



MEMORANDUM

Date: May 14, 2015

To: Randy Smith, Vice Provost, Office of Academic Affairs

From: David, Williams, Dean, College of Engineering

Subject: Proposal to create the Department of Engineering Education (EED)

I am please to submit for review a proposal to create the Department of Engineering Education as a new academic unit in the College of Engineering with my recommendation to approve. My recommendation concurs with that of the College Committee on Academic Affairs and the Faculty of the College of Engineering. This proposal was authored by a team led by Professor Ann Christy, Director of the Engineering Education Innovation Center, and Professor David Tomasko, Associate Dean of Undergraduate Education.

The proposal was offered to the college community for comment in early 2015 and edits were made based on feedback received. The proposal has been presented in a range of venues to solicit feedback from faculty, staff and students. The proposal was presented individually to each of the department faculties in the college. The college executive committee was apprised of the proposal development process through the course of the past academic year. A letter expressing the support of the committee for the proposal is appended to this letter. The proposal, supporting documentation and comments can be found here:

<https://carmenwiki.osu.edu/display/10700/EEIC+Department+proposal+Home>

On April 23, 2015, the College Committee on Academic Affairs reviewed the final proposal and voted in favor of a motion to recommend approval by the College Faculty. The vote was 10 for, 2 against with no abstentions. On May 13, 2015 the College Faculty voted unanimously on a motion to recommend approval of the proposal.

I ask for the earliest possible consideration of this proposal, and stand ready to support the review process as might be needed.

cc: M. Newhouse, OAA
A. Christy, EEIC, FABE
D. Tomasko, COE, CBE
M. Ruegsegger, CCAA, BME
E. McCaul, CCAA, COE
R. Buchheit, COE, MSE



**Letter of Support to Establish the Department of Engineering Education
in the College of Engineering at Ohio State**

May 8, 2015

As the Department Chairpersons in the College of Engineering, we express our support of the proposal to establish the Department of Engineering Education (EED) in the College of Engineering, and wish to highlight the following points in so doing:

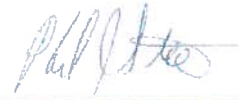
- We find substantive long-term value in EED's mission to "advance the engineering profession and enable student success by developing and delivering state-of-the-art, innovative, multi-disciplinary engineering courses and programs; by modeling and advocating scholarly, evidence-based teaching within the College of Engineering; and by integrating pedagogical discovery, practice, and dissemination through world-class engineering education research."
- We recognize the importance of engineering education research as a distinct pursuit within our field for ensuring the effectiveness of engineering education, the ultimate success of our students and for the betterment of society;
- We see in the EED strategic objectives opportunities to contribute to world-class undergraduate and graduate engineering education at Ohio State through its research and scholarship;
- We see opportunities for collaboration across our departments that are immediate and sustainable;
- We believe the EED will enhance the ability to execute our education, research and engagement missions across the entire college;
- We expect the success of EED to be marked and rapid as a result of its outgrowth from the already successful Engineering Education Innovation Center (EEIC);
- We expect the EED to become a pre-eminent academic department capable of attracting faculty, students and staff of the highest caliber who will define the directions in the discipline.

We look forward to welcoming and engaging the EED as the 12th member of the College's academic units and encourage the broadest possible support for this initiative.

(continued)



Rich Hart, Chair
Dept. of Biomedical Engineering (BME)



Phil Smith, Chair
Dept. of Integrated Systems Engineering (ISE)



Seth Young, Director
Center for Aviation Studies



Mike Cadwell, Director
Knowlton School of Architecture (KSA)



Andre Palmer, Interim Chair
Dept. of Chemical and Biomolecular Engineering
(CBE)



Ahmet Selamet, Chair
Dept. of Mechanical and Aerospace Engineering
(MAE)



Joel Johnson, Chair
Dept. of Electrical and Computer Engineering (ECE)



Mike Mills, Interim Chair
Dept. of Materials Science and Engineering (MSE)



Dorota Grejner-Brzezinska, Chair
Dept. of Civil, Environment, and Geodetic
Engineering (CEGE)



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Date: 24 April 2015

To: Rudy Buchheit
Associate Dean, Academic Affairs and Administration, College of
Engineering

From: Mark Ruegsegger
Chair, College Committee on Academic Affairs (CCAA)

Subject: Proposal to establish the Department of Engineering Education

CCAA reviewed the attached proposal on the 23rd of April 2015 to establish the Department of Engineering Education. The committee is recommending that the college faculty approve the proposal and forward it to the Council on Academic Affairs for its approval. The committee is recommending that the vote by the faculty should be by secret, paper ballot, and distributed early enough for collection and counting of ballots for those who can not attend the College faculty meeting on May 13. The vote at the meeting should also be by paper ballot. The reason for conducting a secret, paper ballot is so that all eligible faculty have an opportunity to vote and can vote their true conscience. CCAA's vote for this recommendation was 10 approved, 2 opposed, and 0 abstentions. If you have any questions concerning this proposal, please let me know.

May 14, 2015

Associate Dean David Tomasko
College of Engineering
Ohio State University

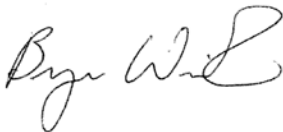
Dear David,

The College of Education and Human Ecology is pleased to support the College of Engineering's proposal to create a Department of Engineering Education. We are delighted to see that interest in improving teaching and learning is developing in the professional colleges and across campus. We believe this new department will benefit both engineering and education students, and serve as a venue for continued collaboration.

Our college has profited from working together with the College of Engineering in the past on various initiatives, for example, on the STEM Education PhD program, on joint appointments, and on K-12 outreach and engagement. We would be happy to collaborate further in your attempts to develop a graduate interdisciplinary specialization in engineering education, online certificate programs, and a masters program. We believe our knowledge of human learning, development, cognition, and pedagogy could enrich and strengthen these programs. At the same time, we believe that engineering educators might have much to teach us, as well, not only about engineering education, but teaching and learning more broadly considered. We appreciate your invitation to be involved in a dialogue about your new programs. We will watch the development of the new department with interest.

Please contact me if I can be of further assistance (warnick.11@osu.edu).

Sincerely,



Bryan Warnick
Associate Dean for Academic Affairs

Proposal to Establish the Department of Engineering Education

Submitted to:

The College of Engineering
The Ohio State University

Contact:

Ann D. Christy, Ph.D., P.E.

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April 16, 2015

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Preamble

To meet current and future global needs, The Ohio State University (OSU) is committed to achieving eminence in both research and teaching. Within the College of Engineering, reaching eminence relies upon attracting and retaining a diverse, highly talented pool of engineering educators and researchers; on developing and delivering evidence-based, significant learning experiences to engineering students; recruiting and graduating high quality graduate students, disseminating our work to others in the engineering and engineering education communities; and on launching new professionals in possession of strong disciplinary knowledge in engineering and similarly strong multidisciplinary general education.

Our graduates are able to confidently tackle open-ended engineering challenges, work effectively on multidisciplinary teams, and communicate compellingly and clearly with a diverse array of technical and non-technical audiences. The Engineering Education Innovation Center (EEIC) already plays an essential instructional role in the College of Engineering and in a national movement focused on research-driven educational innovations in engineering instruction. Researchers have identified a hierarchy of advancing levels of scholarly work in engineering education (Streveler et al., 2007):

- Level 0 Teach -Teaches as taught, without reflection
- Level 1 Effective Teaching - Teaches using accepted practices
- Level 2 Scholarly Teaching - Assesses teaching and makes improvements
- Level 3 Scholarship of Teaching and Learning - Engages in educational experimentation, shares results
- Level 4 Engineering Education Research - Conducts educational research, publishes in archival journals

Current EEIC personnel are very active in Levels 3 and 4 (see Appendices B and C), even though the unit has only one tenure-track faculty member in addition to the director, who is also tenured faculty. Transitioning the EEIC to a Department of Engineering Education and hiring four additional tenure-track faculty who focus on Level 4 activities will significantly expand the College's, and indeed the University's, leadership in this exciting, evolving discipline.

As an academic center, the EEIC has many of the necessary elements of a department in place, including successful programs and courses; a cadre of dedicated faculty, staff and administrators; an expanding pool of highly engaged, talented students; a growing body of funded research activity; and on-going engagement and support from industry and business. The current program grew out of OSU's participation in the NSF-funded \$13M Gateway Engineering Education Coalition from 1992 to 2003. Since 2000, the EEIC has been providing instruction to every entering engineering student at OSU and growing the national recognition of our first-year engineering program.

