

## English Courses – DEMI/DISES – University of Naples “Federico II”

Course Name	Department	CFU	Period	Degree	Course Structure
Organization of business network	DEMI	10	20 April - 6 June	Bachelor/ Master Degree	Totally English
International Accounting Principles	DEMI	12	16 September - 21 December	Master Degree	English educational material and assessment test
Strategic Management of Innovation	DEMI	12	17 February - 6 June	Master Degree	English educational material and assessment test
Innovation Law	DEMI	12	17 February - 6 June	Master Degree	English educational material and assessment test
Integrated Reporting	DEMI	6	16 September - 2 November	Master Degree	English educational material and assessment test
Business Combinations	DEMI	6	20 April - 6 June	Master Degree	English educational material and assessment test
Digital Marketing Trasformation	DEMI	6	20 April - 6 June	Master Degree	English educational material and assessment test
Service Innovation	DEMI	6	16 September - 2 November	Master Degree	English educational material and assessment test
Organizational Learning	DEMI	6	4 November - 21 December	Master Degree	English educational material and assessment test
Statistical Modelling for business	DEMI	6	17 February - 4 April	Master Degree	English educational material and assessment test
Innovation Policy	DEMI	12	16 September - 21 December	Master Degree	English educational material and assessment test
Business Planning	DEMI	12	16 September - 21 December	Master Degree	English educational material and assessment test
Sustainability management	DEMI	6	17 February - 4 April	Master Degree	English educational material and assessment test
Creazione di Impresa e start-up management	DEMI	6	4 November - 21 December	Master Degree	English educational material and assessment test
Diritto internazionale e comunitario dell'economia	DEMI	6	17 February - 4 April	Master Degree	English educational material and assessment test
Valutazione delle start-up e delle imprese innovative	DEMI	6	17 February - 4 April	Master Degree	English educational material and assessment test
Enterprise Risk Management	DEMI	6	16 September - 2 November	Master Degree	English educational material and assessment test
Creativity management	DEMI	6	16 September - 2 November	Master Degree	English educational material and assessment test
Blockchain management	DEMI	6	17 February - 4 April	Master Degree	English educational material and assessment test

Project based organization for innovation	DEMI	6	4 November - 21 December	Master Degree	English educational material and assessment test
Finance and business innovation	DEMI	6	20 April - 6 June	Master Degree	English educational material and assessment test
Advanced macroeconomics	DISES	12	23 March – 17 April	Master Degree	Totally English
Advanced microeconomics	DISES	12	23 March – 17 April	Master Degree	Totally English
Banking	DISES	6	4 May - 29 May	Master Degree	Totally English
Corporate Finance	DISES	6	23 March – 17 April	Master Degree	Totally English
Derivatives	DISES	6	23 March – 17 April	Master Degree	Totally English
Economic Theory	DISES	6	23 March - 17 April	Master Degree	Totally English
Economics of regulations	DISES	6	23 March - 17 April	Master Degree	Totally English
Financial econometrics	DISES	6	23 March - 17 April	Master Degree	Totally English
Financial economics	DISES	6	23 March - 17 April	Master Degree	Totally English
Law and Economics	DISES	6	23 March - 17 April	Master Degree	Totally English
Market microstructure	DISES	6	23 March - 17 April	Master Degree	Totally English
Mathematics for economics and finance	DISES	12	16 September - 2 November	Master Degree	Totally English
Econometrics	DISES	12	16 September - 2 November	Master Degree	Totally English
Economic Policy	DISES	10	20 April - 6 June	Bachelor Degree	Totally English
Introduction to econometrics	DISES	10	20 April - 6 June	Bachelor Degree	Totally English
Mathematics for economic analysis	DISES	10	23 September – 2 November	Bachelor Degree	Totally English

## Course Programs

### ❖ Organization of business networks

Projectification of contemporary business environment. Pluralism in Project Management research and practice. Structural alternatives in designing interorganizational project environments. Inter-firm industrial projects. Developing project competences in interorganizational settings. Temporary interorganizational projects: how temporal and social embeddedness enhance coordination and manage uncertainty. Managing inter-institutional projects: the significance of isochronism, timing norms and temporal misfits. The consequences of organizational fragmentation in contemporary project environments

**Assessment methods:** Only written exam

### ❖ International Accounting Standards

Accounting theory. Harmonization process. Withdraw and Endorsement. Main actors and political lobbying. Capital maintenance. Conceptual Framework. Financial Statements. Materiality Judgements. Property plant & equipment. Leasing. Impairment of assets. Intangibles. Revenue from Contracts with Customers. Employee benefits. Provisions. First-time Adoption of IFRS. Share-based Payment. Financial Instruments. Recognition, measurement and disclosures. Joint Arrangements. Fair Value Measurement. Earnings per Share. Capital maintenance.

