

1. General Information

1a. Submitted by the College of: ENGINEERING

Date Submitted: 4/15/2016

1b. Department/Division: Electrical and Computer Engineering

1c. Contact Person

Name: Yuan Liao

Email: yliao@engr.uky.edu

Phone: 8592576064

Responsible Faculty ID (if different from Contact)

Name:

Email:

Phone:

1d. Requested Effective Date: Semester following approval

1e. Should this course be a UK Core Course? No

2. Designation and Description of Proposed Course

2a. Will this course also be offered through Distance Learning?: No

2b. Prefix and Number: EE 641

2c. Full Title: Advanced Power Systems

2d. Transcript Title:

2e. Cross-listing:

2f. Meeting Patterns

LECTURE: 3

2g. Grading System: Letter (A, B, C, etc.)

2h. Number of credit hours: 3

2i. Is this course repeatable for additional credit? No

If Yes: Maximum number of credit hours:

If Yes: Will this course allow multiple registrations during the same semester?

2j. Course Description for Bulletin: This course covers advanced topics on electric power systems including power system analysis, operation, monitoring, protection, optimization and control.

2k. Prerequisites, if any: Graduate student, AND EE415 or equivalent or consent of instructor

2. Supplementary Teaching Component:

3. Will this course taught off campus? **No**

If YES, enter the off campus address:

4. Frequency of Course Offering: **Spring,**

Will the course be offered every year?: **Yes**

If No, explain:

5. Are facilities and personnel necessary for the proposed new course available?: **Yes**

If No, explain:

6. What enrollment (per section per semester) may reasonably be expected?: **16**

7. Anticipated Student Demand

Will this course serve students primarily within the degree program?: **Yes**

Will it be of interest to a significant number of students outside the degree pgm?: **No**

If Yes, explain:

8. Check the category most applicable to this course: **Relatively New – Now Being Widely Established,**

If No, explain:

9. Course Relationship to Program(s).

a. Is this course part of a proposed new program?: **No**

If YES, name the proposed new program:

b. Will this course be a new requirement for ANY program?: **No**

If YES, list affected programs:

10. Information to be Placed on Syllabus.

a. Is the course 400G or 500?: **No**

b. The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable, from **10.a** above) are attached: **Yes**

Distance Learning Form

Instructor Name:

Instructor Email:

Internet/Web-based: **No**

Interactive Video: **No**

Hybrid: **No**

1. How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?
2. How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc.
3. How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc.
4. Will offering this course via DL result in at least 25% or at least 50% (based on total credit hours required for completion) of a degree program being offered via any form of DL, as defined above?
If yes, which percentage, and which program(s)?
5. How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting?
6. How do course requirements ensure that students make appropriate use of learning resources?
7. Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.
8. How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Information Technology Customer Service Center (<http://www.uky.edu/UKIT/>)?
9. Will the course be delivered via services available through the Distance Learning Program (DLP) and the Academic Technology Group (ATL)? **NO**
If no, explain how student enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.
10. Does the syllabus contain all the required components? **NO**
11. I, the instructor of record, have read and understood all of the university-level statements regarding DL.

Instructor Name:

EE 641
Advanced Power Systems

Instructor: Dr. Yuan Liao
Office Address: 691 FPAT
Email: yliao@engr.uky.edu
Office Phone: 257-6064
Office hours: Tuesday, 10:50-11:50 AM
Meeting days/times: Tuesday and Thursday, 12:30 – 1:45 PM

Course Description:

This course covers advanced topics on electric power systems including power system analysis, operation, monitoring, protection, optimization and control.

Prerequisites:

Graduate student, AND
EE415 or equivalent or consent of instructor

Student Learning Outcomes:

After completing this course, the student will be able to:

1. Analyze power systems under normal and abnormal operating conditions and assess the performance of power systems
2. Decide optimal schedules of generation resources and real time electricity pricing
3. Calculate and select parameters for optimal power system operation and control
4. Explain and summarize techniques for power system monitoring and protection

Required Materials:

Textbooks are not required. Recommended readings are:

- (1) Power Systems Analysis, J. J. Grainger and W. D. Stevenson Jr., McGraw-Hill Education, January 1994
- (2) Allen J. Wood, Bruce F. Wollenberg, and Gerald B. Sheble, Power Generation, Operation, and Control, Wiley-Interscience; 3rd edition, November 2013.

Course Assignments

- **Exams:** two exams at 100 points each
- **Homework:** six graded homework at 100 points each
- **Projects:** two projects at 100 points each

Summary Description of Course Assignments

There will be a mid-term exam and a final exam. Two projects include one project on power system economics analysis and one on voltage and var control.

Course Grading

The overall course grade is calculated as

$$\text{Grade} = (\text{Exam Average}) * 0.6 + (\text{Homework Average}) * 0.2 + (\text{Project Average}) * 0.2$$

The grading scale will be:

>= 90: A; >=80: B; >=70: C; <70: E

Final Exam Information

Final exam will be held in the classroom at the specified time in the final exam week, as prescribed by the university.

Course Policies:

Submission of Assignments

Assignments can be submitted in hardcopy or electronic copy. Late assignments will not be accepted except for the case of an excused absence (See the policy below). Requests for corrections to grades must be made in writing within 14 calendar days of the time your grade is given. After that no changes will be made even if there was an error in grading. You must state clearly the grading errors in the request.

Attendance Policy

All students are expected to come to class alert and ready to participate. Please refer to the [Senate Policy](#) on excused absences.

Excused Absences

Students need to notify the professor of absences prior to class when possible. *Senate Rules 5.2.4.2* defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit “reasonable cause for nonattendance” by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable, but should not be given any later. Information regarding major religious holidays may be obtained through the Ombud (859-257-3737, http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php).

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused) per University policy.

Per *Senate Rule 5.2.4.2*, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The professor must give the student an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred.

Verification of Absences

Students may be asked to verify their absences in order for them to be considered excused. *Senate Rule 5.2.4.2* states that faculty have the right to request “appropriate verification” when students claim an excused absence because of illness, or death in the family. Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.

Academic Integrity

Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the University may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud>. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rules 6.3.1 (see <http://www.uky.edu/Faculty/Senate/> for the current set of *Senate Rules*) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work (including, but not limited to a published article, a book, a website, computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work, which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone.

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple

changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain.

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Accommodations due to disability

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at drc@uky.edu. Their web address is <http://www.uky.edu/StudentAffairs/DisabilityResourceCenter/>.

Topics

- Supervisory control and data acquisition and energy management system
- Power flow analysis
- Economic dispatch and unit commitment
- State estimation
- Dynamic analysis
- Fault analysis
- Voltage and Var optimization
- Power system monitoring and protection
- Cooperative control, distributed control and optimization
- Power system resilience
- Demand response

Project due dates, and examination dates:

Project 1: 2/16

Project 2: 4/12

Mid-term Exam: 3/10

Final exam: 5/5