

University of Maryland, College Park
Professional Masters/Mechanical Engineering Department
ENPM624

Fall 2019, Class Time: Thursday 7:00 – 9:40 PM.

Course Instructors & developers: Dr. Farah Singer (FS), Dr. Brian Valentine (BV) and Dr. Michael Ohadi (MO)

Phone: (301) 405-5412

E-mail: fsinger@umd.edu ; bvalent2@umd.edu ; ohadi@umd.edu ,

Office Hours: Tuesday 5:00pm EST-6pm EST, Glenn L. Martin Hall building, Office 4164C. Questions by e-mails at all times are welcome and will be responded within 24 hrs when possible.

Reference Books:

1. **Highly recommended: Kreith, Frank: “Principles of Sustainable Energy Systems”, ISBN: 9781466556966, 2nd edition, 2014.**
2. Michael Ohadi, Jianwei Qi, Harish Ganapathy, “Alternative Energy Technologies: Price Effects”, In: Encyclopedia of Energy Engineering and Technology, 2nd edition, Taylor & Francis, New York, 2014.
3. Duffie and Beckman, “Solar Engineering of Thermal Processes”, ISBN 0-471-69867-9, John Wiley and Sons INC., 2006.

Course Description:

This course will provide students with the fundamentals, design and analysis tools, and an in-depth understanding of state of the art alternative energy technologies. The course will begin with discussions on the energy resources and global perspective of current and future energy demand/consumption trends. Next, we will cover prime alternative energy technologies, including wind, solar, hydro, geothermal, and ocean thermal energy conversion. The last section of the course will cover relevant contemporary topics such as economics of alternative energy, CO2 capture and storage, electrification of transportation, electrical and thermal energy storage, and Fusion as the next large scale carbon-free energy supply.

Course Schedule:

The following is a tentative course schedule. It may change during the semester as circumstances arise. Consult the course web site for updated versions. Any deviations on Quizzes and/or Exams dates will be announced at least three days in advance.

Week	Date	Topics Covered	
1	08/29	- Introduction to the course and review of fundamentals applicable to the course - U.S. and World Energy Resources and Demographics - HW # 1 assigned	FS/BV
2	09/05	- Thermal Energy Storage - Ocean Thermal Energy Conversion - HW 1 Solutions posted ; HW # 2 assigned	BV
3	09/12	- Geothermal Energy I and II - HW 2 Solutions posted ; HW #3 assigned	FS
4	09/19	- Fusion—the next large scale alternative to carbon-free energy supply - Project Part I Assigned; discussion of the project - HW 3 Solutions posted; HW # 4 Assigned	FS
5	09/26	- Wind Power I - Wind Power II - Quiz 1	BV
6	10/03	- Hydro Power I - Hydro Power II - HW 4 Solutions posted; HW # 5 posted	BV
7	10/10	- Solar Photovoltaic Systems, Solar Photo thermal Systems; - Regulatory and Price Incentives to promote Renewable Energy. - HW 5 Solutions posted	BV
8	10/17	- Solar Cooling Systems—heat activated cooling - MIDTERM (1 Hour) - Projects Part II Assigned - Project discussions	BV
9	10/24	- Solar Energy Fundamentals. Also Models for Predicting Solar Flux on a Surface; - Analysis of solar collectors for domestic hot water and space heating systems - HW # 6 Assigned - Projects Part I due	MO
10	10/31	- Bio Energy as Alternative Fuel and for Power Generation I - Bio Energy II - HW 6 Solutions posted	FS
11	11/07	- Large scale Solar Thermal/Power Applications - Solar Desalination systems - Quiz 2 - HW # 7 assigned	BV
12	11/14	- Smart Grid principles and its infrastructure impact - Energy Battery/Electricity Storage for Renewable Energy Applications - HW 7 Solutions posted	BV
13	11/21	- Projects Part II and comprehensive report Due on Nov 13th. - Project Final Presentations in class	FS
14	11/28	- Thanks giving Break	
15	12/5	- Emerging Technologies in renewable/sustainable energy--CO2 Capture and Storage - Emerging technologies for sustainable energy— Electrification of Transportation/Aviation - Problem solving session	MO
16	12/12	FINAL EXAM	FS

GRADING

- Each instructor will give quiz questions for his lecture materials.
- Tentative grade weights are as follows:

Homework	Will not be collected
Quizzes	20%
Projects	35%
Midterm	20%
Final Exam	25%
- Note: All exams should be viewed as comprehensive.

