

CHANGE GRADUATE/UNDERGRADUATE CERTIFICATE

Fill out this form to change an existing certificate. This form should be used for both undergraduate certificates and graduate certificates.

Once approved at the college level, your college will send the proposal to the appropriate Senate academic council (HCCC and/or GC) for review and approval. Once approved at the academic council level, the academic council will send your proposal to the Senate Council office for additional review and then a 10-day posting online, during which senators review on their own and have an option to register an objection if they so desire. If no objection is raised to the Senate Council Office within ten days of the posting the proposal, then the graduate certificate change is approved. The Senate Council Office will report approvals to the Provost, Registrar and other appropriate entities, including the contact person.

For each change, you MUST enter the current language/requirement as well as the proposed change.

SUMMARY OF CHANGES				
Check all that apply.				
<input type="checkbox"/>	Courses	<input type="checkbox"/>	Certificate Name	<input type="checkbox"/>
<input type="checkbox"/>	Total required credit hours		<input type="checkbox"/>	Certificate review
<input type="checkbox"/>	Criteria for admissions/progression/termination		<input checked="" type="checkbox"/>	Other
1. General Information				
1a	Change is for:	<input type="checkbox"/> UNDERGRADUATE CERTIFICATE	OR	<input checked="" type="checkbox"/> GRADUATE CERTIFICATE
1b	Date of contact with Institutional Effectiveness (IE) ¹ :	4/13/2017		
	<input checked="" type="checkbox"/> Appended to the end of this form is a PDF of the reply from Institutional Effectiveness.			
1c	College ² :	Engineering	Department ² :	Electrical and Computer Engineering
1d	CIP code:			
1e	Current certificate name:	Power and Energy	Proposed certificate name:	<i>unchanged</i>
1f	Today's Date:	3/24/2017		
1g	Requested effective date:	<input checked="" type="checkbox"/> Fall semester following approval.	OR	<input type="checkbox"/> Specific Date ³ : <i>Fall 20</i>
1h	Contact person name:	Yuan Liao	Phone / Email:	8592576064 / yuan.liao@uky.edu
2. Overview of Changes				
2a	Describe the rationale for the change(s), including (as appropriate) input from an advisory board, professional body, etc. (450 word limit)			
	The Graduate Certificate in Power and Energy was officially approved in March 2013. The students fulfill the certificate programs by completing 15 credit hours of required course work. This revision aims to expand the			

¹ You can reach Institutional Effectiveness by phone or email (257-2873 or institutionaleffectiveness@uky.edu).

² It is not possible to change the home academic unit of a certificate via this form. To change the home unit, visit <http://www.uky.edu/faculty/senate> and search for forms related to academic organizational structure.

³ No certificate changes will be effective until all approvals are received.

certificate program to meet the needs of more students.

In the proposal, the new graduate certificate program will consist of two tracks: one is the original track, identified as Track 1 – Training through Course Work, and the other is the proposed new track, Track 2 – Training through Course Work and Research. Both tracks will ensure the fulfilment of the outcomes from the original proposal. See 5a for the proposed additional track.

These proposed changes were discussed and approved at the PEIK Industry Advisory Board meeting held on 2/24/2017 and at the PEIK Faculty meeting held on 3/24/2017.

3a. Will the requested changes result in the use of courses from another unit? Yes No

If "Yes," describe generally the courses and how they will used.

If "Yes," two pieces of supporting documentation are required.

Check to confirm that appended to the end of this form is a letter of support from the other units' chair/director⁴ from which individual courses will be used.

Check to confirm that appended to the end of this form is verification that the chair/director of the other unit has consent from the faculty members of the unit. This typically takes the form of meeting minutes.

3. Non-Course Related Changes

3a Will the certificate's admissions and/or application procedures change? Yes No

If "Yes," describe below. (150 word limit)

Current:	Proposed:
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4. Course-Related Changes

4a Will the required courses for the certificate change? (If "Yes," indicate and note the changes in the area below. If "No," indicate and proceed to 4b.) Yes No

If "Yes," note the specific changes in the grid below.

