APPROVED BY SENATE
05/01/2017

EP.17.83 Final

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Proposal to the Senate Educational Policy Committee

Revised Draft – 25 January 2017

PROPOSAL TITLE: Establish a Graduate Concentration in Railway Engineering within the major in Engineering in the Master of Engineering Degree in the College of Engineering

SPONSOR: Professor Benito J. Mariñas, Head, Department of Civil and Environmental Engineering, 217-333-6961, marinas@illinois.edu

COLLEGE CONTACT: Harry Dankowicz, Associate Dean of Graduate, Professional and Online Programs, 217-244-1231, danko@illinois.edu

BRIEF DESCRIPTION:

This proposal seeks to establish a concentration in Railway Engineering within the Major in Engineering in the Master of Engineering (M.Eng.) degree in the College of Engineering (CoE). This program is a collaborative effort between the Rail Transportation and Engineering Center (RailTEC) in the Department of Civil and Environmental Engineering at Illinois and the Railway Group at KTH Royal Institute of Technology in Stockholm, Sweden. The Railway Engineering Concentration proposal builds upon successful online exchange of railway engineering courses between Illinois and KTH to implement a formal railway-engineering curriculum that draws upon the strengths of both institutions. The Railway Engineering Concentration is professionally oriented and aimed at providing graduate students with solid foundational knowledge in various interdisciplinary aspects of railway vehicle and track infrastructure engineering from both North American and European perspectives. This concentration will be housed in the Department of Civil and Environmental Engineering (CEE). The department will administer admission decisions, advising of students, and confirmation of degree completion. The Railway Engineering Concentration will be comprised of 36 credits with:

- 20 credit hours of course work in railway transportation and engineering from Illinois (see Appendix A);
- 9 credit hours of course work in railway transportation and engineering from KTH (see Appendix A);
- 3 credit hours of course work on the theory and methodology of science from KTH;
- 4 credit hours of professional development, and;
- At least 12 credit hours taken at the 500-level.

JUSTIFICATION: *(Please provide a brief but complete rationale for your request.)*

Railway transport is experiencing a worldwide renaissance. In the United States, ridership on regional and short-haul passenger trains increased by over 50 percent between 2002 and 2013 as various states developed new intercity passenger rail corridors and Amtrak set a new annual ridership record 10 out of 11 years. Between 1997 and 2012, commuter rail ridership increased by 49 percent and eight new

commuter rail systems have inaugurated service since 2004. According to the US Department of Transportation report "Beyond Traffic 2045", over the past 20 years, light rail transit ridership has more than doubled. Due to its high levels of efficiency, the US freight rail network has experienced similar traffic growth. Between 1980 and 2015, US freight rail traffic (revenue ton-miles) more than doubled. The railroad share of all freight ton-miles has grown to 42 percent, the largest share of any U.S. transport mode. North American railroad freight transport is more than 3.5 times more energy efficient than highway transport and U.S. intermodal traffic (trailers and containers on railcars) has doubled since 1990. Due to its cost advantages and energy efficiency, this growth in intermodal traffic is projected to continue in the coming decades and freight rail is viewed as part of a sustainable transportation system. Studies of future traffic growth indicate that over $100 billion in capital improvements will be required to meet US freight rail traffic demand through 2035.

The technical challenges associated with meeting the growing demand for railway transportation in an efficient and sustainable manner requires a considerable number of engineers with education in the field of railways. According to a 2015 Transportation Research Board report on railroad workforce development prepared by the National Cooperative Railroad Research Program, the railroad industry in the US employs approximately 250,000 people. Of these employees, over 25 percent are aged 55 or older, and roughly 11,000 railroad employees retire each year. With approximately 10 percent of railway employees in professional management and engineering positions, this rate of attrition translates into opportunities for hundreds of graduates to enter full-time engineering positions with US railroad industry each year. In addition to railroads, the rail supply community has similar demographics and offers hundreds of job opportunities each year for graduates with railroad engineering design consulting firms, rolling stock and track component manufacturers and construction management firms. State and federal government agencies are also replacing retirees as well as expanding their staff with railway expertise in response to the initiatives mentioned above. Based on these trends, strong domestic demand for a new generation of railway engineering professionals.

In addition to domestic demand, international, freight, passenger and high-speed rail systems are rapidly expanding in China, Brazil, Australia, India, Europe and elsewhere. Furthermore, entirely new rail systems are being developed or redeveloped in countries such as Tanzania, Afghanistan and Costa Rica. Planning, design, construction, operations and maintenance of these expanding international rail networks offers additional opportunities for both domestic and international students enrolled in the proposed Railway Engineering Concentration.

Despite the annual demand for hundreds of students educated in railways, for various historical reasons, there are relatively few degree programs in the field of railway engineering. Most new graduates entering the rail industry have general civil or highway transportation engineering backgrounds with limited exposure to railway topics during their engineering education. However, railways are an integrated technical system with more closely coupled interactions between the vehicles and infrastructure than the highway mode. Incomplete knowledge of these systems can lead to poor engineering decisions that maximize the performance of one aspect of the railway system at the expense of overall system performance. Therefore, the railway industry can be better served by providing graduate engineers with the knowledge of all railway subsystems (track, vehicle and traffic control) required to maximize the performance of the whole system. The proposed M.Eng. Railway Engineering Concentration will be one of the few programs in the world that covers all aspects of railway engineering.