**Assessment methods:** Only oral exam

### ❖ Strategic Management of Innovation

This course aims to deliver the concepts and methodologies needed to understand innovation and to strategically manage the processes of innovation. We will adopt an approach to the strategic management of technological innovation that emphasizes the primary role of knowledge and of the interpersonal and interorganizational networks wherein innovation develops.

The course is composed of three units. The first unit focuses on the concept of innovation and the dynamics of technological innovation. The second unit introduces a strategic perspective to innovation and innovation management, and deals with major issues related to the innovation strategy of a firm. The third unit focuses crucial organizational issues related to the implementation of an innovation strategy.

Unit 1:

What is innovation? – The social and economic importance of innovation – External and internal sources of innovation – Types and patterns of innovation – Dominant design, technological standards, and winner-takes-all markets – Entry timing

Unit 2:

Strategy, innovation, and competitive advantage – Choosing innovation projects – Collaboration strategies and knowledge networks for innovation – Capturing the value of innovation: the mechanisms to protect intellectual property.

Unit 3:

Organizing the processes of innovation – Managing the new product development process – Managing new product development teams.

**Assessment methods:** Only written exam

### ❖ Innovation Law

Industrial property law. Patents, standards and licenses for use. Utility models, inventions and drawings.

Competition law and intellectual property law. Antitrust law. The role of national and Community authorities.

Intellectual property in networks of companies. Start-ups and certified incubators. New techniques for raising capital through digital platforms. The rules applicable to equity-crowdfunding operations. The role of digital platforms in the sharing economy. The legal qualification of virtual currencies.

**Assessment methods:** Only oral exam

### ❖ Integrated Reporting

Theory of corporate disclosure: notions and theoretical perspectives; theory of corporate disclosure: determinants and effects of disclosure policies on the capital markets; integrated reporting: framework, guiding principles and information content; integrated reporting the impact on the company reporting system; intellectual capital: assessment and measurement of company performance; non-financial information: Sustainability Reporting; non-financial information: Total Tax Contribution Reporting; the role of the Chief Financial Officer (CFO); the NON-GAAP disclosure; discussion of case study and ad hoc analysis.

**Assessment methods:** Written and Oral exams

### ❖ Business Combinations

The definition of a business group; types of business groups.

The concept of “control” under local and international GAAP; the definition of consolidated financial statement; the consolidation area; the exclusion of subsidiaries from consolidation under local and international GAAP; the valuation of investments in subsidiaries excluded from the consolidation.

The consolidation methods under local and international GAAP; full consolidation for subsidiaries; proportional consolidation for joint ventures; synthetic consolidation for non-equity investments.

The consolidation theories; formal and substantial pre-consolidation transactions.

The elimination of intra-group operations; the elimination of intra-group profits.

The consolidation of equity investments; the consolidation differences; a comparison between local and international GAAP; accounting for goodwill.

Non-controlling interests under local and international GAAP; goodwill and non-controlling interests; the full goodwill method.

The consolidated financial statements in accordance with the local and international GAAP.

The preparation of the consolidated financial statements.

**Assessment methods:** Written and Oral exams

### ❖ **Digital Marketing Transformation**

Business transformation in the digital age. Digital Marketing (DM) and Social Media Marketing (SMM): scenario, trends and definitions. DM and SMM Plans. DM/SMM decisions and actions. DM and SMM Platforms. KPIs of digital investments and decisions.

**Assessment methods:** Written and Oral exams

### ❖ **Service Innovation**

Servitization paths for product businesses. Production and main service delivery models. Stage gate model, open innovation and practice-based approach. Introduction to service experience design. Intelligence for service design. Innovating the customer journey approach. Applying digital augmentation to service experience design. Big data and AI to design adaptive service. Service ecosystems. The social/collaboration dimension of the new services. Service innovation for business model innovation. The new competencies.

