



The Business School  
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## PhD Advanced Courses

A set of core and advanced courses in the first year provides the basic theory and methodology for management research, irrespective of the eventual field of specialisation. It forms the basis for the second year's more advanced, specialised studies. During the second year, students focus on training in their chosen field of expertise.

The programme offers advanced courses on a two-year cycle. They may be complemented by reading courses or independent studies in fields of interest to the student and faculty members.

*NB: Course workload is presented in credits: 16 credits = 21 hours; Courses in italics are alternated.*

### MULTIDISCIPLINARY COURSES OR COURSES REQUIRED BY MULTIPLE FIELDS

#### **PhD 505 Game Theory (A) (16) and (B) (8)**

Game theory is a general formal model of social interaction. The goal is to describe how agents should or would act in group situations. Game theory has many applications, such as in industrial organisation, marketing, procurement, contracting, organisational theory, bargaining, international trade, corporate finance, asset pricing, and auctions.

The primary goal of this course is to learn the basic theory, encompassing static and dynamic games with complete and incomplete information.

Specific topics may include Nash equilibrium, the existence of an equilibrium, mixed and correlated equilibria, rationality and dominance solvability, learning and evolution, strategic complements and substitutes, backwards induction, Stackelberg games, subgame perfection, dynamic bargaining games, repeated games, Markov-perfect equilibrium, auctions, mechanism design, signalling games, perfect Bayesian equilibrium, sequential equilibrium.

#### **PhD 506 Econometrics (A) (16) and (B) (16)**

This course is designed to give students a sound introduction to applied econometrics theory and practices. Throughout the course, the emphasis is on the correct application of econometric techniques to areas such as strategy, finance, marketing, and economics.

The course is divided into two parts: Part 1 constitutes the fundamentals of the theory and practice of econometrics. Part 2 will cover several important topics in more detail. These

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include models with limited-dependent or qualitative variables, panel data techniques, as well as linear and non-linear simultaneous systems.

### **PhD 507 Industrial Organisation (A) (16) and (B) (16)**

This is an introductory course on the theory of imperfect competition.

The fundamental conditions that make such markets "imperfect" relate to:

- Technology: i.e. increasing returns to scale, entry costs, the progress curve, research and development;
- Consumers' imperfect information: about product quality, price, location of sellers, etc;
- Firms' imperfect information: about other firms' conditions (e.g., costs) or their employees' effort levels and motivations.

Accordingly, this course will survey how individual firms behave under such conditions, what outcomes result from interactions among such firms, how good or bad these outcomes are from a social standpoint, and how one might go about regulating these markets. This is the so-called structure - conduct - performance paradigm. The primary tool used in analysing these issues is game theory.

### **PhD 510 Bayesian Analysis (16)**

This course covers Bayesian inference and prediction methods, emphasising the general approach of modelling real-world problems of interest to data analysts and decision-makers. Topics include subjective probability, evaluation of probabilities, revision of probabilities, Bayesian modeling, inference and prediction for various processes, Bayesian estimation and hypothesis testing, and comparisons with classical/frequentist methods.

The course is self-contained. Students will be given assignments during the term and a take-home exam at the end, to be done individually. Final grades will be on the assignments and the exam.

### **PhD 511 Time Series (16)**

This course covers a wide range of topics in time series analysis, divided into two parts:

(1) the standard theory of stationary stochastic processes (ARMA models, spectral density, generalised method of moments estimation, vector autoregressions, forecasting.) and the Kalman filter

(2) modern asymptotic theory based on the use of martingales and functional limit theory, as

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well as new developments in the estimation of models with integrated regressors, cointegration, autoregressive conditional heteroscedasticity, structural breaks, and regime-switching regressions.

### **PhD 512 Microeconometrics (16)**

This course serves as a guide for a beginner in empirical research. It will include econometric theory, discussions of the relevance of the hypothesis, STATA practice, and advice on how to clean the data, check for outliers, etc.