Illinois RailTEC is the leader in railway engineering education in North America and the KTH Railway Group is among the leading academic programs in Europe, with one of the most extensive course offerings in this sector. The current educational focus on specific subfields of railway engineering at each institution complements each other. RailTEC is based in civil engineering with depth in topics such as

track design and construction management of civil infrastructure for high-efficiency, heavy-axle-load freight transport and high-speed rail systems. The strengths of the KTH Railway Group are in the mechanical and electrical engineering specialties of rail vehicle technology, running gear design and development of traction equipment for passenger and freight rail operations. Combining these complementary courses from each institution into a single shared curriculum will create a program that uniquely addresses all engineering aspects of the rail vehicle-track system in an integrated, holistic manner consistent with state-of-the art, 21st Century viewpoints of the discipline.

The proposed Railway Engineering Concentration curriculum will include courses taught by Illinois faculty, combined with online delivery of course material by KTH faculty. In addition to the online delivery of KTH classes, students enrolled in this program will spend up to one semester on the KTH campus taking classes, meeting faculty in person and interacting with their student peers enrolled in an equivalent railway engineering degree program at KTH. Through this type of interaction, students in the Railway Engineering Concentration will benefit not only by learning from subject-matter experts at each campus, but also through their exposure to a variety of complementary international perspectives on rail transportation engineering topics, policies and institutional aspects. In this way, they will gain a broader, more cosmopolitan view of the role of rail transport and how it is practiced worldwide.

The co-operation and complementary courses between the two universities offers a unique opportunity to provide a common, comprehensive program in a cost-effective manner. Increasing the breadth and depth of the technical content available will attract students because of the unique educational opportunity. Pooling faculty resources makes it possible to have experts on each topic teach courses covering the full range of railway vehicle-track subsystems. Students enrolled in this program will thus benefit from interactions with a group of faculty with greater breadth and depth than would be possible at either university alone. It is anticipated that the opportunity to matriculate in such a unique program will not only lead to more Illinois bachelor students staying for graduate school, but will also be attractive for students from other domestic undergraduate programs and international students from all over the world. This program will also attract practicing industry professionals who require advanced knowledge of all rail subsystems and their interactions to effectively manage railway engineering and operating activities.

BUDGETARY AND STAFF IMPLICATIONS: *(Please respond to each of the following questions.)*

1) Resources
   a. How does the unit intend to financially support this proposal?

      This concentration is requesting self-supporting program status. Students enrolled in this concentration will pay tuition. The College of Engineering will use graduate tuition dollars returned to the college from the Office of the Provost Budget and Resource Planning to fund additional instructional resources needed to support the curriculum in M.Eng. programs. Graduate tuition funds returned to the college from campus are considered state, recurring funds that may be used to fund faculty and lecturer salaries or support instruction in other ways. The college has developed a tuition distribution model for departments offering majors/concentrations within the M.Eng. degree. Please see Appendix C for the Tuition MOU Agreement.

   b. How will the unit create capacity or surplus to appropriately resource this program? If applicable, what functions or programs will the unit no longer support to create capacity?

The proposed curriculum for this program groups together existing courses currently available for student enrollment. No new courses are being proposed to support this curriculum. Four of the courses to be offered will be delivered via online technology by KTH instructors with Illinois faculty overseeing their content and delivery, and with responsibility for final grades. Three of these courses have already been successfully offered to Illinois students in this manner for the past three years. Existing capacity and carefully controlled enrollments will ensure sufficient capacity without sacrificing the quality of experience for all students involved.

c. Will the unit need to seek campus or other external resources? If so, please provide a summary of the sources and an indication of the approved support.

No

d. Please provide a letter of acknowledgment from the college that outlines the financial arrangements for the proposed program.

This program will be a self-funded program. Please see Appendix C for the Tuition MOU Agreement.

2) Resource Implications

a. Please address the impact on faculty resources including the changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc.

The proposed curriculum is built entirely from courses currently taught at either Illinois or KTH. The program will not introduce any new courses or teaching activities. Three of the four KTH courses included in the curriculum are currently being exchanged online on an individual basis.

It is anticipated that enrollment in the Railway Engineering Concentration will initially be 20 to 25 students per year with a goal to at least double this over time as the program gains recognition within the rail industry both domestically and internationally. Students enrolled in the Railway Engineering Concentration will increase enrollment in required core courses at Illinois by 20 to 25 students initially. Currently, each of these two courses have an average of 30-35 students enrolled each semester. Thus the Railway Engineering Concentration would approximately double the size of these two courses over time. However, the size of the courses would be similar to current semester-to-semester variation for these courses and no higher than other 400-level advanced technical elective courses in CEE.

For the 400 and 500-level elective courses, the 20 to 25 students initially expected in the Railway Engineering Concentration will be distributed over multiple elective courses available to them each semester. Thus the number of Railway Engineering Concentration students in any one of the elective courses will be less than the overall enrollment in the program. The addition of 10 to 15 students in any single elective course will not substantially increase faculty teaching responsibilities.

b. Please address the impact on course enrollment in other units and provide an explanation of discussions with representatives of those units. *(A letter of acknowledgement from units impacted should be included.)*

We expect negligible changes in courses taught by other units. With a highly prescribed curriculum of CEE courses at Illinois, there should be no impact on course enrollment in other units.

c. Please address the impact on the University Library.

None anticipated. Letter provided.

d. Please address the impact on technology and space (e.g. computer use, laboratory use, equipment, etc.)

No impact on research labs. Minimal impact on engineering workstations labs. Courses in the proposed curriculum are already being exchanged online using class recording and online delivery technology at Illinois and KTH.

For new degree programs only:

3) Briefly describe how this program will support the University's mission, focus, and/or current priorities. Include specific objectives and measurable outcomes that demonstrate the program's consistency with and centrality to that mission.