In addition, the EEIC teaches a broad array of courses to students across the college and university including engineering technical communications, multidisciplinary capstone, engineering education, and seminar courses outside the curricular scope of traditional engineering departments. The EEIC also offers two minors, manages two Scholars programs, collaborates with the College of Education and Human Ecology on a STEM education Ph.D. program with a specialization in Engineering Education, and created and implemented the university's first multidisciplinary honors program in collaboration with Fisher College of Business: Integrated Business and Engineering (IBE). In addition, the EEIC houses the Humanitarian Engineering Center and has been a major contributor to the development of service learning courses and study abroad programs in the College. EEIC personnel include faculty (tenure track and clinical in collaboration with other departments, senior lecturers, and lecturers) and technical and administrative staff who are supported by

about 50 graduate and 160 undergraduate teaching assistants who are from various engineering departments. Enrollment in EEIC offered programs and courses has grown steadily. The unit is currently the third largest generator of student credit hours in the College of Engineering accounting for over 16,000 semester credit hours annually.

The College of Engineering's strategic objectives (October 2014) include several that are directly related to the EEIC's mission and vision:

- Build on our strength in experiential learning to establish national leadership in this area for Ohio State.
- Transform the Engineering Education Innovation Center to a formal administrative unit within the college.
- Partner across the university to bring forward new academic programs, such as... integrated business and engineering that prepare graduates for modern professional practice.

Because the EEIC is not a tenure initiating unit (TIU), it is extremely difficult to hire and retain clinical faculty and nearly impossible to hire tenure-track faculty. This has created an ongoing administrative burden. Only through lengthy negotiations and special arrangements with existing TIU chairs has the EEIC been able to hire its five clinical and two tenured faculty members. To achieve our goals, the EEIC must become a TIU setting the stage to become a recognized global leader in the field of engineering education.

We are confident that transitioning the EEIC to departmental status will:

- Enhance Ohio State's reputation by gaining international recognition for leadership in the emerging field of engineering education,
- Achieve many of the College of Engineering's strategic objectives, and
- Streamline burdensome administrative processes.

Minimum Requirements Met

The proposed Department of Engineering Education (EED) meets OSU's Office of Academic Affairs' minimum requirements to become a department (OAA, 2007, p. 5):

1. **Minimum of 10 faculty members from assistant to full professor.** By combining the existing seven faculty (who may transfer their majority tenure home to the EED) with four planned new tenure-track faculty position lines, the EED will have at least ten faculty members from assistant to full professor, a simple majority of whom will be tenure-track faculty (Table 1, on the next page). It is anticipated that several of the EED's new faculty hires will be joint appointments with other TIUs within the College of Engineering. This proposal does not include a request for additional clinical faculty lines beyond the five already in place. Rules of the University Faculty 3335-7-03 states that "*clinical faculty may comprise no more than forty percent of the total tenure-track, clinical and research faculty (as defined in rule 3335-5-19 of the Administrative Code) in each of the colleges of the health sciences and no more than twenty percent of the tenure-track, clinical, and research faculty in all other colleges. In all tenure-initiating units not in health sciences, the number of clinical track faculty members must be fewer than the number of tenure-track faculty members in each unit.*" The most recent Annual Statistical Report (2014) shows that the College of Engineering has 316 tenure-track faculty (285 unduplicated), 40.54 FTE non-tenure track teaching personnel (includes clinical faculty and lecturers), and 17.67 FTE non-teaching research personnel. If all non-tenure track teaching FTEs are counted as clinical (which they are not), the college's contingent of clinical faculty is 11.8% of the total unduplicated faculty ($=40.54/[285+40.54+17.67]$). This departmental proposal will not increase that percentage but will actually decrease it slightly with the planned addition of four tenure-track faculty lines over the next two

to three years. Please note that several OAA administrators have stated that the minimum of ten do not need to be in place at the time of establishment of the department, but that a plan must be in place to fill those lines in the near future. The first two of the proposed four new lines have been requested for the FY 2016 budget.

2. **Minimum budget of \$1.7 million (\$250,000 in 1968 expressed in 2014 dollars).** Our current annual budget for FY15 is \$5.8 million, roughly 3.25 times the minimum. For details, see Table 3 on page 18 and Appendix D on page 42.
3. **Offer more than 1000 credit hours each semester.** We currently teach more than 8,000 credit hours per semester in courses not covered or offered by other units in the College of Engineering, more than eight times the minimum.

Table 1. Current EEIC and Proposed EED Faculty and Staff

Personnel Category	Name	Current Faculty Position	Current TIU Home
Tenure Track (6)	Director/Chair (Ph.D.)	EEIC Director	T.B.D.**
	Sorby, Sheryl (Ph.D.)	Professor	T&L (EHE)
	Open Position (requested for 2016, not yet funded)	Associate or Full Prof.	N.A.
	Open Position (requested for 2016, not yet funded)	Assistant Professor	N.A.
	Open Position (not yet funded)	Open rank	N.A.
	Open Position (not yet funded)	Open rank	N.A.
Clinical (5)*	Freuler, Rick (Ph.D.)	Professor of Practice	MAE
	Grzybowski, Deborah (Ph.D.)	Assist. Prof. of Practice	CBE
	Kajfez, Rachel (Ph.D.)	Assist. Prof. of Practice	CEG
	Rogers, Peter (Ph.D.)	Professor of Practice	BME
	Whitfield, Cliff (Ph.D.)	Assist. Prof. of Practice	MAE
Associated faculty (27)	multiple names	Senior Lecturer	N.A.
	multiple names	Lecturer	N.A.
Staff (12)	multiple names	Technical and Administrative Staff	N.A.

* The scope of this proposal does not and cannot include specific personnel reassignments. It should not be inferred that the individuals named above will request a change in TIU. Regardless of those individual choices, the unit plans to retain five clinical budget lines upon becoming a department.

** Pending the results of the current search for a new EEIC director.

The following sections which describe the rationale, demand, cost, and other/proposed schedule derive their organization from the OAA Academic Organization and Curriculum Handbook's "Additional Issues to be Addressed in Proposals for New Academic Units" (OAA, 2007, p. 6).

Rationale

1. **Mission.** *“The EED advances the engineering profession and enables student success by developing and delivering state-of-the-art, innovative, multidisciplinary engineering courses and programs; by modeling and advocating scholarly, evidence-based teaching within the College of Engineering; and by integrating pedagogical discovery, practice, and dissemination through world-class engineering education research.”*

Strategies:

- Discover new knowledge by performing significant research in engineering education
 - Develop and deliver world-class engineering education at the undergraduate and graduate levels based upon preeminent education research.
 - Work collaboratively with programs within the College of Engineering to provide and continuously improve undergraduate and graduate courses that meet shared disciplinary needs. To avoid “mission creep” and undesirable overlap, the EED will not offer courses that fall within the scope of other departments, as the focus of the EED will be on applied pedagogy in undergraduate engineering education, making the EED a collaborator rather than a competitor.
 - Work collaboratively with programs within the College of Education and Human Ecology to provide and continuously improve graduate programs that meet shared disciplinary needs.
 - Work collaboratively with the University Center for the Advancement of Teaching (UCAT) to refine our teaching methods, design courses and curricula, internationalize curricula, support faculty and TA development, and assess and improve student learning. The philosophy of UCAT which includes the goal “to create and advocate for a culture that enhances teaching effectiveness,” aligns well with the EED’s mission.
 - Employ best practices in pedagogy embodying the values of integrity, professionalism, teamwork, mutual respect, and life-long learning and share those best practices with the engineering community both inside and outside the university.
 - Support the College of Engineering in engineering education research and the scholarship of teaching and learning while seeking collaborative, interdisciplinary funding opportunities.
 - Provide support for college outreach, engagement, and diversity initiatives and activities including K-12 education and social services.
 - Initiate, incubate, and pilot engineering education innovations.
2. **Purpose of the Department of Engineering Education (EED).** The purpose of the EED is to develop and foster the discipline of engineering education, teach fundamentals of engineering courses required by all engineering programs, teach engineering technical communication, offer innovative multidisciplinary graduate and undergraduate programs, and support the College of Engineering in advancing the principles of engineering education through funded research.

3. **Role of the EED within the College.** The items *a* through *f* below have been mapped to the six academic requirements outlined in the OAA Academic Organization and Curriculum Handbook's "Guidelines for the Consideration of the Establishment of an Academic Department" (OAA, 2007, p. 5).

