ABET-Course Syllabus

1. **Course number and name:** Fuel and Energy (0915323)
2. **Prerequisites:** Chemical Engineering Thermodynamics (1) (0915321)
3. **Class schedule: 3 Credits Hours**
   a. Time and place: ……

   b. Office hours:……..
1. **Instructor:** Prof. Zayed Al-Hamamre
   Office Tel. number: 5355000
   Email: z.hamamre@ju.edu.jo
2. **Textbook:**
   1. Culp, Jr, A W., Principles of energy conversion, second edition. United States: N. p., 1991.
   2. Power point slides provided by instructor.
3. **References:**

   1. Yaşar Demirel, Production, Conversion, Storage, Conservation, and Coupling, 2nd edition, Springer International Publishing Switzerland, 2016
   2. Giovanni Petrecca, Energy Conversion and Management Principles and Applications

4. **Course website**: https://elearning.ju.edu.jo//

5. **Online lectures:** When needed, online lectures are given using Zoom

6. **Catalog description::**
   Energy classification, sources and utilization. Non-renewable Energy: fossil fuels and Nuclear energy. Renewable Energy: solar energy, wind power, tidal power, and geothermal energy. Fossil-fuel systems and applications. Energy storage: chemical storage, thermal storage and fuel cells.

7. **Specific goals of the course:**

After this course students should be able to:	**Chemical Engineering program outcomes:**						
	O1	O2	O3	O4	O5	O6	O7
1. An ability to classify and describe energy sources.							
2. An ability to specify the potentials of different types of fuel and energy.							
3. An ability to specify the potentials of different types of fuel and energy.							
4. An ability to classify and describe the concepts of different types of energy conversion systems							
5. An ability to achieve combustion calculations for solid, liquid and gaseous fuel combustors.							
6. An ability to describe and design the various types of solar collectors and energy storages.							

7. An ability to describe and derive models that can be l used to estimate the useful thermal energy of geothermal and wind energy.							

8. **Course topics:** Course topics will be covered through around 45 (60 minutes) classes according to the following distribution:

Content	# of lectures
1. Energy Classifications, Sources and Utilization	3
2. Fossil fuels formation, critical properties and evaluation	6
3. Fuel production processes from fossil fuels	6
4. Synthetic and alternative fuels	3
5. Combustion Calculations and fossile fule systems and applications	6
6. Nuclear fuels and nuclear thermal power plants	6
7. Solar and wind energy	6
8. Geothermal Energy	3
9. Fuel cells	3
10. Thermal storage	3

9. **Policies and procedures:**

Attendance. Students are expected to attend each class session and they are responsible for all material, announcements, and schedule changes discussed in class. University policy states that teachers must keep a record of attendance throughout the semester and may impose academic penalties commensurate with the importance of the work missed because of unexcused absences.

Lateness. Coming late to class is disruptive and may be treated as an unexcused absence.

Grading policy. A weighted average grade will be calculated as follows:

- Midterm exam 30%
- Project: 20%
- Final exam: 50%

10. **Contribution of Course to Meeting the Professional Component:**

This course contributes to building the fundamental and design concepts in separation processes.

11. **Relationship to Program Outcomes (%):**

O1	O2	O3	O4	O5	O6	O7
√	√					

12. **Relationship to Chemical Engineering Program Objectives:**

PEO1	PEO2	PEO3	PEO 4
√	√	√	√

13. ABET Criteria: Outcomes and Assessment: Engineering programs must demonstrate that their graduates have

- O1 Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- O2 Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- O3 Communicate effectively with a range of audiences.
- O4 Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- O5 Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- O6 Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- O7 Acquire and apply new knowledge as needed, using appropriate learning strategies.

Prepared by: Prof. Zayed Al-Hamamre
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