

**EC5101 Microeconomic Theory**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

The purpose of this course is to provide students with a sound understanding of modern microeconomic theory. Microeconomic theory is concerned with the behaviour of individual economic agents such as individual people, households, firms and single industries. The course presents a rigorous treatment of the principles governing individual behaviour and an introduction to general equilibrium analysis. Other topics that will be covered include game theory, information economics, and welfare economics. Knowledge of basic mathematics is necessary. This includes equations, coordinate geometry, functions of several variables, real analysis, calculus, and vector algebra.

**EC5102 Macroeconomic Theory**

Modular Credits: 4

Workload: 3-1-0-4-2

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

This module aims to equip students with understanding of recent macroeconomic theory at the graduate level. The main topics are basic growth theories, modern business cycle models, and issues in aggregate demand components. Growth theory covers the Solow model, infinite horizon model, and overlapping generations model. The main topics in business cycle are the real business cycle models, Lucas model, and new Keynesian models. Issues in aggregate demand components usually cover current issues in consumption and investment theories.

**EC5103 Econometric Modelling and Applications I**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): EC5253/EC5304/ECA5103

Preclusion(s): EC5154

Cross-listing(s): Nil

This is an introductory level core module for graduate students. Students are required to have background knowledge in econometrics at least at the level of EC3304 Econometrics II. Students who do not have this background will be advised to read EC3304 first as an additional module which will not be counted towards CAP. The broad topics covered include mathematical and statistical prerequisites (matrix algebra and statistical inference), standard regression analysis (OLS, GLS, IV, ML, SUR techniques), and applications oriented topics on cointegration, panel data, and limited dependent variable models.

*Remarks: Candidates who do not have sufficient background in Econometrics may have to read an introductory level first before reading EC5103.*

**EC5104 Mathematics for Economists**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC5210/EC5311

Cross-listing(s): Nil

The main purpose of this module is to provide students with a systematic exposition of certain advanced mathematical techniques and to relate them to the various types of economic theories and analyses in such a way that the mutual relevance of the two disciplines is clearly brought out. Basically, the module is divided into five major parts:

(i) static analysis,

- (ii) comparative static analysis,
- (iii) dynamic analysis,
- (iv) optimisation problems and mathematical programming, and
- (v) welfare economics.

The mathematical tools appropriate for each are then introduced in due order within the economic framework of each topic. The module is expected to provide students with a clear understanding of the numerous existing economic models, including models of the market, of the firm, and of the consumer, national income models, input-output models, and models of economic growth.

*Remarks: For undergraduates reading this module, the following are applicable:*

*Prerequisite(s): EC3101/EC3151,  
EC3102/EC3152 and EC3311/EC3221*

*Preclusion(s): EC4211/EC4311 and  
EC5210/EC5311*

### **EC5305 Computational Methods in Economics**

Modular Credits: 4

Workload: 3-1-0-3-3

Prerequisite(s): EC5101 Microeconomic Theory and EC5102 Macroeconomic Theory

Preclusion(s): Nil

Cross-listing(s): Nil

This module introduces students to numerical methods in economics commonly used to simulate and solve models in the fields of macroeconomics, international trade, finance, and industrial organization. The first half of the module focuses on learning the basic tools of numerical analysis including optimization, approximation, non-linear equations, numerical differentiation/integration and parallel computation. The second half of the module applies these tools to solving dynamic equilibrium models that are widely adopted for quantitative-applied research in macroeconomics. No prior experience in coding is required, and this module aims at facilitating students' own development in MATLAB/FORTRAN programming.

### **EC5314 Time Series Analysis**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): EC5154/EC5103

Preclusion(s): EC5214

Cross-listing(s): Nil

The main objective of this course is to provide a rigorous training in univariate and multivariate time series analysis. Univariate techniques are mainly used for forecasting and multivariate techniques are used for both forecasting and policy analyses. Starting with simple ARMA and GARCH models the course moves on to more advanced topics involving non-stationary multivariate processes. Students will learn to use Monte Carlo techniques as well as a lot of practical applications.

### **EC5319 Experimental Economics**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): EC5101

Preclusion(s): Nil

Cross-listing(s): Nil

This course introduces students to the basic research methodologies in Experimental Economics. The course also provides a survey of the most significant results obtained in Economics from human experiments. Students will learn all facets of conducting experimental research from problem formulation to experimental design to the conducting of pilot experiments. The structure of the course includes seminars, laboratory participation, and a student project.

**EC5322 Industrial Organisation**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC5215, EC5268

Cross-listing(s): Nil

The purpose of this course is to make in-depth analysis and understand various theoretical issues of modern industrial organisation. The approach of this course is game theoretic. In the beginning, basic concepts of non-cooperative game theory are reviewed in detail. This lays the foundation to study various applications of game theoretic models in the field of industrial organisation. The course is aimed for Masters' students and researchers in Economics interested in the area of Industrial Organisation.

*Remarks: For undergraduates reading this module, the following are applicable:*

*Prerequisite(s): Either passed Level- 4000 micro, or A- or better in Level-3000 micro.*

*Preclusion(s): EC4322 Industrial Organisation II*

**EC5324 Cost-Benefit Analysis**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC5216/ EC5264/  
EC5325/ ECA5325

Cross-listing(s): Nil

This is a standard graduate module on Cost-Benefit Analysis. The Welfare Foundations of Cost-Benefit Analysis are emphasised throughout the module. Topics include investment criteria in the public sector; risk and uncertainty; valuing costs and benefits when prices change; problems of distribution; shadow pricing; externalities and public goods; and the social rate of discount. In addition, students are expected to use Cost-Benefit Analysis in a number of case-studies.

