

Cover Sheet: Request 13704

Proposal to Create a Department of Engineering Education in the Herbert Wertheim College of Engineering

Info

Process	Unit New/Modify/Close Dept
Status	Pending at GRAD - Graduate Council
Submitter	Casey Griffith cgriffith@aa.ufl.edu
Created	3/1/2019 2:19:09 PM
Updated	3/13/2019 2:46:30 PM
Description of request	The Herbert Wertheim College of Engineering (HWCOE) is one of the largest colleges at the University of Florida with 10 departments (2 are part of a school), 15 BS degree programs, 13 MS degree programs and 13 PhD degree programs. Recognizing the importance of engineering education to serve the stakeholders of the departments, college, and university, the Institute for Excellence in Engineering Education (IE3) was formed in 2016 to coalesce faculty who provide instruction in high enrollment freshman and sophomore general engineering courses, manage the production of online graduate courses (EDGE), manage college-level accreditation (SACS and ABET), and to organize research in engineering education. IE3 is now the home for 12 lecturer and 1 tenure-track faculty, providing instruction to 5,700 students (enrollments) per year (2017-18 data) in HWCOE. This proposal to form a new Department of Engineering Education has been developed, modified, and ratified by the affected faculty members. It has been benchmarked to similar departments that have been formed at leading engineering colleges nationwide. The new department will have tenured and non-tenured faculty members. To contribute to scholarship specifically in engineering education, it will be home to a future Ph.D. program in Engineering Education.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	ENG - Engineering - General 011940001	Johannes Van Oostrom		3/1/2019
Department Creation Support 02122019.pdf					3/1/2019
College	Approved	ENG - College of Engineering	Heidi Dublin	Moved forward at request of Dr. van Oostrom. Proposal was discussed at HWCOE Curriculum Committee and HWCOE Faculty Meeting.	3/5/2019
No document changes					

Step	Status	Group	User	Comment	Updated
University Curriculum Committee	Commented	PV - University Curriculum Committee (UCC)	Casey Griffith	Added to March UCC agenda. Request will also be "Approved in system" so that it may be simultaneously reviewed by the Graduate Council, this does not mean the request has been approved by the UCC on this date. The current approval system does not allow for a request to be pending at two groups simultaneously and there were mitigating circumstances with the submission of this request. Circumstances did not allow for alignment with the monthly schedule of committee meetings. Summary document of process and request progress is included in request. Request will be "recycled" by administrative action if the UCC does not approve at its upcoming meeting	3/5/2019
No document changes					
University Curriculum Committee	Approved	PV - University Curriculum Committee (UCC)	Casey Griffith		3/11/2019
Engineering Education process explanation document.pdf					3/11/2019
Graduate Council	Pending	GRAD - Graduate Council			3/11/2019
No document changes					
Faculty Senate Steering Committee					
No document changes					
Faculty Senate					
No document changes					
Academic Affairs					
No document changes					
Board of Trustees					
No document changes					
Office of the Registrar					
No document changes					
OIPR Notified					
No document changes					



College of Education
Office of the Dean

2-083A Norman Hall
PO Box 117040
Gainesville, FL 32611-7048
352-273-4134

February 12, 2019

Toshi Nishida, PhD
Associate Dean for Academic Affairs
Herbert Wertheim College of Engineering
University of Florida
Gainesville, FL 32611

SUBJ: Departmental Creation

Dear Toshi:

I have reviewed the HWCOE summary for the formation of a Department of Engineering Education. After consultation with the College of Education STEM Education faculty, I am pleased to indicate support for the creation of a department that focuses on teaching and learning in the field of engineering. The successes of the Institute for Excellence in Engineering Education should provide a robust foundation for academic activities in the new department. To that end, the College of Education STEM Education faculty are keen to be involved in conversations focusing on vision, doctoral program development, and affiliation of faculty between HWCOE and COE.

Sincerely,

A handwritten signature in black ink that reads 'Thomas M. Dana'.

Thomas M. Dana, Ph.D.
Senior Associate Dean for Academic Affairs

Proposal to Create a Department of Engineering Education in the Herbert Wertheim College of Engineering (Request # 13704)

This submission will be simultaneously reviewed by the University Curriculum Committee (UCC) and the Graduate Council (GC) during the month of March, 2019. There have been mitigating circumstances during the review and uploading of the submission, as such the process is being adjusted in order to accommodate the monthly meeting times of the relevant approval groups. These adjustments to the process will allow for the request to appear before the Faculty Senate in a timely manner and before the end of the spring semester.