Rail traffic has been growing worldwide for decades. Passenger rail transport is widely viewed as a safe, economic and environmentally sustainable means of providing rapid urban, regional and intercity passenger service. High-efficiency rail freight transport has experienced similar growth, especially in North America where it is more than 3 times more energy efficient than highway transport. This growth has led to substantial demand for a new generation of professionals educated in the principles of railway engineering. The proposed program will firmly establish Illinois among the leading academic rail programs worldwide, and substantially enhance our competitiveness compared to other emerging rail degree programs in North America. It will do so by taking advantage of mutually complementary faculty expertise at Illinois and KTH to offer an integrated curriculum encompassing the major elements of the discipline that would not otherwise be possible without KTH. Beyond these technical complementarities, the program will offer students unique insights into several operational, management, and institutional complementarities between North American and European rail transport. The international experience and additional perspective will further strengthen students' knowledge, experience and global leadership potential.

The proposed concentration will incur little additional cost to the university because it leverages existing faculty resources but will provide additional tuition revenue that

can fund instructional resources needed to support the railway-engineering curriculum. Graduate tuition funds, returned to the college and shared with the home department using an existing tuition distribution model, are considered state, recurring funds that may be used to fund faculty and lecturer salaries.

The most obvious specific objectives and measurable outcomes are enrollments, graduates and their placement in appropriate rail engineering and transportation management positions. Quantitative and qualitative information for both of these metrics will be monitored.

Regarding enrollment targets, as discussed above, we propose an initial objective of 20 to 25 students per year with further growth anticipated. It should be noted that if this proposal were accepted, Illinois review procedures would not permit full marketing of it until late spring 2017 at the earliest. Consequently, Fall 2017 enrollment will likely be less than the initial objective. This has the advantage that it will allow us to fine-tune the program in its first year with a smaller number of students enrolled.

4) Please provide an analysis of the market demand for this degree program. What market indicators are driving this proposal? What type of employment outlook should these graduates expect? What resources will be provided to assist students with job placement?

The technical challenges associated with meeting the growing demand for rail transportation requires a considerable number of engineers with education in the field of railways. A recent TRB study, combined with rail industry data, indicates that close to 1,000 professionals are retiring annually from railroads alone. This estimate does not include comparable figures for the railway supply sector, nor does it account for additional demand due to the continued growth in the sector as discussed above. Furthermore, international demand is substantial and growing.

Despite this demand, there are only a handful of rail academic programs in North America, and Illinois is by far the largest and most highly regarded. The partnership with KTH will substantially enhance the educational experience and consequent attractiveness of the current Illinois program in a manner that is infeasible working alone. KTH offers rail expertise and institutional perspective complementary to ours. The combined intellectual resources of the two programs will provide unmatched educational value to students.

To assist students with placement, we will build on existing resources. The national stature of the Illinois rail educational program is already well-known in the North American rail community. RailTEC has several staff whose job responsibilities specifically include developing and maintaining relationships with recruiters. Due to the Illinois rail program's frequent interactions with the private and public sector rail industry, we receive inquiries from potential employers on a weekly basis. We also work closely with Engineering Career Services directing recruiters to their office.

5) If this is a proposed graduate program, please discuss the program's intended use of waivers. If the program is dependent on waivers, how will the unit compensate for lost tuition revenue?

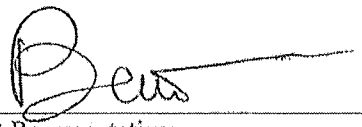
The proposed program will not use tuition waivers. Self-supporting status will be requested for this concentration, i.e., students under this program code will not be eligible for tuition waivers. This will be a fast-paced, 16-month professionally oriented master's program. Students will be self-funded and engaged in coursework and professional training, with minimal emphasis on research and associated skills development.

DESIRED EFFECTIVE DATE: Fall 2017

STATEMENT FOR PROGRAMS OF STUDY CATALOG: See Appendix B

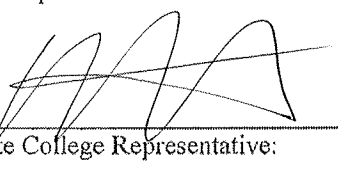
CLEARANCES: *(Clearances should include signatures and dates of approval.* ***These signatures must appear on a separate sheet.*** *If multiple departments or colleges are sponsoring the proposal, please add the appropriate signature lines below.)*

Signatures:



Unit Representative: 30-JAN-2017 Date:

College Representative: 3-14-2017 Date:



Graduate College Representative: 3/17/17 Date:

Council on Teacher Education Representative: Date:

Appendix A:
Proposed Curriculum for M.Eng. Railway Engineering Concentration

Course and Credit Requirements

Program Component	Hours
Core Courses from Illinois • CEE 409 Railroad Track Engineering (3 hours) • CEE 412 High-Speed Rail Engineering (3 hours) • *Or alternate Illinois course from approved list (see below)*	6
Core Courses from KTH • CEE 498RVT (KTH SD2307) Rail Vehicle Technology (3 hours) • CEE 598RVD (KTH SD2313) Rail Vehicle Dynamics (4 hours) • CEE 598ET (KTH EJ2400) Electric Traction (2 hours) • CEE 498TMS (KTH AK2306) Theory and Methodology in Science (3 hours)	12
Elective Courses from Illinois • Railway Elective Courses from approved list A (minimum 6 hours) • Engineering Elective Courses from approved list B (minimum 6 hours)	14
Professional Development Courses from approved list	4
Total Hours	**36**
Minimum of 12 hours of 500-level courses required in the concentration	

Note: If a student has completed one or more of the above prescribed core courses (or equivalent) as part of another degree program, the student may select one of the following courses with consultation and approval by the advisor. 500-level courses can only be replaced by other 500-level courses.