**EC5326 Policy Impact Evaluation Methods**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

This module covers the main policy impact evaluation methods. The aim is to understand how to evaluate the causal impact of a policy and how to choose the best method depending on the type of policy and on the context. This module is suitable for students interested in policy issues. Students who successfully complete this course will be able to learn:

- both the theoretical founding principles of several impact evaluation methods, and their empirical limits; and
- how to determine the sample size for a randomized field experiment.

**EC5332 Money & Banking**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC5208

Cross-listing(s): Nil

EC5332 is a first year graduate course on money, banking and financial markets. Topics covered include central banking and monetary policy, prudential supervision, financial markets and stochastic processes, the banking industry in South-East Asia, the role of price expectations, and modern theories of money, inflation, interest rates and the exchange rate. An important part of the course is the discussion of selected academic articles, with emphasis placed on the motivation and techniques underlying the

theoretical and empirical work.

**EC5342 International Trade**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Undergraduate major in Economics

Preclusion(s): EC5265, IZ5202. Students who have read (or concurrently reading) courses in International Economics at the graduate level should not read this course, since there may be considerable overlapping of material.

Cross-listing(s): Nil

This course surveys and studies the various theories of international trade and applies them to the analysis of current trade problems. The topics covered include theories explaining trade patterns, the effect of trade on national welfare and welfare of groups within a country, trade policy, international economic integration and so on. The target group of students is those who have background in Economics and would like to have more in-depth knowledge of trade theories and current trade problems.

**EC5343 International Finance**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): EC5274/EC5333/ECA5333

Preclusion(s): EC5259

Cross-listing(s): Nil

This module is mainly concerned with the operation of international finance markets, focusing on those for spot exchange rates and their derivatives, Eurocurrencies, Eurobonds, the behaviour and the determination of exchange rates, the management of risk and investment in an international setting. The intent is to investigate how various financial instruments are used for hedging and speculating in the currency markets and how economic theories are applied to determine the equilibrium exchange rates. Some policy issues concerning the recent world financial market turbulence will also be discussed.

**EC5352 Public Economics**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC5267/ EC5209/ EC5351/ ECA5351

Cross-listing(s): Nil

This module applies economic principles to analyse budgetary policies and programmes of the public sectors. Topics covered include the following: the economic role of the state; the privatisation phenomenon; theory and practice of tax reform; effects of taxes and expenditure on work effort, saving, investment and risk taking; the role of fiscal incentives in economic management; financing of social security, health care and education and; international aspects of taxation.

**EC5353 Health Economics & Policy**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC5217

Cross-listing(s): Nil

This module aims to provide an introduction to the principal questions addressed in the health economics literature at the graduate level, and to equip students with the basic tools to undertake health policy research and analysis. The tools of microeconomic analysis will be used to analyse the behaviour of consumers, providers and insurers in the health care market. The module will also examine and compare the Singapore health care system and health care policies with those of developed countries such as the US, Canada and the UK, and the different approaches toward reforming the health care systems and

health care policies in these countries.

**EC5361 Labour Economics**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

Labour economics is a major area in economics and its importance to the Singapore economy need not be overemphasised. It is one of the largest and essential fields in economics. It studies the decision of everyday life, especially how people earn a living. It helps students to construct logical, internally consistent arguments concerning economic variables, and apply constructed models into real world. The module is offered in all U.S. top economics departments. We would be able to fill the gap by offering the module to our graduate students. These courses cater to both coursework students and masters and Ph.D. students who want to do their research in labour related topics.

**EC5372 Growth Theory**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC5206

Cross-listing(s): Nil

This module introduces several important economic growth models. The main focuses will be on studying the underlying sources of economic growth and analysing how government policies influence the growth process. Major topics include exogenous growth models, endogenous growth models with capital accumulation, technological progress through R & D and growth, growth models with learning-by-doing, diffusion of technology and growth, growth in open economy, and empirical studies of economic growth.

**EC5383 Economics of the Environment**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC5218

Cross-listing(s): Nil

This module provides a rigorous and comprehensive coverage of environmental and natural resource economics. The main objective of the module is to illustrate how the study of mainstream economics needs to be reoriented in the light of the following premises: the natural environment is the core of any economy and economic sustainability cannot be attained without environmental sustainability. The course is intended to equip participants with introductory skills that would enable the analyses of environmental and economic policy issues.

**EC5386 Issues in Port Economics**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Basic level mathematics, economics, and statistics. Previous work experience and knowledge of the maritime transport industry, especially ports and shipping.

Preclusion(s): Nil

Cross-listing(s): Nil

The rapid process of globalisation over the last decade has had pervasive effects on global shipping and logistics. This could not occur without creating profound impact on the way ports are developed, operated and managed, from providing simple ship shelters and warehouse services to much more complex multimodal terminal services, from monopoly to competition, and from state government-owned to local private corporations. Port Economics taught at graduate level studies key topics in port

management in depth and provides students with analytical and quantitative analysis tools that are essential to research and making decisions related to port operation, management and policy formulation.

