



University of Tehran
School of Industrial and Systems Engineering

Course:	8101072 – Energy Systems (Energy 1)		
Course type:	Mandatory	IE – SE – ES*	Credit: 3
Level:	Graduate		
Co-requisite(s):	-		
Prerequisite(s):	Engineering Economics		
Prerequisite by topic:	-		
Reference(s):	[1] Francis M. Vanek, Louis D. Albright, <i>Energy Systems Engineering, Evaluation and Implementation</i> , McGraw Hill, 2008. [2] ...		
Coordinator:	H. Shakouri G., Associate Professor, School of ISE		
Goals:	The course provides systems engineering graduate students with the required conceptual background to understand energy systems problems in a macro level. Students will engage worldwide supply and demand energy systems relationships and find general perception of the interconnections between the energy system, economy and environment.		
Topics:	<p><u>Chapter 1. Introduction</u> (the role of energy in contemporary human being life, economy and environment)</p> <p><u>Chapter 2. Energy Technologies</u> (Introducing basic concepts of energy sciences and technologies)</p> <p><u>Chapter 3. Systems Approach and Modeling</u> (Introduction to analysis methods in systems engineering)</p> <p><u>Chapter 4. Energy Consumption and Rational Energy Use</u> (trends, sectors, shares, main problems of energy consumption, rational methods of conservation)</p> <p><u>Chapter 5. Energy Demand Systems Analysis</u> (mathematical modeling tools, top-down vs bottom-up analyses, the methods of energy data analysis, analysis of important factors)</p> <p><u>Chapter 6. Energy Supply Systems</u> (Energy resources, , individual</p>		

	characteristics and substitution, production, trade of energy) Chapter 7. Applications of Engineering Economics in Energy Systems (calculations on energy systems costs and assessment)
Computer usage:	EXCEL (spread sheets)
Assignments:	6 – 10 homework assignments
Projects:	Understanding a concurrent energy system problem, analysis and proposing a practical solution
Grading:	Assignments: 10 % Midterm exams: 10 % Final exam: 40 % Course Project: 40 %
Further readings:	[1] J. R. Reitz, F. J. Milford, and R. W. Christy, <i>Foundations of Electromagnetic Theory</i> . Addison-Wesley, 4th edition, 2009. [2] M. H. Nayfeh and M. K. Brussel, <i>Electricity and Magnetism</i> . John Wiley, 1985. [3] M. A. Plonus, <i>Applied Electromagnetics</i> . McGraw-Hill, 1978. [4] C. T. A. Johnk, <i>Engineering Electromagnetic Fields and Waves</i> . John Wiley, 1975. [5] P. Lorrain and D. Corson, <i>Electromagnetic Fields and Waves</i> . Freeman, 2nd edition, 1970.
Date:	August 19, 2011

*IE: Industrial Engineering SE: Systems Engineering ES: Energy Systems