**Assessment methods:** Written and Oral exams

### ❖ **Organizational Learning**

Principles of Organizational Learning. Individual and collective knowledge. Knowledge and decision-making processes. Innovation and organizational learning. Tacit and explicit knowledge. Dynamic capabilities. Deliberate and emergent strategies. Learning and improvisation. Strategic Organization

**Assessment methods:** Only written exam

### ❖ **Statistical Modelling for business**

Multiple Regression. Maximum likelihood estimation. Choice model. Variable selection. Logit model. ROc Curve

**Assessment methods:** Only written exam

### ❖ **Innovation Policy**

Technical change: classical, neoclassical and neokeynesian interpretations. Key concepts: Science, Technology and Innovation; Invention and innovation; The sources of innovation. The different approaches to technical change: The origins of technical change; Technical progress and capital; Induced technical change; Specialization and imperfect competition; Cumulative causation; Endogenous technical change; Learning by doing; Investments in R&D.

Innovation policies: The role of institutions; Instruments and goals. Economic indicators: Applied analysis of economic indicators.

**Assessment methods:** Written and Oral exams

### ❖ **Business Planning**

Strategic business management. The performance management system and programming tools. The formalization of business plans. The distinctive features and purposes of the Business Plan. The structure of the Business Plan. The business plan and the corporate plan. The preparation of the qualitative section of the Business Plan. The business idea, the sector analysis and the explanation of the basic strategic guidelines. Market analysis and definition of the offer system. The elements of the production process and the explanation of the organizational structure. The preparation of the quantitative section of the Business Plan. The forecast of the expected results of operational and non-operational management. Financial planning. The forecast balance sheet. The purposes and structure of the Business Plan in start-ups. The analysis of the sector and the explanation of the business model for the preparation of the Business Plan in start-ups. The construction of the strategic map and business plan action plans in start-ups. The formulation of the expected results in the Start-up Business Plan. The articulation of the industrial plan. The explanation of the strategy implemented and the opportunity for a strategic rethink. The formulation of the proposed strategic project and related implementation actions. The elaboration of the economic-financial perspectives relating to the competitive strategies explained in the Industrial Plan. The preparation of the forecast economic accounts. The preparation of the pro forma balance sheets and the determination of the expected cash flows in the time horizon of the Business Plan. The appreciation of the convenience and financial sustainability of the plan. The sensitivity analysis in the Business Plan.

**Assessment methods:** Only oral exam

### ❖ **Sustainability management**

The fundamental principles of sustainability (economic, social, environmental). Corporate social responsibility and stakeholder theory. Circular economy. Sustainable business models. Sustainability analysis and measurement techniques. Stakeholder engagement practices. Empirical evidence of sustainable strategies. Corporate sustainability and finance. Sustainable marketing. Sustainability communication and reporting (the sustainability report). Social and environmental certifications.

**Assessment methods:** Written and oral exams

### ❖ **Creazione di impresa e start-up management**

Business creation techniques and economic tools. Business model design and management. Business acceleration and incubation. Innovative finance for start-up management. Analysis of successful start-up cases. Development of business projects.

**Assessment methods:** Only oral exam

### ❖ **Diritto Internazionale e comunitario dell'economia**

The international economic community: its distinctive features and elements with respect to state regulations. The subjects and actors of international economic law (States, international organizations, natural persons, legal persons, multinational companies). The sources of international economic law and the introduction of international standards in state laws.

**Assessment methods:** Only oral exam

### ❖ **Valutazione delle start-up e delle imprese innovative**

Company valuation principles. Income, equity, financial and multiples method. Venture capital method. The real options method. The evaluation in the perspective of industrial investors and financial investors. Evaluation case studies of successful start-ups and innovative companies.

**Assessment methods:** Oral exam and project work

### ❖ **Enterprise risk management**

Introduction to Enterprise Risk Management (ERM): definitions, types of risk and the possibility to manage it, concepts of risk identification, risk assessment, risk appetite, risk capacity, risk limit, etc.; the Enterprise Risk Management: purpose, objectives, added value. The evolution of the Enterprise Risk Management models. The implementation of the Enterprise Risk Management. Enterprise Risk Management and Corporate Governance. Enterprise Risk Management and Organization. Enterprise Risk Management and Performance. Enterprise Risk Management and Disclosure. Enterprise Risk Management in professional companies. Enterprise Risk Management and Knowledge Management. Enterprise Risk Management and Innovation. Enterprise Risk Management and Technology. Enterprise Risk Management and new risks.