**EC5387 Issues in Maritime and Shipping Economics**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Students must have read EC2104 Quantitative Methods for Economic Analysis OR EC2303 Foundations for Econometrics AND EC3101 Microeconomic Analysis II or equivalent.

Preclusion(s): Nil

Cross-listing(s): Nil

This course is designed to provide an in-depth insight into selected specific issues that are of concern to maritime and port industry as well as to policy makers. The issues covered include shipping markets, shipping networks, increasing ship sizes, cabotage, freight determination, port choice, efficiency measurements, maritime safety, maritime hub strategy and green maritime logistics. Upon completion of this module, students should be able to:

- Explain the role of shipping including recent trends in the maritime sector
- Carry out various analyses in shipping service pricing and investment
- Analyse the operational costs of ship operations
- Explain the advantages and disadvantages of various approaches to pricing of shipping service
- Analyse competition using various economic models
- Assess shipping performance and efficiency using various quantitative analysis tools
- Identify and analyse different issues related
  - to policies and regulations to shipping
  - industry especially with more liberal trading
  - environment and within the competitive global supply chain framework

**EC5880 Topics in Economics**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC5220

Cross-listing(s): Nil

This module is designed to cover selected topics in economics. The topics covered will be dependent on the interest and specialities of regular or visiting staff in the Department.

*Remarks: For undergraduates reading this module, the following are applicable:*

*Prerequisite(s): EC4301/EC4101*

*Preclusion(s): EC5220*

**EC5881 Topics in Microeconomics**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

Game theory has been at the core of much of the contemporary research in economics. The importance of the subject arises from the pervasiveness of the assumption of rational behavior in many human sciences. Applications of game theory have arisen in many fields of economics, such as industrial organization, international economics, labor, finance, and political science. This module is designed to present the main ideas and methods of game theory at graduate level, emphasizing on its theoretical foundations and practical implications.

**EC5882 Topics in Macroeconomics**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): Nil  
Cross-listing(s): Nil

This module introduces students to recent developments in growth theory and discusses their empirical relevance. Topics include sources of economic growth, cross-country income differences, neoclassical growth theory, human capital and growth, innovation and growth, finance and growth and trade and growth.

**EC5883 Topics in Applied Economics**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): Nil  
Cross-listing(s): Nil

The purpose of this module is designed to help students become comfortable and creative as economic researchers and modelers. The course covers microeconomic theories and its applications in various policy analyses. Topics include economic and econometric modeling, and empirical strategies in identifying causal relationship.

**EC6101 Advanced Microeconomic Theory**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): Nil  
Cross-listing(s): Nil

As an essential module for economics Ph.D. students, this module aims to equip them with the tools of modern microeconomic theory and prepare them to be independent researchers. As a subsequent module following EC5101, this module focuses on general equilibrium and welfare theory, game theory, and information economics.

**EC6102 Advanced Macroeconomic Theory**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): Nil  
Cross-listing(s): Nil

This course builds on EC5102 Macroeconomic Theory, and stresses the use of dynamic programming in the study of macroeconomic problems. The emphasis will be placed on building and analysing models and analysing existence, optimality and dynamic properties of equilibria. The theory of dynamic programming will be developed in some detail and be applied to macroeconomic issues such as economic growth (including multi-sector models and endogenous growth), economic fluctuations, recursive competitive equilibrium, search and matching models, design of optimal monetary and fiscal policies, neo-Keynesian models, and advanced topics in consumption, investment and asset pricing.

**EC6103 Econometric Modelling and Applications II**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): EC5103/EC5154  
Preclusion(s): EC6154  
Cross-listing(s): Nil

**Department of Economics, FASS, NUS**  
**Graduate Modules**

This is a core module for Ph.D. students. It is aimed at providing a good training in econometric theory and applications. It covers some topics already covered in EC5103 but at a more theoretical level. Asymptotic theory, ML and GMM estimation, extremum estimators, non-linear models, simultaneous equations models are among the topics covered under this module.

**EC6104 Advanced Mathematics for Economists**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC6210/EC6311

Cross-listing(s): Nil

This module covers a number of advanced mathematical techniques that are frequently used for solving dynamic optimisation problems in economics. Topics include calculus of variations, dynamic programming and optimal control theory. The emphasis would be placed on both mathematics and applications in economics.

**EC6312 Advanced Game Theory**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

This is a comprehensive introduction of modern game theory at a PhD graduate level. Topics include strategic games, extensive games, incomplete-information games, repeated games, interactive epistemology, mechanism design, implementation theory, and information economics. This module is designed to equip students with a solid understanding of modern game theory. The aim of the module is to help students to conduct research in game theory and/or apply game theory in economic models.

**EC6313 Topics in Econometrics**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): EC5154/EC5103

Preclusion(s): EC6204

Cross-listing(s): Nil

This module is designed to train students in advanced econometric applications in various areas. This is a reading-intensive course; students are required to read a large volume of journal articles in the relevant areas and analyse them. Students can make requests to cover topics that are of interest to them. This is an ideal setting for Ph.D. students to try out their thesis research topics. Topics such as Bayesian econometrics, panel regression with unit-root time series, and macroeconometric modelling for forecasting and policy analyses are likely to be covered under this module.

**EC6314 Advanced Time Series Analysis**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC6214

Cross-listing(s): Nil

This module may be offered jointly with EC5314 Time Series Analysis but with more emphasis on advanced theory. Unit root econometrics and Wiener processes, spectral techniques, and structural time series models are covered in detail under this module.