Approved Illinois Alternate Core Course List

- CEE 408 – Railroad Transportation Engineering
- CEE 410 – Railway Signaling & Control
- CEE 411 – Railroad Project Design & Construction
- CEE 498HRP – High-Seed Rail Planning
- Other technical courses within the major field of study as approved by the advisor

Approved List A of Railway Elective Courses from Illinois

- CEE 408 Railroad Transportation Engineering (3 hours)
  or CEE 498RTM (KTH AH2026) Railway Traffic Market & Planning (3 hours)
- CEE 410 Railroad Signaling & Control (3 hours)
- CEE 411 Railroad Project Design & Construction (3 hours)
- CEE 498HRP High-Speed Rail Planning (3 hours)
- CEE 598ATE Advanced Track Engineering (4 hours)
- CEE 598RTD Railway Terminal Design & Operations (4 hours)
- CEE 509 Transportation Soils (4 hours)

Approved List B of Engineering Elective Courses from Illinois

- CEE 401 Concrete Materials (4 hours)
- CEE 418 Public Transportation (3 hours)
- CEE 472 Structural Dynamics (3 hours)
- CEE 483 Soil Mechanics and Behavior (4 hours)
- CEE 491 Decision and Risk Analysis (3 hours)
- CEE 503 Construction Materials Deterioration (4 hours)
- CEE 504 Infrastructure NDE Methods (4 hours)
- CEE 507 Repair of Civil Infrastructure (4 hours)
- CEE 509 Transportation Soils (4 hours)
- CEE 512 Logistics (4 hours)
- CEE 573 Structural Dynamics II (4 hours)
- CEE 598TSR Tunneling in Soil and Rock (4 hours)
- CEE 598UQ Uncertainty Quantification (4 hours)
- CEE 598RAO Reliability Analysis (4 hours)

Approved List of Professional Development Courses from Illinois

Students must complete a minimum of 4 hours of professional development from the list below:

- CEE 411 Railroad Project Design & Construction (3 or 4 hours)
- CEE 524 Construction Law (4 hours)
- CEE 525 Construction Case Studies (4 hours)
- CEE 526 Construction Optimization (4 hours)
- CEE 527 Construction Conflict Resolution (4 hours)
- CEE 597 Independent Study (on rail-related internship or project) (2 to 4 hours)
- ENG 565 Technology Innovation & Strategy (2 hours)
- ENG 566 Finance for Engineering Management (2 hours)
- Other advisor-approved 400 or 500-level course meeting the M.Eng. requirements for Professional Development

Core Courses from KTH

The following course content - CEE 498RVT (KTH SD2307), CEE 598RVD (KTH SD2313), CEE 598ET (KTH EJ2400), and CEE 498TMS (KTH AK2306) – will be delivered by instructors at KTH either online or in person. Each course has a regular Illinois course number and an Illinois faculty member as instructor on record who is responsible for ensuring quality and assessment of the students. These courses have been taught as 498 and 598 courses for the past several years. If the concentration proves to be successful, CEE will complete new course proposals to convert these courses to permanent courses prior to submitting a new degree program proposal. Please see the College of Engineering's attached "Master of Engineering in Engineering Program Administration and Policies" document for more details on program administration.

Academic Year at Illinois and KTH

The Railway Engineering Concentration, with online exchange of courses from KTH, is facilitated by similarities in the academic calendars of Illinois and KTH. The table below provides a comparison of start and end of instruction at Illinois and KTH for the 2016-17 academic year.

Instruction at KTH is divided into four periods that roughly correspond to half-semesters at Illinois. For example, KTH Period 1 is equivalent to the Illinois Fall Semester "Part of Term A" (POT A).

2016-2017 Academic Year Dates of Instruction

Illinois Half-Semesters		**KTH Periods**	
Fall 2016 POT A	Aug 23 – Oct 14	P1	Aug 29 – Oct 20
Fall 2016 POT B	Oct 17 – Dec 7	P2	Oct 31 – Dec 16
Spring 2017 POT A	Jan 17 – Mar 10	P3	Jan 17 – Mar 10
Spring 2017 POT B	Mar 13 – May 3	P4	Mar 20 – May 19

KTH courses are taught within a single Period. During the course of the fall, a student at KTH will typically take two courses during Period 1 and two different courses during Period 2 (for a total of four different courses during the entire fall). Thus Illinois students take online courses exchanged from KTH over the course of a half-semester at Illinois (POT A or POT B).

Student Mobility and Residency

Students in the Railway Engineering Concentration will be required to spend up to one semester in residence at KTH in Stockholm, Sweden.

Based on the prescribed course listing for the Rail Engineering Concentration, the best opportunity for Illinois students to fulfill this requirement occurs during spring semester of their first year.

Previous Experience with Exchange of KTH Railway Courses

The railway programs at KTH and Illinois have participated in a mutual course exchange since Spring 2013 when a member of the KTH faculty visited Illinois to teach the Railway Vehicle Dynamics course. Starting with the 2014-15 academic year, three courses from KTH and three courses from Illinois have been exchanged online each year. Under a MOU agreement, up to an average of five Illinois students can participate as online students in each of the KTH courses. To date, Illinois students have filled nearly every available spot in the courses exchanged with KTH.