- a. **A recognized, fairly discrete area of academic concern not already included within the mission of another department.**

The field of engineering education has roots in formal research study that go back 100+ years (Borrega & Bernhard, 2011; Froyd et al., 2012). Over the past 20 years, the field has seen accelerated growth (Froyd & Lohmann, 2014). Engineering education, like other discipline-specific education fields (Fensham, 2004; Coppola, 2011), grew out of the subject matter discipline, in this case engineering, not education. Engineering faculty who were teaching sought more evidence-based

ways to improve their efforts to enhance student learning. This led to faculty members primarily trained in engineering disciplines choosing to shift their disciplinary focus and research into engineering education. As those faculty continued to grow and develop the field of engineering education, various professional structures were developed to support the new domain including discipline-specific conceptual and theoretical development, research methodologies, academic recognition, high status research journals, professional associations and conferences, prestigious grant programs, seminal publications, and scholarly outcomes that are applicable to the practice of engineering education. While considerable progress has been made in engineering education research since its initial development, many research questions have yet to be answered, as evidenced by recent calls for proposals from the National Science Foundation (e.g., NSF programs titled *Revolutionizing Engineering Departments*, *Broadening Participation in Engineering*, and *Improving Undergraduate STEM Education*).

b. **Potential academic programs at both graduate and undergraduate levels.**

Graduate Program. The EEIC currently collaborates with the College of Education and Human Ecology to offer a Ph.D. degree in STEM Education with a specialization in Engineering Education. The EEIC began this Ph.D. program in 2010, and is developing additional courses to expand the engineering-specific pedagogy offerings. It should also be noted that this proposal does not and cannot propose any specific new courses or curricula; it is solely about transitioning the EEIC from a college center to a department, i.e., a change in administrative structure. However, it may be helpful to consider graduate engineering education course offerings at several of the benchmark institutions listed in Appendix A. Table 2 (Benson *et al.*, 2010) on the following page provides that insight; it was originally published in the *International Journal of Engineering Education*.

Building on that program to better prepare students for success as future engineering faculty, the EED plans to propose a graduate interdisciplinary specialization (minor) in engineering education that would be available to all engineering graduate students. A similar program, but leading to an on-line certificate, could be developed that would be marketed to engineering graduate students and faculty nationally and internationally who want to develop their skills and knowledge in engineering education. A masters degree is also planned that would be of interest to students with undergraduate engineering degrees who would like to teach at two-year community colleges and to K-12 educators who are responding to the new common core state standards which include technology and engineering topics among the science categories.

Our increase in research funding (Refer to Appendix C for details) and inclusion of graduate and undergraduate teaching assistants in our engineering education research has helped build a community of scholars that strengthens the entire continuum of engineering education from the undergraduate to the terminal degree. The EEIC's large-scale instructional program provides a built-in laboratory or testing ground for ongoing education research activities, and the collaboration with the College of Education and Human Ecology provides the linkage between basic educational theory and applied engineering education practice needed for effective research in this field.

Undergraduate Degree Program. No bachelor's level degree in engineering education is presently offered or being considered for future development. The market is not perceived to be there for such a program. However, the EEIC does currently provide instruction to every OSU undergraduate engineering student in support of the center's mission and in service to the academic requirements of other engineering departments. EEIC enrollment is currently about 3500 students per semester.

We continually strive to support diversity and inclusion in the classroom. Of the current 34 faculty and lecturers teaching in the EEIC, 16 of them are female. The diversity of our Graduate and

Undergraduate Teaching Assistants is greater than the diversity of the students whom they teach. In the Autumn 2014 Orientation of 200 faculty, staff, and teaching assistants in the EEIC, a workshop was held on inclusive teaching strategies. Multiple follow-up sessions were provided in order to continue the work on this topic.

Table 2. Courses and core areas of study for four engineering education departments (Benson et al., 2010)

Program	Core Areas	Courses
Purdue University	Engineering Education Foundations	Introduction to Engineering Education (1 cr) History and Philosophy of Engineering Education (3 cr) Theories of Development and Engineering Thinking (3 cr) Leadership, Policy and Change in STEM Education (3 cr) Content, Assessment, and Pedagogy (3 cr) Seminar in Engineering Education
	Secondary Engineering	Courses in an engineering field other than engineering education (9 credit hours minimum)
	Research Preparation	Engineering Education Inquiry (3 cr) Research Methods Elective, in Coll. of Ed. or elsewhere (3 cr) Social science statistical methods (3 cr)
Virginia Tech	Engineering Education Core	Foundations of Engineering Education (3 cr) Seminar (offered jointly with Clemson) taken every semester (1 cr) Assessment Techniques in Engineering Education (3 cr) Design in Engineering Education and Practice (3 cr)
	Engineering Concentration	Courses in an engineering field other than engineering education (15 cr min)
	Engineering Communication	Communication in Engineering Curricula: Theory, Practice, and Pedagogy (3 cr) Evaluating Engineering Communication Assignments (1 cr)
	Research Preparation	Statistical methods (6 cr) Engineering Education Research Methods (3 cr) Advanced Engineering Research Methods (3 cr)
	Engineering Instruction Education Concentration	Practicum in the Engineering Classroom (3 cr min) Concentration in the School of Education (9 cr min)
Utah State University	Engineering Education Core	Evaluation and Assessment (3 cr) Cognition (3 cr) Educational Foundations (3 cr) Teaching and Learning Foundations (3 cr) Research Methods (3 cr) Seminar (3 cr) Finance & Grant Writing (3 cr)
	Area of Specialization	Courses in an engineering field; at least 3 credits outside of engineering education (9 cr min)
	Research Component	Research Theory (3 courses 9 cr) Dissertation (24 cr min.)
Clemson University	Pedagogy and Instruction	Teaching Undergraduate Engineering (3 cr) Teaching Undergraduate Science (3 cr) Theories of Instruction (3 cr)
	Research	Engineering and Science Education Research Methods (3 cr) Elective in School of Education, or Departments of Psychology, Sociology, or Experimental Statistics (3 cr)
	Professional Preparation	Current Topics in Engineering and Science Education (3 cr) Preparing for the Professoriate (3 cr)

The EEIC offers two minors (Engineering Sciences, Humanitarian Engineering) and manages two Scholars programs (Green Engineering, Humanitarian Engineering). Spring 2015 enrollment numbers in the engineering sciences and humanitarian engineering minors are 29 and 10, respectively. Over the past five years, 36 students have completed the engineering sciences minor.

The humanitarian minor was just approved autumn 2014, so there have not been any graduates of that minor yet. Over the past five years, there have been 140 students in each first-year cohort of the green engineering scholars program. The humanitarian scholars program began in Autumn 2012 with 52 students enrolled; there have been 108 students in each first-year cohort for both subsequent years. There exists a growing need as described by members of the National Academy of Engineering (NAE, 2004 and 2005) and representatives from industry (ASEE/TUEE, 2013) to create a more broadly educated engineer to meet the growing needs of our society. OSU produces talented technical students, and the EEIC strives to broaden that education by offering courses and programs that: build an entrepreneurial approach to design; improve professional skills; and develop the students' sensitivity to social, global, and environmental issues.

c. **A source of faculty members prepared to offer academic work in the academic area concerned.**

Worldwide, there are twenty-two institutions that specifically offer engineering/STEM education graduate programs (ASEE-SD & CELT, 2014), of which twenty are doctoral level studies including the one at OSU. A list of these programs is provided in Appendix A. Most of these programs are less than a decade old but are graduating increasing numbers of qualified potential faculty members. In addition, there is a pool of engineers holding Ph.D.s who have chosen to focus their scholarship of teaching and research in the evolving field of engineering education.

In the EEIC, we already have a core of faculty, the large majority of whom are educated at the Ph.D. level, dedicated to scholarly teaching and research in engineering education. With several open positions and a hiring plan in place, we propose to have at least ten regular faculty including six tenure-track faculty (Table 1, page 5). Upon college approval for funding, each open tenure-track position will be filled following national searches to be guided by the new department's proposed Appointments, Tenure, and Promotions document included in the Appendix E. Our faculty also includes 27 senior lecturers and lecturers. We are open to and actively seeking opportunities to collaborate with other departments by establishing additional joint and courtesy appointments with the EED for faculty whose research and teaching interests include engineering education.

- d. **An area of academic concern that offers research and/or public service opportunities in addition to formal classroom teaching.** The National Science Foundation offers substantial funding opportunities in engineering education research through its Directorate for Engineering/Division of Engineering Education and Centers (EEC), its Directorate for Education and Human Resources/Division of Research on Learning (DRL), Directorate for Education and Human Resources/Division of Graduate Education (DGE), and its Directorate for Education and Human Resources/Division of Undergraduate Education (DUE). Engineering education research is considered a crosscutting activity in the NSF. A keyword search for engineering education-specific projects in those four divisions alone identified over \$1.9 billion in active awards (i.e., funded projects with expiration dates in 2015 or later) in NSF's award search database (NSF, 2015) which included \$37M for EEC, \$561M for DRL, \$673M for DGE, and \$706M for DUE. Significant funding is also available through Departments of Education at the state and federal levels.

