

University of Southern California
Viterbi School of Engineering

Course Number & Title:	AME577: Micro- and Nano-Fabrication Technology
Units:	3
Semester:	Spring
Schedule:	Class: M, W 12:30-1:50pm
Location:	online
Instructor:	Wei Wu
Office:	PHE 632
Office Hours:	Th 4-5
Contact Information:	wu.w@usc.edu , 213-740-3085
Teaching Assistant:	Pan Hu

Catalogue Description:

Power production includes conventional fossil fuels, synthetic fuels, hydroelectric, solar, wind, geothermal, biomass and nuclear. The environmental consequences of various energy sources are discussed.

Course Description:

Providing Energy for the world to use in a sustainable fashion is a major challenge for humanity. Therefore, this class will study the technologies relating to energy/power production, transmission, and storage. Moreover, sciences behind those technologies, and externalities of those technologies will be discussed too.

Learning Objectives:

The goal of AME 577 is to:

- 1) Survey the landscape of state-of-the-art energy/power generation, transmission and storage technologies.
- 2) Understand the fundamental sciences behind those technologies.

- 3) Understand the impacts on those technologies on the sustainability of humanity.
- 4) Provide a starting point for sustainable energy related research.

Prerequisite: Graduate standing in Engineering, Physics, or Chemistry

Main Textbook:

“Energy of Physics”, by Robert L. Jaffe and Washington Taylor, Publisher: Cambridge University Press; 1st edition (January 25, 2018), 894 pages, ISBN-13: 978-1107016651

Supplementary Texts: Handout slides and reading assignments are provided in class.

Readings: All lecture notes will be available on DEN.

Grading:

Homework	10%
Presentation	20%
Midterm Exam	30%
Final exam	40%

Tentative Weekly Schedule

Week	Subject	Readings	HW
1	Introduction and overview	Chapters 1, 5	
2	Thermal dynamics laws and state function	Chapter 6,8,9,10	
3	Thermal engines and energy conversion	Chapter 11,12,13	HW 1 Assign
4	Oxidation, D-G model self-limiting oxidation, rapid thermal annealing	Chapter 4&6	HW 1 Due
5	Nuclear power fundamentals, power plants	Chapter 16,17,18	HW 2 Assign
6	Nuclear power, externalities, solar energy fundamentals	Chapter 20, 21, 22, 23	HW 2 Assign
7	Solar energy, solar thermal, photovoltaic	Chapter 24, 25	HW 2 Due HW 3 Assign
8	Biological Energy, Ocean energy flow	Chapter 26, 27	HW 3 Due, HW 4 Assign
9	Midterm Exam; Wind	Chapter 28	HW 4 Due
10	Basic fluid dynamics, wind turbines	Chapter 29,30	HW 5 Assign
11	Hydro, wave, tidal, marine current	Chapter 11	HW 5 Due, HW 6 Assign
12	Fossil Fuels, energy and climate	Chapter 33,34,35	HW 6 Due, HW 7 Assign
13	Energy efficiency and conservation, storage	Chapter 36,37	HW 7 Due
14	Electricity generation and transmission	Chapter 11&16	HW 8 Assign
15	Student presentations		HW 8 Due
	Final Exam		

Homework

Some of homework questions are from the textbook, and some homework question (mainly something to think about) are from the instructor.

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” <https://policy.usc.edu/scampus-part-b/>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) - (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. <https://engemannshc.usc.edu/counseling/>

National Suicide Prevention Lifeline - 1-800-273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. <http://www.suicidepreventionlifeline.org>

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 - 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. <https://engemannshc.usc.edu/rsvp/>

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: <http://sarc.usc.edu/>

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. <https://equity.usc.edu/>

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. <https://studentaffairs.usc.edu/bias-assessment-response-support/>

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. <http://dsp.usc.edu>

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. <https://studentaffairs.usc.edu/ssa/>

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. <https://diversity.usc.edu/>

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible, <http://emergency.usc.edu>

USC Department of Public Safety – 213-740-4321 (UPC) and 323-442-1000 (HSC) for 24-hour emergency assistance or to report a crime.

Provides overall safety to USC community. <http://dps.usc.edu>