1- **Department, number, and title of course:**
   Electrical and Computer Engineering Technology  
   ECET 4904/ECET 6904  
   Fuel Cell Technology  
   CRN: 8811/8812 Undergraduate  
   CRN: 8823/8824 Graduate

2- **Course Designation:**
   Senior Elective/Graduate

3- **Course (catalog) description:**
   In this course, students will learn the thermodynamic principles governing fuel cells operation, and the electro-chemistry specific to various types of fuel cells. Fuel cells design and fabrication techniques are presented, economic and environmental impact of fuel cells are discussed. Fuel cell systems, analysis and design, for mobile and stationary applications, are discussed during lectures and implemented in laboratory sessions.

4- **Prerequisites:**
   *(to be completed after 08/20/2012)*

5- **Textbook:**

6- **Course learning outcomes / expected performance criteria.**
   After successful completion of this course, the student should be able to:  
   1. Describe the operation of a PEM-type fuel cell  
   2. Describe the operation of an Alkaline-type fuel cell  
   3. Describe the Thermodynamic principles governing fuel cells operation  
   4. Determine the efficiency of a fuel cell and a fuel cell system  
   5. Design a single-cell fuel cell system  
   6. Design a fuel cell stack system

7- **Topics covered.**
   1. Fuel cell Thermodynamics  
   2. Electro-chemistry of fuel cells  
   3. Electric charge and mass transport in fuel cells  
   4. Fuel cell characterization: V-I characteristic, impedance, permeability, etc.  
   5. Fuel cell types/classification  
   6. Materials used in fuel cells fabrication  
   7. Fuel cell systems  
   8. Environmental impact associated with fuel cells operation
8- Class / Laboratory schedule:
1 lecture session per week, 150 minutes per session: W; 6:00-8:30 pm, G-106
1 lab session per week, 140 minutes: W; 8:40 – 11:00 pm, G-106

9- Contribution of course to meeting the requirements of Curriculum (Criterion 5)
Engineering Technology/Renewable Energy Topics – 4 Credit Hours

10- Relationship of Course to Program Outcomes

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S – Strong       M – Medium       W – Weak

11- Evaluation of Student Performance

Examinations: Each chapter will be concluded with a 10-minutes test. There will be three
50-minutes Term-Exams, and one 120-minutes Final-Exam.

Homework: will be graded, and will be collected every week. All “review questions” and
all “problems” at the end of each chapter are assigned as homework for each respective
chapter. The homework will be presented on engineering paper. No exceptions!

Laboratory: (due to the nature of this course, laboratory experiments and/or projects will
be completed based on availability of specialized equipment and materials). Existing
software will be sufficient for design and simulation of fuel cells and fuel cell systems.

Laboratory Experiments (tentative):
  a. Fuel cell modeling (computer simulations)
  b. Fuel processing subsystem design (computer simulation & implementation-
     Graduate)
  c. Thermal management subsystem design (computer simulation & implementation-
     Graduate)
  d. Fuel cell system design (computer simulation & implementation-Graduate)

12- SPSU Honors Code: www.spsu.edu/honorcode
As a member of the Southern Polytechnic State University community of scholars, I
understand that my actions are not only a reflection on myself, but also a reflection on the
University and the larger body of scholars of which it is a part. Acting unethically, no
matter how minor the offense, will be detrimental to my academic progress and self-
image. It will also adversely affect all students, faculty, staff, the reputation of this
University, and the value of the degrees it awards. Whether on campus or online, I
understand that it is not only my personal responsibility, but also a duty to the entire
SPSU community that I act in a manner consistent with the highest level of academic
integrity. Therefore, I promise that as a member of the Southern Polytechnic State
University community, I will not participate in any form of academic misconduct. I also
understand that it is my responsibility to hold others to these same standards by
addressing actions that deviate from the University-wide commitment to working, living,
and learning in an environment conducive to a quality education. Thus, I affirm and adopt
this honor code of Southern Polytechnic State University.
13- Instructor
Florian Misoc, Ph.D., P.E.
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e-mail: fmisoc@spsu.edu
Office Hours: As posted
Website: http://educate.spsu.edu/fmisoc/

Disclaimer: The current syllabus is a "first-draft" and it is subject to approval by the appropriate committee in the Electrical and Computer Engineering Technology Department (ECET). Thus, changes to the current document will be made throughout the semester, as requested by the ECET committee.