**EC6316 Contract Theory and Applications**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): EC5101 Microeconomic Theory and EC5104 Mathematical Economics

Preclusion(s): Nil

Cross-listing(s): Nil

This module aims to introduce students to modern economic principles, techniques and applications of *contract theory* in organizations and markets. Authorities want to design incentives such that interacting players, both internal and external, take decisions that further the organization's goals. In the marketplace often competition from rivals determine an organization's internal incentives. Most of the interactions take place under asymmetric information environment about the players' actions and types. A prior, basic knowledge of game theory will be assumed for this module. Students attending this module are expected to engage in research in applied micro areas including *contract theory, industrial organization, auctions, contests, labor, education*, etc. While the module's focus will be on theoretical models of strategies and incentives in firms and organizations, a great deal of attention will be paid to intuitions behind a number important results in the literature. This intuition-based approach should prepare students to formulate independent research questions.

**EC6322 Advanced Industrial Organisation**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC6215, EC6268

Cross-listing(s): Nil

The purpose of this course is to make in-depth analysis and understand various theoretical issues of modern industrial organisation. This course will also provide a platform for research students interested to work in the area of industrial organisation. The courses are directed to develop the analytical skills of the students so that they can handle the deeper issues in their future independent research career. The approach of this course will be game theoretic. In the beginning, basic concepts of non-cooperative game theory will be reviewed in detail. This will lay the foundation to study various applications of game theoretic models in the field of industrial organisation.

**EC6332 Advanced Money & Banking**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC6208

Cross-listing(s): Nil

This Ph.D. level course will cover two broad topics in the Money and Banking: 1) Monetary Policy (including Exchange Rate Policy) and Money Demand; and 2) Related Issues from the Banking Crises. First topic will cover some issues surrounding the behaviour of Money demand and its implications on the overall effectiveness of the monetary policy under different stages of economic developments. The second topic will survey issues emerging from the latest banking crisis in East Asia, such as structure of ownerships, regulations and the role of banking problems in the recent balance of payment crisis (capital account crisis) in East Asia.

**EC6342 Advanced International Trade**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): EC6265  
Cross-listing(s): Nil

This course provides an in-depth study of the trade theories and models that are important in the analysis of policy issues relating to international trade. Some contemporary issues in the field of international trade will also be discussed. At the end of the course, the student should be able to master the basic theoretical framework and analytical tools necessary for the study of contemporary trade issues. Other than theory, the course also emphasises the analysis of recent issues such as the new developments in the WTO, and the controversy of regional trade liberalisation.

**EC6343 Advanced International Finance**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): EC6259  
Cross-listing(s): Nil

This course is mainly concerned with the operation of international financial markets, focusing on the on-shore and offshore banking systems, international capital flows, and restructuring international financial system. The intent is to investigate how to reduce the likelihood of financial panics and crises in the international context. Theories developed in the field of international finance will be carefully studied, and policy issues concerning the recent world financial market turbulence will also be discussed. Students are required to write a major term paper concerning relevant issues.

**EC6351 Advanced Public Finance**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): EC6209  
Cross-listing(s): Nil

This module will examine selected topics of Public Finance in greater depth. There are basically three sections. The first section examines welfare theorem, market successes, market failures and government success and government failures. The second section focuses on tax issues, tax reforms and tax challenges. The third section will examine financing of government expenditures on education, healthcare and old age.

**EC6352 Advanced Public Economics**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): EC6267  
Cross-listing(s): Nil

This course provides an in-depth understanding of the economic role of the state, applies economic principles to the analysis of budgetary policies and expenditure programme, and elaborates on the intricacies of decision processes in this sector. The topics covered include

- (i) justifications for the existence of the state and how these relate to the privatisation phenomenon;
- (ii) tax policy (including tax expenditure and fiscal incentives) and how this may affect the incentive to work, save, invest and the incentive for risk-taking;
- (iii) comparative analyses of social security systems, the financing of health care and education expenditures; and
- (iv) the mechanics of public sector decision-making in unicameral and bicameral structures.

**EC6361 Advanced Labour Economics**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): EC5361 or equivalent

Preclusion(s): Nil

Cross-listing(s): Nil

The objective of the course is to acquaint students with modern topics, modelling strategies, econometric methods, and empirical work in the field of labour economics. Students are also encouraged to extend the course material to develop their independent research interests that could potentially lead to their Ph.D. thesis topics. This module will provide a solid empirical and theoretical grounding in many areas of labour economics, and prepare students to write a dissertation in the field.

**EC6371 Advanced Development Economics**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC6262

Cross-listing(s): Nil

This course provides an in-depth treatment of alternative theories and approaches to economic growth and development, and development problems and strategies pertaining to poverty and income distribution, unemployment and rural-urban migration, agriculture, industry, trade and foreign resources.

**EC6372 Advanced Growth Theory**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): EC6206

Cross-listing(s): Nil

This course introduces several important economic growth models and modelling techniques. The main focus will be on building and solving mathematical models of growth, studying the underlying sources of economic growth, and analysing how government policies influence the growth process. Major topics include mathematical modelling of growth, exogenous growth models, endogenous growth models with capital accumulation, technological progress through R&D and growth, growth models with learning-by-doing, diffusion of technology and growth, growth in open economy, and empirical studies of economic growth.

