San José State University
College of Engineering, Electrical Engineering Department
EE-239, Selected Topics in Electric Vehicles and Renewable Energy Systems, Sec 01, Fall 2017

Course and Contact Information

Instructor:	Mohamed Badawy
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Office Hours:	Tuesday & Thursdays: 6:00 pm – 7:15 pm
Class Days/Time:	Tuesdays & Thursdays: 7:30 pm – 8:45 pm
Classroom:	Eng - 343
Prerequisites:	Graduate Standing or Instructor Consent

Course Format

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on Canvas Leaning Management System course login website at http://sjsu.instructure.com. You are responsible for regularly checking with the messaging system through MySJSU at http://my.sjsu.edu to learn of any updates.

Course Description

This is a selected topics course covering some of the topics in the field of renewable energy systems and electric vehicles. Advanced study of renewable energy sources such as solar photovoltaic cells, and wind turbines as well as storage devices such as battery banks, ultra-capacitors, and fuel cells. The modeling of the aforementioned sources and devices will be covered in this course. Various control structures and power electronic configurations of renewable energy systems in grid tied and standalone systems. The study of the electric vehicle models and conventional architectures. Charging and drive train power electronic configurations of electric vehicles along with their associated control structures.

Course Goals

To teach graduates students an advanced knowledge in the rising field of renewable energy systems and electric vehicles. The knowledge they learn may allow them to work on various power electronic and control research topics during their studies and to supply the demand of power electronic engineers in the Silicon Valley and in the green energy industry.

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

1. Model and simulate different renewable energy and energy storage systems.
2. Learn different power electronic configurations for photovoltaic sources in standalone and grid tied systems.
3. Learn different power electronic configurations for wind turbines interfacing systems.
4. Learn the model and the applicability of advanced storage devices (ultra-capacitors, fuel cells, etc.…).
5. Apply the learned techniques on some modern applications such as microgrid systems and electric vehicle architectures.
6. Learn some of the challenges and opportunities in electric vehicles charging.
7. Learn and implement digital control techniques for power electronic converters.

Required Texts/Readings

- Class notes/handouts.

Other Readings

- "*Digital Control of High-Frequency Switched-Mode Power Converters*", by Luca Corradini, Dragan Maksimović, Paolo Mattavelli, and Regan Zane.
- "*Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design*", by Mehrdad Ehsani, Yimin Gao, and Ali Emadi (*second edition*).
- "*Power Electronics for Renewable Energy Systems, Transportation and Industrial Applications*" by Haitham Abu-Rub, Mariusz Malinowski, and Kamal Al-Haddad

Other technology requirements / equipment / material

- Matlab/Simulink or an alternative software is needed for the course assignments. The software is available in the Engineering labs, however, the students are encouraged to get their own educational copy.

Course Requirements and Assignments

- There will be two midterms for this course.
- The final exam activity will be the student paper presentations as described in the next bullet point.
- There will be one paper presentation, where every group will be assigned a paper to read, review, criticize and present to the class.
- There will be one project, where every group will be assigned a project to design, simulate and present it in a final report.
- There will be 4-5 homework assignments for this course.
- There will be quiz assignments and class exercises (for credit) during the class.

All the assignments are aligned with the aforementioned course learning outcomes.

Grading Information

Grading Distribution

Midterms	40 %
Homework	20 %

Paper presentation	15 %
Project	15 %
Quiz & class exercises	10 %

Determination of Grades

>96%	A+
>92%	A
>88%	A-
>84%	B+
>80%	B
>76%	B-
>72%	C+
>68%	C
>64%	C-
>60%	D+
>56%	D
>52%	D-
<48%	F

- There will be extra credit for class interaction, and for some extra assignments (will be available for all students).
- Late assignment will be credited up to 50% of the full assignment credit (late assignments are accepted up to 48 hours after the assignment due).

Classroom Protocol

Students are encouraged to attend the class on time. Interaction in the classroom between the students and the instructor or between the students and their peers (while solving problems) is highly encouraged.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/"

EE-239 / Selected Topics in Electric Vehicles and Renewable Energy Systems, Fall 2017, Course Schedule

Course Schedule (subject to changes based on the flow of the class and the students feedback)

Week	Topics, Readings, Assignments, Deadlines
1	Solar PV Model
2	Standalone PV Systems
3	Grid Tied PV Systems
4	Wind Power Generation
5	
6	Battery Systems
7	Battery Management System
8	Renewable Energy Sources - Battery Systems
9	Other Storage Devices
10	Micro-grids
11	Advanced Electric Vehicle Architectures
12	Electric Vehicles Charging
13	Power Converters Digital Control
14	
15	Students Presentations
16	
Final Exam	Final Exam Meeting at 19:45 pm Project Reports Due