MEMORANDUM

To: Provost Dutta
From: David J. Russomanno
Date: March 6, 2017
Subject: Requesting Approval for IUPUI site-approved Ph.D. degree in ECE

Dear Provost Dutta,

The Purdue School of Engineering and Technology at Indiana University-Purdue University Indianapolis (IUPUI) is submitting for approval to the Purdue Board of Trustees a proposal for a Doctor of Philosophy in Electrical and Computer Engineering degree at IUPUI.

David J. Russomanno, Dean
Purdue School of Engineering Technology, IUPUI

Approval Recommended:

Debasish Dutta, Provost and Executive Vice President for Academic Affairs and Diversity

Approved:

Mitchell E. Daniels, Jr., President
SIGNATURE PAGE
FOR NEW DEGREE PROGRAM PROPOSAL

Degree Title: PhD in Electrical & Computer Engineering

Name of academic unit offering the new degree: Electrical & Computer Engineering Department at Indiana University Purdue University Indianapolis

Include signatures from all involved programs:

\[\text{Signature of Department Head} \quad \text{Date} \quad 12/14/2016\]
\[\text{Name of Department} \quad \text{Name of College/School} \quad \text{Date} \quad 12-14-2016\]

\[\text{Signature of Academic Dean} \quad \text{Date} \quad 12/14/2016\]
\[\text{Name of College/School} \quad \text{Name of College/School} \quad \text{Date} \quad 12-14-2016\]

\[\text{Signature of Director of Graduate Studies} \quad \text{Date} \quad 2/16/17\]
\[\text{for regional campuses} \quad \text{Name of College/School} \quad \text{Date} \quad 2/16/17\]

\[\text{Approval Recommended by the Graduate Council} \quad \text{Date} \quad 2/16/17\]

\[\text{Dean of the Graduate School} \quad \text{Date} \quad 3/21/17\]

\[\text{Provost} \quad \text{Date} \quad 3/21/17\]
DATE: 2/16/17
TO: Board of Trustees
FROM: Brian King, Primary Contact, 317-274-9723, briking@iupui.edu
SUBJECT: Submission of proposal for Site Approval for Ph.D. in Electrical and Computer Engineering, IUPUI

Purpose:
☐ This item is recommended for discussion by the Board in executive session.
☐ This item is recommended for discussion by the ______ Committee at its meeting.
☒ This item will require a formal vote by the Academic Affairs Committee at its meeting.
☐ This item will require a formal vote by the Board in the Stated Meeting.
☐ This item will be presented in a formal resolution for action at the Stated Meeting.

Attachments:

Executive Summary (1-page): Attached

Concluding thought: The purpose of the Executive Summary is to ensure the trustees know an item will be discussed at the meetings, to give them a general understanding, and to provide contact information if they have early questions. Please keep it to one page, and limit attachments to only those needed to provide a useful introductory overview.
EXECUTIVE SUMMARY
Ph.D. in Electrical & Computer Engineering
Purdue School of Engineering & Technology
Indiana University-Purdue University Indianapolis

The Purdue School of Engineering & Technology at Indiana University-Purdue University Indianapolis (IUPUI) seeks to transition its current cooperative agreement for participation in the Ph.D. Program of Purdue University for Studies in the School of Electrical and Computer Engineering to an IUPUI site-approved ECE Ph.D. degree program. The cooperative agreement entitled: “A Cooperative Agreement Between: The Purdue School of Engineering and Technology, IUPUI and The School of Electrical and Computer Engineering, Purdue University, West Lafayette,” was approved in September 2003. The ECE Department at IUPUI has been successful and active in providing Ph.D. training in Indianapolis for nearly 12 years and has advanced to the stage in which a site-approved program is a logical and necessary transition for further student and faculty success, while contributing to the economic workforce needs of the State of Indiana.