The tracking of this request will reflect approval of this submission by the UCC in order to have this also appear at the GC in the same month, however there has not been an actual vote on this submission yet and that will not occur until March 19th, 2019. If the UCC should not approve this request it will be recycled by administrative action.

For any questions or concerns please contact Casey Griffith, Associate Director of Academic Support Services, Office of Undergraduate Affairs.

PROPOSAL TO CREATE A DEPARTMENT OF ENGINEERING EDUCATION IN THE HERBERT WERTHEIM COLLEGE OF ENGINEERING

V9 FEB 27, 2019

OVERVIEW

The Herbert Wertheim College of Engineering (HWCOE) is one of the largest colleges at the University of Florida with 10 departments (2 are part of a school), 15 BS degree programs, 14 MS degree programs, and 15 PhD degree programs. Recognizing the importance of engineering education to serve the stakeholders of the departments, college, and university, the Institute for Excellence in Engineering Education (IE³) was formed in 2016 to coalesce faculty who provide instruction in high enrollment freshman and sophomore general engineering courses, manage the production of online graduate courses (EDGE), manage college-level accreditation (SACS and ABET), and to organize research in engineering education. IE³ is now the home for 12 lecturer and 1 tenure-track faculty, providing instruction to 5,700 students (enrollments) per year (2017-18 data) in HWCOE (Table 1). This proposal to form a new Department of Engineering Education has been developed, modified, and ratified by the affected faculty members. It has been benchmarked to similar departments that have been formed at leading engineering colleges nationwide. The new department will have tenured and non-tenured faculty members. To contribute to scholarship specifically in engineering education, it will be home to a future Ph.D. program in Engineering Education.

Table 1: Institute courses and enrollment

Course number	Course name	Cr	Fall 17	Spring 18	Sum 18	Total
			Enrolled	Enrolled	Enrolled	
EEL 3003	Elements of Electrical Engineering	3	310	309	279	898
EGN2020C	Engineering Design & Society	2			37	37
CGS 2531	Problem Solving with Comp Soft	3	585	561	130	1276
COP 2271	Computer Programming for Engineers - C++	2	40	32		72
COP 2271L	Computer Programming for Engineers - C++ LAB	1	36	27		63
COP 2271	Computer Programming for Engineers - Matlab	2	378	280	98	756
COP 2271L	Computer Programming for Engineers - Matlab LAB	1	124	150	40	314
EML 3007	Elements of Thermodynamics and Heat Transfer	3	80	170	49	299
EGM 3400	Elements of Dynamics	3	96	101	40	237
EGN 1935	EFTP - Design	2		54		54

COP3503	Programming Fundamentals 2	3			79	79
CEN 3031	Intro Software Engineering	3		172		172
COP 3502	Programming Fundamentals 1	3	511	273		784
COP 3530	Data Structures and Algorithms	4		44		44
COP 4600	Operating Systems	3	225	204		429
COT 3100	Applications of Discrete Structures	3		27		27
ECH 3023	Material and Energy Balances	4		42		42
ECH 4504	Chem Kine/Reactor Des	4	40			40
ECH 4644	Process Design	3		48		48
EGN 4930	Sales Engineering Seminar	4	29			29

Annual Total: 5,700

BACKGROUND AND RATIONALE

The field of Engineering is unique due to its breadth of subject areas, the need for extensive fundamentals, and the requirement of experiential, hands-on learning necessary for engineering design and to apply the knowledge of engineering topics. Discipline-based education research (DBER) is an emerging field of scholarship focused on the understanding of learning and content delivery specific to a discipline. Research and scholarship in DBER have focused on science, technology, engineering, and mathematics (STEM). This is especially the case in Engineering where the number of Ph.D. graduates in Engineering Education has doubled since 2013 and the enrollment in doctoral programs holds steady around 110 (ASEE data, 10 schools reporting). Engineering Education has expanded beyond traditional engineering disciplines and has established itself as a discipline. This is evident by the number of Departments of Engineering Education, and degree programs in Engineering Education shown in Table 2. As a new field, objective data are difficult to obtain because a CIP code has not yet been established and the educational programs are typically grouped under *14.0101 Engineering, General* or the *14.9999 Engineering, Other* CIP codes.