**EC6770 Graduate Research Seminar**

Modular Credits: 4

Workload: 3-1-0-2-4

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

This is a required module for all research Masters and Ph.D. students admitted from AY2004/05. The module provides a forum for students and faculty to share their research and to engage one another critically in discussion of their current research projects. The module will include presentations by faculty on research ethics and dissertation writing. Each student is required to present a formal research paper. Active participation in all research presentations is expected. The module may be spread over two semesters and will be graded "Satisfactory/Unsatisfactory" on the basis of student presentation and participation.

**EC6880 Topics in Economics**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): EC6220  
Cross-listing(s): Nil

This module is designed to cover selected topics in economics. The topics covered will be dependent on the interest and specialities of regular or visiting staff in the Department.

**EC6881 Advanced Topics in Microeconomics**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): Nil  
Cross-listing(s): Nil

This module is designed to enhance PhD students' knowledge and ability to understand the modern literature on decision theory and game theory. The aim of the module is to help PhD students to conduct research in game theory and economic theory.

**EC6882 Advanced Topics in Macroeconomics**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): Nil  
Cross-listing(s): Nil

This module deals with several important topics in macroeconomics. Topics include new growth theory, business cycles, unemployment, inflation and macroeconomic policy. The module introduces students to recent developments in these areas.

**EC6883 Advanced Topics in Applied Economics**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): Nil  
Cross-listing(s): Nil

The purpose of this module is designed to help PhD students to master the necessary skill to become successful economic researchers and modelers. The course covers advanced economic theories and its applications in various policy analyses. Topics include economic and econometric modeling, and empirical strategies in identifying causal relationship.

**EC6884 Behavioural and Experimental Economics**

Modular Credits: 4  
Workload: 3-1-0-2-4  
Prerequisite(s): Nil  
Preclusion(s): Nil  
Cross-listing(s): Nil

Behavioral economics stresses the need to incorporate psychological considerations into economic thinking. Experimental economics, including lab and field experiments, builds on the premise that theoretical implications are subject to testing in controlled laboratory settings. There is a natural synergy between them and neuroimaging and genetics leading to the development of neuroeconomics. This course covers the growing literature in behavioral and experimental economics, including neuroeconomics, and study individual differences in economic behaviour beyond those explicable by culture and socialization towards a deeper understanding of business and market behavior.

**ECA5101 Microeconomics**

Modular Credits: 4

Workload: 2-1-0-4-3

Prerequisite(s): Nil

Preclusion(s): EC5151, EC5101A

Cross-listing(s): Nil

This course is designed to provide students with a sound understanding of modern microeconomic theory. It will cover the aspects of microeconomic theory that are required to analyse contemporary economics issues and to create new models to explain the behaviour of individuals, firms, and markets, and to evaluate economic policies. The topics will include consumer and producer theories, analysis of risk and uncertainty, game theory and its applications in economics, general equilibrium, market failure and welfare economics. The course considers the problem of incomplete and asymmetric information in market interactions, including the issues of moral hazard, adverse selection, and signalling. The impact of government policies on economic activities will also be examined.

**ECA5102 Macroeconomics**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5152, EC5102A

Cross-listing(s): Nil

This subject covers topics in modern Macroeconomic Theory and Policy at the advanced level. The emphasis will be laid on recent advances in the theories about long-term growth and short-term business cycles, and in the related empirical and policy debates. The growth theory includes neo-classical growth models (particularly the Ramsey and overlapping-generations models), and various endogenous growth models with knowledge spillovers, human capital and R&D investment. We also consider income distribution, convergence, income ranking, and population ageing in the growth models. The business cycle theory includes the real-business cycle model and various New Keynesian models. The policy issues include national debt, social security, and monetary policies. It helps students understand the frontier debates in macroeconomics.

**ECA5103 Quantitative & Computing Methods**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5253, EC5304

Cross-listing(s): Nil

This is an applications-oriented introductory level module for students who do not have a sufficient training in econometrics. Students who have already completed modules at this level can opt for higher level econometric modules. Students will be provided with hands-on training in computer software such as SAS, EViews and Excel. The module covers probability distributions and statistical inference, matrix algebra, simple and multiple linear regression models, diagnostic testing, dummy variable regressions, time series econometrics including cointegration and error correction models.

**ECA5304 Machine Learning and Economic Forecasting**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

This module provides an introduction to machine learning and data mining methods for economics problems. The module will explain the core concept of well-known supervised learning algorithms including decision trees, neural networks, and support vector machines. Differences between these methods and econometrics methods will be discussed. This module will move on to explain unsupervised learning methods. Emerging topics, such as time series data mining, text mining or other methods for unstructured data mining, will also be covered. Examples, assignments, and the final project will be designed to help students learn using machine learning techniques to complement traditional econometrics analysis.

**ECA5305 Programming for Economists**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

The module will introduce students to practical approaches to handling data using R. Students will be introduced to R programming, and learn to load data (from small datasets to relational-database datasets), to clean and to transform the data for analysis. Next, students will learn to examine the data, which consists of summarizing the data, visualizing the data, and addressing data quality problems. After that, we will discuss different models to analyze the data. Among them are ordinary least square regression, time series, single-variable models, decision trees, nearest neighbor, naive Bayes models, linear and logistic regression models and clustering. We expect the course to equip the students with relevant data analyzing skills using one of the most programming languages. Students should be able to make use of the skills to transform the data, to make inferences from the data and to be able to communicate the results. Along the way, students will work with the different kinds of datasets, including economic data.