Current			Proposed			
Prefix & Nmbr	Credit Hrs	Title	Prefix & Nmbr	Credit Hrs	Title	Course Status ⁵
						Select one....
						Select one....
						Select one....
						Select one....
						Select one....

4b Provide the Bulletin language about required courses.

⁴ A dean may submit a letter only when there is no educational unit below the college level, i.e. there is no department/school.

⁵ Use the drop-down list to indicate if the course is a new course ("new"), an existing course that will change ("change"), or if the course is an existing course that will not change ("no change").

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4b	Will the elective courses for the certificate change? (If “Yes,” indicate and note the changes in the area below. If “No,” indicate and proceed to 5a.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
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If “Yes,” note the specific changes in the grid below.

Prefix & Nmbr	Credit Hrs	Title	Prefix & Nmbr	Credit Hrs	Title	Course Status ⁶
						Select one....
						Select one....
						Select one....
						Select one....
						Select one....
						Select one....

4c	Provide the Bulletin language about elective courses.
	The list of acceptable elective courses will be maintained by the Certificate Director, because it is expected to evolve as new courses in power and energy are developed across the College of Engineering.

5. Other Changes

5a	Are there any other changes to the certificate? If “Yes,” note below. (150 word limit)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	<p>In addition to the original track, a new track was proposed, called Track 2 – Training through Course Work and Research. Students will need to</p> <ul style="list-style-type: none"> complete a one semester EE748 - a zero hour course for Master research, or 4 credit hours of EE767 for PhD research in areas of power and energy and 9 credit hours of course work, including any one of the required courses for Track 1, and two selected from the acceptable elective courses <p>or</p> <ul style="list-style-type: none"> complete a 3 credit hours of EE784 in areas of power and energy and 12 credit hours of course work, including any two of the required courses for Track 1, and with the other courses selected from any of those acceptable elective courses. 		

6. Approvals/Reviews

Information below does not supersede the requirement for individual letters of support from educational unit administrators and verification of faculty support (typically takes the form of meeting minutes).

	Reviewing Group Name	Date Approved	Contact Person Name/Phone/Email
6a	(Within College)		/ /
			/ /
			/ /
			/ /
6b	(Collaborating and/or Affected Units)		/ /

⁶ Use the drop-down list to indicate if the course is a new course (“new”), an existing course that will change (“change”), or if the course is an existing course that will not change (“no change”).

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administrators and verification of faculty support (typically takes the form of meeting minutes).			
	Reviewing Group Name	Date Approved	Contact Person Name/Phone/Email
6a	(Within College)		
	College of Engineering	11/8/17	Kimberly Anderson / 7-8827 / kimberly.anderson@uky.edu
			/ /
			/ /
			/ /
6b	(Collaborating and/or Affected Units)		
			/ /
			/ /
			/ /
			/ /
			/ /
6c	(Senate Academic Council)		Date Approved
	Health Care Colleges Council (if applicable)		
	Graduate Council		12/20/17
			Roshan Nikou

Proposed Revision to Graduate Certificate in Power and Energy

March 24, 2017

Background and Summary of Proposed Revision

The Graduate Certificate in Power and Energy was officially approved in March 2013. The students fulfill the certificate programs by completing 15 credit hours of required course work. This revision aims to expand the certificate program to meet the needs of more students.

In the proposal, the new graduate certificate program will consist of two tracks: one is the original track, identified as **Track 1 – Training through Course Work**, and the other is the proposed new track, **Track 2 – Training through Course Work and Research**. The requirements for the new track are specified in a new section of this document starting on page 4.

This revision also adds new faculty directly supporting the graduate certificate program.

