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MAY 13 2016

OFFICE OF THE
SENATE COUNCIL**1. General Information**

1a. Submitted by the College of: ENGINEERING

Date Submitted: 8/11/2015

1b. Department/Division: Electrical and Computer Engineering

1c. Contact Person

Name: Yuan Liao

Email: yuan.liao@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 533

2c. Full Title: Advanced Power System Protection

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 teaches philosophies for protecting power systems, covers micro-processor based relays, and provides projects on relay setting and relay testing.

2k. Prerequisites, if any: Engineering standing, or consent of instructor

2l. 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: Not Yet Found in Many (or Any) Other Universities ,

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?: Yes

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:

SIGNATURE|HOLLOWAY|Lawrence E Holloway|EE 533 NEW Dept Review|20150930

SIGNATURE|BJSTOK0|Barbara J Brandenburg|EE 533 NEW College Review|20151209

SIGNATURE|JMETT2|Joanie Ett-Mims|EE 533 NEW Undergrad Council Review|20160413

SIGNATURE|ZNNIKO0|Roshan N Nikou|EE 533 NEW Graduate Council Review|20160512

New Course Form

<https://myuk.uky.edu/sap/bc/soap/rfc?services=>

[Open in full window to print or save](#)

Generate R

Attachments:

[Browse...](#)

Upload File

	ID	Attachment
Delete	6624	EE 533.doc
First	1	Last

(*denotes required fields)

1. General Information

- a. * Submitted by the College of: Submission Date:
- b. * Department/Division:
- c.
- * Contact Person Name: Email: Phone:
- * Responsible Faculty ID (if different from Contact): Email: Phone:
- d. * Requested Effective Date: Semester following approval OR Specific Term/Year¹
- e.
- Should this course be a UK Core Course? Yes No
- If YES, check the areas that apply:
- Inquiry - Arts & Creativity Composition & Communications - II
- Inquiry - Humanities Quantitative Foundations
- Inquiry - Nat/Math/Phys Sci Statistical Inferential Reasoning
- Inquiry - Social Sciences U.S. Citizenship, Community, Diversity
- Composition & Communications - I Global Dynamics

2. Designation and Description of Proposed Course.

- a. * Will this course also be offered through Distance Learning? Yes¹ No
- b. * Prefix and Number:
- c. * Full Title:
- d. Transcript Title (if full title is more than 40 characters):
- e. To be Cross-Listed² with (Prefix and Number):
- f. * Courses must be described by at least one of the meeting patterns below. Include number of actual contact hours³ for each meeting pattern type.
- | | | | |
|--|--|---------------------------------|---------------------------------|
| <input type="text" value="3"/> Lecture | <input type="text"/> Laboratory ⁴ | <input type="text"/> Recitation | <input type="text"/> Discussion |
| <input type="text"/> Indep. Study | <input type="text"/> Clinical | <input type="text"/> Colloquium | <input type="text"/> Practicum |
| <input type="text"/> Research | <input type="text"/> Residency | <input type="text"/> Seminar | <input type="text"/> Studio |
| <input type="text"/> Other | If Other, Please explain: <input type="text"/> | | |
- g. * Identify a grading system:
- Letter (A, B, C, etc.)
- Pass/Fail
- Medicine Numeric Grade (Non-medical students will receive a letter grade)
- Graduate School Grade Scale
- h. * Number of credits:
- i. * Is this course repeatable for additional credit? Yes No
- If YES: Maximum number of credit hours:
- If YES: Will this course allow multiple registrations during the same semester? Yes No

j. * Course Description for Bulletin:

This course teaches philosophies for protecting power systems, covers micro-processor based relays, and provides projects on relay setting and relay testing.

k. Prerequisites, if any:

Engineering standing, or consent of instructor

l. Supplementary teaching component, if any: Community-Based Experience Service Learning Both3. * Will this course be taught off campus? Yes No

If YES, enter the off campus address:

4. Frequency of Course Offering.

a. * Course will be offered (check all that apply): Fall Spring Summer Winter

b. * Will the course be offered every year? Yes No

If No, explain:

5. * Are facilities and personnel necessary for the proposed new course available? Yes No

If No, explain:

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

7. Anticipated Student Demand.

a. * Will this course serve students primarily within the degree program? Yes No

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

If YES, explain:

8. * Check the category most applicable to this course:

Traditional – Offered in Corresponding Departments at Universities Elsewhere

Relatively New – Now Being Widely Established

Not Yet Found in Many (or Any) Other Universities

9. Course Relationship to Program(s).

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

If YES, name the proposed new program:

b. * Will this course be a new requirement⁵ for ANY program? Yes No

If YES⁵, list affected programs:

10. Information to be Placed on Syllabus.

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

If YES, the *differentiation for undergraduate and graduate students must be included* in the information required in 10.b. You must include: (i) identify additional assignments by the graduate students; and/or (ii) establishment of different grading criteria in the course for graduate students. (See SR

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

¹³ Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.