Engineering education plays a significant role in most of the major engineering professional societies (e.g., IEEE, AIChE), and is represented by its own discipline-specific organization, the American Society for Engineering Education (ASEE), which was originally founded in 1893. ASEE, the premier society for professionals "committed to furthering education in engineering and engineering technology" publishes the *Journal of Engineering Education*, the premier journal in the field (ISI impact factor of 2.717), and was identified in their 2013-14 annual report as having over 12,000 members. OSU alone has approximately 120 ASEE members that go well beyond the faculty associated with the EEIC. ASEE sponsors an annual conference that attracts over 2,000 research papers, and EEIC authors average over 20 peer-reviewed research papers presented at that conference each year.

The EEIC manages two university scholars programs (Green Engineering and Humanitarian Engineering), both of which are active in outreach and engagement with the community. The EEIC serves as a focal point with the Office of International Affairs in the conduct of service-learning courses and field experiences and is the home of the Humanitarian Engineering Center. Finally, the EEIC operates the Social Innovation and Commercialization program which works with local nonprofits to create products for people with disabilities.

In the area of STEM outreach in K-12, the EEIC continues to support Metro High School (Columbus), Walnut Hills High School (Cincinnati), and Saint John's Jesuit High School (Toledo) in offering our first-year engineering curricula; and has a credit-granting agreement in place for high school students who have successfully completed a Project Lead the Way program prior to enrolling at OSU. The College of Engineering, the College of Education and Human Ecology, and KIPP Journey Academy in Columbus currently collaborate on an after-school program that aims to introduce underserved and underrepresented students in K-8 to engineering through hands-on exposure to the design process. The EEIC also mentors three after school engineering clubs at schools that have highly diverse populations: Dominion Middle School (Columbus), Metro Middle School (Columbus) and Cristo Rey High School (Columbus). These clubs provide computer programming activities, design projects, and current OSU students as role models to excite girls and underrepresented students about careers in engineering.

- e. **An area of academic concern that has the potential for developing national or international recognition as an academic discipline.** Doctoral-level programs in engineering education and related fields are now being offered at twenty institutions worldwide (ASEE-SD & CELT, 2014, Appendix A), which signifies that the domain is an internationally recognized field of study. In addition to the development of engineering education Ph.D. programs, the discipline experienced a major milestone in 2005 when the already prestigious *Journal of Engineering Education* altered its focus from practice oriented papers to research based publications (Lohmann, 2005; Felder et al., 2005). Additional journals support the ever growing network of researchers including *Advances in Engineering Education*, the *European Journal of Engineering Education*, and the *International Journal of Engineering Education*. These venues provide a showcase for national and international recognition of engineering education research.

Nationally, the first department of engineering education was established at Purdue University in 2004, and Virginia Tech followed soon thereafter. These were the first in the U.S. to provide tenured faculty positions specifically in engineering education. Representatives from these leading institutions in the field of engineering education participated in the EEIC's 2014 program review and strongly recommended the formation of a TIU at Ohio State. By so doing, The Ohio State University will become one of a few elite programs offering teaching, research, and degrees in this growing field.

- f. **An area of academic concern which either has or is in the process of developing a student clientele either for the purpose of major programs or as an important "service" discipline to other major programs.** The EEIC has provided a key educational service to all engineering departments since well before its formal establishment in 2007 and continues to grow its faculty, the number of credit hours taught, the quality of its instructional programs, and the level of academic research and external collaborations. The proposed department will therefore have a small but growing graduate student clientele (as described on pages 7-8 and 15) and a large, established undergraduate student service clientele. Those undergraduate service courses and programs include the following:

Fundamentals of Engineering. The two-semester, fundamentals of engineering course sequence is required in the first-year by all undergraduate engineering programs in the college. It is offered in a variety of tracks (e.g., honors, scholars, standard, transfer), which provide undergraduate

students with the foundational knowledge, lab experiences, and team design projects (e.g., advanced energy vehicle, robot, nano-biotechnology, product development, environmental water quality, infrastructure, roller coaster) needed to successfully complete an academic program in any of the departments of the College of Engineering. Since the establishment of the common First-Year Engineering program by College of Engineering (Autumn 2000), and the founding of the Engineering Education Innovation Center in May 2007, course offerings have continued to expand, along with student enrollment and interest. A key aspect of the first-year program is that more students enroll than the Admissions office admits as true first-year engineering students. For example, in AU 2014 the College of Engineering had approximately 1600 new first year students (NFYS), but the actual enrollment in our first-year classes was 2300. This 31% increase is due to transfers, non-engineering majors, and returning students changing majors into engineering. In addition, the EEIC supports the First-Year Engineering programs at all four OSU Regional Campuses, at Columbus State Community College, and is well positioned to expand to OSU's Agricultural Technical Institute (ATI) in Wooster, OH. With this gateway program, EEIC prepares a significant number of students for direct enrollment into all engineering majors.

Engineering Technical Communications. Our Engineering Technical Communication course (ENGR 2367) serves as a General Education second writing course targeted toward engineering technical communications in all forms. It is uniquely positioned to support the oral and written communication needs of not only our engineering students but other disciplines as well. Engineering technical communications at OSU has grown over the past several years to consist of 54 sections annually and currently satisfies the second writing requirement for 35% of engineering majors. As the only course in the engineering curriculum specifically focused on the communications needs of engineers, this course is key to the success of students in their future courses, undergraduate research, capstone experiences, and in securing entry-level engineering positions in industry. Enrollment demand far exceeds sections offered. We also offer tailored courses and course modules to departments on a by-request basis to further prepare students for their capstone requirements. The communication skills taught are designed to meet the demand described as essential by business, government, and academia and encompass the use of all media involved with oral and written professional communications.

Multidisciplinary Capstone. At the senior level, the EEIC offers a company-sponsored capstone design program that is an accepted option by many departments for the senior capstone design experience required by all of OSU's undergraduate engineering programs. Projects involve open-ended problems that are defined and solved by student teams representing multiple disciplines within and outside of engineering. Like the first-year program, it is offered in a variety of tracks which include Industry Sponsored projects, Social Innovation and Commercialization non-profit projects, and Humanitarian Engineering projects. Students must apply for admission to each specific capstone sub-program. Annually, the EEIC hosts the college's Capstone Showcase which is open to all programs and attended by the public and significant corporate sponsors. EEIC members collaborated with faculty at other institutions in the development of the Capstone Design Hub (CDHub): an interactive web system to promote and communicate capstone design best practices. The EEIC is actively involved in the management of the biannual National Capstone Design Conference, hosting the event in June 2014 and scheduled to do so again in 2016. The 2014 event was attended by faculty from nearly 100 institutions, providing the college and the EEIC with national recognition as a leader in the field of engineering capstone education.

Integrated Business and Engineering (IBE). The EEIC led a collaborative effort to develop and gain university approval of the first-ever multidisciplinary honors program. The program is modeled after a similar program at Lehigh University; there are only one or two other similar programs in the nation. Each cohort of 36 business and engineering students progresses together

through the four-year curriculum which includes special sections of the first-year fundamentals of engineering for honors course sequence, an engineering cornerstone project with a developed product and business model, and a senior-level honors capstone design project. Business seminars and extracurricular professional development activities compliment courses taken for a minor (General Business or Engineering Sciences) in the middle years. Graduates earn a B.S. degree in their college (Engineering or Business), a minor in the opposite field, and IBE honors distinction.

Other Multidisciplinary Engineering-Related Courses. In addition, the EEIC collaborates with other departments and offers courses that do not fit logically in other domains. Some examples include courses in spatial visual skills, engineering graphics, history of technology, leadership, teamwork, engineering law, service-learning, and a course in the practical application of software programming via MATLAB (through an agreement with the Department of Computer Science and Engineering). As a result of delivering the foundational courses in engineering and additional courses not delivered in other units, the EEIC program provides departments and students in the College of Engineering with essential service.

Based on the EEIC's Self Study report (2014, page 13, Figure 5), the proportion of credit hours generated among these undergraduate service programs are as follows:

- Fundamentals of Engineering (non-honors): 46.0%
- Fundamentals of Engineering (honors): 25.7%
- Engineering Technical Communications: 17.2%
- Capstone: 2.8%
- Other multidisciplinary courses: 8.3%

- g. **Collaborations.** The activities of the first-year program, capstone program, engineering technical communications, service learning, visualization, and software courses are, by the nature of the enrolled students and the faculty who deliver the courses, collaborative. The following sections describe the primary methods by which the EEIC collaborates with others and intends to continue to do so, in addition to enhancing those relationships and developing new partnerships, as the proposed Department of Engineering Education (EED).

Collaborations within the College of Engineering.

The EEIC currently offers courses to students across all engineering programs including required course sequences as well as electives. During and after the restructuring involved in becoming a department, we will continue to solicit regular and formal program feedback from all engineering departments to ensure we are contributing to each programs' educational objectives, ABET accreditation requirements (ABET, 2014), industries' needs (ASEE/TUEE, 2013), and the goals for the 21st century engineer as described by the National Academy of Engineering (NAE, 2004).

