

GENERAL INFORMATION

| Course information | |
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| Name | Economy of the Electric Power Industry |
| Code | ECO |
| Degree | Master in the Electric Power Industry (MEPI) |
| Year | 2022-23 |
| Semester | 1 st |
| ECTS credits | 6 ECTS |
| Type | Required |
| Coordinator | José Pablo Chaves Ávila |

| Instructor | |
|--------------|--|
| Name | José Pablo Chaves Ávila |
| Department | IIT |
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| Instructor | |
|--------------|--|
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| Instructor | |
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| Name | Ignacio Martinez del Barrio |
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| Instructor | |
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| Name | Eloy Prieto Monterrubio |
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| Instructor | |
|--------------|---------------------------------------|
| Name | José Luis Castro Pérez-Manzucó |
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DETAILED INFORMATION

| Contextualization of the course |
|---|
| Contribution to the professional profile of the degree |
| The objective of the course is to become familiar with electric power systems' microeconomic, strategy and financial fundamentals. The concepts presented in this course will set the foundations for properly understanding stakeholders' decision-making processes in the electricity industry. |
| Prerequisites |
| There are no prerequisites for this course. The course assumes the student is not familiar neither with microeconomics nor with financial analysis. |

CONTENTS

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| Contents |
| Theory |
| Chapter 1. Microeconomic Analysis of the Electric Power Industry |
| <ul style="list-style-type: none"> 1.1 Demand and supply 1.2 Centralized context 1.3 Perfect competitive markets 1.4 Monopoly 1.5 Oligopoly |
| Chapter 2. Financial Statements Analysis |
| <ul style="list-style-type: none"> 2.1 Financial statements. Structure of balance sheet and income statement 2.2 Balance sheet analysis: assets, equity and liabilities 2.3 Income statement analysis: revenues & expenses 2.4 Cash flow statement analysis 2.5 Case study |
| Chapter 3. Costs and Return Analysis |
| <ul style="list-style-type: none"> 3.1 Economic and Financial Return. Value Creation and Financial Leverage. 3.2 Economic and Financial Analysis. Ratios. 3.3 Case studies.Regulation impact on economic and financial analysis (I). 3.4 Case studies.Regulation impact on economic and financial analysis (II). |
| Chapter 4. Electricity Industry Financing |
| <ul style="list-style-type: none"> 4.1 Objectives of the Company and Financial Policies. 4.2 Cost of Capital. Optimal financial structure 4.3 Financial needs and working capital management 4.4 Alternatives for financing. Financial Risk analysis and risk management 4.5 Project Financing 4.6 Analysis and valuation of electricity companies by financial markets |
| Chapter 5. Strategy in the Electricity Sector |
| <ul style="list-style-type: none"> 5.1 Introduction to strategy in the electric power industry 5.2 Business models in the electricity industry 5.3 Build, borrow or buy a framework 5.4 Case presentations |

| Competences and Learning Outcomes | |
|---|--|
| Competences | |
| Basic Competences | |
| CB2 | Being able to apply and integrate the knowledge, their comprehensiveness, the scientific founding, and their abilities to solve problems in new environments and defined in an imprecise manner, including multidisciplinary contexts as highly qualified researchers and professionals. |
| Specific Competences | |
| CE7 | Being able to transfer theoretical concepts of Microeconomics to the study and analysis of the real markets. |
| CE8 | Understand the accounting and financial regime of a company and know the general mechanisms for settlement of the sector. To be able to realize the investment analysis in an electricity company and understand the main aspects of strategic management of the sector. |
| Learning outcomes | |
| By the end of the course, students should be able to: | |
| LO1. | Understand the drivers behind demand and supply behaviour. |
| LO2. | Understand the efficiency gains a market environment can achieve, |
| LO3. | Understand why the market does not always do its job. In this respect, the student will be able to identify the most relevant market failures affecting electricity markets |
| LO4. | Understand the most relevant financial concepts, with a particular focus on the electricity industry. |
| LO5. | Use some well-known techniques and methods aimed to analyze electricity companies' financial position. |
| LO6. | Understand the electricity company's strategy |

