MEER501/ MEEB501 Energy Economics

Course Title	Energy Economics				
Course Code	MEER501/ MEEB501				
Course Type	Elective				
Level	Masters (2nd Level)				
Year / Semester	1st year/ 2nd semester or 2nd year/ 3rd semester				
Teacher's Name	Dr. Michalis Menicou				
ECTS	10	Lectures / week	3	Laboratories/week	0
Course Purpose	Energy engineering projects tend to be capital intensive with long gestation and pay-back periods. As such, a thorough economic study prior to their undertaking is of an outmost importance. Within this context, the purpose of this course is to familiarize students with the main economic characteristics of energy engineering projects coupled with an understanding of the prevailing engineering economic analysis tools and best practices. By the end of this course students should be able to use engineering economic tools and principles to conduct a simple economic analysis of an energy project.				
Learning Outcomes	By the end of the course, students must be able to: 1. To understand the fundamentals of energy systems' economics and to able to evaluate alternative modes of energy supply, considering the challenges and the constraints of renewable and non-renewable energy systems by appreciating the economic framework within which decisions are made. 2. To address the issues of developing renewable energy systems in a period of profound and rapid change of national and international energy markets driven by processes of privatisation and liberalisation. 3. Understanding the principles of engineering economic analysis 4. Applying investment appraisal techniques for engineering and energy related investments 5. Understand alternative methods of financing and their effect on valuation *6.* Understanding the element of risk/uncertainty in the range of engineering and energy related decisions a company faces, and how to measure its effect *7.* Use Microsoft Excel® to structure an energy related economic decision and address the element of Project Risk.				
Prerequisites	Prior taught experience on energy engineering issues or instructor's approval		Corequisites	None	
Course Content	**1. Principles of Engineering Economics** - Time value of Money - Evaluating Business and Engineering Assets: - Present-Worth Analysis - Rate of Return Analysis - Project Cash Flow Analysis - Project Cost Elements - Project cash flow activities - Effect of inflation - Cost of Capital and the capital asset pricing model (CAPM) - Project financing - Debt versus equity - Cost of capital with different sources of financing - Capital budgeting with different sources of financing - Handling Project Cash Flow Risk - Methods of describing Risk (Sensitivity Analysis, Scenario Analysis) - Including Risk in Investment evaluation (Probabilistic approach) - Investment strategies under Uncertainty (Real Options) - Rate of Return Analysis: Use Microsoft Excel® to formulate investment decisions and evaluate their rate of return. - Project Cash Flow Analysis: Use Microsoft Excel® to structure Project Cash Flows and estimate their Rate of Return.				

	- Mean-variance optimization in Microsoft Excel® and construction of efficient frontiers - Project Uncertainty: Use Microsoft Excel® to conduct sensitivity analysis and scenario evaluation of particular projects' cash flows. - Use Microsoft Excel® to build scenario trees for investment decisions under uncertainty and valuation of options **2. Energy Economics** - Energy Data and Energy Balance of a Country - Understanding and analyzing energy demand; energy demand at disaggregated level. - Energy Demand forecasting - Economic analysis of energy investments - Economics of fossil fuels; - Economics of Non-Renewable Resource supply - Economics of Electricity Supply - Economics of Renewable Energy Supply - International Oil Markets - Markets for Natural Gas
Teaching Methodology	Teaching methodology of this course comprises delivering lectures, laboratory demonstration (Microsoft Excel®), and collaborative arguments. In detail: - Lectures will be delivered on a weekly basis addressing the course content on energy economics and engineering economic analysis. Lecture notes will be available to e-learning, coupled with indicative bibliography. - Laboratory demonstration will take place at computer labs to introduce students to the use of Microsoft Excel® to structure engineering economic analysis. - Last, but not least, collaborating teaching is to be achieved by students' presentations and group discussion.
Bibliography	**Textbooks:** 1. Fundamentals of engineering Economics (International Edition), by Park Chan, Prentice Hall, 2nd edition 2009. **References** PART A: 1. Murray Barrie, Power Markets and Economics: Energy Costs, Trading, Emissions, Wiley Publishers, ISBN: 978-0-470-77966-8, 2009. 2. , Energy Economics: Concepts, Issues, Markets and Governance, Springer Academic Publishers, ISBN 978-0-85729-267-4, 2011. PART B 1. Engineering Economy, by William Sullivan, Elin Wicks, and Patrick Koelling, 14th edition, 2009 2. Principles of Corporate Finance, 9th edition, by Brealey A. R., Myers C. S. I
Assessment	Students are expected to be assessed through: - An individual or group exercise at the 5th week of the course on Project Cash Flow Analysis - An individual Project at the 9th week of the course on energy economic decisions - An individual presentation at the 12th week of the course on energy economic decisions - A final test at the end of the semester, in which all material will be examined. The weights of the course assessment are as follows: • Final Exam: 50% • Individual or small group exercises: 20% • Project: 20% • Presentation: 10%
Language	English