Additionally, through our growing knowledge base gained through engineering education research, the EEIC proposes to provide a collaborative resource to assist other engineering faculty in advancing their educational programs and helping establish "best practices" in teaching. Some of these activities are already in place such as:

- Annual book discussion group open to college faculty, staff, and students who meet biweekly to study a recent publication and learn more about teaching engineering.
- Biweekly engineering education seminar series
- Short term teaching assignments with the EEIC (for release time or off duty pay)
- Communities of Practice around shared rank and teaching contexts (e.g., Dr. Lisa Abrams convenes monthly meetings with clinical faculty from around the college)

- Communities of Practice around different teaching methods (e.g., Dr. Deb Grzybowski is a co-organizer of the college's E-Learning Brown Bag Lunch & Learn series and has initiated another Community of Practice to discuss and share experiences with the Inverted or Flipped Classroom.)
- Annual offering of a 2 credit hour course on College Teaching in Engineering which is taken for credit by students and audited by faculty
- Informal affiliations with faculty of all categories and ranks (e.g., tenure track, clinical, research, lecturer, visiting).

Others are proposed for future development including:

- Annual mini-conference on teaching for the College of Engineering
- Assistance with the on-boarding process of new college faculty (tenure track, clinical, and lecturers) though providing resources and mentoring on the scholarship of teaching and learning in engineering.
- Presentations, facilitation and/or consultancy for departmental retreats across the college
- Research collaborations on engineering education projects throughout the college
- Service as co-PIs on research grant proposals specifically by contributing engineering education expertise, broader impacts leadership, formal or informal education program oversight, and/or assessment roles
- Joint and courtesy faculty positions. In cases of joint appointments, a primary department will be assigned power and responsibility for salary and workload assignments as well as determination of promotion and tenure
- Curricular development special assignments (similar to SRAs)
- Faculty Fellows program (multi-year term joint appointments).

Our vision is that we can serve as the nucleus of an expanding, networked community of engineering education scholars at OSU.

Collaborations Across Campus.

The EEIC has developed collaborations with academic units throughout Ohio State's Columbus and regional campuses in offering programs that support the inclusive learning environment and academic preparation of engineering students. For example, the EEIC established the Engineering Education Ph.D. program (as part of the STEM education Ph.D. degree) in collaboration with the College of Education and Human Ecology. As part of that collaboration, the College of Education and Human Ecology has been a partner in establishing a tenure home for EEIC faculty. Other EEIC programs that serve students from other OSU colleges include the Multidisciplinary Capstone and the Social Innovation and Commercialization programs which attract students from Fisher College of Business, College of Arts and Sciences, College of Dentistry, Knowlton School of Architecture, and the College of Medicine. Our spatial visualization courses draw students from Engineering and from the College of Dentistry. The Engineering Sciences Minor is open to all university students, with required courses that include the Fundamentals of Engineering and Multidisciplinary Capstone sequences. The Integrated Business and Engineering (IBE) program, a collaboration with the Fisher College of Business, is the university's first multidisciplinary honors program. The EEIC has a strong partnership with the Multicultural Center (MCC) at OSU. In 2014-2015, the MCC staff, in collaboration with EEIC staff, delivered 14 workshops on diversity and inclusiveness, including a summer orientation session for 200 faculty, staff, and students who are employed by the EEIC.

The EEIC also manages two campus-wide scholars programs and offers several seminars in innovation and entrepreneurship to students across the university. The EEIC's Fundamentals of Engineering course sequence is offered at all four regional campuses, providing a smooth and

transparent transition to main campus after students have completed their first one or two years of study at OSU-Newark, Marion, Mansfield, or Lima. Exploration has begun of extending that program also to the OSU Agricultural Institute at Wooster. The EEIC collaborates with the University Center for the Advancement of Teaching (UCAT) on improving teaching methods, designing courses and curricula, supporting faculty and TA development, and student learning outcomes assessment. Seven members of the EEIC are currently serving as mentors in OSU's Second-Year Transformational Experience Program (STEP).

Collaborations Outside the Institution.

A formal agreement with Columbus State Community College includes offering the EEIC's Fundamentals of Engineering course sequence at that institution. Local companies participating in the Multidisciplinary Capstone program have benefitted from the commercialization of products to help them be more competitive; that program also collaborates with the Columbus College of Art and Design by combining students from both institutes in client-sponsored projects. Through collaboration with local nonprofit organizations, the EEIC established the Social Innovation and Commercialization program to define, design, and commercialize assistive technology to improve the independence of people with disabilities, while providing a learning experience for the next generation of social entrepreneurs. The EEIC sponsors activities to promote women in engineering, minorities in engineering, STEM education in K-12 grades, and humanitarian engineering projects both locally and in developing countries.

- 4. Similar Units at Other Universities.** The specific names of the academic units vary at the 22 institutions offering graduate engineering education programs worldwide (of which 20 are at the Ph.D. level, Appendix A). The two academic units in the U.S. that are most similar to the proposed EED are located at Purdue University and Virginia Tech. They were formally established in 2004 and 2005 as units that offer a first-year engineering program and a Ph.D. in engineering education. Both have seen considerable growth in recent years including the number of graduates from their programs, research dollars brought in from both external and internal funding sources, and the expansion of their faculty.

The School of Engineering Education at Purdue University granted its first Ph.D. in 2006. To date, they have graduated 43 students with a Ph.D. in engineering education and currently have around 70 in their doctoral program. Their graduates hold a variety of positions from tenure-track faculty to postdocs both within the U.S. and abroad. Purdue's engineering education faculty consists of 22 faculty members who range from assistant to full professor, some of whom hold joint or part-time appointments. Their hiring pattern has been that four faculty members were hired each year from 2005 to 2007, two in 2008, one in 2009, four in 2013 and another four in 2014. These faculty perform at a high level, bringing in approximately \$40M in external research funding over the past 5 years. They also employ over 20 administrators, instructional support staff, and advisors. They advise around 2400 first-year students annually. Their first-year program is a two-course sequence taught in 120-student sections, except for honors which are 70-student sections. Purdue's School of Engineering Education also offers their own B.S. program in Multidisciplinary Engineering; approximately 100 students are enrolled in that program.

The Department of Engineering Education at Virginia Tech granted its first Ph.D. in 2010. Since then, they have graduated approximately 20 students with a Ph.D. in engineering education. Similar to the graduates from Purdue, these graduates hold a variety of positions from tenure-track faculty to postdocs within the U.S. and abroad. Some graduates from Virginia Tech are also working in industry both in traditional engineering positions and education positions. Virginia Tech currently has approximately 15 faculty who range from assistant to full professors, all of whom are on the tenure-track. Some of these faculty also hold joint appointments with other departments across the college. They employ a variety of staff and lecturers including a team of academic advisors. In their first-year courses they teach just over 2000 students a year. In the last five years, the Department of Engineering Education has added approximately two new faculty lines (some were joint appointments) and has had additional hires to fill

positions of faculty who have moved on to start engineering education programs at other institutions. Research funding has totaled approximately \$8M over the last five years where 99% was from external sources.

Clemson University, Utah State University, and the University of Cincinnati have related departments. Clemson's is a STEM education department, Utah State's is an engineering and technology education program, and Cincinnati's engineering education department does not offer graduate degrees in engineering education. Our proposed Department of Engineering Education at Ohio State will be one of a few elite programs in the country offering both undergraduate service courses and graduate level courses in engineering education. Given the size of OSU's College of Engineering undergraduate enrollment, we are able to conduct undergraduate education research on a scale that exceeds most other institutions, and based on those research results make changes to practice in the classroom that positively impact thousands of undergraduates.

5. **Proposed Major Programs.**

- a. **Enrollment projections.** The EEIC neither has an undergraduate major nor is it planning to offer one, however it provides service courses to every undergraduate engineering student at OSU. EEIC enrollment is currently trending to 3500 students per semester enrolled in all of our programs: fundamentals of engineering courses, engineering technical communications, multidisciplinary capstones, and other multidisciplinary engineering courses. The EEIC offers a mature program of undergraduate service courses, and this enrollment number has grown and stabilized over the past five years. The proposed department intends to expand its graduate program in engineering education to 20 Ph.D. students plus another 20 graduate interdisciplinary specialization (i.e., graduate minor) students.
- b. **Goals of enrollees in proposed programs.** While the current annual population of students enrolled in fundamentals of engineering courses is approximately 2300 students per semester with no plans to further enlarge that number, we do anticipate continued growth in engineering technical communications and multidisciplinary capstone design courses. Additionally, we currently have two Ph.D. engineering education/STEM education candidates (plus one recent graduate) and propose growing this program to 20 students in the next five years with the addition of four new tenure-track faculty.
- c. **Opportunities for graduates of proposed programs.** Graduates of our fundamentals of engineering program are well prepared to make informed decisions on finalizing their major selection but also are well prepared to work on multidisciplinary teams, solve engineering problems, and communicate effectively. Graduates of our Ph.D. program and of the proposed M.S. program and graduate interdisciplinary specializations (i.e., graduate minors) are likely candidates for teaching and research positions at top universities throughout the country and beyond.