Enrollment in Railway Courses Exchanged from KTH

Term	Course	Illinois Enrollment	Delivery Method
Spring 2013	Rail Vehicle Dynamics	12	On campus by visiting KTH faculty
Fall 2014 POT B	Rail Vehicle Technology	5	Online
Spring 2015 POT A	Rail Vehicle Dynamics	5	Online
Spring 2015 POT B	Electric Traction	5	Online and on campus by visiting KTH Faculty
Fall 2015 POT B	Rail Vehicle Technology	5	Online
Spring 2016 POT A	Rail Vehicle Dynamics	6	Online
Spring 2016 POT B	Electric Traction	4	Online
Fall 2016 POT B	Rail Vehicle Technology	5	Online

Note: The Theory & Methodology of Science and Railway Traffic Market & Planning courses have not yet been exchanged between KTH and Illinois.

To facilitate the online exchange of courses with KTH, corresponding special topics courses have been created at Illinois. All lecture content is provided by KTH online and Illinois students interact with the KTH faculty through email and web conferences. An Illinois faculty member is assigned to the course to administer exams and help coordinate student meetings with KTH faculty. In consultation with the KTH Professor teaching the course at KTH, the Illinois faculty assigns the final grade.

Appendix B:
Statement for Program of Study

College of Engineering

engineering.illinois.edu

Harry Dankowicz
Associate Dean of Graduate, Professional, and Online Programs
400 Engineering Hall
1308 West Green Street
Urbana, Illinois 61801
217-244-1231
E-mail: danko@illinois.edu

Major: Engineering
Degrees Offered: Master of Engineering
Graduate Concentration: Railway Engineering

Graduate Degree Programs

The College of Engineering offers a professional master's degree program for students whose primary intent is a career in industry or government. This degree differs from the Master of Science degree in that it is a terminal degree and not a pathway to a doctoral program. The major in Engineering for the M.Eng. degree requires the selection of an interdisciplinary concentration.

Admission

Students with bachelor's or master's degrees in engineering or related fields will be considered for admission if they have a grade point average of at least 3.00 (A = 4.00) for the last two years of undergraduate study. Admission is possible for the spring term, but most admissions are for the fall term. Full details of admission requirements are on the web page of the department offering the concentration.

All applicants whose native language is not English must submit a minimum TOEFL score of 103 (iBT), 257 (CBT), or 613 (PBT); or minimum International English Language Testing System (IELTS) academic exam scores of 7.0 overall and 6.0 in all subsections. Applicants may be exempt from the TOEFL if certain criteria are met. Full admission status is granted for those meeting the minimum requirements and having taken the TOEFL or IELTS since the scores required for admission to MEng are above the minimum scores demonstrating an acceptable level of English language proficiency.

Degree Requirements

* For additional details and requirements, please refer to the web page of the concentration's home unit and the Graduate College Handbook.

Master of Engineering, Major in Engineering with a Concentration in Railway Engineering

Requirements	
Credit Hours	**Hours**
Total Credit for the Degree	*36*
Course Work	36
Core Courses from Illinois • CEE 409 Railroad Track Engineering • CEE 412 High-Speed Rail Engineering • Alternate Illinois course from approved list for students who many have completed one of the two required courses in previous degree.	6
Core Courses from KTH • CEE 498 RVT (KTH SD2307) Rail Vehicle Technology • CEE 598 RVD (KTH SD2313) Rail Vehicle Dynamics • CEE 598 ET (KTH EJ2400) Electric Traction • CEE 498 RTM (KTH AH2026) Railway Traffic Market & Planning	12
Elective Courses from Illinois • Railway Elective Courses from approved list A (minimum 6 hours) • Engineering Elective Courses from approved list B (minimum 6 hours)	14
Professional Development courses from approved list	4
Other Requirements and Conditions (may overlap):*	
A minimum of 20 credit hours must be taken at the University of Illinois Urbana-Champaign campus.	
A minimum of 12 500-level credit hours in the concentration, with at least 8 credit hours in the core concentration.	
No courses used to fulfill any degree requirement may be taken using the "Credit/No Credit" option.	
The minimum program GPA is 3.0.	

Appendix C: MOU Agreement

MEMORANDUM OF UNDERSTANDING BETWEEN THE

COLLEGE OF ENGINEERING (CoE)

AND THE

DEPARTMENT OF Civil & Environmental Engineering (CEE)

For the distribution of tuition funds for tuition-generating enrollments in the Professional Master's degree program in CEE

This MOU applies to tuition paying M.Eng. in Engineering with a concentration in Railway Engineering students in the CEE Department and establishes a formula for the transfer of tuition funds between the CoE and CEE. This is a new agreement, which follows the CoE Guidance Document for Professional Master's Program Tuition Sharing ratified in July 2014. This agreement is not applicable to online programs or enrollments.

- For tuition generated by CEE self-supporting M.Eng. students, net tuition funds (those returned to the CoE from campus) will be split as follows: 20% CoE, 80% CEE.

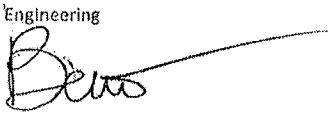
Using the Campus Budget Office's report on net tuition received, tuition as non-recurring funds will be distributed to CEE at the end of each fiscal year. This agreement is effective August 16th, 2017 (or term the program is approved) and valid through August 15, 2020.