Proposal for a Graduate Certificate in Power and Energy

College of Engineering

Proposal Contact: Dr. Yuan Liao

453 F Paul Anderson Tower

Department of Electrical & Computer Engineering

Phone: 859-257-6064

Email: yliao@engr.uky.edu

Purpose and Background

The purpose of the proposed Graduate Certificate in power and energy is to provide students with state of the art knowledge in power and energy areas and produce well trained graduates in power and energy areas.

It is anticipated that there will be a substantial shortage of power and energy professionals in the national labor force in the near future. To help train more power and energy engineers, the Department of Energy (DOE) issued a call for proposals on power and energy workforce training in December 2009. The College of Engineering submitted a proposal and was awarded a grant to create a Power and Energy Institute of Kentucky (PEIK¹) to train the next generation of power and energy professionals. As part of the proposal, we have proposed to offer a Graduate Certificate in Power and Energy. In close collaboration with industry, the Institute will combine existing UK College of Engineering power engineering courses with newly created courses to provide students with an attractive, clearly-marked pathway into the power engineering workforce.

The Graduate Certificate was approved by the university in March 2013. This revision aims to expand the certificate program to meet the needs of more students.

Graduate Certificate Director

The Director for the Certificate will be PEIK Associate Director for the Graduate Program, Dr. Yuan Liao. Dr. Liao is a member of the College of Engineering faculty who has graduate faculty status in the University. The Certificate academic unit will be the College of Engineering.

¹ (Note that the term "Power and Energy Institute of Kentucky", PEIK, as used above and in this report is a name of an organized faculty group, as allowed per Academic Regulation AR1:3 for a faculty group organized in response to external funding opportunity, in this case a \$2.5M funding from the US Department of Energy. The request for official recognition of the PEIK name within the university has been filed but not yet approved. However, the requested approval of this certificate program should not be contingent on the final recognized name of the power and energy faculty group.)

Admission Requirements

The Certificate Director will be responsible for the certificate curriculum and matters such as: admission to and successful completion of the graduate certificate by students, enforcement of certificate requirements, maintenance of records, advising students on electives, and so forth.

Students who already are or will be enrolled in a degree program, or those who simply apply for Postbaccalaureate (non-degree) status in order to complete the certificate, are eligible to apply for admission. The certificate director may limit admissions so that faculty and other resources available are not overwhelmed.

The minimum requirements for admission to the graduate certificate curriculum are the same as those for post-baccalaureate status. Applications for admission to the Graduate Certificate will be reviewed by the certificate director, who will notify the Graduate School in writing of the student's admission. A student is encouraged to apply and be admitted to the certificate curriculum prior to taking any classes that will be counted towards completion of the certificate.

Certificate Requirements

As required by the Graduate School, a student must maintain a minimum GPA of 3.0 in the set of courses required for completion of the graduate certificate.

Certificate curriculum courses taken at graduate level by a student (undergraduate or graduate) before being admitted to the certificate curriculum will count toward the completion of the certificate.

Graduate courses taken at other universities that are transferrable to UK may be counted toward the completion of the certificate at the discretion of the Certificate Director.

Students can take two tracks to fulfill the certificate requirements.

Track 1 Training through Course Work

In this track, the curriculum of the certificate will consist of 15 credit hours, including four required courses and one elective course. The certificate curriculum is designed to permit completion within one academic year. Students can take appropriate substitute courses for the required courses at the discretion of the Certificate Director to fulfill the certificate requirements.

Certificate curriculum courses taken at undergraduate level can satisfy the requirement for course work in particular topics but do not count toward the completion of the certificate. The student still needs to take appropriate power and energy courses as suggested by the Certificate Director, a total of five courses (15 credits) in order to complete the certificate.

Required courses

Students are required to take all of the following courses, a total of 12 credit hours.