TEACHING METHODOLOGY

| General methodological aspects of the course | |
|---|----------------------|
| Classroom Methodology: Activities | Competences |
| Lectures. Description of the course contents and open discussion of concepts. The students also have to try to respond to the numerous questions posed by the instructors throughout the lecture (54 hours). | CB2, CE7, CE8 |
| Oral presentations. The students have to discuss the most relevant aspects of their work (6 hours). | CB2 |
| Tutorial activities. Available according to the need of the student. (5 hours) | CB2, CE7, CE8 |
| Non-Classroom Methodology: Activities | Competences |
| The classroom activity should be complemented by the individual student work performed out of class. | |
| Personal study. Study of the course contents (90 hours). | CB2, CE7, CE8 |
| Term task. The student has to apply the theoretical concepts reviewed in class real cases (25 hours). | CB2 |

GRADING

There are five blocks in the course. Each of these blocks has a different instructor and a different grading system (described below). The total grade of the course will be the weighted average of the five parts, where each part gives weights in the weights of sessions.

To pass the course in the regular assessment period, a minimum grade of 3,5 (out of 10) in each of the five parts will be needed, and an average equal to or above 5.

In case the student does not pass the course, the final grade in the regular assessment period will be the lowest of the five marks, and the student will have to retake all the blocks with less than 5 points (the grade corresponding to blocks with 5 or more points will be maintained). After the retake, the total grade of the course will again be the weighted average of the five parts, where each part gives weights concerning the sessions.

3.1 Grading in the regular assessment period:

Block 1: Microeconomics

| Evaluation activities | Evaluation Criteria | Weight |
|---|--|-------------|
| <u>Exams</u> Exams are a combination of short questions, multi-option tests and problems. | <ul style="list-style-type: none"> - Concept understanding - Application of concepts to the solution of practical problems | 90 % |
| <u>Participation in the class</u> | <ul style="list-style-type: none"> - Contribution to the class discussions | 10% |

Block 2: Financial Statements Analysis

| Evaluation activities | Evaluation Criteria | Weight |
|---|---|------------|
| <u>Exam</u> Exams are a combination of short questions, multi-option tests and problems. | <ul style="list-style-type: none"> - Concept understanding - Application of concepts to the solution of practical problems | 80% |
| <u>Participation in the class</u> | <ul style="list-style-type: none"> - Contribution to the class discussions | 10% |
| <u>Business case</u> <ul style="list-style-type: none"> • Analysis of a real business case. | <ul style="list-style-type: none"> - The team task will be evaluated based on the quality of the analysis and the application of the concepts introduced in class. | 10% |

Block 3: Cost and Return Analysis

| Evaluation activities | Evaluation Criteria | Weight |
|-----------------------|---------------------|--------|
|-----------------------|---------------------|--------|

| | | |
|--|--|-------------|
| <u>Exam</u> Exams are a combination of short questions and multi-option tests. | <ul style="list-style-type: none"> - Concept understanding - Application of concepts to the solution of practical problems | 90 % |
| <u>Participation in the class</u> | <ul style="list-style-type: none"> - Contribution to the class discussions | 10% |

Block 4: Electricity Industry Financing

| Evaluation activities | Evaluation Criteria | Weight |
|--|--|-------------|
| <u>Exam</u> Exams are a combination of short questions, multi-option tests and problems. | <ul style="list-style-type: none"> - Concept understanding - Application of concepts to the solution of practical problems | 90 % |
| <u>Participation in the class</u> | <ul style="list-style-type: none"> - Contribution to the class discussions | 10% |

Block 5: Strategy in the Electricity Sector

| Evaluation activities | Evaluation Criteria | Weight |
|--|---|------------|
| <u>Participation in the class</u> | <ul style="list-style-type: none"> - Contribution to the class discussions | 35% |
| <u>Business case</u> | <p>The final case presentation will be evaluated from two points of view:</p> <ul style="list-style-type: none"> - The quality of the analysis itself, the clarity and the comprehensiveness of the assessment. - The oral presentation of the work, the way the students build up their discussions and their ability to back their proposals and respond to the questions received. | 65% |