6. **Opportunities Beyond the Classroom.** Significant opportunities exist for both students and faculty outside the classroom. The EEIC's leadership of several international service oriented programs that have resulted in projects in developing nations, solving local problems using sound engineering principles. Our growing staff and related graduate students continue to produce 30 to 40 research papers per year which include conference proceedings (ASEE, FIE, FYEE, etc.) and journal publications (JEE, IJEE, AEE, and others). Refer to Appendix B for additional details and examples. We are currently working on funded research grant projects and have significant proposal writing activity, with a main focus on the NSF. Our Green and Humanitarian Scholars programs provide opportunities for students to engage with both local disadvantaged people and those of developing countries, and our Social Innovation and Commercialization program provides opportunities for students to engage with local nonprofit organizations and people with disabilities. Our multidisciplinary capstone program is among the leading

client-sponsored programs in the country combining business, engineering, design and other interested students in teams to solve realistic industry problems.

7. **Potential for National or International Recognition as an Academic Discipline.**

The field of engineering education has already achieved national and international recognition as evidenced by the 20 doctoral-level programs in engineering education and related fields that are now being offered worldwide (ASEE-SD & CELT, 2014; Appendix A); the growth of the field's discipline-specific professional organization: the American Society for Engineering Education; and the increasing quantity and quality of peer-reviewed research being published in the *Journal of Engineering Education* and other journals.

EEIC faculty, staff, and students already have a significant presence in engineering education. Our research efforts allow us to present papers, posters, panels, and workshops at national and international conferences including but not limited to ASEE regional and national conferences, Capstone Design Conference, Frontiers in Education (FIE) conference, and the International Conference on Engineering Education (ICEE). Additionally, faculty take an active role in organizational committees such as those for ASEE. Further supporting our presence, the EEIC has sponsored the ASEE North Central Regional Conference in 2013, the National Capstone Design Conference in 2014 (and again in 2016), and we will host the First-Year Engineering Experience (FYEE) conference in 2016. Finally, the College will co-host, for the first time, the ASEE National Conference in Columbus in 2017, giving great visibility to our program, our college, and our university. Our current presence and participation helps us attract highly regarded engineering education faculty and provides a solid foundation for future leadership contributions in the growing field.

8. **First Proposal Submittal.** This proposal was highly recommended by our recent 2014 academic program review team and is the first such proposal submitted.

Demand

1. **Evidence of Demand.** There is **demand for engineering education research**, as demonstrated by the \$1.9 billion in engineering education projects being funded by NSF (see section d, page 9 for details) and by national calls for transformation in undergraduate engineering education. There is demand for engineering education teaching as evidenced by the student credit hours currently delivered by the EEIC.

The National Academy of Engineering report “The Engineer of 2020” (NAE, 2004) and the more recent ASEE workshop results of “Transforming Undergraduate Engineering Education” (ASEE/TUEE, 2013) call for the education of more well-rounded engineers. The TUEE workshop itemized and prioritized the required learning outcomes requested by industry and ABET accreditors and indicated where many current educational practices are not entirely achieving the outcomes expected of our engineering graduates. These reports demonstrate the need for more emphasis on undergraduate engineering education and the development and enhancement of curricula and learning environments through scholarly work.

There is **demand for graduates of doctoral engineering education programs**. The EEIC began this Ph.D. program in 2010, and thus far three students have pursued this specialization. As of May 2015, two students have graduated from the program; one is currently a post doctoral researcher, and the other just accepted a tenure-track faculty position at Embry-Riddle Aeronautical University in Florida. Over the past five years there have been a total of 15 STEM PhD degrees awarded (counting all specializations including engineering education). The job market for engineering education graduates includes universities, colleges, community colleges, and technical colleges (both in tenure-track and clinical faculty appointments), corporate training organizations, and high schools challenged by the addition of engineering design into core science standards. Streveler and Smith (2010) wrote:

"The interest among prospective Ph.D. students is strong. Purdue University's School of Engineering Education currently has over 50 Ph.D. students, and 16 Ph.D. graduates. The graduates were all able to find employment. Virginia Tech has over 20 engineering education Ph.D. students and they, too, indicate that interest among prospective students as well as job prospects are strong."

There is **demand for graduates of doctoral engineering programs** with expertise in engineering education as a minor focus of their scholarly work in addition to their major focus on technical research. The application process for most new faculty searches include requirements to submit a teaching philosophy and to present a teaching seminar in addition to a research seminar during the interview process.

There is **ongoing demand for service teaching to undergraduate engineering students**. Figure 1 presents the historical record of credit hours taught by the unit. We currently serve over 3500 students per semester inclusive of all courses, and there exists a growing need for engineering graduates nationally as demonstrated by the President's Council of Advisors on Science and Technology (PCAST, 2012) call for additional STEM graduates.

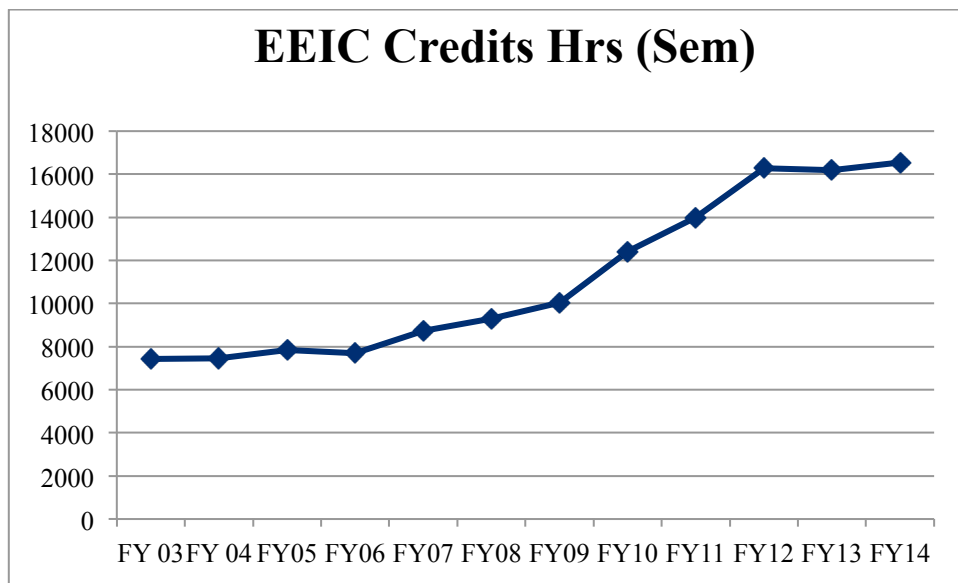


Figure 1. Credit Hours Taught by the Engineering Education Innovation Center (EEIC)

NOTE: Credit hours under the quarter system have been normalized to semester hours and include courses taught by the unit before it was officially named the EEIC.

Based on the EEIC Self Study report (2014, page 13, Figure 5), the proportion of credit hours generated within the EEIC are as follows:

- FE(non-honors): 46.0%
- FE (honors): 25.7%
- Engineering Technical Communications: 17.2%
- Capstone: 2.8%
- Other multidisciplinary courses: 8.3%

2. **Duration of Demand.** The role of engineering education nationally and internationally, the strategic objectives of the College of Engineering, and the historical pattern of credit hour generation by the unit indicate that demand is unlikely to lessen. The pace of technological change is rapid and increasing; nowhere is this more apparent than in the engineering disciplines. Concerns about sustainability, energy efficiency, and environmental and social impacts show that the challenges faced by today’s engineering graduates far surpass those faced by our graduates even a few decades ago, requiring long-term, continuous improvement of engineering education. The proposed EED will support such change through advances in both teaching and engineering education research.

3. **Why Other Units are Unable to Meet Demand.** Nationally, there is a growing trend toward multidisciplinary education and research. The EEIC offers a range of general engineering courses and programs that do not fit under the missions of other engineering departments. The EED will continue to foster multidisciplinary education through courses taught, and discussions are currently underway for development of a masters degree program in engineering education as well as a graduate minor (Graduate Interdisciplinary Specialization) in engineering education.

Cost

1. **Describe Anticipated Internal Funding and External Funding Potential.** In the past five years, EEIC instructional hours have increased to 16,000 credit hours per year with a supporting budget of \$5.8M. The budget growth over these five years has responded to increased instructional credits as shown in Table 3 and presented in more detail in Appendix D. An increase in research dollars is expected in the near term and will continue to grow with the addition of more faculty having backgrounds and interest in engineering education research.

