expectations of potential supervisors.

When initially discussing industrial MSc supervision, the first step will be submission of a project proposal, a short summary taking into account the advice detailed in this guidance document. The MSc committee will review the proposal and, if it is considered suitable, will follow up with a meeting to further establish the scope of the project and to manage expectations of supervision. Agreed project proposals are then offered to members of faculty for co-supervision and when fully agreed, made available to students to review and choose from.

As part of the decision making process for students, the department hosts a 'taster session' where academics and industry affiliates alike have the opportunity to give a 5 minute presentation detailing their project, its unique features and benefits. This session allows students to make an informed choice and to follow up with potential industrial supervisors after the event with further questions (should industry affiliates choose to share their contact details).

The structure of the MSc programme means that all projects are offered to all students who will ultimately choose a project that fits with their individual research interests. This means that there is no guarantee that a proposed project will be chosen in the current academic cycle. Multiple students may be interested in the same project, and it is possible (although not mandatory) for supervisors to take on multiple students for the same project.

Additionally, it is important to be aware that MSc projects are individual in nature and thus multiple students undertaking the same project cannot 'collaborate' with one another. Their approach to the challenge set should be entirely independent.

The project should also allow for regular interaction between all of the involved parties (the student(s), the internal supervisor and the industry supervisor) with the internal supervisors' role to ensure that the project is proceeding such that the research will give rise to a good or excellent thesis. Regular meetings enable progress to be observed and any required interventions to be enacted early. To that end, industry supervisors should be able to commit to regular update meetings to maintain project continuity. Weekly progress meetings are common, although longer intervals (e.g. fortnightly) may be appropriate. This will allow students to present their progress and ask for guidance where appropriate.

Timeline of events

The academic year runs from October-September and MSc students work continuously throughout the year without having the extended summer break afforded to undergraduate degrees. The table below outlines the key periods and deadlines for MSc students (exact dates are subject to change annually). As a co-supervisor it is important that you are also aware of these timings.

Month	**Activity**
October	Start of academic year - New intake of students
November-December	Collation of project proposals from academic staff and industry affiliates. Internal academics are offered external projects to supervise
January	Project taster session – Short presentations by academics and industry affiliates detailing project proposals and answering questions from students
February-March	Students asked to make formal choice of project with a deadline at the end of February
April-May	Students begin project*
June-September	Research and project completion. Submission deadline is in September.

*The exact start date will vary for students depending on prior modules completed and associated examination timetables. In some circumstances students are free to begin their project in late April whilst for others this may not be until early May or June contingent on exam completion.

During the months leading to the project selection, students meet with potential supervisors to determine the suitability of the project. Potential supervisors, both internal and external, have input on whether a project is suitable.

Expectations of project proposals from Industry

Research project proposals should address the points below to allow the committee to confidently determine that the project would offer the freedom for a student to construct an excellent thesis. Proposals do not need to be very long, typically a paragraph or two is sufficient to give a good introduction of the scope of the project and can be refined after initial discussion if appropriate. It is

also important to define what makes the project technically interesting in order to gain student interest. Please be aware however, that it is not possible for the academic committee to review previous publications and suggest interesting projects based around that research. Proposals need to be succinct and well considered given the criteria below.

- Proposals must have a clear motivation and problem statement. This should be centred on a computer science challenge or area and not simply "produce algorithm X to solve company problem Y".
- Some detail of the skills exercised and *potential* approaches to solve the problem must be included, although of course we welcome and encourage students to take a novel approach to the problem.
- An indication of resources or data that would be available to students during the project should be detailed, if it is over and above what would be reasonably provided by the University.
- Methods of interaction with the student should be outlined, be that regular in person meetings or virtual catch up sessions (especially important for overseas supervisors who are potentially in a different time zone).

Whilst considering the points above, an understanding of the structure of an MSc thesis would be very beneficial in defining the proposal (good examples can be provided on request). Typically for an applied thesis, the structure would follow: motivation, preliminaries and background, problem statement, algorithm/approach used, proof of correctness (or other properties), benchmark description, experiments, critical evaluation and summary.

Another important consideration that would-be industry co-supervisors should keep in mind is that the internal supervisor will have overall responsibility for monitoring and safeguarding project progression. The industry co-supervisor should make it clear if they will require active contribution from the academic supervisor so the committee is able to make suitable matches internally.