What is the purpose of empirical research? It is to make causal inferences from microdata. That is, to understand causality from data at the individual level. The critical concept is identification. Evidence-based management, public policy analysis, and customer behaviour analysis partly rely on proper empirical research of causal relationships. Another crucial but secondary concept is inference. The class will explain identification and generalisation in many intuitive real-life examples.

An easy way to get 'excited' about microeconomics is to read *Freakonomics* by Steven D. Levitt and Stephen J. Dubner. It is fun to read, but it does not help to understand the required maths for the course. So we also recommend students freshen up probability and statistics and linear algebra and understand and master the following: matrices, probability and statistics, maximisation of convex functions, etc.

### **PhD 515 Experimental Design (16)**

This course tackles the practical aspect of the general concepts, principles, and philosophy behind the experimental design covered in the first part of the course. If the first part of the course teaches how to think about experimental research, the second part teaches how to do it properly.

Sessions will improve your ability to deal with the most important practical aspects involved in experimental research, including (1) learning an interactive computer programming language, which will allow you to programme any experiment, which can subsequently administer easily on any Windows PC; (2) an introduction to the SAS statistical analysis programming language; (3) teach how to write up experimental papers in general, and the result sections specifically; (4) teach to "think through" what is done in experiments, trying to sharpen your reviewing

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senses for experimenter error/bias; (5) devote particular attention on how to deal with nasty, unruly data; (6) sharpen your ability to design effective manipulations.

### **PhD 517 Macroeconomics and Finance (8)**

This course focuses on studying models of economic growth and business cycles to answer questions such as: Why are some countries rich and others poor?; Why do countries grow?; What are the sources of recessions and booms?; How do government policies affect business cycle fluctuations? What are the connections between the financial and real sides of the economy?

To answer these questions, we will focus on using optimisation methods to construct models of economic behaviour, as well as applying these models to explain economic phenomena.

### **PhD 518 Organisational Economics (8)**

This course presents some fundamental topics in organisational economics. The class will study the provision incentives, the choice of organisational structure (hierarchies, allocation of authority, decision-making and delegation) and corporate governance and leadership inside firms.

Course descriptions of the following will be updated soon

**PhD 513 *Social Psychological Foundations of the Management Disciplines* (16)**

**PhD 523 PhD Mathematics Tutorials (non-credit)**

**PhD 527 Contract Theory (8)**

**PhD 528 *Field Experiments* (8)**

**PhD 530 *Multivariate Methods* (16)**

**PhD 534 Foundations of Machine Learning and Artificial Intelligence (16)**

**PhD 535 *Machine Learning Causality and Management* (16)**

**PhD 537 Fundamentals of Optimisation (16)**

**PhD 538 Linear Optimisation (16)**

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## ADVANCED COURSES BY AREA

### ACCOUNTING AREA

- ACC 602 Fundamentals of Accounting Research (16)
- ACC 603 Management Accounting (16)
- ACC 604 Accounting and Valuation (16)
- ACC 605 Analytical Methods in Accounting Research (8)

### DECISION SCIENCES

- DSC 615 Behavioral Decision Theory (16)
- DSC 616 Dynamic Programming Applications (16)
- DSC 613 *Experimental Economics* (8)
- DSC 620A *Selected Topics in Decision Sciences A* (16)
- DSC 620B *Selected Topics in Decision Sciences B* (16)
- DSC 623 Choice Theory and Behaviour (16)
- PhD 534 Foundations of Machine Learning and Artificial Intelligence (16) [also appearing in multidisciplinary courses]

### ENTREPRENEURSHIP

- EFE 601A Entrepreneurship Research (A) (16)
- EFE 601B *Entrepreneurship Research (B)* (16)
- EFE 601C *Entrepreneurship Research (C)* (16)
- EFE 603 *Applied Event History Analysis* (8)
- EFE 604 *Computational Organisation Sciences* (16)
- EFE 605 *Organisational Foundations of Financial Markets* (16)
- EFE 606 *Organisational Learning* (8)