Overall course grading

| Evaluation activities | Evaluation Criteria | Weight |
|---|--|------------|
| <u>Exams</u> Exams are a combination of short questions, multi-option tests and problems. | <ul style="list-style-type: none"> - Concept understanding - Application of concepts to the solution of practical problems | 70% |

| | | |
|--|---|------------|
| <u>Participation in the class</u> | - Contribution to the class discussions | 15% |
| <u>Business case</u> Analysis of a real business case. | - The team task will be evaluated based on the quality of the analysis and the application of the concepts introduced in class. | 15% |

3.2 Retake

| Retakes |
|--|
| <p>In case the student does not pass the course in the regular period, she/he will have to retake all blocks. The dates of the retake evaluation period will be agreed with the course coordinator. The grading system of each block in the retake is described below.</p> <p>Each of the five chapters (parts) will have the following grading system in the corresponding retake:</p> <ul style="list-style-type: none"> • Block 1 (Microeconomics): exam (100%) • Block 2 (Financial Statements Analysis): exam (100%) • Block 3 (Cost and Return Analysis): exam (100%) • Block 4 (Electricity Industry Financing): exam (100 %) • Block 5 (Strategy): case presentation (100 %). <p>A minimum grade of 5 out of 10 points (the grade corresponding to the blocks with 5 or more points in the regular period will be maintained to compute the average).</p> |

WORK PLAN AND SCHEDULE¹

| Class | Content |
|-------|---|
| 1 | Introduction to the course - Introduction to Microeconomics |
| 2 | Microeconomic analysis of the electric power industry - Demand and supply (i) |
| 3 | Microeconomics analysis of the electric power industry - Demand and Supply (ii) |
| 4 | Microeconomics - Centralized context (i) |
| 5 | Microeconomics - Centralized context (ii) |
| 6 | Microeconomics - Perfect competitive markets |
| 7 | Monopoly |
| 8 | Test |
| 9 | Economic and Financial Return. Value Creation and Financial Leverage |
| 10 | Economic and Financial analysis. Ratios |

¹ A detailed work plan of the subject can be found in the course summary sheet (see the last pages).

- 11 Case studies
- 12 Generation and distribution costs. Discounted cash flow valuation.
- 13 Financial statements. Structure of balance sheet and income statement.
- 14 Balance sheet analysis: assets, equity and liabilities
- 15 Income statement analysis: revenues & expenses
- 16 Cash flow statement analysis
- 17 Case studies
- 18 Intro. Objectives and financial policies
- 19 Financial needs and working capital management
- 20 Cost of capital. Optimal financial structure
- 21 Alternatives for financing. Risk management (1/2)
- 22 Risk Management (2/2). Project Finance and non-recourse debt
- 23 Industry Valuation. Analysis of electricity industry by Financial Markets
- 24 Exam Finance
- 25 Introduction to strategy in the electric power industry
- 26 Value innovation. Business plan
- 27 Strategy in the electric power industry (1)
- 28 Strategy in the electric power industry (2)
- 29 Strategy in the electric power industry (3)
- 30 Case presentations

SCHEDULE

| SUMMARY OF WORKING HOURS OF THE STUDENT | | | |
|---|-------------------------------|----------|---------------|
| CLASSROOM HOURS | | | |
| Lectures | Oral presentations | | |
| 54 | 6 | | |
| NON-CLASSROOM HOURS | | | |
| Personal study | Personal work in case studies | Tutoring | |
| 95 | 25 | 5 | |
| ECTS CRÉDITS: | | | 6 (180 hours) |

BIBLIOGRAPHY

| Basic bibliography |
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| <ul style="list-style-type: none"> Presentations provided by the instructors |
| Complementary bibliography |
| <p>Microeconomics</p> <ul style="list-style-type: none"> 2013, I.Pérez-Arriaga "Regulation of the Power Sector". Chap. 2, "Power System Economics", M.Ventosa, P.Linares, I.Pérez-Arriaga 1986, Samuelson and Nordhaus, "Economics" 2005, Viscusi, Harrinton & Vernon "Economics of Regulation and Antitrust" 1992, Varian, "Microeconomic Analysis" |

