# UNIVERSITY FACULTY SENATE FORMS

## Academic Program Approval

This form is a routing document for the approval of new and revised academic programs. Proposing department should complete this form. For more information, call the Faculty Senate Office at 831-2921.

**Submitted by:** Kathleen C. Werrell/Allan M. Zarembski phone number_4863/7002_____

**Department:** Engineering Outreach/Civil & Environmental Engg
Email: werrell@udel.edu; dramz@udel.edu

**Date:** _March 27, 2014 submission to EAC, Engineering

**Action:** Request approval of a new Graduate Certificate Program in Railroad Engineering____
(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

**Effective term**__a.s.a.p – ideally 14F _____
(use format 04F, 05W)

**Current degree**__This certificate does not exist, but the courses could count as electives in the graduate programs in civil engineering (MCE, MAS-CE, PhD CE)
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

**Proposed change leads to the degree of:** _n/a_____
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

**Proposed name:**__Graduate Certificate in Railroad Engineering-----_____
Proposed new name for revised or new major / minor / concentration / academic unit (if applicable)

**Revising or Deleting:**

**Undergraduate major / Concentration:**_____
(Example: Applied Music – Instrumental degree BMAS)

**Undergraduate minor:**_____
(Example: African Studies, Business Administration, English, Leadership, etc.)

**Graduate Program Policy statement change:**_____
(**Must attach** your Graduate Program Policy Statement)

**Graduate Program of Study:**_____
(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

**Graduate minor / concentration:**_____

**Note: all graduate studies proposals must include an electronic copy of the Graduate Program Policy Document, highlighting the changes made to the original policy document.**

**List new courses required for the new or revised curriculum. How do they support the overall program objectives of the major/minor/concentrations)?**
(Be aware that approval of the curriculum is dependent upon these courses successfully passing through the Course Challenge list. If there are no new courses enter "None")

Two graduate railroad engineering courses comprising core options in the proposed Graduate Certificate in Railroad Engineering have each been offered as CIEG667 courses and are currently passing through the Course Challenge (Spring'14). They are:
CIEG617, Introduction to Railroad Engineering (offered in Fall'12 and Fall'13)
CIEG618, Railroad Derailment and Safety (offered in Spring'13 and Spring'14)

Additional railroad engineering courses that are suitable as "core" courses for the Graduate Certificate in Railroad Engineering are being designed and will be added as options upon completion of the relevant Course Challenge period. One such course (planned to be offered for the first time in Fall'14 or Spring'15) is Railroad Geotechnical Engineering.

**Explain, when appropriate, how this new/revised curriculum supports the 10 goals of undergraduate education: http://www.ugs.udel.edu/gened/**

n/a, as this is a *graduate* certificate program

**Identify other units affected by the proposed changes:**
(Attach permission from the affected units. If no other unit is affected, enter "None")

The certificate program courses (if taken standard grading) will be transferrable into a graduate mechanical engineering degree program, as permitted by the Mechanical Engineering graduate program policy statement (and confirmed by Professor Leonard Schwartz, Chair of the ME Graduate Committee) – see attached e-mail.

**Describe the rationale for the proposed program change(s):**
(Explain your reasons for creating, revising, or deleting the curriculum or program.)

The College of Engineering (particularly since the hiring of Professor Allan M. Zarembski, an internationally known expert in railroad engineering) is increasingly receiving requests for students/graduates trained in railroad engineering. In addition, the Education Advisory Board, Continuing and Online Education Forum, conducted a market research study at the request of the University of Delaware, *Market Demand for Graduate Railroad Engineering Programs: An analysis of Employer Demand and Existing Programs.* One of the key observations was that "Completion of several courses in railroad engineering adequately prepares students to compete for employment in the rail transportation industry." Additionally, the study points out that on-line courses are "feasible but not yet prevalent" and it goes on to say that, because of the transient railroad engineering workforce, with railroad engineers often relocating for jobs but seeking graduate programs while concurrently employed, an online graduate program will be needed. As the study points out, there are no institutions offering graduate degrees in railroad engineering, although there are a few institutions offering certificate programs (Michigan Tech, University of Illinois at Urbana-Champaign, University of Kentucky, and more recently Penn State). For the most part, these programs are face-to-face. Employers typically hire civil or mechanical engineering graduates and subsequently have to find training for them in railroad engineering.

To address that concern, we propose this Graduate Certificate in Railroad Engineering, as a win-win for the railroad industry and the University of Delaware:
*Benefitting the Railroad Industry:*

- By requiring three graduate level courses in railroad engineering, the graduate certificate will meet employers' expectations for the educational background of prospective railroad engineering hires.
- Because of the "professionally convenient" nature of the graduate level railroad engineering courses (generally late-day scheduling and/or available on-line, thanks to UDCapture technology), new railroad engineering hires who have not had specific railroad engineering coursework in their

undergraduate civil/structural or mechanical engineering degree programs will be able to pursue this graduate certificate while working full-time. Similarly with engineers who would like to advance their careers in the railroad industry.

- Faculty can get to know students taking the railroad engineering certificate program courses and can then more a legitimately make recommendations to prospective railroad industry employers of interns and full-time employees.