Given the experience and maturity of the IUPUI ECE Department and the success of its students, the terms and conditions of the existing cooperative agreement place unnecessary limitations on the students and the faculty that it is intended to serve. Under the current agreement, IUPUI doctoral students are required to take at least half of their courses and all dissertation credits on the West Lafayette campus. All degrees are awarded by the West Lafayette campus even though the research is conducted on the IUPUI campus and supported by grants and awards to the faculty and students in Indianapolis. The proposed site approval for the Ph.D. program in Electrical & Computer Engineering at IUPUI will facilitate an enhanced venue for delivery of engineering research and training that will be unique and provide much needed support to the central Indiana community. Further, niche areas such as the Transportation Active Safety Institute will soon advance to be an internationally recognized institute. Such research institutes at IUPUI need a site approved Ph.D. offering in ECE to provide the necessary graduate student research assistants. Also, collaborations between ECE at IUPUI and West Lafayette will be strengthened based on complimentary faculty and students research interests and objectives, rather than mandated by Ph.D. student committee composition requirements as specified under the current agreement. Collaborations based on complimentary research interests/objectives can provide greater overall benefits to both campuses, such as increased access to local industry partners with an IUPUI collaborator available to reach out to the local industrial partner in a timely manner; or as an enabling bridge between faculty in West Lafayette and the expanding health/medical industry and facilities in Indianapolis. Currently, there are no other Ph.D. engineering programs in Electrical and Computer Engineering in the metropolitan Indianapolis area and none in the region with the leading research foci being pursued by the department. It is also clear that local Ph.D. training opportunities in Electrical and Computer Engineering are desired by regional employers, such as Interactive Intelligence, Raytheon, Cummins, Delphi, LHP, Rolls Royce, and NSW Crane, as well as other employers both nationally and internationally in the research areas being pursued by the department including Toyota, Delphi, Ford, BMW, and Samsung among others. Finally, a site-approved Ph.D. in ECE will also serve the goals of IUPUI by increasing the graduate research and training efforts in an area that aligns with the health science-oriented commitment of the IUPUI campus. For example, there is a strong collaboration between ECE at IUPUI and the IU School of Medicine in the area of automobile driver studies and active safety systems, including the analysis of the impact of alcohol on driver performance. The ECE Department has a strong research program that is capable of supporting the proposed Ph.D. program.

The ECE Department currently has 17 tenured/tenure-track faculty members who are committed to high quality research and teaching, with research emphasis in areas that include transportation active safety, automatic control, medical image processing, signal processing, power, renewable energy, data analytics, information intelligence, cybersecurity, and sensor technologies. Faculty research efforts have been well funded by various agencies including NSF (including NSF CAREER awards), NIH, and the Department of Defense.
PROPOSAL
Ph.D. in Electrical & Computer Engineering
Purdue School of Engineering & Technology
Indiana University-Purdue University Indianapolis, Indianapolis, IN

Characteristics of the Program
a) Campus(es) Offering Program: Indiana University-Purdue University Indianapolis (IUPUI)
b) Scope of Delivery Specific Sites or Statewide: IUPUI
c) Mode of Delivery: Classroom
d) Other Delivery Aspects: Ph.D. students will be required to participate in research and have the option to complete internships related to their plan of study.
e) Academic Unit Offering Program: School of Engineering & Technology, IUPUI
f) Department: Electrical & Computer Engineering

Rationale for Program

a) Institutional Rationale (e.g. Alignment with Institutional Mission and Strengths)
IUPUI is an urban, core research campus of Indiana University and often characterized as the State of Indiana’s “Health & Life Sciences” campus. There has been tremendous increase in the number of academic programs at IUPUI. In particular, there has been significant growth in Ph.D. programs, which reflects IUPUI’s evolution as a research university. The Purdue School of Engineering & Technology seeks to transition from a cooperative agreement of participation in the Purdue West Lafayette ECE Ph.D. program to a site-approved doctoral degree program in Electrical & Computer Engineering at IUPUI. This transition reflects the vision for research development in the department with its ability to deliver quality specialized research as well as to mentor graduate students in these areas. Some of the niche research areas of focus in the department include transportation active safety systems, automatic control, power, renewable energy, signal processing, cybersecurity, medical imaging, data analytics, information intelligence, and sensor technologies, especially in the context of health sciences.

The proposed program will build upon the existing research strengths of the ECE Department and will leverage the resources available in Indianapolis and on the IUPUI campus to train the next generation of Electrical and Computer Engineers and enable them to actively participate in meeting industry demands, primarily, in Central Indiana but also in Indiana, the greater Midwest and the nation. The IUPUI campus vision is “to be the best urban research university by conducting world-class research, scholarship, and creative activities that develop knowledge and contribute to the economic growth and social advancement of Indiana and the nation and benefit humanity as a whole.” Engineering is essential to IUPUI achieving this vision and a site-approved ECE Ph.D. program provides a unique opportunity for the department to become an active participant in this vision. Missing this opportunity will certainly translate into the organic redistribution of advanced engineering research activities across several schools. The above-mentioned factors, together with the evolution of the IUPUI campus and changes in the local economy, makes an Indianapolis-based ECE doctoral program not just an aspiration but also a pressing need in order to sustain the active participation of our department in the research and
educational enterprise of Central Indiana, the home of many engineering, information technology, life and health sciences, and manufacturing industries.

The ECE Department has been offering a site-approved MSECE degree for many years. Under the current cooperative agreement with the ECE department at Purdue University West Lafayette (PUWL), we have Ph.D. students who are members of the ECE PUWL Ph.D. program. These students have a permanent home on the IUPUI campus. They conduct research at IUPUI and take courses both at IUPUI and PUWL. However, the current agreement requires that the majority of their courses be taken at PUWL. In addition, admissions for the program are processed by PUWL. Despite these constraints, our PhD student population has maintained a level of more than 12 Ph.D. students over the past five years. This relative success can primarily be attributed to the significant subsidy of the program by the School of Engineering and Technology at IUPUI as well as the determination of the faculty members to making the program a success. Nonetheless, the lack of self-sustainability of the program has hindered its growth. Indeed, the current restrictions make it difficult for the department to grow the Ph.D. program and definitely make the program less attractive to potential Ph.D. students for whom pursuing a Ph.D. program in Indianapolis is the only possible option.