EGR540 Electric Power Economics and Public Policy (3 credit hours): This is an overview class that provides background on: Tariff/rate structures, the role of public service commissions, economic dispatch and generation/load balancing issues, demand management, environmental issues, regulated and deregulated markets, etc.
EGR 542 Electric Power Generation Technologies (3 credit hours): An overview of generation methods, including coal, nuclear, gas turbine, hydro, solar, wind, and biomass.
EGR 546 Power System Fundamentals (3 credit hours): This course is an introduction to power transmission and distribution basics.
EGR 649 Power and Energy Experiences (3 credit hours): Unique experiences through visits to a variety of energy-related sites and hear from topical experts.

EGR542 and EGR546 are offered in each fall semester, EGR540 is offered in each spring semester, and EGR649 is offered in each summer session I.

Elective Courses

Students are required to take one course from a list of elective courses in power and energy. The list of acceptable elective courses will be maintained by the Certificate Director, because it is expected to evolve as new courses in power and energy are developed across the College of Engineering.

Track 2 Training through Course Work and Research

In this track, students will need to

- complete a one semester EE748 - a zero hour course for Master research, or 4 credit hours of EE767 for PhD research in areas of power and energy and 9 credit hours of course work, including any one of the required courses for Track 1, and two selected from the acceptable elective courses
or
- complete a 3 credit hours of EE784 in areas of power and energy and 12 credit hours of course work, including any two of the required courses for Track 1, and with the other courses selected from any of those acceptable elective courses.

Certificate Outcomes

Upon completion of the certificate, students should

1. have the ability to not only understand the material learned but also to apply what they have learned in new situations.
2. have a broader background and perspective on power and energy issues that includes areas outside technical engineering issues, such as economics, public policy, societal impact.
3. have the ability to take a systems approach to the complex behavior of coupled human, technical and natural systems, behavior that can't be adequately understood by engineers educated within traditional disciplinary boundaries.

All three outcomes will be assessed for all students completing the certificate.

Award of the Certificate in Power and Energy

When the student has successfully completed the last course required for the Graduate Certificate, the student shall notify the Director. The Director shall send a completed, signed Graduate Certificate Completion Form to the Dean of the Graduate School verifying that the student has fulfilled all the requirements for the certificate and requesting award of the certificate. The form requires a listing of the courses completed by the student for the certificate and the grades earned therein. The form is to be accompanied by the printed copy of the student's certificate prepared by the Director for signature by the Dean. The Graduate School shall officially notify the University Registrar of the award of the certificate for posting to the permanent transcript.

The Associated Faculty for the Certificate and the Departments They Represent

The list below shows the Faculty of Record responsible for the certificate implementation and development:

Dr. Yuan Liao - PEIK Graduate Certificate Director and Main Contact (Electrical and Computer Engineering): Power transmission and distribution, system protection and fault monitoring, power market, power system optimization and economics.
Dr. Rodney Andrews (Chemical and Materials Engineering, and Director, Center for Applied Energy Research): Activated carbon materials, Agriculture, Biotechnology, carbon fiber formation, Carbon materials, Energy, Environment, Nanotube synthesis, Nanotube-polymer and nanotube-carbon composite materials, Pitch chemistry and characterization.
Dr. Y.T. Cheng (Chemical and Materials Engineering): Materials for Energy Conversion and Storage, Nanostructured Materials, Sustainable Manufacturing.
Dr. Donald Colliver (Biosystems Engineering): P.E. PM-FASHRAE. Energy efficient and green facility design, thermal and electrical solar energy, codes and standards
Dr. Aaron Cramer (Electrical and Computer Engineering): Power system analysis and power electronics.
Dr. Paul Dolloff (Electrical and Computer Engineering): (Adjunct) Power delivery (transmission and distribution) and distributed generation. Teaching includes Power Distribution Systems, System Protection, and Renewable/Alternative Energy Systems. Senior Engineer in the R&D Department of East Kentucky Power Cooperative, an electric utility.
Dr. Zongming Fei (Computer Science): Communications and networking.
Dr. Jack Groppo (Mining Engineering): Mineral Processing, Surface Chemistry, Power Generation, Industrial and Coal Utilization By-product Recycling.
Dr. Larry Holloway (Electrical and Computer Engineering). Experience in administration and project management, including industrial extension and professional development education programs. Research and teaching area in systems and control.
Dr. Dan M. Ionel (Electrical and Computer Engineering): alternative and renewable energy technologies, electric machines and power electronic drives, electromagnetic devices, electric power systems, smart grids and buildings.
Dr. Steve Lipka (Center for Applied Engineering Research, and adjunct faculty, Electrical and Computer Engineering): materials and device development for electrochemical energy storage systems, including systems for distributed electric utility grid.
Shiela Medina (Center for Applied Energy Research) Associate Director, Research Program Manager.
Wilda Moore (Electrical Engineering): Electric Machinery.