Table 3. Budget for the Engineering Education Innovation Center Over the Past Five Years

Year	Total Budget
FY2010	\$ 3,817,454
FY2011	\$ 4,701,546
FY2012	\$ 4,693,875
FY2013	\$ 5,569,070
FY2014	\$ 5,838,707

2. **Compare Cost of Proposed Unit with That of Like Institutions with Similar Academic Units.** The EED anticipates the cost of the proposed unit is similar to that of like programs at other institutions such as Virginia Tech and Purdue. Although actual budget numbers were not available, the scale of those operations can be inferred by numbers of faculty, graduated engineering education doctoral students, and undergraduate engineering students enrolled in the College of Engineering (Table 4).

Table 4. Comparison Data of Peer Engineering Education Units

Institution	Unit	Number of tenure-track and clinical faculty	Number of undergraduates served (total Au14 college enrollment used as proxy)	Number of PhD students graduated to date
Ohio State	Center, proposed Department	Currently 7, proposed 4 more	7752	1
Purdue University	School	22	7877	45
Virginia Tech	Department	15	7412	20

- 3. Evaluate Cost of Additional Faculty that May be Needed.** We will be seeking to fill four open tenure-track faculty positions upon establishment of the department which will require salary and start-up packages. It is anticipated that these four tenure-track faculty lines will be funded and filled over the next two to three years. This will require additional annual rate budget and one-time cash expenditures.
- 4. Adequacy and Availability of Facilities as Well as Faculty.** Current programs are being offered with current facilities, but utilization rates are too high, hindering lab supervisors from performing classroom lab equipment set up and maintenance between classes. The EEIC has 33,400 square feet of assignable space including 12,656 square feet of assigned instructional space, plus 6,500 square feet of central pool classroom space and 452 square feet of shared storage space. Most of the classroom, lab, and office facilities are located on the second and third floors of Hitchcock Hall, but some EEIC undergraduate laboratories are also located on the third floor of Smith Lab.

Many of the faculty and instructional staff share offices, resulting in *per capita* space allocations well below university recommended standards; several instructional staff reside in buildings external to the program including Scott Lab, Smith Lab, and Bolz Hall. Local assigned instructional space utilization rates (i.e., scheduled for graded courses of instruction) include a 90% rate for honors Fundamentals of Engineering courses, 99% for non-honors Fundamentals of Engineering courses and 96% for Engineering Technical Communications courses, all based on eight schedulable hours daily per room. In comparison, Ira Fink et al. (2009) recommended that OSU's instructional labs be scheduled for full use at 50% (p. 122) and classrooms at 70% (p. 96).

Requests for additional EEIC space are already in the university's capital planning process, specifically associated with three projects under Capital Needs Index #s 12000333 (College of Engineering Experiential Learning Center), 14000090 (EEIC computer classroom renovation), and 14000091 (Smith Lab backfill). All three are listed with a projected timeframe of "near term unfunded."

Other / Proposed Schedule

- 1. Use of Consultants.** This proposal was composed by a team of EEIC faculty and staff and was developed in a non-password protected Carmen Wiki environment open to all OSU Carmen users <<https://carmenwiki.osu.edu/display/10700/EEIC+Department+proposal+Home>> so that OSU stakeholders could observe, comment upon, and share in the writing. Some of the ideas originated from the final report of the EEIC's March 2014 academic program review. No other external consultants were utilized.
- 2. Effective Date.** The intent is to create a department by early 2016 according to the proposed timeframe and milestone achievements shown in Table 5.

Table 5. Proposal Milestones and Proposed Schedule

Milestone	Date
Drafting of proposal summary using un-password protected Carmen Wiki site to allow all stakeholders and interested parties to contribute and comment	July 2014 - March 2015
Submission of proposal summary to College of Engineering Executive Committee, Core Curriculum and College Services Committee, College Committee on Academic Affairs (CCAA), College of Education and Human Ecology, and Office of Academic Affairs	December 2014
Meetings with College of Engineering department chairs and faculty, sharing draft proposal and answering questions	January - April 2015
Presentation of final proposal to College of Engineering Executive Committee (department chairs, associate deans, etc.)	March 12, 2015
Submission of full proposal to CCAA Subcommittee A and the making of revisions based on feedback from subcommittee members as well as from departmental meetings	March - April 2015
Discussion and vote by full CCAA committee	March - April 2015
EEIC open house, including classroom tours and proposal discussions	March 30 - April 3, 2015
Submission of proposal to College faculty via email	upon approval by CCAA
Presentation of final proposal and vote by College of Engineering faculty at spring semester meeting	May 13, 2015
Submission of proposal to university's Council on Academic Affairs	upon approval by college faculty
Vote by Council on Academic Affairs (CAA)	Summer 2015
Scheduling by University Senate's Steering Committee	upon approval by CAA
Vote by University Senate's Faculty Council	Autumn 2015
Vote by University Senate	Autumn 2015
Vote by OSU Board of Trustees	January 2016

References

- ABET. (2014). *Criteria for Accrediting Engineering Programs 2015-2016*. Baltimore, MD.: ABET. Available at: http://www.abet.org/uploadedFiles/Accreditation/Accreditation_Step_by_Step/Accreditation_Documents/Current/2015-2016/E001%2015-16%20EAC%20Criteria%2011-7-14.pdf
- American Society for Engineering Education (ASEE). (2013). *Transforming Undergraduate Engineering Education (TUEE), Phase one: A workshop report*. Arlington, VA.: ASEE/NSF.
- American Society for Engineering Education - Student Division (ASEE-SD) and the Center for Engineering Learning and Teaching (CELT). (2014). Engineering Education Community Resource Wiki. Available at: <http://engineeringeducationlist.pbworks.com/>
- Benson, L.C., Beckler, K., Cooper, M.M., Griffin, O.H., & Smith, K.A. (2010) Engineering education: Departments, degrees and directions. *International Journal of Engineering Education*, 26(5), 1042-1048.
- Borrego, M., & Bernhard, J. (2011) The emergence of engineering education research as an internationally-connected field of inquiry. *Journal of Engineering Education*, 100(1), 14-47.
- Carberry, A. & Yasuhara, K. (2014). Engineering education community resource. Retrieved from <http://engineeringeducationlist.pbworks.com>
- College of Engineering at the Ohio State University (2015) *2014 Annual Statistical Report*. Available at: <https://engineering.osu.edu/about/report>
- Coppola, B.P. (2011). Making Your Case: Ten Questions for Departments and Individuals: Building an Argument for Work in Discipline-Centered Education. *International Journal for the Scholarship of Teaching & Learning* 5(1), Article 5. Available at: <http://digitalcommons.georgiasouthern.edu/ij-sotl/vol5/iss1/5>
- EEIC Self Study Report (2014) <Available at: <https://eeic.osu.edu/eeic-self-study-documents>>
- Felder, R. M., Sheppard, S. D., & Smith K. A. (2005). A new journal for a field in transition. *Journal of Engineering Education*, 94(1), 7-10.
- Fensham, P.J. (2004). *Defining an identity: the evolution of science education as a field of research*. Dordrecht: The Netherlands: Kluwer Academic Publishers.
- Froyd, J. E., & Lohmann, J.R. (2014). Chronological and Ontological Development of Engineering Education as a Field of Scientific Inquiry. Appears in A. Johri & B.M. Olds (Eds.), *Cambridge Handbook of Engineering Education Research*. (pp. 3-15) New York, NY: Cambridge University Press.
- Froyd, J. E., Wankat, P. C., & Smith, K. A. (2012). Five major shifts in 100 years of engineering education. *Proceedings of IEEE*, 100, 1344-1360.
- Ira Fink & Associates, Inc. (2009). *The Ohio State University Instructional Space Feasibility Study, Final Report*. Available at: <https://registrar.osu.edu/scheduling/spacestudyfinalreport.pdf>

Johri, A. & Olds, B.M., eds. (2014). *Cambridge Handbook of Engineering Education Research*. New York, NY: Cambridge University Press. 786 p.

Lohmann, J. R. (2005). The editor's page – Building a community of scholars: The role of the Journal of Engineering Education as a research journal. *Journal of Engineering Education*, 94(1), 1-6.

National Academy of Engineering (2005). *Educating the engineer of 2020: Adapting engineering education to the new century*. Washington, DC: The National Academies Press.

National Academy of Engineering (2004). *The engineer of 2020: Visions of engineering in the new century*. Washington, D.C.: The National Academies Press.

National Science Foundation. (2015). Awards advanced search webpage. Available at: <<http://www.nsf.gov/awardsearch/advancedSearch.jsp>>. Accessed January 12, 2015.

Office of Academic Affairs (OAA) at The Ohio State University. (2007) Academic Organization and Curriculum Handbook. Available at <<http://oaa.osu.edu/academicorganizationcurriculumhandbook.html>>.