**Assessment methods:** Oral exam and project work

### ❖ **Creativity management**

Notions of triune brain psychology of creativity. The "cognitive" development of creativity. The "limbic" development of creativity. The "primitive" development of creativity. Discovery skills and innovation DNA. Techniques for cognitive creativity: Design and Divergent Thinking; Scamper Model; Brain Storming; Absurdity technique, Irrelevance. Techniques for the development of limbic creativity: Metaphors and Analogies. Techniques for the development of archaic and profound creativity: sense making, telling stories, paths of faith (inner journey) and drama. The selection and testing of creative ideas.

**Assessment methods:** Oral exam and project work

### ❖ **Blockchain management**

Peculiarities and innovations related to blockchain technology and related technologies; managerial implications of the diffusion of these technological innovations in the management processes of supply and distribution chains. Analysis of empirical evidence with reference to the logistics-distribution chains of ready-to-wear, agri-food, the distribution of drugs, the management of cyber-security and the fight against criminal financial laundering operations.

**Assessment methods:** Only oral exam

### ❖ **Project based organization for innovation**

Organizational theories on temporary and project-based organizations. Organizational theories on project-based innovation processes. Operational tools for managing complex projects in areas related to innovation. Analysis and resolution of case studies on the course topics.

**Assessment methods:** Only written exam

### ❖ **Finance and business innovation**

The economy of innovation. The role of innovation in economic theory and in the current economic context. The factors of innovation development. The characteristics of innovative processes. The financing of innovation. Financial analysis of innovative processes. The financial system and the financing of innovation: the role of financial intermediaries. The financial system and the financing of innovation: risks and evaluation models.

**Assessment methods:** Written and oral exams

### ❖ **Advanced Macroeconomics**

The Solow growth model. The Ramsey-Cass-Koopmans model. The Diamond models. Cross country income differences. Consumption under uncertainty: permanent income/random walk hypothesis. Investments: a model of investment with adjustment costs, Tobin's Q. Real business cycle theory: a baseline Real-business Cycle model. Inflation and monetary policy: inflation money growth and interest rates, the dynamic inconsistency of low-inflation monetary policy, addressing the dynamic inconsistency problem.

The second part of the course covers the basic real business cycle model and then moves to New-Keynesian models. It discusses the microeconomic foundations of nominal rigidities, analysing models of imperfect information and models of imperfect competition with menu costs and real rigidities. Finally, we discuss unemployment fluctuations and cycles driven by self-fulfilling expectations in non-walrasian models with coordination failures and multiple equilibria.

**Assessment methods:** Only written exam

### ❖ **Advanced Microeconomics**

Preference and choice: preference relations, choices rules, the consumption set, competitive budgets, demand functions and comparative static. Preference and utility. The utility maximization problem. The expenditure minimization problem. Duality. Indirect utility and expenditure function. Integrability. The weak axiom of revealed preferences. The strong axiom of revealed preference. Welfare evaluation and economic changes. Aggregate demand and wealth. Production: production set, profit maximization and cost minimization, efficient production. Choice under uncertainty: expected utility theory, money lottery and risk aversion, state dependent utility. Monopoly. Oligopoly. General equilibrium theory: pure exchange, Edgeworth box, consumer-producer economy.

The course will focus on Economics of information. One economic agent has often more information about a characteristic that is relevant to an agreement, than the other. In this module, we will study how agents deal with this information asymmetry by designing incentives and embedding them in contracts. We will also study the effects of information asymmetry on the prevailing market equilibrium. Applications of the theory include insurance, labour economics, industrial economics.

By the end of the module, students should be familiar with the different types of information asymmetries and their consequences in contract design and market equilibrium and should be able to solve principal-agent models using appropriate mathematical techniques.