Tentative Grading Scale:

A+: 100-96 A: 95-92 A-: 91-90
 B+: 89-87 B: 86-83 B-: 82-80
 C+: 79-77 C: 76-73 C-: 72-70
 D+: 69-67 D: 66-63 D-: 62-60
 F: below 60

Note: The above grading scale is meant to serve as a guideline.

HOMEWORK:

Homework will be assigned and will not be collected. Solutions to homework will be posted on the course website. You are urged to work on the problems yourself before looking at the solutions.

PROJECT(S):

Two projects will be assigned and will require submission of a report and power point presentation summarizing the report.

QUIZZES:

Quizzes are normally designed for duration of 25 minutes. They may include both statement type as well as problems to solve. Quizzes are normally closed books/notes, but you are allowed to have a reference sheet (earlier in the semester one side of 8.5" by 11" sheet and later in the semester both sides of 8.5" by 11" sheet). Necessary tables will also be provided. Every quiz might involve some calculations, thus you need to have your calculator with you. You are urged to properly indicate the units of the calculated variables to receive partial credits for your solutions. This is important for all quizzes, exams, projects, and other assignments to avoid losing points that otherwise are deserved. Grading error due to lack of clarity of the paper will be strictly your responsibility.

MIDTERM AND FINAL EXAMS:

Midterm and final exams may typically consist of two parts: the first part will focus on statement type questions and the 2nd part on problems to solve. They are normally closed-book and closed-notes. However, you are allowed to have a reference sheet (earlier in the semester one side of 8.5" by 11" sheet and later in the semester both sides of 8.5" by 11" sheet). Necessary tables are provided or you are asked ahead of time to bring them with you to the exam. You need to have your calculator with you. The Final Exam will be cumulative and will test the knowledge gained in the entire course. Mid-term will be an hour exam (60 minutes duration) and Final will be for 90 minutes.

MAKE UP POLICY:

No make up will be given for quizzes. If you miss a Quiz and your excuse is accepted then the weight of that Quiz will be distributed on the remaining Quizzes. Make up for midterm or final

examinations will only be given in the exceptional cases when the individual can demonstrate with proper documentations that the emergency involved was beyond his/her control. In case of any religious observance, the student must personally hand over a written notification of the projected absence in the first week of the semester.

ACADEMIC HONESTY:

All students are expected to uphold the highest ethical and professional of academic honesty (see the University of Maryland Code of Academic Integrity). A violation of the UMD Code of Academic Integrity includes (but is not limited to) intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise. Please be advised that a failure to accept and exhibit the fundamental value of academic honesty may result in a course grade of 'XF'

COURSE WEBSITE:

We will use ELMS (<https://elms.umd.edu>) as the primary site to archive lecture notes and course related materials and share information. If you are unfamiliar with ELMS Learning System, it would be a good idea to familiarize yourself with its features now. In case of any technical difficulty, please send an email to elms@umd.edu. Should you prefer assistance over the phone, you can call the OIT Help Desk at 301-405-1400. You are required to check the course website on a regular basis.

PATH TO SUCCESS IN ENPM624:

The key factors for success in this course are to stay focused and fulfill your responsibilities. The course material is inherently cumulative such that the material learned in one session will be used in the following sessions. If you lose your focus for a day or two, it will be extremely hard for you to come back to the track. Please feel free to send your questions by e-mail any time. We will be happy to assist you as necessary.

COURSE RELATED POLICIES

Please check the Grad school website <https://gradschool.umd.edu/course-related-policies> for all related policies.