Faculty members of the ECE Department have been successfully training Ph.D. students for several years. Even prior to the adoption of the cooperative agreement between ECE and ECE PUWL, numerous faculty members were mentoring Ph.D. students at other universities. We have qualified faculty and nearly all have experience with Ph.D. mentoring and training. Furthermore, the ECE department has been the recipient of many substantial and competitive research awards. For instance, two of our faculty members are the recipient of the NSF Career Award and several have patents. Doctoral students in the ECE program at IUPUI also benefit from our campus membership in the NSF-sponsored consortium CIRTL, Center for Integration of Research, Teaching and Learning, which provides career development programs specifically for STEM-focused graduate students. In order, for the ECE department to continue to be increasingly competitive in
  - the delivery of high quality research,
  - the recruitment and retention of top research faculty talent, and
  - in the provision of an environment conducive to faculty success,
a high quality onsite Ph.D. program that can further stimulate the research activities on campus is an absolute necessity.
Table 1
Question 3a: Cost of and Support for the Program Detail on Direct Program Costs
IUPUI Campus PhD in ECE Program

<table>
<thead>
<tr>
<th>Totalyear</th>
<th>#1 FY 2018</th>
<th>#2 FY 2019</th>
<th>#3 FY 2020</th>
<th>#4 FY 2021</th>
<th>#5 FY 2022</th>
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<tbody>
<tr>
<td>FTE Costs</td>
<td>FTE Costs</td>
<td>FTE Costs</td>
<td>FTE Costs</td>
<td>FTE Costs</td>
<td>FTE Costs</td>
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<td>1. Faculty and staff</td>
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<td>a. staff</td>
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<tr>
<td>b. faculty</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>c. limited term lecturers</td>
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<td>2. Supplies and Expenses</td>
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<td>e. Other</td>
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<td>Total Supplies and expenses</td>
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<td>a. graduate Fee scholarships</td>
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<td>b. fellowships total</td>
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<td>75000**</td>
<td>75000**</td>
<td>75000**</td>
<td>75000**</td>
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<td>sum of all direct program costs</td>
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</table>

** costs will be absorbed by existing support within ECE Department base budget
## Table 2
Data for Question #6
Projected Headcount and FTE Enrollment and Degrees Conferred

<table>
<thead>
<tr>
<th></th>
<th>Year #1 FY2018</th>
<th>Year #2 FY2019</th>
<th>Year #3 FY2020</th>
<th>Year #4 FY2021</th>
<th>Year #5 FY2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment Projections (Headcount)</td>
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<td>Enrollment Projections (FTE)</td>
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<tr>
<td>Degree Completions Projection</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

*Does not count current students under the cooperated agreement that may decide to switch to the on-site PhD program rather than stay as PhD students at PWL working on the IUPUI campus. We currently have 17 in the program and expect a few more to start in Fall. 4 is new students.
August 10, 2016

Brian King, Ph.D.
Associate Professor and Acting Chair
Department of Electrical and Computer Engineering
IUPUI
799 W. Michigan Street
Indianapolis, IN 46202

Dear Professor King:

The College of Engineering and the School of Electrical and Computer Engineering at Purdue's West Lafayette campus support the proposal to award a site-specific doctoral degree in Electrical and Computer Engineering at Indiana University-Purdue University Indianapolis, with the understanding that both the diploma and the transcript will clearly state that the degree is awarded for work at the Indianapolis campus.

Faculty members in the School of Electrical and Computer Engineering (ECE) are ready to work with you and your faculty as you launch your program. Joint efforts could include such activities as research proposals, seminars, and service on graduate student advisory committees. We have also recently agreed to the Graduate School's new policy that applicants to the ECE graduate program at West Lafayette who could not be accommodated on this campus may apply to a graduate program at another Purdue campus at no charge. ECE receives nearly 2,000 applications for graduate programs each year and can enroll only a small fraction of those students.

In addition, Audeen Fentiman, Associate Dean of Engineering for Graduate Education and Interdisciplinary Programs, who has been involved in development of other proposals for new graduate programs in engineering, will be happy to work with you, if you like, as you prepare the pre-proposal and proposal. We wish you success with this endeavor.

Sincerely,

Leah H. Jamieson
The John A. Edwardson Dean of Engineering
Ransburg Distinguished Professor of Electrical & Computer Engineering

Venkataramanan Balakrishnan
The Michael and Katherine Birck Head and Professor of Electrical and Computer Engineering