¹⁴ The chair of the cross-listing department must sign off on the Signature Routing Log.

- In general, undergraduate courses are developed on the principle that one semester hour of credit represents one hour of classroom meeting per week for a semester, exclusive of any laboratory meeting. Laboratory meeting, generally, is two hours per week for a semester for one credit hour. (from SR 5.2.1)
- You must also submit the Distance Learning Form in order for the proposed course to be considered for DL delivery.
- In order to change a program, a program change form must also be submitted.

Rev 8/09

EE 533
Advanced Power System Protection

Instructor: Dr. Yuan Liao, Paul Dolloff
Office Address: 691 FPAT
Email: yuan.liao@uky.edu; paul.dolloff@ekpc.coop
Office Phone: 859-257-6064; 859-745-9389

Office hours: Monday
1 to 1:50 PM

Course Description:

This course teaches philosophies for protecting power systems, covers micro-processor based relays, and provides projects on relay setting and relay testing.

Prerequisites:

Engineering standing, or consent of instructor

Student Learning Outcomes:

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

1. Evaluate power system protection philosophies including digital protection
2. Calculate relay settings for over-current protection, distance protection and differential protection
3. Model power systems and perform transient simulations during fault conditions
4. Perform relay testing using Omicron testing device

Required Materials:

Textbooks are not required. Recommended readings are:

- (1) J. J. Grainger and W. D. Stevenson Jr., Power Systems Analysis, McGraw Hill 1994
- (2) S.H. Horowitz and A. G. Phadke, Power System Relaying, Research Studies Press Ltd., 2008.
- (3) J. L. Blackburn, Thomas J. Domin, Protective Relaying – Principles and Applications, 3rd edition, CRC Press, 2007.
- (4) Research papers distributed to class

Course Assignments

4 projects at 15 points each; 2 exams at 20 points each.

A list of projects are show as follows:

1. Power system modeling and relay testing device introduction. In this project, students will model power systems and perform fault simulation studies, and learn how to operate the relay testing device.
2. Setting for a distance relay and testing. In this project, students will calculate settings for a distance relay for protecting a transmission line, save the settings to

- the relay, and perform relay testing under different fault conditions.
3. Setting for an over-current relay and testing. In this project, students will calculate settings for an over-current relay for protecting a transmission line, save the settings to the relay, and perform relay testing under different fault conditions.
 4. Setting for a differential relay and testing. In this project, students will calculate settings for a differential relay for protecting a bus section, save the settings to the relay, and perform relay testing under different fault conditions.

Course Grading

Graduate students will have more problems in the exams and in the projects than undergraduate students.

For undergraduate student, the Letter Grade will be determined from the numeric grade as:

≥ 90 : A; ≥ 80 : B; ≥ 70 : C; ≥ 60 : D; < 60 : E

For graduate student, the Letter Grade will be determined as:

≥ 90 : A; ≥ 80 : B; ≥ 70 : C; < 70 : E

Final Exam Information

Final exam will be held in the final exam week.

Mid-term Grade (for 100-400 level courses, and for undergraduates in 500 level courses)

Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar (<http://www.uky.edu/Registrar/AcademicCalendar.htm>).

Course Policies:

Submission of Assignments

Assignments can be submitted in hardcopy or electronic copy. Late assignments will not be accepted. 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. S.R. 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. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

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

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.

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.

Part II of *Student Rights and Responsibilities* (available online <http://www.uky.edu/StudentAffairs/Code/part2.html>) 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 the question of plagiarism involving their own 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 anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes

reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. 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 of information, the student must carefully acknowledge exactly what, where and how he/she 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 (Section 6.3.1).

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 (Suite 407 of the Multidisciplinary Science Building, 725 Rose Street, 0082, 257-2754, email address: dtbeac1@uky.edu) for coordination of campus disability services available to students with disabilities.

Tentative Course Schedule

Topics:

1. Fundamentals of protection, protection zones, current transformers, potential transformers, relays (electromechanical relay, digital relay), circuit breakers, fuses
2. Review of symmetrical component theory and fault analysis
3. Transient analysis using software (Omicron transient analyzer, Electromagnetic Transients Program)
4. Relay testing using Omicron testing device
5. Overcurrent protection
6. Distance protection
7. Differential protection

Project 1: 10/1

Project 2: 10/22

Project 3: 11/19

Project 4: 11/30

Exam A : 11/5

Exam B (final exam): 12/10