Signatures:

Jan. 30, 2017

by Harry Dankowicz
Associate Dean of Graduate, Professional & Online Programs
College of Engineering

Date



30 JAN, 2017

by Benito Marinas
Head, Department of Civil & Environmental Engineering

Date

Appendix D: Letter of Intent from KTH

Stockholm, 2016-09-22

Re: University of Illinois at Urbana-Champaign Proposal for a Graduate Concentration in Railway Engineering within the major in Engineering in the Master of Engineering Degree in the College of Engineering

This letter is to indicate the unanimous support by the management and faculty of KTH Royal Institute of Technology (KTH) for collaboration with the University of Illinois at Urbana-Champaign (Illinois) as part of a joint railway engineering initiative. To this end, KTH has formally approved a new Masters Degree in Railway Engineering with start Fall 2017 that relies on KTH students enrolling in a number of courses offered at Illinois for transfer credit.

In a reciprocal fashion, and as part of a forthcoming memorandum of understanding, the following courses will be offered by KTH and available, at no additional cost, to Illinois students participating in the proposed Graduate Concentration in Railway Engineering within the Major in Engineering in the professional Master of Engineering degree at Illinois.

Courses from KTH

- SD2307 Rail Vehicle Technology
- SD2313 Rail Vehicle Dynamics
- EJ2400 Electric Traction
- AH2026 Railway Traffic Market & Planning
- AK2306 Theory and Methodology of Science

Thank you for your support of this effort.

Best regards,

Per Berglund
Vice Dean of Faculty

Attachment: *KTH formal approval to implement the MSc Program in Railway engineering in collaboration with UIUC.*

KTH
Universitetsförvaltning
Brinellvägen 8 | 100 44 Stockholm
08 790 60 00 | info@kth.se | www.kth.se

The Graduate College | University of Illinois at Urbana-Champaign

REQUEST & JUSTIFICATION FORM FOR PROGRAM CLASSIFICATION TRADITIONAL, SELF-SUPPORTING or REIMBURSABLE

CURRENT PROGRAMS:
Current graduate programs can request a change in classification to Traditional or Reimbursable, but not to Self-supporting.

NEW PROGRAMS:
New programs seeking Traditional classification do not need to complete this form.

New programs seeking Self-supporting classification should be aware of the following:

a) Students enrolled in Self-supporting programs are ineligible to hold waiver-generating appointments. NOTE: There is no mechanism within the Human Resources Front End system that restricts the appointment of a Self-supporting program student to an assistantship. Therefore, if a unit (faculty or staff) appoints a student, in error, significant problems result for everyone involved.
b) Self-supporting status results in reduced flexibility for the program. Even if a student in the program is most qualified for a particular assistantship appointment and financing is available through the program, the program status makes the student ineligible.
c) Because Traditional, Reimbursable and Self-supporting programs each yield 90% of net tuition, and the Reimbursable classification avoids the limitations above, a program might find the Reimbursable classification more advantageous than Self-supporting.

Please contact the Fellowship Office at the Graduate College if you have questions or seek clarifications, (217) 333-0036 or gradfellowships@illinois.edu.

COLLEGE OR SCHOOL: College of Engineering

IS THIS A NEW OR EXISTING PROGRAM:
☑ New Program
☐ Existing Program Program Code: _____ Current Classification: _____

REQUESTED CLASSIFICATION: ☐ TRADITIONAL ☐ REIMBURSABLE ☑ SELF-SUPPORTING

JUSTIFICATION: On a separate sheet, please address the following.

1. Describe the reasons for this request and explain: (a) the pros and cons of the classification requested, and (b) how the requested classification will benefit and not adversely affect the academic quality of the program.

2. Describe the expected impact of the requested classification to new students. How will these measures affect the affordability of the program? What type of financial aid, if any, will be offered? Note: Continuing students will not be affected as they are subject to the rules in effect at the time of their admission.

3. What provisions will be made to communicate the implications of the classification to prospective and newly admitted students?

4. Name the college and program contact persons in charge of implementing and communicating the classification and its consequences to students.

Unit Head Signature and Date _____

College Dean Signature and Date _____ 3-14-17

1) Describe the reasons for this request and explain: (a) the pros and cons of the classification requested, and (b) how the requested classification will benefit and not adversely affect the academic quality of the program.

This is a request to establish self-supporting status for a new concentration within the M.Eng. in Engineering, Railway Engineering. The total enrollment in this professional degree program is projected to be approximately 20 to 25 representing a small fraction of the enrollments in CEE graduate programs. As such, there will not be any significant impact on class sizes for current or future graduate students in the existing M.S. and Ph.D. programs. Designating this new program as self-supporting will not affect admissions standing for the M.Eng. or the existing M.S. and Ph.D. programs. The program will generate new revenue for CEE and the College of Engineering units as a whole, enabling us to increase the level of TA and grader support for all graduate courses. We expect that establishment of the self-supporting M.Eng. in Engineering with a concentration in Railway Engineering will not decrease the quality of the educational experience in all of the graduate degree programs in CEE and Engineering.

2) Describe the expected impact of the requested classification to new students. How will these measures affect the affordability of the program? What type of financial aid, if any, will be offered? Note: Continuing students will not be affected as they are subject to the rules in effect at the time of their admission.

The concentration in Railway Engineering is a new concentration under the M.Eng. in Engineering. No change that would affect any current or future students in the existing M.S. or Ph.D. degree programs is proposed. All students entering the new concentration will need to pay tuition. We do not intend to offer financial aid to any students who are enrolled in the M.Eng. program.

3) What provisions will be made to communicate the implications of the classification to prospective and newly admitted students?

The self-supporting nature of this program will be clearly explained on the program's website and in any and all communications to prospective students.

4) Name the college and program contact persons in charge of implementing and communicating the classification and its consequences to students.