Table 2: US Departments and degree programs

DEPARTMENTS		
Name	Institution	Ph.D. Program
Department of Engineering Education	Purdue University	Ph.D. Engineering Education
Department of Engineering and Science Education	Clemson University	Ph.D. Engineering and Science Education
Department of Engineering Education	University of Buffalo	Ph.D. in Engineering Education (coming soon)
Department of Engineering Education	University of Cincinnati	no degree programs
Department of Engineering Education	The Ohio State University	Ph.D. Engineering Education
Department of Engineering Education	Utah State University	Ph.D. Engineering Education
Department of Engineering Education	Virginia Tech	Ph.D. Engineering Education

PROGRAMS

Name	Institution	Ph.D. Program
College of Engineering and Science	Louisiana Tech University	Ph.D. Engineering with Engineering Education concentration
Faculty of Engineering	University of Georgia	PhD in Engineering with Area of Emphasis in Engineering Education Research
Graduate School of Education	University of California - Berkeley	Ph.D. Studies in Engineering, Science, and Mathematics (SESAME) Education
Ira A. Fulton School of Engineering	Arizona State University	Ph.D. Engineering Education Systems and Design
Michigan Engineering Education Research Program	University of Michigan	Ph.D. Engineering Education Research
School of Universal Computing, Construction and Engineering Education (SUCCEED)	Florida International University	Ph.D. Engineering Education being approval

Benson, et al. (2010) has described the expected outcomes for students graduating from these programs:

1. Conduct and direct cutting-edge education research, including the areas of epistemologies, learning mechanisms and systems, pedagogical implementation, diversity and inclusiveness, and assessment.
2. Apply the results of such research to courses, curricula, and educational policies in academic and non-academic settings.
3. Be prepared for academic, government, and industry positions related to the lifelong education of engineers and scientists.
4. Actively participate and act as leaders in their fields through professional organizations, conferences, government organizations, workshops, and related activities to advance engineering and science education, and to develop highly qualified engineers, scientists, and discipline-based education researchers.

A more current analysis of these programs shows that there are a number of common features such as focus on research, need for teaching experience, coursework related to a specific engineering discipline, and the focus on research methods in engineering education (Murzi, et al. 2015).

The number of peer-reviewed scientific journals has also expanded and include the following:

- Journal of Engineering Education (the premier journal in the field with an impact factor of 1.97)
- European Journal of Engineering Education
- Advances in Engineering Education
- Engineering Studies
- International Journal of Engineering Education
- Computer Applications in Engineering Education
- Journal of Professional Issues in Engineering Education and Practice
- Other, broader education journals publish Engineering Education work

ANTICIPATED IMPACTS

The Institute for Excellence in Engineering Education (IE³) will form the basis of the new department. This institute is responsible for teaching general education courses, managing production of the engineering online graduate program (EDGE), overseeing the Integrated Product and Product Design (IPPD) program, and college-wide assessment and accreditation. With a current list of 14 faculty, the institute is no longer an appropriate unit for these faculty and functions. The department structure would also allow the hiring of tenure-track research faculty and the future creation of a Ph.D. program in Engineering Education. The Engineering Faculty Council has questioned appointing faculty and teaching curriculum in a unit outside a department structure in IE³ (Nov. 30, 2017 meeting minutes). Departments are the fundamental structure to house faculty and curriculum in a university. It has, however, been beneficial to bring together teaching faculty from multiple disciplines in a single unit with the shared interest of providing excellent teaching in engineering. The proposed new Department of Engineering Education addresses these concerns.

The new department will function as a resource for other departments by promoting best practices for teaching and learning, assist faculty with educational and outreach impacts of federal grants, and provide a focal point for engineering education grant writing. As a host to a Ph.D. program in Engineering Education, the department will provide a home to students in this discipline, rather than trying to fit it within existing departments. As a precursor to the department, IE³ has shown that it can attract a diverse group of faculty (31% Female, 15% African American, and 23% Hispanic) who can serve as role models for underrepresented minorities in engineering. Additionally, IE³ has redesigned courses to include more experiential and team learning through active learning methods and flipped classroom approaches, and a new first-year engineering course EGN 2020C Engineering Design & Society has been initiated to promote student retention within engineering and timely progression towards degree completion.

The immediate impact of the new Department of Engineering Education will be on the faculty of IE³ because their appointment will change from the institute to the new department. IE³ has functioned as their academic home allowing them to share ideas and best practices for teaching engineering students and growing professionally. It is essential that this culture is maintained to allow the non-tenure track faculty to have a voice in the new department. Other faculty may choose to request a change of their home department to the new department. This would form the initial set of department faculty.

Since the current institute (IE³) already operates with a faculty, staff, and a budget, no additional funding is requested to form the new department. Current sources of funding are Provost 500 and E&G funds for faculty and staff, distance learning fees and off-book revenue for EDGE, contract and grants (IPPD and research), and UF Foundation.