- 1990, Tirole, "The Theory of Industrial Organization"

Financial Analysis

- 1999, G. Bennett Stewart III "The Quest for Value"
- 2010, McKinsey & Company, "Valuation, Measuring and Managing the Value of Companies".
- 2000, Richard A. Brealey and Stewart C. Myers, "Principles of Corporate Finance".
- Aswath Damodaran, "Applied Corporate Finance: A User's Manual".
- 2003, Anthony Rice, "Account Demystified", Pearson's education

Strategy

- 2008, David J. Collis and Michael G. Rukstad, "Can You Say What Your Strategy Is?" HBR 2008
- 2004, W. Chan Kim, Renée Mauborgne, "Value Innovation - The Strategic Logic of High Growth", HBR 2004
- 2007, Robert S. Kaplan and David P. Norton "Using the Balanced Scorecard as a Strategic Management System", July–August 2007
- 2003, Paul M. Healy and Krishna G. Palepu Paper, "The Fall of Enron", Journal of Economics Perspectives, Volume 17, Number 2. (Spring 2003), pp. 3-26; Up to page 10
- 2010, McKinsey, "The five types of successful acquisition", McKinsey on Finance Number 36, Summer 2010

WORK PLAN (i/ii)

| Week | h/w | Class | Content | In-class activities | | h/w | Out of Class activities | | | Learning outcomes | |
|------|-----|-------|--|-----------------------------|---------------|-----|-------------------------|-----------------|-------------------------------------|-------------------|--|
| | | | | Lecture and problem solving | Assessment | | Self-study | Problem solving | Individual and in-group assignments | Learning outcomes | Description |
| 1 | 4 | 1 | Introduction to the course - Introduction to Microeconomics | | | 6 | Review and self-study | | | LO1 | Introduction to the course |
| | | 2 | Demand and supply (i) | | | | | | | LO1 | Introduction to Economics and to general principles of Microeconomics |
| 2 | 4 | 3 | Demand and supply (ii) | | | 6 | Review and self-study | | | LO1 | Understand supply and demand diagrams Introduce demand and supply elasticity. Consumer and producer surplus |
| | | 4 | Economics in the centralized context (i) | | | | | | | LO1 | Understand supply and demand diagrams Introduce demand and supply elasticity. Consumer and producer surplus |
| 3 | 4 | 5 | Economics in the centralized context (ii) | Problem solving | | 6 | Review and self-study | Problem solving | | LO1 | The all-knowing, all-powerful perfect benevolent planner. The concept of net social welfare |
| | | 6 | Perfect competitive markets | Problem solving | Exam | | | | | LO2 | The all-knowing, all-powerful perfect benevolent planner. The concept of net social welfare |
| 4 | 4 | 7 | Monopoly | Problem solving | | 6 | Review and self-study | Problem solving | | LO2, LO3 | Characterization of a perfect competitive market Analysis of supply and demand equilibrium in the electricity markets |
| | | 8 | Test | | Exam | | | | | LO3 | Imperfect competition and monopolies. Oligopolistic models and market agent's behavior in oligopolistic markets. Market power indexes. Final Text. |
| 5 | 4 | 9 | Strategy in the electric power industry | | | 6 | Review and self-study | | Case study | LO6 | Strategies in the Electric Power Industry |
| | | 10 | Case presentations | | Presentations | | | | | LO6 | |
| 6 | 4 | 11 | Economic and Financial Return. Value Creation and Financial Leverage | | | 6 | Review and self-study | | | LO4 | Introductory session to the Financial Statements: information contained, different types, basic principles used to prepared them, objectives and main users. Preliminary analysis of the structure and basic concepts of the Balance Sheet and the Income Statement. |
| | | 12 | Economic and Financial analysis. Ratios | | | | | | | LO4 | Different types of balance Sheet. Practical approach, analysing Iberdrola's Financial Statement |
| 7 | 4 | 13 | Case studies | | | 6 | Review and self-study | | | LO4 | Analysis of the Income Statement, Study of the different margins shown in an Income Statement: contribution margin, EBITDA, EBIT, EBT and Net Result. |
| | | 14 | Generation and distribution costs. Discounted cash flow valuation. | | | | | Problem solving | | LO4 | Basic concepts and methods to prepare a Cash Flow Statement, Review of the different kinds of Cash Flows. Free Cash Flows and Net Cash Flow. Analysis of Iberdrola's Cash Flow. |
| 8 | 4 | 15 | Financial statements. Structure of balance sheet and income statement. | Problem solving | | 6 | Review and self-study | | Case study | LO4, LO5 | Comprehensive exercise to elaborate and interpret a set of Financial Statements: Balance Sheet, Income Statement and Cash Flow. To be prepared and presented in groups in class. |
| | | 16 | Balance sheet analysis: assets, equity and liabilities | Problem solving | | | | | | LO4, LO5 | Exam |

