

APPLICATION FOR NEW COURSE

1. General Information.

- a. Submitted by the College of: Engineering Today's Date: 11 October 2010
- b. Department/Division: Electrical Engineering
- c. Contact person name: Rodney Andrews Email: Andrews@caer.uky.edu Phone: 257-0200
- d. Requested Effective Date: Semester following approval OR Specific Term/Year¹: _____

2. Designation and Description of Proposed Course.

- a. Prefix and Number: EGR542
- b. Full Title: Electric Power Generation Technologies
- c. Transcript Title (if full title is more than 40 characters): Electric Power Generation Technologies
- d. To be Cross-Listed² with (Prefix and Number): CME542
- e. Courses must be described by at least one of the meeting patterns below. Include number of actual contact hours³ for each meeting pattern type.

45 Lecture _____ Laboratory¹ _____ Recitation _____ Discussion _____ Indep. Study _____
_____ Clinical _____ Colloquium _____ Practicum _____ Research _____ Residency _____
_____ Seminar _____ Studio _____ Other – Please explain: _____

- f. Identify a grading system: Letter (A, B, C, etc.) Pass/Fail
- g. Number of credits: 3
- h. 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

- i. Course Description for Bulletin: Overview of technologies used for generating electricity from location, recovery, transportation and storage of fuel to the types of technologies used to convert the fuel to electricity. Included is a discussion of the advantages and disadvantages of each technology and how they must adapt to be viable in the future. Technologies covered include coal, natural gas, nuclear, biomass, wind, solar and advanced technologies.
- j. Prerequisites, if any: Engineering standing or consent of instructor
- k. Will this course also be offered through Distance Learning? YES⁴ NO
- l. Supplementary teaching component, if any: Community-Based Experience Service Learning Both

¹ Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.

² The chair of the cross-listing department must sign off on the Signature Routing Log.

³ 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, represents at least two hours per week for a semester for one credit hour. (from SR 5.2.1)

⁴ You must *also* submit the Distance Learning Form in order for the proposed course to be considered for DL delivery.

APPLICATION FOR NEW COURSE

3. Will this course be taught off campus? YES NO
4. Frequency of Course Offering.
- a. Course will be offered (check all that apply): Fall Spring Summer
- 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? 30
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: Power and Energy Graduate and Undergraduate Certificates
- b. Will this course be a new requirement⁵ for ANY program? YES NO
If YES⁵, list affected programs: Required for proposed Power and Energy Graduate Certificate
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) identification of additional assignments by the graduate students; and/or (ii) establishment of different grading criteria in the course for graduate students. (See *SR 3.1.4.*)
- 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.

⁵ In order to change a program, a program change form must also be submitted.

APPLICATION FOR NEW COURSE

Signature Routing Log

General Information:


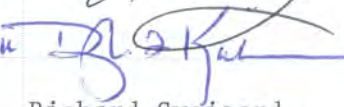
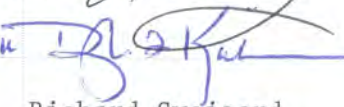
Course Prefix and Number: EGR542

Proposal Contact Person Name: Rodney Andrews Phone: 257-0299 Email: Andrews@caer.uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
Power & Energy Institute of Kentucky (PEIK) faculty DEPT. Chemical & Materials Eng.	Second review: 10-19-2011 10/24/2011	Lawrence Holloway 17-8042 / holloway@engr.uky.edu DOUG KALIKA 17-5507 / KALIKA@engr.uky.edu	 
Engineering Faculty	12/16/11	Richard Sweigard rsweigard@engr.uky.edu / / / /	 Richard Sweigard

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision ⁶
Undergraduate Council	2/28/2012	Sharon Gill	
Graduate Council	4/9/12	Brian Jackson	
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

⁶ Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

EGR 542 (Previously EGR 599-008)
Electric Power Generation Technologies

Instructor: Dr. Rodney Andrews
Dr. Jack Groppo
Dr. Jim Neathery

Office Address:

Email: Andrews@caer.uky.edu
Groppo@caer.uky.edu
neathery@caer.uky.edu

Office Phone: 859-257-0200

Office hours: By appointment

Course Description:

Overview of technologies used for generating electricity from location, recovery, transportation and storage of fuel to the types of technologies used to convert the fuel to electricity. Included is a discussion of the advantages and disadvantages of each technology and how they must adapt to be viable in the future. Technologies covered include coal, natural gas, nuclear, biomass, wind, solar and advanced technologies.

Prerequisites:

Engineering standing or consent of instructor.