**ECA5313 Topics in Econometrics**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5253/EC5304/EC5103

Cross-listing(s): Nil

This module is designed to cover topics that are not covered under ECA5103 Quantitative and Computing Methods. Topics such as Bayesian econometrics, microeconometrics, panel regressions, limited dependent variable models, simultaneous equations models and macroeconomic modelling for forecasting and policy analyses are likely to be covered under this module.

**ECA5315 Financial Econometrics**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): EC5274/EC5333/ECA5333

Preclusion(s): EC5261, EC5315

Cross-listing(s): Nil

This module is designed to provide students with vigorous training in applied financial econometrics. It covers topics on characteristics of macroeconomic and financial data; basic concepts of linear and non-

linear time series models: stationary time series models, ARMA models; stochastic volatility models; GARCH models and diagnostic tests; value at risk analysis; and multivariate conditional time-varying models. Students are expected to do several computer-based projects.

**ECA5325 Project & Policy Evaluation**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5264/ EC5325, EC5216/ EC5324

Cross-listing(s): Nil

This module emphasises applied cost-benefit analysis. The module examines the theoretically correct approaches in the key areas and then focuses on the methods and practices in the application of cost-benefit analysis. Topics include investment criteria in the public sector, risk and uncertainty, valuing and identifying costs and benefits, shadow pricing, and the social rate of discount. In addition, students are expected to use cost-benefit analysis in a number of actual case studies.

**ECA5331 Open Economy Macroeconomics**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5270/EC5331

Cross-listing(s): Nil

This module aims to provide an understanding of some of the major issues in international finance. The module focuses especially on the policy-oriented aspects of the issues. Topics covered include the interdependence of fiscal, monetary and exchange rate policies, international capital movements, foreign exchange rate determination, European monetary integration, and the Euro, and international coordination of economic policies. A combined reading list of books and articles in this module will be distributed during the lectures.

**ECA5333 Financial Markets & Portfolio Management**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5274/EC5333

Cross-listing(s): Nil

This module is to offer a broad overview of financial assets traded in the money, options, and stock markets. It includes valuation of bonds and securities, analysis of options and futures contracts, asset pricing models and some applications.

**ECA5334 Corporate Finance**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): EC5274/EC5333/ECA5333

Preclusion(s): EC5269/EC5334

Cross-listing(s): Nil

This module provides a theoretical and practical treatment of corporate financial theory for students who have completed an introductory course in financial economics. Topics covered in this course will include: an overview of financial management; comparisons of financial and real investment; capital budgeting and valuing real assets and real options; risk and return of assets; capital structure and dividend policy, and mergers and acquisitions; applications of portfolio management techniques in corporate finance.

**ECA5335 Derivative Securities**

Modular Credits: 4

Workload: 2-1-0-1-4

Prerequisite(s): EC5274/EC5333/ECA5333

Preclusion(s): EC5260/EC5335

Cross-listing(s): Nil

The module provides an in-depth analysis of the theories and models that are essential to the understanding of contingent claims. The course covers topics on mathematics of financial derivatives, stochastic models of securities price movements, Black-Scholes analysis and risk-neutral valuation, analytical and numerical procedures for various option-embedded products. Students reading this module are expected to have some basic knowledge of options and futures.

**ECA5336 Financial Anomalies & Behavioural Finance**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): EC5274/EC5333/ECA5333

Preclusion(s): EC5275/EC5336

Cross-listing(s): Nil

This module studies the stock performance in world stock markets by using different approaches such as fundamental analysis, technical analysis, stock market imperfections and investors' behaviour, stock market information and events, etc. This module also studies the various models for stock returns as well as the viewpoints from theoreticians and practitioners in stock markets analyses. Certain traditional approaches to analyse stock market will be introduced. Students are required to read widely the literature and the current issues and research in order to have a better understanding of world stock market studies.

**ECA5337 Applied Financial Economics**

Modular Credits: 4

Workload: 0-3-0-4-3

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

The module studies how trading takes place in financial markets. We cover theoretical models and the associated empirical analysis employing game theory and econometric theory. We first analyse the movement of security prices by time series models. Second, we investigate various trading strategies adopted by market participants. To understand increasingly popular computerized trading, we cover programming and econometric software such as Excel VBA and R. Then, we examine three main types of theoretical models of trading: inventory models, sequential trading models, and strategic trading models. Finally, we study how trading rules and institutional details may lead to different trading processes. We expect the course will equip the students with skills for understanding and analysing how financial market works in both theory and practice. Students are expected to conduct empirical analysis with high frequency data to explain market outcomes. After the course, students should have a good understanding how trading rules may lead to different trading outcomes; and how people actually trade in financial market in real time. In particular, students will understand how the working process of a market affects the determinants of transaction costs, price, quotes, volumes and trading behaviour.

**ECA5341 International Trade & Finance**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5211/EC5341

Cross-listing(s): Nil

**Department of Economics, FASS, NUS**  
**Graduate Modules**

This is a Masters' level course on international trade and finance, open to both economics and non-economics graduate students. In the first half of the course, we will examine theories and empirics of trade, including Ricardian, Heckscher-Ohlin theories, and theories of trade under increasing returns, welfare implications of trade policy, and the political economy of trade policies. The second and monetary half of the course will focus on balance of payments, foreign exchange markets and open-economy macroeconomic policies. An emphasis will be placed on the implications of the theories and empirics for policy discussion.

