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Note: The modules provided and their timing is subject to availability of faculty and may be subject to change.

Operations & Technology Management PhD pathway: Course outline

The PhD in Operations & Technology Management (OTM) is offered by the Operations Subject Group at CJBS. Through your coursework you will become familiar with the three major research methodologies of the field - mathematical modelling, econometrics, and laboratory and field experiments. We expect you to build a reputation as an expert in one of these methodologies as demonstrated by the thoughtful use and robust defence of the method in your research papers and by your critical and constructive contributions to academic debates at conferences or in research seminars. In addition to becoming a methodology expert, you will become a context expert by focusing on the context of a major societal or business challenge. You will learn how to study this general problem with an operations lens, drawing on the literature and on your engagement with organizations that wrestle with this problem, and produce interesting and impactful research that expands our academic knowledge base and contributes to the solution of an important problem.

The PhD pathway in Operations & Technology Management is taken over a period of five years, including a foundation year when you will be registered as a masters student - either on the MPhil in Strategy, Marketing & Operations or on the Master of Research (MRes) - followed by four years registration as a PhD student. The programme is specifically designed to prepare you for a successful academic career in an operations or technology management department of a business school. The OTM PhD programme comprises a coursework component and a research component.

Coursework

The coursework component comprises of a suite of foundational and methodological courses, complemented by research seminars, which introduce you to current debates and research streams in the field and teach you how to evaluate research papers and how to write research proposals. The coursework component will be completed during the Foundation Year (contributing to a masters degree) and the first year of your PhD. Typical coursework for a PhD in Operations & Technology Management includes the following modules:

THREE CORE OPERATIONS & TECHNOLOGY MANAGEMENT MODULES

- Incentives, Behaviours and Operations
- Managing Innovative Organisations
- Process Perspectives on Innovation Management

SIX CORE FOUNDATIONAL AND METHODOLOGICAL MODULES

- Fundamentals of Competitive Markets
- Game Theory & Information Economics
- Mathematical Foundations of Operations Management
- Mathematical Models of Operations Management
- Econometrics I
- Econometrics II
THREE ELECTIVE MODULES, SUCH AS

- Quantitative Marketing Models
- Further Econometrics: Time Series
- Qualitative Research Methods
- Seminar in Strategy Content
- Seminar in Strategy Process
- Marketing Strategy
- Organisational Behaviour
- Consumer Behaviour
- Masters-level modules offered elsewhere in Cambridge (e.g. the Cambridge Master of Mathematics, www.maths.cam.ac.uk/postgrad/mathiii/)

Your individual coursework requirement may deviate somewhat from this list as we take account of your prior training and research interests. We will determine a final list of coursework modules with you during your masters year.

Research component

The research component of the PhD will build on the coursework and will normally consist of two or three research projects, typically connected by a common theme and carried out in collaboration with faculty. These projects will lead to co-authored papers for publication in leading operations journals and constitute the core of your PhD thesis.

Foundation year: research masters (MPhil or MRes)

During the Foundation Year, you are registered for a masters programme, either the MPhil in Strategy, Marketing & Operations or the Master of Research (MRes).

- MPhil SMO students have an excellent first degree with solid mathematical training and may have an additional professional masters degree (e.g. an MBA) but no prior relevant research experience. If you are registered as an MPhil student you take nine of the recommended 12 PhD coursework modules or eight modules and an individual research project,

- MRes students have, in addition to an excellent first degree with solid mathematical training, prior research experience at masters level relevant to the OTM field, including relevant methodology training and a prior research dissertation. They apply with a research proposal for an MRes dissertation. If you are registered for the MRes, you will take six coursework modules during the MRes year (the choice depends on your prior training and research plan) and write a masters dissertation.

You will take any remaining PhD coursework modules during the subsequent first PhD year.

Preparatory Mathematics & Statistics (September)

The MPhil in Management Science & Operations and MRes programmes offer a pre-term mathematics refresher course, which starts in mid-September. Its aim is to review the mathematical and statistical methods required for the mathematical modelling and econometrics modules. Students with strong mathematics training may apply for exemption from this pre-course, which is otherwise mandatory.
Individual research project

If you are registered for the MPhil in your foundation year, you may undertake a supervised individual research project (IRP). This project will provide first-hand research experience and will prepare you for the individual research activity during the first year of the PhD. You are encouraged to propose a theme for your IRP. Alternatively, you can contact faculty and discuss possible IRP themes with them. If you intend to do an IRP, you will agree its theme with the MPhil director and a supervising faculty member at the beginning of Lent Term. The IRP is equivalent in weighting and workload to one course and may be included as part of the First Year Report at the end of the First Year of the PhD (see below).

Dissertation

MRes students write an MRes dissertation, supervised by a faculty member, which counts for 50% of the overall mark for the MRes degree.

PhD continuation requirement

If you are registered for an MRes degree during your foundation year, you will proceed to PhD registration without a further application process, provided you achieve a mark of 70 per cent in your dissertation and an average mark of 70 per cent across all assessed components in your MRes year (six course modules and your dissertation, with the latter counting for 50 per cent of the mark).