WORK PLAN (ii/ii)

| Week | h/w | Class | Content | Lecture and problem solving | Assessment | h/w | Self-study | Problem solving | Individual and in-group assignments | Learning outcomes | Description |
|------|-----|-------|---|-----------------------------|--------------|-----|-----------------------|-----------------|-------------------------------------|-------------------|--|
| 9 | 4 | 17 | Income statement analysis: revenues & expenses | | | 6 | Review and self-study | | | LO4, LO5 | The Electricity Business: Departing from UNESA's income account a description of the main cost items of the electricity business is made for both operating and capital costs |
| | | 18 | Cash flow statement analysis | | | | | | | LO4, LO5 | Ratios: the use of financial ratios by the financial analysis is explained. The notions of financial leverage and value creation are introduced |
| 10 | 4 | 19 | Case study | | Case studies | 6 | Review and self-study | | | LO4, LO5 | Case studies: the previously explained concepts and analytical tools are applied to the consolidated financial statements of a relevant electricity group of companies. |
| | | 20 | Intro. Objectives and financial policies | | | | | | | LO4, LO5 | The time value of money is introduced to explain the discounted cash flow methodology. Application to the case of a generation plant and to a distribution network. The link between this methodology and the analysis usually performed by financial analysis is explained. |
| 11 | 4 | 21 | Financial needs and working capital management | | | 6 | Review and self-study | | | LO4, LO5 | The objective of the firm, the positioning of the financial function within the company and the strategic decisions of financial management (investment, financial infrastructure, dividend, financial communication). |
| | | 22 | Cost of capital. Optimal financial structure | | | | | | | LO4, LO5 | The cost of the financial resources used by the company (WACC). Optimal financial structure. Rating Agencies and the rating process. |
| 12 | 4 | 23 | Alternatives for financing. Risk management (1/2) | | | 6 | Review and self-study | | | LO4, LO5 | Financial Planning Process (short and long term). Working Capital Management. Banking instrument for the short term financial management. |
| | | 24 | Risk Management (2/2). Project Finance and non-recourse debt | | | | | | | LO4, LO5 | The relationship bank-company. Alternatives for funding the company (long term), including equity, banking products and capital markets. Financial Derivatives. The risk management process. |
| 13 | 4 | 25 | Industry Valuation. Analysis of electricity industry by Financial Markets | | | 6 | Review and | | | LO4, LO5 | Analysis and valuation of electricity companies by financial markets: Quantitative and Qualitative analysis. |
| | | 26 | Exam Finance | | | | | | | LO4, LO5 | Exam |
| 14 | 4 | 27 | Introduction to strategy in the electric power industry | | | 6 | Review and | | | LO4, LO5 | Key concepts of Business Unit Strategy. Readings & Discussion: What is strategy? |
| | | 28 | Business models in the electricity industry | | | | | | Case study | LO6 | Strategy and Financial Statements Review of financial statement analysis- relationship with strategy. |
| 15 | 4 | 29 | Build, borrow or buy | | | 6 | Review and self-study | | | LO6 | Business Plans. Readings & Discussion: How to write a great business plans. |
| | | 30 | Finance Exam | | Exam | | | | | LO6 | Mergers & Acquisitions. Readings & Discussion: Making Acquisitions, Valuation Methods. |