Dr. Mike Musulin II (Electrical and Computer Engineering) Energy and public policy.
Dr. Sue Nokes (Biosystems Engineering): Process Engineering for Converting Lignocellulosic Biomass into Biofuels and Biochemicals.
Dr. John� Parker (Mechanical Engineering) : Image-Processing, Imaging Sensor/System Modeling, Vision System Hardware/Software Design.
Dr. Jeffrey Seay (Extended Campus Programs, College of Engineering): Sustainability, Green Engineering, Biofuels, Computer Aided Process Engineering, Process Design, Process Safety.
Dr. Vijay Singh (Electrical and Computer Engineering): Solar energy harvesting, including advanced photovoltaics and nanostructured solar cell devices.
Dr. Joseph Sottile (Electrical and Computer Engineering): Electrical system protection and safety, detection of electrical component incipient failure, and electrical energy management.
Dr. Timothy Taylor (Civil Engineering): Infrastructure development and management, nuclear power construction, infrastructure public policy, energy economics.
Dr. Y. T. Wang (Civil Engineering): Biotransformation of Metals Areas, Kinetics of Anaerobic Processes, Water Pollution Control.

As members of this group depart, the remaining members will recommend replacements to the Dean of the College of Engineering, who will make the appointment.

The certificate program was developed with input from several groups:

1. The Power and Energy faculty working group in the college of engineering defined the structure of the certificate and will continue to provide oversight to its administration. The working group corresponds to faculty participants from multiple engineering disciplines who are involved in the Power and Energy Institute of Kentucky (PEIK) sponsored by the Department of Energy grant mentioned above. Beyond the existence of the grant, this advisory group membership will be defined by appointment of the Dean of Engineering. Leadership of this faculty group currently resides with the Chair of Electrical and Computer Engineering, as the Principal Investigator of the PEIK grant from DOE. The leadership of the group in the future will be by appointment of the Dean of Engineering.
2. There is also a Power and Energy External Advisory Board that was established as part of the initial grant. This group includes representatives from industry and government. This group reviewed and influenced the structure of this proposed certificate program. This advisory board will continue into the future to provide advice on power and energy courses and the undergraduate certificate.
3. As part of the requirements of the founding grant, there is a Power and Energy Internal Advisory Board, consisting of department chairs of each of the engineering departments most closely associated with the program (Biosystems Engineering, Chemical and Materials Engineering, Civil Engineering, Electrical and Computer Engineering, Mechanical Engineering, and Mining Engineering). This board has also reviewed and influenced this proposed certificate program.

Assessment for the Certificate Program

Assessment for instructors and courses within the Certificate Program will be performed in standard university fashion via regular teaching and course evaluations. Assessment for students

in the program will be through course grades in the program, with a minimum GPA requirement as discussed above.

The overall Certificate Program will be assessed through regular review of the Power and Energy faculty and the Power and Energy External Advisory Board (both mentioned above). The External Advisory Board consists of industry representatives that will provide feedback on the material covered in the curriculum and on the quality of the students coming through the certificate program. The enrollment numbers in the program will also be regularly reviewed and will be considered an assessment measure, as the original goal of the US Department of Energy funding for this program was to produce students with power and energy knowledge and skills, as taught by the curriculum of the certificate program.