FUEL CELLS: WORTH THE HYPE?

Instructors

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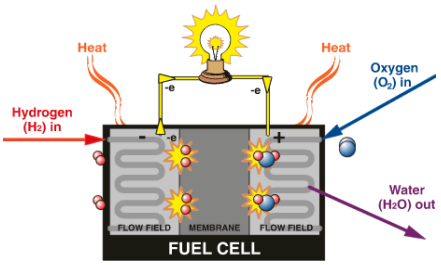

Credit Hours: 2 credit hours

Meeting Times: Twice a week for 48 minutes each meeting

Grading System: Letter Grades

Course Goals

- To introduce the younger generation to fuel cells (FC)—specifically, how fuel cells work, what role they are expected to play in the future, and what are the techno-socio-economic-political challenges facing fuel cell technology to make them part of our future
- To dispel commonly held notions about fuel cells

Course Content

- What are fuel cells? How are they different from other commonly seen energy conversion devices? How do they work?
- What are the different types of fuel cells? Why do we need so many different types?
- What are their potential applications? What are the competing technologies?
- See actual fuel cell systems in operation
- How affordable are fuel cell powered appliances? How close are we to making them available (and affordable) to the consumer for each application? How can scientists and engineers help?
- What role do fuel cells play in the world energy (depleting fossil fuel) picture?
- What is the hydrogen economy and what role do fuel cells play in it?
- What do we, consumers, have to do to gain maximum benefits from fuel cell technology?

Upon completion of this seminar course, a student, irrespective of background, will be able to:

- Distinguish facts (science) from fiction (rumors)
- Readily access, gather, and intelligently process information on fuel cells and associated energy conversion technology
- Educate their colleagues on the fundamental working principles of a fuel cell, as well as associated non-technical issues
- Be interested and/or participate in research on fuel cells more readily

Outline of Topics

Week	Topics Covered	Writing Assignments
1	What are fuel cells? How do they work? How are they different from other competing energy conversion devices? What makes them so attractive and not so attractive?	
2	What are the different types of fuel cells? What are their advantages and disadvantages (in layman terms)? Relation between advantages/ disadvantages of each type of FC and potential applications. *Tour of Center for Automotive Research to see FC powered vehicles, a hydrogen refueling station, actual fuel cell stacks and experimental setups.*	***Short essay*** on types of fuel cells and their *pros* and *cons*
3	Applications of different types of fuel cells, discussion of competing technologies for each application	***Short essay*** on applications of each type of FC
4	Affordability of FC technology for various applications; what is the fuel of choice? Infrastructure issues; Marketing issues; Cost comparison *Tour of the Westerville 250 kW fuel cell power generation facility*	***Short essay*** on current and projected cost of FC powered appliances
5	Discussion of how and in what areas research is needed to make FC technology more affordable	
6	Fuel cells and its role in the bigger energy picture—how can it impact the depleting fossil fuel scenario?	***Short essay*** on world's fossil fuel trends
7	Is a hydrogen powered economy feasible? What needs to be done? What are the socio-political issues?	***Comprehensive Paper*** topics selected by various groups and work continued until end of quarter
8	What will it take to bring FC powered appliances to mainstream consumers? What pieces of the puzzle have to fall into place?	
9	What can we do to make fuel cells a commercial success? What can we do to alleviate our impending energy crisis? How do we have to change the way we live our lives?	
10	Student Presentations of ***Comprehensive Paper***	

Each lecture period will constitute 30-35 minutes of actual lecture/presentation followed by 10-15 minutes of group discussion, in which participation by all students is mandatory.

Assignments and Grade Assessment

- Group Discussions: 10% of grade
- 4 Short Essays (see above): 40% of grade
- Comprehensive Paper: 25% of grade (each student must write independently)
- Presentation (Group) on Comprehensive Paper: 25% of grade

Reading Material

- Selected material from class notes of other fuel cell related courses previously taught by Profs. Mazumder and Guezennec. These materials will be distributed in electronic form on the course website.
- Fuel Cell Handbook (Department of Energy): Chapter 1 and parts of Chapter 2. Material from this handbook will be posted on the course website in electronic form.
- Education Kit from http://www.fuelcelltoday.com/
- Appropriate topics from the US Fuel Cell Council Website (http://www.usfcc.com/)
- Website of Professor Seppo Korpela (OSU Mechanical Engineering Department) on World Oil Crisis (http://mecheng.osu.edu/~korpela/oil.html)
- Others to be decided

Academic Misconduct

Academic Misconduct is described in Rule 3335-23-04 of the Code of Student Conduct (http://studentaffairs.osu.edu/resource_csc.asp) as "any activity that tends to compromise the academic integrity of the university, or subvert the educational process." Pertinent examples include, but are not limited to:

- Knowingly providing or using assistance in the laboratory, on field work, or on a course assignment unless such assistance has specifically been authorized;
- Submitting plagiarized work for an academic requirement. Plagiarism is the representation of another's work or ideas as one's own; it includes the unacknowledged word-for-word use and/or paraphrasing of another person's work, and/or the inappropriate unacknowledged use of another person's ideas;
- Submitting substantially the same work to satisfy requirements for one course that has been submitted in satisfaction of requirements for another course, without permission of the instructor of the course for which the work is being submitted;
- Engaging in activities that unfairly place other students at a disadvantage, such as taking, hiding or altering resource material, or manipulating a grading system.

The use of University Computing Resources for expressly committing or facilitating the commission of Academic Misconduct is prohibited by the Policy of the Office of Information Technology: http://cio.ohio-state.edu/policies/use_policy.html.

Any violations of the above policies will be reported to the University Committee on Academic Misconduct. Students who cheat in class may receive a failing grade on the assignment in question or in the class in general. Students who violate the computing policy may also be denied access to University Computing Resources.

Disability Services

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office of Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue, Phone: 292-3307, TDD: 292-0901, website: http://www.ods.ohio-state.edu