This is a new M.Eng. in Engineering concentration. No changes are being requested. Professor Christopher Barkan, Director, Rail Transportation & Engineering Center and Professor in Civil and Environmental Engineering, and the CEE Academic Office (Mickey Peyton, Joan Christian, and Professor Jeff Roesler) will be responsible for communicating with prospective students. The College of Engineering contacts for this program are Harry Dankowicz, Associate Dean of Graduate, Online and Professional Programs, College of Engineering, and Rhonda McElroy, Director of Engineering Graduate and Professional Programs.

Master of Engineering in Engineering
Program Administration and Policies

Background

The Master of Engineering in Engineering (M.Eng. in Engineering) degree program is for students whose primary intent is a professional career in industry or government. This degree differs from the Master of Science (M.S.) degree in that it is not a pathway to a doctoral program. The M.Eng. in Engineering requires the selection of an interdisciplinary concentration.

The M.Eng. in Engineering degree was approved and implemented in the College of Engineering in fall 2014. It allows academic units within the college to partner with other academic units or research centers in the college, or at other institutions, to

1. pilot a time-sensitive, professional graduate program in a timely fashion, and for finite duration, in the form of an interdisciplinary concentration,
2. use the concentration to gauge demand for a formal degree program in the interdisciplinary field, and
3. terminate the concentration in a timely fashion if such demand is found insufficient.

For concentrations that are successful within the first three to four years, the College of Engineering Office of Graduate, Professional and Online Programs works with the academic units to transition the concentration to a new major within the Master of Engineering degree. For concentrations that fall short of such expectations, the Office of Graduate, Professional and Online Programs works with the academic units to sunset the concentration.

Degree Requirements

The M.Eng. in Engineering degree program resides within the College of Engineering Office Graduate, Professional and Online Programs and requires an approved concentration, which must be housed within one of the twelve academic departments in the college. The curriculum for the major in Engineering is organized as follows:

- At least a total of 32 credit hours. At least 12 hours of the 32 must be at the 500-level.
- Must have an approved concentration, which must be interdisciplinary.
- A concentration must be a minimum of 24 credit hours of which 8 hours must be at the 500-level and 4 hours must be professional development. Professional development can be in the form of an internship, capstone project, and/or business-oriented courses.

Example of a Concentration Curriculum

Requirements	
Coursework	Hours
Required Courses	12
Complete two of from this approved list of courses.	8
Elective courses chosen in consultation with advisor.	8

• Professional Development. Students must complete either a capstone project (independent study course), an internship with a company secured by the student, and/or business oriented or leadership courses.	4
Total Coursework Hours	32

In addition,

- Students enrolled in the degree must maintain a minimum GPA of 3.0 or higher to remain in good academic standing.
- A minimum of 20 credit hours must be taken from the University of Illinois Urbana-Champaign campus.
- No courses used to fulfill any degree requirements may be taken using the "Credit/Not Credit" option.
- A maximum of 12 graduate-level credit hours from outside the University of Illinois Urbana-Champaign Graduate College can be transferred into this degree program if approved by the concentration's home department. Coursework must have been completed within the last five years.

Implementation Plan

Units wanting to propose a new concentration to be housed under this degree program must complete the Senate Curriculum Proposal form. In addition to the information required in this form, the College of Engineering Office of Graduate, Professional and Online Programs requires a five-year implementation plan to be submitted. The implementation plan must include the following information.

- Anticipated allocation of existing, shared, and future staff resources (faculty loads, existing commitments, new faculty hires) that will be responsible for delivery of the proposed concentration.
- Anticipated enrollment figures, recruitment efforts, curricular enhancements, advising efforts, and other non-academic activities intended to enhance student learning in the proposed concentration.
- Anticipated metrics for evaluating success of the proposed concentration and for gauging demand for a formal degree program in the interdisciplinary field.
- Anticipated steps to sunset the proposed concentration if there is insufficient demand for a formal degree program in the interdisciplinary field. These should address the impact to existing students, faculty that may have been hired, and new courses that may have been implemented, as well as outline structures that will remain in place until the last student has graduated.

Program Administration

The College of Engineering Office of Graduate, Professional and Online Programs includes a full-time M.Eng. Program Coordinator who assists each academic department that houses a concentration in the M.Eng. in Engineering degree program with recruitment, admissions, advising, and degree conferral. Each academic department that has a concentration under this degree pays a portion of the M.Eng. Program Coordinator's salary. The Director of Graduate Study in the concentration's home department works closely with the M.Eng. Program

Coordinator and the Office of Graduate, Professional and Online Programs to resolve any student concerns.

Each concentration must have a designated admission committee charged with defining admission criteria, evaluating all applications to the program, and making admission decisions, as well as a designated curriculum committee charged with reviewing changes or exceptions to the published curriculum.

A standard website template, developed by the College of Engineering, must be used for each concentration under this degree. This can be linked to the website of the home department.

Policies

All approved concentrations under the M.Eng. in Engineering degree program are in a pilot phase. Approved concentrations will adhere to the following guidelines.

- Concentrations must be housed within one of the twelve Engineering academic departments.
- Academic program policies and procedures of the Graduate College, the College of Engineering Graduate, Professional and Online Programs Office, and the home department must be followed.
- Concentrations can remain in the pilot phase up to 5 years.
- A yearly progress report must be submitted each June to the College of Engineering Office of Graduate, Professional and Online Programs. This report should include annual and cumulative enrollment statistics, recruitment plans, projected future enrollment, past and projected program enhancements, and an accounting of costs associated with administration of the concentration.
- Successful concentrations that show evidence of significant demand for a regular degree program by year three shall complete the Senate Curriculum Proposal form to request that the concentration be turned into a formal degree program.
- In the spring of the fourth year, any concentration that has not started the Senate Curriculum Proposal form will be evaluated to determine appropriate actions to be taken to sunset the concentration in a timely fashion.