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## FINANCE

- FIN 601A Information Economics (A) (12)
- FIN 601B *Information Economics (B)* (12)
- FIN 603A Finance Theory in Continuous Time (A) (12)
- FIN 603B *Finance Theory in Continuous Time (B)* (12)
- FIN 607 *International Finance* (8)
- FIN 609A Financial Economics (A) (16)
- FIN 609B Financial Economics (B) (16)
- FIN 611A Empirical Asset Pricing (A) (12)
- FIN 611B *Empirical Asset Pricing (B)* (12)
- FIN 612 Corporate Finance Theory (12)
- FIN 617A Empirical Corporate Finance A (12)
- FIN 617B *Empirical Corporate Finance B* (12)
- FIN 614 *Research in Corporate Finance* (12)
- FIN 615A Behavioral Finance (A) (8)
- FIN 615B *Behavioral Finance (B)* (8)
- FIN 615C *Behavioral Finance (C)* (8)
- FIN 618 *Research Topics in Asset Pricing* (8)
- FIN 620 *Research Topics in Financial Markets* (8)

## MARKETING

- MKT 601 *Consumer Behavior (A)* (16)
- MKT 602 *Consumer Behavior (B)* (16)
- MKT 609 *Analytical Modeling in Marketing* (16)
- MKT 610 *Structural Econometric Models with Applications* (16)
- MKT 611 *Consumer Decision Making* (16)
- MKT 615 *Decision Neuroscience for Management* (16)
- MKT 616 *Marketing Strategy Models* (16)
- MKT 618 *Quantitative Methods and Marketing Topics* (16)
- PhD 530 *Multivariate Methods* (16) [also appearing in multidisciplinary courses]

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- PhD 535 Machine Learning Causality and Management (16) [also appearing in multidisciplinary courses]

## ORGANISATIONAL BEHAVIOUR

- OBH 601 Organisation Theory (16)
- OBH 602 Organisational Behavior (16)
- OBH 603 *Organisational Sociology* (16)
- OBH 604 Advanced Topics in OB/OT (16)
- OBH 614 *Network Analysis (A)* (16)
- OBH 615 *Network Analysis (B)* (16)
- OBH 622 *Organisational Psychology* (16)

## STRATEGY

- STR 601A *Strategic Management Process (A)* (12)
- STR 601B *Strategic Management Process (B)* (12)
- STR 602A *Readings and Research on Multinational Enterprises (A)* (16)
- STR 602B *Readings and Research on Multinational Enterprises (B)* (8)
- STR 603A *Competitive Strategy Research (A)* (12)
- STR 603B *Competitive Strategy Research (B)* (12)
- STR 605 Foundations of Strategy and Organisation (16)
- STR 607 Special Topics in Strategy (6)
- STR 608A *Corporate Strategy (A)* (12)
- STR 608B *Corporate Strategy (B)* (12)
- STR 617 *Special Topics in Management* (16)

## TECHNOLOGY AND OPERATIONS MANAGEMENT

- TOM 603A Foundations of Operations (A) (12)
- TOM 603B Foundations of Operations (B) (12)
- TOM 604 Discrete Stochastic Processes (16)

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- TOM 605 *Supply Chain Management (16)*
- TOM 607 *Technology Management (16)*
- TOM 609 *Operations Strategy (16)*
- TOM 610 *Queueing Theory (16)*
- TOM 612 *Empirical Methods in OM (16)*
- TOM 613 Bayesian Methodology and Computation (16)
- TOM 635 *Modeling Workshop (16)*
- TOM 640 Research Topics in TOM (16)
- PhD 537 Fundamentals of Optimisation (16) [also appearing in multidisciplinary courses]
- PhD 538 Linear Optimisation (16) [also appearing in multidisciplinary courses]

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