Topics:

Introduction

The types of asymmetric information

The basic principal agent model; Description of the model; Symmetric information contracts

The moral hazard problem; The case when the agent chooses between two effort levels; Continuous effort; Applications

The adverse selection problem; A model for one principal and one agent; When principals compete for agents; Applications

**Assessment methods:** Only written exam

### ❖ **Banking**

Banking is an ever expanding field of theoretical and empirical research in economics. The purpose of the course is to provide an introduction to the economics theory of banking and to discuss some empirical issues. Pre-requisites are a basic knowledge of game theory, contract theory, industrial organization and econometrics. The course covers four main topics: the role and function of financial intermediaries; Bank-firm relationships; Credit market competition and bank stability; Bank regulation.

Following the program: 1. Bank and development. 2. Theory of financial intermediaries. 3. Direct versus indirect debt. 4. Asymmetric information, credit allocation and credit rationing. 5. Competition in credit markets and bank fragility. 6. Relationship banking. 7. Bank organization and the spatial structure of credit markets. 8. Banking regulation.

**Assessment methods:** Only written exam

### ❖ **Corporate Finance**

Capital structure theory with symmetric information: valuation of the firm, M&M propositions, M&M with taxes, M&M with taxes and bankruptcy, Miller equilibrium, DeAngelo and Masulis model. Capital structure with asymmetric information: credit and equity rationing, role of collateral, optimal capital structure with agency costs. Corporate governance. Dividend policy theory: dividend indifference, types of dividend policy, tax effects, signalling theories of dividend policy. Initial Public Offerings: IPO underpricing.

**Assessment methods:** Only written exam

### ❖ **Derivatives**

Forward contracts. Futures contracts. Options. Other derivatives. Hedging strategies using futures: minimum variance hedge ratio. Stock index futures. Interest rate markets: zero rates, bond pricing, forward rates, forwards rates agreements. Theories of term structure. Treasury bond futures. The LIBOR zero curve. Duration, duration based hedging strategies.



Swaps: swap quotes and LIBOR zero rates, valuation of interest rate swaps, valuation of currency swaps. Mechanics of option markets: specification of stock options, trading commissions and margins, taxation. Warrants, executive stock options and convertibles bonds. Properties of stocks options: factors affecting options prices, put-call parity, effect of dividends. Trading strategies involving options: strategies involving a single option and a stock, spreads, combinations. Binomial trees: risk neutral valuation. Models of behaviour of stock prices: Markov property, continuous time stochastic process, process for stock prices, Itô's Lemma. Lognormal property of stock prices. Distribution of the rate of return. Derivation of the Black-Scholes-Merton differential equation, Black-Scholes pricing formula, cumulative normal distribution functions, options pricing formulas. Currency options. "The Greeks": Delta, Theta, Gamma, Rho, Vega.

**Assessment methods:** Only written exam

### ❖ Economic Theory

- Overview of Individual Decision-Making.: Preference relations. Basic assumptions on preference relations. Strict and indifference relations. Utility functions. Choice rules. Weak Axiom of revealed preference (WARP). The relationship between preference relations and choice rules.
- Utility Maximization Problem and Expenditure Minimization Problem: Basic assumptions on utility functions. Marshallian and Hicksian demands: existence of solutions (Extreme Value Theorem) and uniqueness. Relationship between Marshallian demand and Hicksian demand. Characterization of a solution (Karush-Kuhn-Tucker necessary and sufficient conditions). Comparative statics: differentiability of Marshallian and Hicksian demands (Implicit Function Theorem).
- Implications of the Implicit Function Theorem in terms of derivatives: Expenditure function. Hicksian demand: properties of its derivatives. Marshallian demand: properties of its derivatives. Generalized Slutsky equations.
- Revealed Preferences: Generalized Axiom of Revealed Preference (GARP) and Afriat's theorem.
- Overview of an equilibrium model: General formulation: agents, actions, environmental/institutional parameters (individual and social parameters), payoffs, environmental/institutional constraints (individual and social constraints). Equilibrium: individual behavior and social consistency. Specific formulation: individuals/consumers, consumptions of goods, endowments and market prices, utility functions, budget constraints, feasibility. Competitive equilibrium: consumer's behavior and market clearing conditions.
- Pareto Optimality: Pareto efficiency. The First Fundamental Theorem of Welfare Economics. Characterization of a Pareto optimal allocation in terms of Karush-Kuhn-Tucker conditions associated to a Pareto optimality problem. The Second Fundamental Theorem of Welfare Economics.
- Existence of a competitive equilibrium: Two approaches.
- Regular economies: Definition of a regular economy. The importance of regular economies: comparative statics and testable restrictions. In the presence of imperfections (incomplete markets, public goods, externalities): regular economies towards Pareto improving policies. Theorem: Almost all economies are regular. Proof of the theorem (Regular values and Transversality Theorem).