As soon as the department is formed, departmental bylaws will be written and voted upon by the departmental faculty (tenured and non-tenured) to specifically include 1) clear guidelines for promotion of non-tenure-track teaching faculty, and 2) allowing non-tenure track faculty departmental voting rights with the exclusion of voting on issues reserved in the Collective Bargaining Agreement to tenured faculty (such as voting on tenure, etc.). The bylaws will also describe the other required items such as guidelines for tenure, merit raises, etc.

A Department of Engineering Education would put the UF Herbert Wertheim College of Engineering on the map of leading institutions that focus on researching and implementing pedagogies, optimizing learning, and teaching excellence specific to engineering. It will join a number of its peers and will create a pathway for students to get doctoral degrees in Engineering Education, allowing them to propagate excellence in engineering education around UF, the state, and the nation.

LIST OF INAUGURAL FACULTY

Name	Title	Tenure status
Aggarwal,Ashish	LECTURER	non-tenure track
Blanchard,Jeremiah	AST ENG	non-tenure track
Cheney,David	LECTURER	non-tenure track
Dickrell,Pamela	ASO ENG	non-tenure track
Fox,Joshua	LECTURER	non-tenure track
Guico,Rodney	PRG DIR & ASO ENG	non-tenure track
Hill,Ira	AST ENG	non-tenure track
Jackson,Philip	AST ENG	non-tenure track
Kim,Gloria	SR LECTURER	non-tenure track
Mendoza Garcia,John	LECTURER	non-tenure track
Resch,Cheryl	LECTURER	non-tenure track
Rivera Jimenez,Sindia	LECTURER	non-tenure track
van Oostrom,Johannes	PRG DIR & ASO PROF	tenured
Virguez Barroso,Lilianny	LECTURER	non-tenure track

LIST OF INAUGURAL JOINT FACULTY

Name	Title	Home Department	Tenure status
Boyer, Kristy	ASO PROF	CISE	tenured
Douglas, Elliot	PROF	ENV	tenured
Fox, Robert	ASO PROF	ECE	tenured
Gader, Paul	PROF	ESSIE	tenured
Lam, Herman	ASO PROF	ECE	tenured
Lindner, Angela	ASO PROVOST & ASO PROF	ENV	tenured
Phillpot, Simon	DIS PROF	MSE	tenured
Taylor, Curtis	ASO DEAN & ASO PROF	MAE	tenured

Joint faculty have full voting rights, including for tenure and promotion in the new department.

FACULTY REVIEW PROCESS

An initial discussion about forming a department was held on August 24, 2018, at the IE³ faculty meeting. After discussion, it was decided for the non-tenure-track faculty to hold a separate meeting to discuss pros and cons of forming a department. This meeting was held on September 7, 2018. Dean Abernathy discussed the plans to form a department at the Engineering General

Faculty meeting on September 18, 2018. Further discussion was held at the IE³ faculty meeting on September 21, 2018. A draft of this proposal was reviewed by the non-tenure-track faculty on October 5, 2018. A final proposal was presented for voting at the IE³ faculty meeting on October 12, 2018. A motion to hold a ballot vote of the IE³ faculty was made at the November 16, 2018, IE³ faculty meeting.

A presentation to the Engineering Faculty Council was made on January 17, 2019. A presentation was made at the College Faculty meeting on February 12, 2019.

Presentations at departmental faculty meetings were made:

Department	Date	Department	Date
CISE	December 4, 2018	CHE	January 29, 2019
ABE	January 6, 2019	ECE	February 13, 2019
MAE	January 8, 2019	MSE	February 5, 2019
ISE	January 11, 2019	BME	March 13, 2019
ESSIE	January 14, 2019		

FACULTY VOTING RESULTS

IE³ Faculty.

November 16, 2018. Motion made for a ballot vote. 13 in favor of forming a department, 0 against, 0 abstain.

College Curriculum Committee.

February 5, 2019. 6 in favor of forming a department, 0 against, 0 abstain.

CITED LITERATURE

Benson, L.C., Becker, K., Cooper, M.M., Hayden Griffin, O. and Smith, K.A., 2010. Engineering education: Departments, degrees and directions. *International Journal of Engineering Education*, 26(5), p.1042.

Murzi, M.H.G., Shekhar, M.P. and McNair, L.D., Comparative Analysis of PhD programs in Engineering Education. 2015. *Proceedings of the 122nd Annual Conference and Exposition of the American Society of Engineering Education*.



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Sincerely,

A handwritten signature in black ink that reads "Thomas M. Dana". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Thomas M. Dana, Ph.D.
Senior Associate Dean for Academic Affairs