Frequently Asked Questions;

Below are answers to the most common queries we have from prospective industry co-supervisors. If there is anything not covered, or you would like more information, please contact industry@cs.ox.ac.uk and we will be happy to informally discuss any project proposals.

What level of support will I be expected to provide before during and after the project?

Supervision of MSc projects by industry is designed to be a collaborative process and as such your contribution to the project will be defined at the outset. You should however expect to be generally 'available' to answer questions of a technical nature or questions related to their thesis from students, in addition to attending regular catch up meetings with the student and academic supervisor.

Can I work with multiple students and can they collaborate with each other?

MSc projects are offered to all students and as such your project may be popular and multiple students may choose it. You have the option to stipulate at the outset whether you would be happy

to provide supervision to more than one student and will have the resources to enable this. Students however, must approach the project as individuals as their grade will be based on their own interpretation of the project. Collaboration between students on the same project is therefore not allowed.

What about Intellectual Property (IP)?

IP considerations are typically discussed on a case-by-case basis although the default position of the University is that it is unlikely for MSc projects to result in anything of commercial value or indeed anything that requires protection. If you feel that IP ownership could preclude collaboration, please mention this early on so we have time to fully address any issues.

Can Oxford propose a project based on my/my company's previous research?

It is important that the scope of a project is defined by industry partners as it is not possible for the academic committee to review previous research and define a project to build on that work. We are of course happy to advise and amend projects to ensure that it fits within the scope of the degree and meets the requirements for an MSc.

What constitutes an MSc thesis?

It is recommended that you review previous MSc Theses to grasp the length and structure required to achieve a good grade. We have examples from a number of different research areas that we can provide on request. Theses have a word limit of 30,000 words and typically for an applied thesis, the structure would follow; motivation, preliminaries and background, problem statement, algorithm/approach used, proof of correctness (or other properties), benchmark description, experiments, critical evaluation and summary.

Can students work 'on-site' at our company office to use specialist equipment or data?

It may be possible to arrange on site visits, and this can be discussed on a case-by-case basis although it is important to recognise that the completion of the MSc thesis is not an internship or paid employment. Students must still meet the requirements of the University statutes for being a full time student studying for their degree.

What is expected of me as an external supervisor?

It is expected that by agreeing to supervise an MSc project that you have the requisite prior education or equivalent experience in your field to provide technical and project support to a student expecting to achieve the highest grade in their MSc. This should at the very least be plausible in collaboration with an Oxford University co-supervisor. If you determine that you will require active and project specific input from an internal supervisor to deliver this level of supervision it should be addressed up front so that we are able to assign a suitable internal supervisor.

At what level should I pitch a project and what prior understanding do students have?

Students accepted on to the Oxford MSc programmes in Advanced Computer Science all have a solid grounding in the fundamentals of Computer Science and will be familiar with programming (we do not prioritise any particular language) and with implementing algorithms. Students generally have an excellent grasp of theory and are looking to further test and expand this understanding with real world applications.

When projects are offered to students we will denote prior expectations and learning (completion of specific modules) that are prerequisites.

We are able to provide examples of previous work that is considered very good and this will serve as a useful guide to what is achievable in the confines of the project. It can also be useful to discuss the potential methodologies to solve a problem with the academic committee in order to refine a project proposal prior to making it available to students.

What is likely to make my project more appealing to students and therefore more likely to be chosen?

We have observed in recent years that projects involving machine learning, deep learning and neural network development in artificial intelligence are highly sought after. This is not to say that this is the only interest of students in the department and we certainly would not discount proposals utilising other areas of computer science. Students choose projects that interest them and we will only redirect students to other projects should some become oversubscribed.

As an external supervisor am I responsible for ensuring the student is on track to produce a good thesis?

No. Whilst you may play a significant role in directing the project and providing support, the ultimate responsibility of ensuring a student is on track, lies with the internal supervisor. Any issues that you feel are causing the student to produce substandard work should be discussed with the internal supervisor as soon as possible.

As an External supervisor, will I contribute to the final report or assessment/grading of the thesis?

The responsibility for overall assessment/grading lies with the MSc assessment committee and is independent of both of the supervisors. The final report submitted to the committee is the responsibility of the internal supervisor although it is anticipated (not required) that external supervisors will contribute to this process either through written comments that can be included in the report or though verbal discussion of the report's contents with the internal supervisor.