**Assessment methods:** Only written exam

### ❖ Financial Econometrics

The main purpose of the course is to provide an introduction to estimation and testing of dynamic causal effect, by using time series and panel data. The pre-requisites include a good knowledge of the OLS estimator under classical assumption and a basic knowledge of the IV estimator.

The Rubin causal model, random assignment and field experiments

Regression Recap and Limited dependent variables

Conditional Independence Assumption and Matching

Fixed effects and Difference-in-differences

Instrumental variables: heterogeneous potential outcomes

Regression Discontinuity Design

Event study and causal effect; Models with unobservable characteristics; Strict exogeneity; Inference in short panel

DGP and time series; Weak dependence and stationarity: WLLN and CLT; Testing the mean and the serial correlation of DGP; MA and AR

Regression analysis and serial correlation; Neglecting serial correlation; The Newey-West approach

Dynamic causal effect; The CO approach: static vs. dynamic model; Finite and infinite distributed lag models; Model specification and lagged dependent variable

Stationary VAR; Difference-stationary process; Impulse response functions

Introduction to non-stationary process: Unit root process, Dickey-Fuller test, Cointegration.

**Assessment methods:** Only written exam

### ❖ Financial Economics

Functions of financial markets. Model of consumption and investment choice in autarchy and with perfect financial markets: Fisher's separation theorem. Consumption and investment with imperfect financial markets. Choices under risk: expected utility, attitudes to risk, risk premium, HARA utility, comparing risk (first order stochastic dominance, second order stochastic dominance). Intertemporal choice under uncertainty and asset pricing: introduction. Contingent claims markets: law of one price, arbitrage, complete markets and state prices, relation between state prices and asset prices, equilibrium state prices, risk neutral probabilities. Mean-variance analysis: efficient frontier with N risky assets, two-fund separation theorem, tangency portfolio, market equilibrium (CAPM) without and with a riskless asset, extensions of the static CAPM. Consumption-based asset pricing: Merton's intertemporal CAPM, Lucas model, equity premium puzzle. Empirical evidence: testing the CAPM and the CCAPM. Bond pricing and term structure of interest rates. Market efficiency and investor rationality.

**Assessment methods:** Only written exam

### ❖ **Market Microstructure**

The topic of the course is liquidity and price formation on securities markets. The structure and performance of prominent real-world securities markets is described and examined using relevant theory and evidence from the financial economics literature. The course focuses on stock market microstructure, that is, secondary market trading strategies and trading costs; how trading on stock exchanges is organized and regulated, and how this affects their functioning in terms of trading costs, international efficiency, volatility and other measures of performance. The impact of differences in trading system architecture and regulatory policies is considered. Explicit attention is also given to the relationship between market liquidity and asset prices, highlighting the role of the liquidity of the secondary market in determining the cost of new capital.

**Assessment methods:** Only written exam

### ❖ **Mathematics for Economics and Finance**

Homogeneous functions and Euler's formula. Continuous functions and compact sets. Concave and quasi concave functions. The implicit function theorem. Convex sets and separating hyperplanes: separating hyperplanes theorem, supporting hyperplanes theorem. Difference equations. Unconstrained maximization: local and global maximizer (minimizer), maximization theorems. Constrained maximization: the Lagrangian function and constraints qualification, Lagrange multipliers. Inequality constraints: Kuhn Tucker conditions. Comparative statics. Differential equations and systems of differential equations. Dynamic maximization: the calculus of variations and its applications to economic models, Euler equation of maximization problems. Control theory and applications to economic models.

Simultaneous moves games. Games in strategic form, dominant strategy equilibrium, iterated deletion of strictly dominated strategies. Reaction functions and Nash equilibrium. Finding Nash equilibria with both discrete and continuous action spaces. Supermodular and submodular games. Mixed strategies, domination by a mixed strategy and never-best-response. Rationalisability. Games in extensive form. Backward induction and information sets, Subgame perfect Nash equilibrium. Repeated games. Folk theorems. Collusion. Imperfect Information and incomplete information. Risk dominance. Forward induction. Bayesian Nash Equilibrium. Purification. Sequential rationality, consistency of beliefs and perfect Bayesian Nash Equilibrium. Signalling: separating equilibria and pooling equilibria. Spence Signalling Model.