**ECA5351 Public Finance**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5209/EC5351

Cross-listing(s): Nil

The main objective of the module is to gain appreciation of how economic theory can be used to analyse both the individual components of the fiscal system, such as effects of various taxes and expenditures, as well as the size and the behaviour of the government sector itself. The module encompasses the traditional, public choice and supply side approaches. While the main focus is on partial equilibrium analysis, wherever feasible or relevant, e.g., in incidence analysis, a general equilibrium approach is also included. The theory of social choice is also discussed.

**ECA5371 Economic Growth and Development**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5262, EC5263, IZ5201, EC5371

Cross-listing(s): Nil

This graduate module on economic growth and development is organised into three parts. Part 1 will survey alternative theories and approaches to economic growth and development. Part 2 will focus on development problems and strategies planning to poverty and income distribution, unemployment and rural-urban migration, agriculture, industry, trade and foreign resources. Part 3 will offer analysis of the development experiences of selected countries in ASEAN and East Asia.

**ECA5372 Big Data Analytics and Technologies**

Modular Credits: 4

Workload: 3-0-0-3-4

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

This module covers the concepts of big data, analytics and technologies. The main goal aims at managing and analysing a set of big data. Big data differs from traditional data, as the nature of big data is massive, unstructured, granular, and heterogeneous. Big data is produced by various digital resources and domains including smart phones with multiple sensors, a variety of digital media produced by various social media, and billions of on-line financial transactions. The topics of this module covers big data scalability and process, infrastructure, and analytics using Hadoop, HBase, MapReduce, R, in-database analytics, mining of data streams, etc.

**ECA5373 The Singapore Economy**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5205, EC5255, EC5373

Cross-listing(s): Nil

**Department of Economics, FASS, NUS**  
**Graduate Modules**

This module provides an in-depth study of Singapore's economic structure and development strategies in the context of a changing global and regional economic environment. It examines the various policy options available based on economic principles and theories. Thereby the course provides an opportunity for the application of theoretical concepts to the analysis of the Singapore Economy. Basic knowledge of micro and macro economics and applied economics such as development, public finance and monetary economics are very useful.

**ECA5374 The Modern Chinese Economy**

Modular Credits: 4

Workload: 2-1-0-3-4

Prerequisite(s): ECA5101/EC5101A/EC5151 or EC5101 or EC4101/EC4151 or EC5102 or ECA5103/EC5304/EC5253 or EC4152/EC4102

Preclusion(s): EC5271, EC5374

Cross-listing(s): Nil

This module aims to provide students with a basic understanding of the contemporary Chinese economic system and an analytical framework for the study of the modern Chinese economy. Through lecturing and class discussions on the literature, the students will develop the ability to comprehend the major theoretical and policy issues in China's economic development and transformation. They will also attain confidence in applying theoretical-quantitative approaches to the analysis of these issues.

**ECA5375 Economic Growth in East Asia**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5266, IZ5212

Cross-listing(s): IZ5212

This course is designed to enhance understanding of economic growth by analysing the experience of East Asian countries. By looking at both common and specific factors across the countries and related theoretical issues, it attempts to provide students with both analytical and realistic view on development process. The major topics include catching-up debate, comparisons of Asian models, the role of the state, industrial and trade policy, foreign direct investment, globalisation, and the Asian financial crisis.

**ECA5376 Auctions and Market Design**

Modular Credits: 4

Workload: 2-1-0-0-7

Prerequisite(s): ECA5101

Preclusion(s): Nil

Cross-listing(s): Nil

Modern market design principles are creatively and increasingly improving a range of economic and other systems. This module will cover the principles behind the design of markets and how they are actually applied. The first part introduces the theory of auctions and discusses how auctions for radio spectrum licenses, internet key search words and advertisements, and eBay work. The second part covers other types of systems which include applications that are as diverse as allocation of environmental permits, systems for matching medical interns to hospitals, partner matching (e.g., marriage), and facilitating kidney exchange. On completion of the module, students will:

- be able to apply economic principles of allocation and incentives to actively harness market forces to achieve specific goals in a broad range of markets
- have the knowledge of how a range of standard market design tools like auctions, matching rules, etc., work in different situations to allocate tangible and intangible assets

**ECA5381 Urban Economics**

Modular Credits: 4

Workload: 3-0-0-3-4

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

The module provides an overview of key urban economic theories, including increasing return and spatial equilibrium, urban transportation and urban forms, housing choices and residential externalities, and urban growth and public finance. These theories are then applied to the analysis of urban challenges, such as urbanization, land-use efficiency, housing affordability, and sustainable urban development. Students will be challenged to understand the various difficult issues faced by cities in developing as well as developed economies. They will learn to apply urban economic theories to analyse these challenging issues and to evaluate policy options for addressing these issues. The module equips students with key urban economic theories and their applications to the analysis of urban challenges, such as urbanization, land-use efficiency, housing affordability, and sustainable urban development.