As an MPhil student you will apply for continuation to the PhD in December, based on a research proposal that you develop during the first term of the MPhil year. You will receive ample feedback from faculty during the development this proposal. In addition, several modules during the first term practice the writing of convincing research proposals. Your application will be assessed by the PhD Admissions Committee in January on the basis of your research proposal, an admissions interview with OTM faculty, and your module performance during the first term. Continuation to the PhD programme will normally be conditional on your overall performance in the MPhil or parts thereof, the usual condition being a mark of 70 per cent overall.

Summer (July–September)

Your masters year ends formally in June, while your PhD only commences formally in October. We strongly advise you to discuss with your faculty supervisors how to continue your research over the summer prior to the formal start of the first PhD year. This ensures that you don’t lose valuable time towards completing your PhD. You may continue the work on your masters dissertation or individual research project or may do fieldwork or take a placement in an organization related to your research proposal. We prefer students to remain in Cambridge over this period if possible. If this is not practicable (e.g. for visa reasons), faculty will be happy to supervise you remotely via Skype and email.

First year of the PhD

The first year of the PhD is still probationary. Its purpose is to complete your coursework requirements and to develop a convincing final research proposal and execution plan for the PhD. Students will typically take three to four coursework modules, accounting for roughly 1/3 of the time, with the remainder dedicated to individual research. A senior faculty member (your principal
supervisor) will work with you on the development of your PhD research programme during the year and you may work with your principal supervisor or another faculty member on a specific research project, possibly but not necessarily as a continuation of any individual research (IRP or dissertation) you may have done during the Master's year.

First year report

You will work with a faculty supervisor to produce a research report. This first year report can take one of two forms:

- A draft of a scientific paper targeted for publication which will become your first PhD paper. The paper will normally be co-authored with your faculty supervisor, in which case your report will clarify your specific contribution to the paper.
- An extended research proposal on the broader theme that you wish to address with your PhD research, including a thorough literature review and/or an in-depth case study based on your experience in an organization, and a clear proposal and execution plan for a first research paper during the second PhD year.

The report will demonstrate that you are able to produce your first research paper (typically co-authored with faculty) during the following academic year and provides evidence of your ability to formulate focused research questions, summarise relevant academic debates, critically assess the extant literature, and choose and execute appropriate research methods. You may (but do not have to) incorporate any part of your MPhil work into the first year report, such as module essays, individual research project, dissertation or a summer project (where applicable).

Second year continuation requirements

To proceed to the second year of the PhD, you will have to gain a mark of 70 per cent for your first year report and have to pass all required courses (60 per cent pass mark).

Second year of the PhD

During the second year, you will focus on the production of your first research paper. You will do this by "learning on the job": You may join a project proposed by one of your faculty advisors or develop a project of joint interest with a faculty member and work in close collaboration with the advisor, who will normally be a co-author on the paper. You will present progress frequently, formally and informally, to all faculty and PhD students in the operations subject group. You are expected to submit an abstract of the paper in spring for presentation at the INFORMS conference in the fall of the coming year. You will aim to submit the paper by the end of the second year of the PhD.

Third year of the PhD

During the third year, following submission of your first paper, you will focus on a second paper. You may continue to work with your co-author(s), choose other co-authors, or work independently on a paper. While your advisors will still play a significant role in shaping the idea for the second paper, you are expected to take more of a lead in the formulation and execution of this second paper and be the lead author on this paper. This second paper will normally become your "job market paper" (your designated "master piece" when you apply for your first faculty position). You are expected to submit an abstract of the paper in spring for presentation at the INFORMS conference in the fall of
the coming year and are expected to submit the paper by the end of the academic year. In parallel with the development of this second paper, you and your co-authors will revise your first paper, following feedback from the journal, and will continue to present both papers at seminars and conferences.

**Fourth year of the PhD**

The fourth year is your job-market year. We aim for you to go on the job market with one accepted paper and one revise and resubmit invitation from leading journals in the operations field. Achieving this is the focus of the fourth year. You will present your two papers at the INFORMS job-market conference and continue to revise and polish them. In addition, you may begin to work on a third paper. This third paper should further demonstrate your independence as a researcher - the idea, while born out of and honed in discussion with your advisors and other academics, should be substantially your own and the execution should be driven by you, including assembling a suitable team of co-authors. We will encourage you to spend part of the fourth year as a visitor in an operations department of another university, typically in the USA, to build closer ties with potential collaborators and the global operations community.

You will submit your PhD thesis, based on your papers, at the end of your fourth year at the latest.

**Optional fifth year**

Good research requires you to take risks, to explore avenues and tackle issues that are new and original. Research may therefore not unfold as planned and your work may require substantial revision. In fact, many of the most influential research projects ended up taking considerably longer than anticipated. We encourage students to be aspirational and take risks – and we work with them to manage these risks. To accommodate early “wrong turns” and unforeseen delays, we sometimes recommend that a student delays entering the job market by a year and spend an additional year at CJBS (and possibly another university) to work on paper revisions with faculty and strengthen their portfolio of research paper before applying for a junior faculty position. This optional fifth year is typically funded through a combination of post-doc research grants and targeted teaching opportunities, which further strengthen the student’s job market prospects.