Department of Mechanical Engineering
Phone: +1.903.566.7003
Fax: +1.903.566.7148
Uttyler.edu/engineering

MENG 4345 – Energy Conversion Systems
Course Syllabus

Semester / Year	Spring 2025
Catalog Description	This course introduces students to the different energy conversion systems as an integrated form of application of different knowledge bases such as: thermodynamics, chemistry, heat transfer and fluid mechanics. Analysis and design of systems for energy conversion and storage will be carried out with emphasis on efficiency, performance and environmental impact. Graduate students are expected to carry out a major project as an assignment within this course.
Prerequisites	MENG 3316
Section Number	050 & 051
Instructor Name	Dr. Mohammad A. Rafe Biswas
Contact Information	Office: HEC A214 or via Zoom (details posted on Canvas) E-mail: mbiswas@uttyler.edu Phone & Zoom ID: 903 566 6115
Class Type / Instruction Mode / Location	Lecture face-to-face in HEC A217 and Zoom synchronous in RBN 2011– Details on Canvas
Class Time	Mo We 6:30 PM – 7:50 PM
Office Hours	MW 2:30 to 4 pm or By appointment (in person or Zoom)
No. of Credits	3
Required Textbook	Demirel, Yaşar. Energy : Production, Conversion, Storage, Conservation, and Coupling, Praxis, 2012. (ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/uttyler/detail.action?docID=883989)
Optional References	Rauf, S. Bobby. (2011). *Finance and Accounting for Energy Engineers.* Fairmont Press, Inc. Retrieved from https://ebookcentral.proquest.com/lib/uttyler/reader.action?docID=3239056&ppg=1 Physics of Energy Conversion by Katharina Krischer, Konrad Schönleber, and Konrad Schönleber, De Gruyter, Inc., 2015. (https://ebookcentral.proquest.com/lib/uttyler/reader.action?docID=1867270) Fuel Cell Fundamentals by Suk-Won Cha, Whitney Colella, Fritz B. Prinz, and Ryan O'Hayre, John Wiley & Sons, Incorporated, 2016. (https://ebookcentral.proquest.com/lib/uttyler/reader.action?docID=4505263&ppg=1) Additional Material on Canvas: Websites, Class Handouts, Tutorials on MATLAB and Simulink by Mathworks, Inc.

Additional Rules and Requirements	MATLAB, Simulink & Simscape by MathWorks, Inc. (available through virtual desktop – one.uttyler.edu) and/or other software I encourage you to explore using artificial intelligence (AI) tools, such as Copilot and ChatGPT, for all assignments and assessments. Any such use must be appropriately acknowledged and cited, following the guidelines established by the IEEE Style Guide, including the specific version of the tool used. The submitted work should include the exact prompt you used to generate the content and the AI's complete response as an appendix. Because AI-generate content is not necessarily accurate or appropriate, you must assess the validity and applicability of any submitted AI output. You will not earn full credit if inaccurate, invalid, or inappropriate information is found in your work. http://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE_Reference_Guide.pdf The use of cellular phones during lectures is prohibited. If a student uses the cellular phone (call, text, internet), he/she will be asked to leave the classroom and the penalties of missing the class will apply. It is highly recommended to keep your cellular phone off.
Evaluation Method	Grading: Assignments, Class Participation and Conduct 30% Quizzes/Exams 20% Project (Energy & Cost Analysis of a set of assigned systems) 50%
Grading Policy / Scale	Letter grades, scale: A: 90 – 100; B: 80 – 89; C: 70 – 79; D: 60 – 69; F: < 60
Important Events / Dates	Census date: Jan 27th Last date to withdraw from one or more 15-week courses: March 31st Final Report & Presentation: Week of April 14 Final Quiz/Exam during finals week: Week of April 28
Attendance / Makeup policy / other rules	Attendance and participation to lectures are expected per university's Class Attendance policy. Any violation of the Student Behavior (see below) will result in 1% or more grade reduction for each incident. Students may appeal the grade reduction to the instructor if valid excuse or reason can be given. Make-up assignments if approved will be administered during finals week.

Course Learning Objectives / ABET & PEOs Relation	**Course Learning Objectives** By the end of this course students will be able to: 1. Demonstrate knowledge of the different energy conversion systems and their typical applications. 2. Analyze, perform and conduct preliminary design of various energy conversion systems. 3. Explain the physics of the environmental issues, including the greenhouse effect and global climate change 4. Conduct energy and cost analysis of various energy conversion systems, as well as compare social acceptability and environmental consequences of such systems 5. Apply engineering design and analysis techniques to emerging energy conversion technologies

Tentative Topics / Course Plans	• Types of Energy
	• Mass and Energy Balances/Energy Conservation
	• Selected Energy Production and Conversion systems
	  ○ Fossil fuel systems including combustion engines
	  ○ Renewable systems including solar and wind energy
	  ○ Alternative technologies including Fuel cell
	  ○ Ethical & Environmental impacts & Engineering Economics

University Policies	https://www.uttyler.edu/offices/academic-affairs/files/syllabus-information.pdf