**ECA5383 Environmental Economics**

Modular Credits: 4

Workload: 2-1-0-4-3

Prerequisite(s): ECA5101 Microeconomics

Preclusion(s): Nil

Cross-listing(s): Nil

This course examines the economics behind environmental issues and problems and policies designed to address them. Topics are focused on valuation of nonmarket goods, cost-benefit analysis, project selection, correcting market failures especially in the provision of public goods, the tragedy of the commons, and climate change. This class will provide students with the tools to understand how market inefficiencies might arise in the presence of externalities like pollution and how market solutions can correct market failures. We will study topics on pollution control, valuation of environmental amenities, natural resource management and cost benefit analysis. We will look at market mechanisms like cap and trade, as well as taxes and subsidies, as well as how to correct the under provision of public goods. A large part of the course will also look at climate change and its impact on the economy. This course requires some fieldwork.

**ECA5394 Cultural Economics**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5272/EC5394

Cross-listing(s): Nil

This Graduate Seminar Course places the episteme of economic ideas in a relativistic, socio-cultural context instead of viewing them as naturalistic universals. Issues of the core metaphysics of standard economic theory are then highlighted to underscore the plurality and provisionality of economic systems and ideals. The key discovery here is that social choices come heavily mediated by culture and institutional history and as such the course offers a novel perspective on the limits of economic theory when stripped of context.

**ECA5395 Political Economy of Globalisation**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): EC5213, EC5273/EC5395

Cross-listing(s): Nil

To familiarise advanced (graduate) students with comprehensive knowledge of the problems and prospects of the developing agenda of Globalisation in the twenty-first-century. The module will attempt to capture the socio-economic impact of the global restructuring currently under way with much emphasis on empirical and policy issues as they pertain to matters as diverse as migration, financial flows and the environment. The approach is comprehensive and examines the political economy—not just the economics—of the emergent processes. As such, institutional factors, traditionally omitted in more standard analyses, are factored in. The perspective of the module is also global with no special regional emphasis.

**ECA5396 Economics of Business and Law of Intellectual Assets**

Modular Credits: 4

Workload: 3-0-0-2-5

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

Evaluating and commercializing intellectual assets (IA) is important to seek capital source or cash for any entity who owns any form of IA like goodwill, branding, patent, trademark, copyright, trade secret, etc. The objective of this module is to examine the business context of IA, the legal aspects of IA that heavily affect its value, the financial principles and applications against which IA might be evaluated, and from which exploitation strategies might be derived. This module will equip financial and business professionals with critical understanding of IA valuation, IP management and exploitation strategy making, and economic principles underlying IP value.

**ECA5880 Topics in Applied Economics**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

The purpose of this module is designed to help students become comfortable and creative as economic researchers and modelers. The course teaches both the principles of microeconomic theory and the fundamental concepts in the various fields of applied microeconomics, such as health economics, public economics and labour economics. Students will learn how to use various economic tools to predict how various parties might respond to changes in public policies. The philosophy behind this course is learning by doing. By applying economic theories to analyze real world issues, students will strengthen their understandings of economic theories. By the end of this course, students should be able to assess the potential effect of hypothetical changes in the health care system on costs and access as well as on providers and consumers.

**ECA5881 Topics in Economic Policy**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

The purpose of this module is to introduce students to the application of economic theory to public policy. The emphasis will place on economic analysis of public policy. Topics include market failures and

government intervention, intellectual property right protection, taxation, income distribution, education, public goods, social security and health care. Students will have better understanding of the impact of various public policies and will be able to use the tools introduced in this module to do policy analysis.

**ECA5882 Topics in Applied Macroeconomics**

Modular Credits: 4

Workload: 3-0-0-4-3

Prerequisite(s): Nil

Preclusion(s): Nil

Cross-listing(s): Nil

This module applies the tools of macroeconomic analysis to analyze issues related to the determination of output, unemployment and inflation in the economy. It utilizes various economic frameworks and models for understanding macroeconomic developments and events. The module examines the applications of macroeconomic theory to policy in analysing the causes of macroeconomic events and their consequences. The students will learn to apply macroeconomic principles to analyze contemporary and historical macroeconomic developments. They will learn about the applications of macroeconomic theory to policy in using various economic models and framework for understanding and analyzing macroeconomic events, their causes and consequences. They will be provided with opportunities to enhance their reading and analysis as well as writing and presentation skills.

**ECA5884 Applied Behavioural Economics**

Modular Credits: 4

Workload: 2-1-0-2-5

Prerequisite(s): ECA5101, ECA5103

Preclusion(s): Nil

Cross-listing(s): Nil

This course provides an introduction to the field of behavioural economics. In the first part of the course, we will familiarize students with specific empirical problems of the standard model in economics, which assumes that individuals are fully rational, act consistently over time, and are strictly selfish. We will show how departures from these assumptions can be modelled and integrated into economics analysis. In the second part, we will show how this approach can be put to use. We will study how policy interventions can be made more effective, for example in resource conservation, retirement savings, and human-resource practices. In the first part of the course, students will gain an understanding for which types of decisions the standard model in economics systematically fails to describe human behaviour. They will learn how to model these behaviours, and know the relevant empirical literature. In the second part of the course, students will learn how to implement randomized controlled trials to evaluate and utilize the concepts developed in the first part of the course. The module equips students with a sense of the circumstances under which the standard economic model is going to make misleading predictions and makes them aware of the evidence. It complements the strong methodological component of the program by proposing simple ways to model departures from the standard model in economics. It also complements the applied side by putting a heavy emphasis on empirical applications and the design of behavioural interventions that can be used in the private or public sector.

(List updated on 1 Sep 2020)