Description: To simulate a realistic competitive environment similar to the workplace, the class is divided into teams competing on same or similar Alternative Energy Technology (AET) system design project. Team score consists of half of student’s final grade. Individual efforts are earned through homework, individual design exercise/project, quizzes, and peer review. The team design projects usually are on contemporary AET issues with relevant thermal-fluid energy system contents. The design analyses usually include thermal-fluid (energy), environmental, economic and public impact/educational analyses. The class format includes: lectures, computer lab, presentations, and weekly group discussion and interactions in additional to the regular scheduled class. The pace of the design process in the class is set by the 4 milestones:

- **MS 1** defines the design problem professional supported with detailed background information. It focuses on clarity of Problem Statement and effectiveness of the Specifications/Constraints, and design Criteria/Philosophy.

- **MS 2** provides alternative design solutions to the problem. It focuses on engineering soundness and innovation. In addition to energy considerations such as mass and energy balance, operation in steady state and transient conditions, environmental, safety, and cost analyses are also important parts of the design analyses.

- **MS 3** arrives at the final design. It focuses on the soundness of decision-making process; i.e. satisfaction of the problem specifications and constraints, and weighted by the design criteria as supported by the analyses carried out in MS1.

- **MS 4** is the final wrap-up with focuses on the detailed design analysis of the integrated system.

Students who successfully complete AET 5250 will be able to *conceptually design and present an Alternative Energy Technology with emphasis on thermal/fluid engineering system to meet specific needs*. Specifically, they will be able to (Abbreviations in brackets refer to the methods of evaluation, with HW = Homework, QE = Quizzes & Exams, PC = Projects or Competitions, PR = Presentations, and RP = Reports.):

1. function as a team to design a AET thermal/fluid system or process to meet specific needs; [PC, RP, PR]
2. be familiar with the AET design process (i.e., evaluating different technical alternatives while bearing in mind practical constraints and criteria) and to better understand the environmental impacts in engineering design; [PC, RP, PR]
3. identify thermal-fluid engineering problems in the AET design project, and apply knowledge of thermodynamics, fluid mechanics, and heat transfer for formulation and design analysis; [HW, QE, RC, RP, PR]
4. use computer and internet tools, patent, and technical literature resources for AET system design, analysis and presentation. [HW, PC, RP, PR]

Prerequisites: AET 5120 or consent of instructor.

Required Backgrounds: First, students must understand sufficient fundamental *engineering thermodynamics* and *fluid mechanics* (comparable to that in typical BSME curriculum). If not, formally taking an UG class would be recommended. Second, students must have *adequate skills and sufficient comfort level in solving problem using Excel, or MATLAB, or programming languages*. Third, students must be willing to work in a sometimes interdisciplinary to work *toward a design and analysis*. 
**Grading Policies:**

Team work is greatly emphasized in this team design course. Team score consists of half of student’s final grade. The final presentation and report scores are also used to weigh the mean of the peer review grade. The grade distribution is as follows:

- Milestone reports (3) (Team score) 12% (3, 5, 4)
- Final Report (Team score) 18%
- Final Presentation (Team score) 15%
- Team Logbook (Team score) 5%
- Milestone/Homework Presentation (Indiv. score) 10%
- Homework & Individual Projects (Indiv. score) 10%
- Quizzes on Design Analysis (Indiv. score) 10%
- Participation & attendance (Indiv. score) 5%
- Peer review (Indiv. score) 15%*  

(*weighted by overall team scores)


**Other Course-Specific Policies:**

**Cheating**

Cheating is unethical and unprofessional. Cheating in homework, individual design project and exam will result in a failing grade for the course. Please see the student conduct section for more details. Teamwork is encouraged in this course in the team design project; however, cheating policy also applies relevantly to claiming undeserved credit among group members or from competing teams, such as falsifying technical data or log book, espionage on competing teams’ activities, or other unprofessional conducts. (Refer to the attached Student Conduct Statement)

**Withdrawal**

1. Students can now request instructor’s permission, within Weeks 5 through 15, to withdraw from a course. The instructor can approve the request by assigning one of the new withdrawal grades on Pipeline: **WP** withdrawal/passing (i.e., withdrawal with a passing grade earned to date), **WF** withdrawal/failing, or **WN** withdrawal never attended or no graded work. [Univ policy]

2. If a student does not request permission to withdraw, within Weeks 5 through 15, then he/she can only receive **F**. [Univ policy]

3. **All W’s will count towards a student’s allowed number of substandard grades** (5 overall or 1 every 24 crs, 2 in any single course), and the violation for which will result in exclusion. Therefore, I recommend that students make withdrawal decisions before the end of Week 4 to avoid any W-grade recorded, or even before the end of Week 2 in order to receive full tuition refund. **Students should NOT have to base their withdrawal decisions on exam scores so much.** [Eng & ME policy]

4. If a student feels that there are extenuating circumstances (medical, family emergency, change in work schedule) that justify the withdrawal without it counting towards the allowed number of repeats, he/she must submit a
petition to the Associate Dean for Academic Affairs before the end of the semester. [Eng policy]

**Make-up**
The students are expected to attend exams and turn in homework and milestone reports on their due dates. Only under exceptional circumstances and with written proof, can make-up arrangements be made prior to the due date.