*Benefitting the University of Delaware:*

- Because the railroad-specific courses are being made available in distance format (currently utilizing UDCapture + Sakai), these are being taken by professionals well beyond our region, spreading UD's reputation internationally. (To date, we have had students taking these courses from Israel and India, as well as from areas around the U.S.)
- Enrollment in these courses (with the occasional exception of the elective course CIEG608 which is currently offered in alternating years) has not maximized the on-campus class size nor the distance potential. The motivation of earning a graduate certificate should help maximize enrollments in these classes.
- Because the University policy is that (at most) nine (9) credits can be moved from non-degree to degree status, a certificate program student can take the certificate program courses and apply them as electives in a graduate civil or mechanical engineering degree program if/when accepted into the degree program.
- Meanwhile, the student's pursuit of the graduate certificate courses on a non-degree basis allows him/her to "test the waters" of taking graduate engineering courses while working full-time, but it also allows the faculty to more accurately assess the student's potential for success in the graduate degree program if/when the student decides to apply. Thus the certificate becomes an excellent recruiting tool.
- Railroad industry employers generally offer tuition benefits, particularly for courses needed for employees to be most productive, bringing tuition dollars that may not have otherwise come to UD.
- Not only will students have completion of the railroad engineering graduate certificate noted on their UD graduate transcript, but the Engineering Outreach Program will also provide to them a framed certificate – something hung with pride by the student, even while it spreads the name recognition of the University of Delaware.

**Program Requirements:**

(Show the new or revised curriculum as it should appear in the Course Catalog. If this is a revision, be sure to indicate the changes being made to the current curriculum and **include a side-by-side comparison** of the credit distribution before and after the proposed change.)

Prospective Students: This Graduate Certificate in Railroad Engineering is designed for engineering professionals working in the area of railroad engineering or for those desiring to expand their knowledge of railroad engineering and related engineering disciplines, to thereby become viable candidates for employment in the railroad industry.

Admission Requirements/Procedures: The prospective graduate certificate student must hold a bachelor's degree in engineering that indicates the necessary background in engineering, basic structural analysis, and mathematics. The prospective student not matriculated in a graduate engineering degree program will follow the procedures for admission as a graduate/non-degree student through Engineering Outreach (EGOR-ND classification), submitting an unofficial copy of the undergraduate transcript for review by the Assistant Dean/Director of Engineering Outreach. If approved, the Assistant Dean for Engineering Outreach will then guide the student through the admission process for EGOR-ND matriculation status, and, with the Certificate Program Director, will co-advise and register the student for the chosen railroad engineering certificate courses.

Program Description: The graduate certificate courses can be taken for credit with standard grading (A, B, etc.) or on a Pass/Fair basis. Courses in which the student earns a grade of B or

better would be transferable as electives into a graduate civil or mechanical engineering degree program. (At most institutions, including the University of Delaware, a maximum of three courses – 9 credits – taken in non-degree status can be transferred into a graduate degree program.) If the certificate program participant already holds a graduate degree and does not intend to use the courses toward any future degree program, then the participant may elect to take the courses Pass/Fail, still earning graduate credits toward the certificate; however, those credits would not be considered transferable into a graduate degree program.

Professor Allan M. Zarembski, Director of the Railroad Engineering & Safety Program, will also serve as Director of the Graduate Certificate Program in Railroad Engineering. This certificate program will be offered by the University of Delaware's Department of Civil and Environmental Engineering and will be administered through the Engineering Outreach Program. Satisfactory completion of the certificate will require the taking of three graduate courses (as detailed below) earning passing grades (C or better). (This can be done by students classified EGOR-ND/graduate/non-degree or matriculated in a graduate engineering degree program.) The certificate completion will be noted on the student's graduate transcript, and a certificate will be awarded as well, signed by the Director of UD's Railroad Engineering & Safety Program, the Chair of the Department of Civil & Environmental Engineering, and the Assistant Dean/Director of the Engineering Outreach Program.

Course Requirements:

**Required Core Courses:**

Two courses, selected from the following (this list will be added to over time):
CIEG617, Introduction to Railroad Engineering
CIEG618, Railroad Derailment and Safety
CIEG667[1]: Railroad Geotechnical Engineering

***Note that any of the courses currently listed, or later added to the list of core course options, that are not used to fulfill the required core may be used as an elective course.***

**Elective Options:**

One course from the following CIEG courses. (Also see the note above.)
CIEG608, Introduction to Bridge Design
CIEG626, Soil Behavior
CIEG628, Ground Improvement Methods
(Additional course options may be added as approved by the CEE graduate committee.)

**ROUTING AND AUTHORIZATION:** (Please do not remove supporting documentation.)

Department Chairperson _____ Date 3/26/14

Dean of College _____ Date 3/28/2014

Chairperson, College Curriculum Committee _____ Date 3/27/14

Chairperson, Senate Com. on UG or GR Studies _____ Date _____

Chairperson, Senate Coordinating Com. _____ Date _____

Secretary, Faculty Senate _____ Date _____

Date of Senate Resolution _____ Date to be Effective _____

Registrar _____ Program Code _____ Date _____

[1] Permanent status is being requested in parallel for this experimental course that will be offered for the first time in Spring 2015.

Vice Provost for Academic Affairs & International Programs_____Date_____

Provost _____Date_____

Board of Trustee Notification _____Date_____

Revised 02/09/2009 /khs