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

University Library
Office of Dean of Libraries
and University Librarian
230 Main Library, MC-522
1408 West Gregory Drive
Urbana, IL 61801

February 10, 2017

Rhonda McElroy
Director of Graduate and Professional Programs
College of Engineering @ ILLINOIS
Engineering Hall 405
1308 West Green Street
Urbana, IL 61801

Dear Rhonda:

Thank you for providing the University Library with the opportunity to review the College of Engineering's proposal to the Senate's Committee on Educational Policy. The proposal to establish a Concentration in Railway Engineering in the M.Eng in Engineering program is one that our Engineering Librarian feels as though the Library is well-positioned to support. As Bill Mischo, Head of the Grainger Engineering Library and Information Center, noted, "We work very closely with the Railway Engineering program and its Director, Chris Barkan in Civil Engineering.... We have extensive collections and services for Railroad Engineering and work very closely with Chris and the other faculty in the program.... So, we can strongly support this new program."

The University Library and the College of Engineering have a long history of working closely together. We look forward to utilizing the resources committed in order to grow in the areas necessary to provide support for this program.

Sincerely,

John P. Wilkin
Juanita J. and Robert E. Simpson
Dean of Libraries and University Librarian

c: Bill Mischo
Thomas Teper

Office of the Provost and Vice Chancellor for Academic Affairs
Swanlund Administration Building
601 East John Street
Champaign, IL 61820

March 17, 2017

Bettina Francis, Chair
Senate Committee on Educational Policy
Office of the Senate
228 English Building, MC-461

Dear Professor Francis:

Enclosed is a copy of a proposal from the College of Engineering to establish a graduate concentration in Railway Engineering within the major in Engineering for the degree of Master of Engineering.

Sincerely,

Kathryn A. Martensen
Assistant Provost

Enclosures

c: A. McKinney
H. Dankowicz
B. Marinas
R. McElroy
J. Hart

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

College of Engineering

Executive Committee
306 Engineering Hall, MC-266
1308 West Green Street
Urbana, IL 61801

March 14, 2017

Associate Dean John Hart
Graduate College
204 Coble Hall
MC-322

Via: Andreas Cangellaris, Engineering College

Dear Dean Hart:

The College of Engineering Executive Committee has reviewed and approved the following new program. We now submit for campus approval.

"Establish a Graduate Concentration in Railway Engineering within the major in Engineering in the Master of Engineering Degree in the College of Engineering"

Attached is a copy of the request.

Sincerely yours,

David Padua

David Padua, Vice Chair
Executive Committee

Approval Recommended:

3-14-2017

Andreas Cangellaris, Dean
College of Engineering

Date

Harry Dankowicz
Rhonda McElroy
David Padua

telephone 217-333-2151 • *fax* 217-244-7705

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Senate Educational Policy Committee
Proposal Check Sheet

PROPOSAL TITLE (Same as on proposal): Establish a Graduate Concentration in Railway Engineering within the major in Engineering in the Master of Engineering Degree in the College of Engineering

PROPOSAL TYPE (select all that apply below):

A. ☒ Proposal for a NEW or REVISED degree program. Please consult the Programs of Study Catalog for official titles of existing degree programs.

1. Degree program level:

   ☒ Graduate ☐ Professional ☐ Undergraduate

2. ☐ Proposal for a new **degree** (e.g. B.S., M.A. or Ph.D.):

   Degree name, "*e.g., Bachelor of Arts or Master of Science*": _____

3. ☐ Proposal for a new or revised **major, concentration, or minor**:

   ☐ New or ☐ Revised **Major** in (name of existing or proposed major): _____

   ☒ New or ☐ Revised **Concentration** in (name of existing or proposed concentration): Railway Engineering

   ☐ New or ☐ Revised **Minor** in (name of existing or proposed minor): _____

4. ☐ Proposal to rename an existing major, concentration, or minor:

   ☐ Major ☐ Concentration ☐ Minor

   Current name: _____

   Proposed new name: _____

5. ☐ Proposal to terminate an existing degree, major, concentration, or minor:

   ☐ Degree ☐ Major ☐ Concentration ☐ Minor

   Name of existing degree, major, or concentration: _____

6. ☐ Proposal involving a multi-institutional degree:

   ☐ New ☐ Revision ☐ Termination

Name of existing Illinois (UIUC) degree: _____

Name of non-Illinois partnering institution: _____

Location of non-Illinois partnering institution:

☐ State of Illinois ☐ US State: _____ ☐ Foreign country: _____

B. ☐ Proposal to create a new academic unit (college, school, department, program or other academic unit):

Name of proposed new unit: _____

C. ☐ Proposal to rename an existing academic unit (college, school, department, or other academic unit):

Current name of unit: _____

Proposed new name of unit: _____

D. ☐ Proposal to reorganize existing units (colleges, schools, departments, or program):

1. ☐ Proposal to change the status of an existing and approved unit (e.g. change from a program to department)

   Name of current unit including status: _____

2. ☐ Proposal to transfer an existing unit:

   Current unit's name and home: _____

   Proposed new home for the unit: _____

3. ☐ Proposal to merge two or more existing units (e.g., merge department A with department B):

   Name and college of unit one to be merged: _____

   Name and college of unit two to be merged: _____

   Proposed name and college of new (merged) unit: _____

4. ☐ Proposal to terminate an existing unit:

   Current unit's name and status: _____

E. ☐ **Other educational policy proposals** (e.g., academic calendar, grading policies, etc.)

Nature of the proposal: _____

Revised 10/2012