**Teamwork and individual credit:**

Students are expected to interact as a individual with team members, and with both the instructor and the TA.

Each team will name a contact person.

Within a team, cooperation between task groups and individuals is necessary. Each team will decide how to assign tasks among its members.

The project is a team project. Therefore, the milestone reports and the final report should be the result of a team activity.

The final report must follow an outline and format which will be prescribed. Each student will give an oral presentation of some part of the project results.

The final written report of the design will contain a special appendix. In it, the self evaluation (1 page) and the contributions which have been made by each student will be agreed upon (with individual signature) by the team and clearly and explicitly described.

**Participation:** Everyone is expected to attend all class and team meetings. Failing to do so will result in a low participation score.

The participation of individual team member is also rated by instructor and TA as well as in a confidential peer review on the day of the final exam.

**Team Logbook:**

Each team must keep their own logbook as their meeting minutes and progress reports. A uniform format is used as the following:

1. Meeting Date/Time/Place:
2. Members Present:
3. Accomplishment since last meeting:
4. Agenda of this meeting:
5. Plan for next meeting, with delegation of task to each member
6. Secretary of this log:

Please send it as an attachment with a name of Tx_mmd_doc (where the "x" is the team number and the "mmd" are the month and date of the meeting) file to all team members plus the Instructor and TA. The Secretary must be rotated among the team members. The meeting log must be sent out by the secretary within 24 hours of the meeting.

**Exams**

Two written quizzes are held during the semester. Oral exam is carried out in the milestone and final presentation period.
**Typical Schedule of Activities**

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction; Project assignment; Successful Teamwork; Team Formation,</td>
</tr>
<tr>
<td>2</td>
<td>Engineering Design Processes; Thermodynamics</td>
</tr>
<tr>
<td>3</td>
<td>Software Tutorials: Site Visit</td>
</tr>
</tbody>
</table>
| 4    | Software Tutorials:  
**Milestone 1 report & presentation** (Problem statement, Specs., Criteria) |
| 5    | MS#1 discussion, Chemical Reaction  
Software Tutorials |
| 6    | Thermal cycle and IC Engines  
Software Tutorial |
| 7    | Fuel Reforming; Renewable Energy & Fuel Cell Technology; Flow analysis: Conservations Laws, Pipe Flow, Fluid Machinery & Network; Piping system design and automotive examples  
Software Tutorial |
| 8    | **Quiz #1**  
Software Tutorial |
| 9    | **Milestone 2 report and presentation** (Alternative design proposals, Environmental analysis). MS#2 Discussion |
| 10   | Thermal Management – System’s Heat and Work analysis Design System simulation and analysis |
| 11   | Economic and Safety Analyses  
Design System simulation and analysis; |
| 12   | **Milestone 3 Report due and Presentation** (Design, Safety and Cost analysis) |
| 13   | MS#3 Discussion  
Final design system integration |
| 14   | Individual reviews of team’s report |
| 15   | **Final Presentation (Milestone 4 Final Report due)**  
**Final Exam & Peer Review** |
Student Conduct:

It is the responsibility of each student to adhere to the principles of academic integrity. Academic integrity means that a student is honest with him/herself, fellow students, instructors, and the University in matters concerning his or her educational endeavors. Thus, a student should not falsely claim the work of another as his/her own, or misrepresent him/herself so that the measures of his/her academic performance do not reflect his/her own work or personal knowledge. In this regard, cheating will not be tolerated. All homework, presentation, and quiz must be an individual effort unless specifically noted. Since teamwork is specially encouraged in this team design project, unethical conducts such as copying or spying on competing teams, unlawful claiming credit for copy-righted materials, and unlawful use of education softwares used in the class, which should not be used for any outside consulting without the written approval of the software vendors. **STUDENTS WHO CHEAT ON ANY ASSIGNMENT OR DURING ANY EXAMINATION WILL BE ASSIGNED A FAILING GRADE FOR THE COURSE.** Therefore avoid all appearance of improper behavior! Students who witness cheating should report the incident to the instructor as soon as possible.