Student Learning Outcomes

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

1. Understand the current major electrical generation technologies in practice today.
2. Understand how fuels are recovered, processed and converted into electrical power.
3. Understand coal, oil, gas, nuclear and renewable sources and the environmental consequences/benefits of each fuel source.
4. Understand how each technology must adapt to meet future energy demands.
5. Develop an understanding of design principles for the various generation technologies.

Required Materials:

No required text. Reading may be assigned to various online sources.

Course Assignments

- 3 semester exams
- Weekly homework assignments
- 1 Final Exam
- 1 critical analysis project (Graduate Students only)

Course Grading

Expectations for graduate students beyond the expectations for undergraduates (400G and 500 courses only)

Grading scale for undergraduates:

90-100% = A

80-89% = B

70-79% = C

60-69% = D

Below 60% = E

Homework = 20%

Exams = 60%

Final Exam = 20%

Grading scale for graduate students (no D for Grad Students):

90-100% = A

80-89% = B

70-79% = C

Below 70% = E

Homework = 10%

Exams = 50%

Final Exam = 30%

Critical Analysis Project = 10%

Final Exam Information

December 14th, 3:30 p.m., location TBD

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:

1. There is no makeup on missed/late homework assignments. Makeup exams will only be given with valid acceptable excuse.
2. Homework assignments will be given in-class throughout the semester. There will be three exams which will occur during the semester as well as a comprehensive final exam.
3. Individual effort must be demonstrated on all exams as well as homework. Any instance of academic misconduct will be reported to the Dean for appropriate action (which includes possible failure in the course and/or dismissal from the University).
4. Class attendance will be crucial to the student's successful completion of this course. Sincere there is no required textbook for this course, class attendance will

- be crucial for the student to succeed with a good or passing grade.
5. If there is a dispute or a problem with a grade, it must be brought to our attention and resolved within 5 days of the grades return.

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 (Room 2, Alumni Gym, 257-2754, email address: jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Tentative Course Schedule

Lecture #	Date	General Topic	Lecturer	Material Covered
1	26- Aug	Course Introduction	JG/JKN	Syllabus, energy, energy units
2	31- Aug	Generation by Fuel	JG	Why regions use the fuels they do
3	2-Sep	Coal and Coal Mining	JG	Coal quality, geology, mining and preparation

4	7-Sep	Pulverized Coal Combustion	JG	Unit processes, equipment, steam flow
5	9-Sep	Thermodynamics and Power Generation	JKN	Combustion fundamentals
6	14-Sep	Environmental Considerations: Particulates	JKN	ESP's, baghouses, fly ash classification and chemistry
7	16-Sep	Environmental Considerations: Sox, Nox	JKN	Low Nox burners, SCR, SNCR, scrubbers
	21-Sep	Exam #1		
8	23-Sep	Clean Coal Technologies: Comb. Power Cycles	JG	Combined cycle, repowering
9	28-Sep	Clean Coal Technologies: Gasification	JG	Gasifier types, technology overview, by-products
10	30-Sep	Field Trip		Plant visit, steam or power plant to be announced.
11	5-Oct	Clean Coal Technologies: FBC	jG	PFBC, CFBC, technology overview, by-products
12	7-Oct	Natural Gas	JG	Gas quality, geology, recovery, trans. and storage
13	12-Oct	Natural Gas Power Cycles	JG	Simple cycle, combined cycle
	14-Oct	Exam #2		
14	19-Oct	Nuclear Power Plants	RA	Uranium Mining, fuel prep, Plant layout, environ. issues
15	21-Oct	Renewable Energy: Biomass	RA/JKN	Classification and characteristics
16	26-Oct	Biomass as Fuel	RA/JKN	Co-firing, economic drivers, limitation
17	28-Oct	Renewable Energy: Wind	JKN	Where it makes sense and why
18	2-Nov	Renewable Energy: Wind	JKN	System design strategy
19	4-Nov	Renewable Energy: Solar	JKN	Where it makes sense and why
20	9-Nov	Renewable Energy: Solar	JKN	Design considerations
21	11-Nov	Renewable Energy: Hydro	JKN	Technology overview
	16-Nov	Exam #3		
22	18-Nov	Advanced Power Generation	JKN/JG	Hydrogen, fuel cells
23	23-Nov	Global Warming and CO2 Issues	JKN/JG	Scientific Debate, Natural vs. Man-made effects
	25-Nov	Thanksgiving: No Class		
24	30-Nov	Carbon Capture and Sequestration	JKN	Post Combustion Capture
25	2-Dec	Carbon Capture and Sequestration	JKN	Oxy-fuel & Chemical Looping Combustion

26	7-Dec	Poly Generation/Process Integration	All	
27	9-Dec	Last Class	All	Review
	14- Dec	Final Exam		