**Assessment methods:** Only written exam

### ❖ **Econometrics**

The course is an introduction to the classical statistical inference theory.

The first half of the course is devoted to Probability theory. Topics include: Elements of set theory. Axiomatic definition of probability. Calculus of probability. Conditional probability and Bayes Theorem. Discrete and continuous random variables. Common Family of distributions, Hierarchies and Mixtures. Bivariate Random variables. Transformations and Convolution Integral.

The second part of the course is devoted to Inference. Topics include: Sampling and sampling distribution. Principles of data reduction (sufficiency, Likelihood). Point and interval estimation (methods to find estimators and properties of the estimators). Hypothesis testing. Asymptotic Theory. Linear regression models. The very last lectures are devoted to an introduction to the use of Stata for applied economic research.

Classical multiple linear regression model: ordinary least squares (OLS), goodness of fit and analysis of variance. Finite sample properties of the OLS estimator: unbiased estimation, variance of the OLS estimator and the Gauss Markov theorem. Estimation of the variance of the least square estimator. Normality assumptions and basic statistical inference. Data problems: multicollinearity and missing observations. Large sample properties of the OLS estimator: consistency, asymptotic normality, asymptotic efficiency. Instrumental Variables and Hausman's specification test. Inference and Prediction. Tests for structural change: dummy variables, partitioned regression. Specification analysis and model selection: irrelevant variables and omission of relevant variables. Nonspherical disturbances and generalized regression model: GLS and FGLS. Heteroskedasticity: inefficiency of OLS, estimated covariance matrix of the parameters, Generalized Method of Moments (GMM), estimation of the heteroskedastic regression model, testing for heteroskedasticity. Serial Correlation: disturbance processes, testing for autocorrelation; models with lagged variables.



**Assessment methods:** Only written exam

### ❖ Economics Policy

The Module provides students with the economic knowledge to enable them to understand major policy issues in the twenty-first century. By the end of module, the student should have an understanding of theoretical economic models and their implications for economic policy, mainly macroeconomic and labor market policies; to apply an analytical framework to explain the effects of monetary and fiscal policy on macroeconomic performance, economic crises, financial and fiscal stability, and income and wage distribution.

**Assessment methods:** Only written exam

### ❖ Mathematics for economic analysis

Vector spaces. The space  $R^n$  and the geometric representation of  $R^2$  and  $R^3$ . The set of matrices  $2 \times 3$ . Definition of vector space and vector subspace. Examples and basic properties. Linear dependence and linear independence. Spanning set. Basis and dimension. Standard bases. Vector spaces of matrices; null space, row space and column space. Vector spaces of polynomials. Euclidean vector spaces. Inner product; norm of a vector; orthogonal vectors; orthonormal bases. Complex numbers. Eigenvalues and eigenvectors. Definition of eigenvalue, eigenvector, eigenspace. Basic properties. Computation of eigenvalues and eigenvectors; examples. Symmetric matrices and their properties. Similar matrices. Diagonalization. Powers of diagonalizable matrices. An application to networks: the eigenvalue centrality and Google Page Rank. Quadratic forms. Definitions and classification. Identification criteria. Unconstrained optimization. Elements of point set topology: interior point, open sets, closed sets, bounded sets and compact sets. Local extrema, first order conditions, second order sufficient conditions and second order necessary conditions: definitions, statements, remarks and examples. Convex and Concave functions. Definitions and properties. Characterizations. Examples and applications. Quasi-convex and quasi-concave functions: definitions and properties. Integral calculus. Definitions, area and integrals, examples and applications, the fundamental theorem of calculus, integration techniques. Linear differential equations with constant coefficients of order  $n$  and homogeneous systems of linear differential equations with constant coefficients. Definitions. Initial value problems. The existence and uniqueness of solutions. General solutions and particular solutions. The general solution for a non-homogeneous equation. The general solution for an homogeneous equation: the characteristic equation. Particular solutions for some non-homogeneous cases. Linear differential equations with variable coefficients and some examples of non-linear differential equations. The variation of parameters method.

**Assessment methods:** Only written exam