President's Council of Advisors on Science and Technology (PCAST). (2012). *Engage to excel: Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics*. Technical report, Executive Office of the President, Washington, D.C.

Sorby, Sheryl, Williams, B., Oliveira, J.M.N., Duffy, G. & Brabazon, D. (2014). The emergence of engineering education research in Portugal and Ireland. ASEE Annual Conference & Exposition. Indianapolis, IN: *ASEE Conference Proceedings*.

Streveler, R., Borrego, M. and Smith, K.A. (2007) Moving from the Scholarship of Teaching and Learning to Educational Research: An Example from Engineering, *Improve the Academy*, Vol. 25, 139-149.

Streveler, R., and K.A. Smith. (2010). From the Margins to the Mainstream: The Emerging Landscape of Engineering Education Research. *Journal of Engineering Education*, 99 (4), 285-287.

Appendix A: Graduate programs in engineering education and related fields (from ASEE-SD and CELT, 2014)

#	Institution: (U.S.)	Program	Degrees Awarded
1	Arizona State University	<u>Mary Lou Fulton Teachers College</u>	<u>Ph.D. and M.Ed. in Educational Technology</u> <u>Ph.D. in Learning, Literacies and Technologies</u> <u>Ph.D. in Curriculum and Instruction with concentration in Engineering Education</u>
		<u>Ira A. Fulton School of Engineering</u>	<u>Ph.D. Aerospace Engineering with concentration in Engineering Education</u> <u>Ph.D. Mechanical Engineering with concentration in Engineering Education</u>
2	University of California - Berkeley	<u>Graduate School of Education</u>	<u>Ph.D. and M.A. in Education in Math, Science, & Technology</u> <u>Ph.D. in Studies in Engineering, Science, and Mathematics Education</u>
3	Clemson University	<u>Department of Engineering and Science Education</u>	<u>Ph.D. Engineering or Science Education</u>
4	University of Kentucky	<u>College of Education - Department of STEM Education</u>	<u>Ph.D. in Education Sciences</u>
5	Louisiana Tech University	<u>College of Engineering and Science</u>	<u>Ph.D. in Engineering with Engineering Education concentration</u>
6	The College of New Jersey	<u>School of Engineering - Dept. of Technological Studies</u>	<u>M.A.T. in Secondary Education - Technology Education</u>
7	Niagara University	<u>College of Education</u>	<u>M.S. Ed. Math, Science, and Technology Education</u>
8	North Carolina State University	<u>College of Education - Department of Science, Technology, Engineering, and Mathematics Education</u>	<u>M.S. and M.Ed. Program in Technology Education</u> <u>Ed.D. Program in Technology Education</u>

9	Old Dominion University	<u>Darden College of Education - Department of STEM Education & Professional Studies</u>	<u>Ph.D. Concentration in Occupational and Technical Studies</u>
10	The Ohio State University	College of Education and Human Ecology, in collaboration with College of Engineering	Ph.D. in Science, Technology, Engineering and Mathematics with specialization in Engineering Education
11	Purdue University	<u>School of Engineering Education</u>	<u>Ph.D. Engineering Education</u>
12	University of Texas at Austin	<u>College of Education</u>	<u>Ph.D. STEM Education</u> <u>M.A. or M.Ed. STEM Education</u>
13	Tufts University	<u>Department of Education</u>	<u>M.S. Science, Technology, Engineering Education or Math (STEM)</u> <u>Ph.D Science, Technology, Engineering Education, or Math (STEM)</u> <u>Master of Arts in Teaching - Engineering</u> <u>Masters of Arts in Teaching - Elementary STEM Education</u>
14	Utah State University	<u>Department of Engineering Education</u>	<u>M.S. Engineering and Technology Education,</u> <u>Ph.D. Engineering Education</u>
15	Virginia Tech	<u>Department of Engineering Education</u>	<u>Ph.D. Engineering Education</u>
		<u>School of Education</u>	<u>M.A.Ed. Integrative STEM Education</u> <u>Ed.S. Integrative STEM Education Specialist</u> <u>Ed.D. Integrative STEM Education</u> <u>Ph.D. Integrative STEM Education</u>

#	Institution: (International)	Program	Degrees Awarded
1	Aalborg University (Denmark)	<u>UNESCO Chair in Problem Based Learning in Engineering</u>	<u>Ph.D. in Engineering Education (joint with UTM (Malaysia))</u> <u>Ph.D. in PBL in Engineering Education</u> <u>Master in PBL in Engineering and Science</u>
2	Chalmers University of Technology (Sweden)	<u>Department of Applied Information Technology</u>	<u>Ph.D. Engineering Education Research</u>
3	Universiti Kebangsaan Malaysia (Malaysia)	<u>Centre for Engineering Education Research (CEER)</u>	Ph.D. Engineering Education
4	Linköping University (Sweden)	Department of Science & Technology - Division of Physics and Electronics	<u>Ph.D. in Science and Engineering Education</u> <u>Engineering Education Research Group</u>
5	Universidad de las Americas, Puebla (Mexico)	<u>EDEI - The School of Engineering</u>	<u>Ph.D. in Education of Sciences, Engineering and Technologies</u>
6	Universiti Teknologi Malaysia (Malaysia)	<u>Department of Technical and Engineering Education</u> <u>Training and Research in Engineering Education (TREE)</u>	<u>Ph.D. in Engineering Education</u> <u>Ph.D. in Engineering Education (joint with AAU (Denmark))</u>
7	Uppsala University (Sweden)	<u>Uppsala Computing Education Research Group (UpCERG)</u>	<u>Ph.D. in Computer Science with specialization in Computer Science Education Research</u>

Appendix B. List of publications January 1, 2009 - January 31, 2015

This list contains publications from members of the EEIC for January 1, 2009 – January 31, 2015 that have been finalized or are currently under review. Authors from the EEIC have been bolded, and the publications are listed under the name of highest author ranking to reduce redundancy.

Lisa M. Abrams (Staff)

PEER-REVIEWED PROCEEDINGS

1. **Abrams, L. M.**, Lilly, B. W., Srinivasan, K., & Mendelsohn D. A. (2013). *Designing and teaching an intensively hands-on class in a large public university*. Paper presented at the American Society for Engineering Education North Central Section Annual Conference, Columbus, OH.
2. **Abrams, L. M.**, Lilly, B. W., Neal, M., Srinivasan, K., & Mendelsohn D. A. (2012). *Developing an effective platform for introducing mechanical engineering in a large public university*. Paper presented at the American Society of Mechanical Engineers Conference, Houston, TX.
3. **Abrams, L. M.**, Lilly, B. W., Altschuld, J., & Mendelsohn D. A. (2012). *Introduction to mechanical engineering: A course in progress*. Paper presented at the 119th American Society for Engineering Education Annual Conference & Exposition, San Antonio, TX.
4. **Abrams, L. M.**, Gustafson, R. J., & Artis, S. (2011). *Extending information on time effective student interactions to engineering faculty*. Paper presented at the 118th American Society for Engineering Education Annual Conference & Exposition, Vancouver, BC.

Gregory D. Bixler (Senior Lecturer)

JOURNAL ARTICLES

1. **Bixler, G. D.**, Campbell, J., **Dzwonczyk, R.**, Greene, H. L., **Merrill, J. A.**, & Passino, K. M. (2014). Humanitarian engineering at The Ohio State University: Lessons learned in enriching education while helping people. *International Journal for Service Learning in Engineering*, 78-96.
2. **Bixler, G. D.**, Simon, M., Doudican, B., & **Dzwonczyk, R.** (2012). Importance of appropriate collaboration with international partners. *International Journal for Service Learning in Engineering*, 7(1), 28-39.

PEER-REVIEWED PROCEEDINGS

1. **Bixler, G. D.** (2011). *Extreme user-centered design: Methodology for eliciting and ranking requirements in user-centered new product development*. Paper presented at the 2011 IEEE Global Humanitarian Conference, Seattle, WA.

Paul A. Clingan (Senior Lecturer)

JOURNAL ARTICLES

1. Vernier, M. A., Wensing, P. M., Morin, C. E., Phillips, A., Rice, B., Wegman, K. R., Hartle, C., **Clingan, P. A., Kecskemety, K. M., & Freuler, R. J.** (In-Press). Design of a full-featured robot controller for use in a first-year robotics design project. *Computers in Education Journal*, doi: 10.1007/s10877-014-9657-4

Roger R. Dzwonczyk (Lecturer)

JOURNAL ARTICLES

1. Perez, W., Dukatz, C., El-Dalati, S., Duncan, J., Abdel-Rasoul, M., Springer, A., ...**Dzwonczyk, R.** (2015). Cerebral oxygenation and processed EEG response to clamping and shunting during carotid endarterectomy under general anesthesia. *Journal of Clinical Monitoring and Computing*
2. Bailey, M., Kirchen, G., Bonaventura, B., Rosborough, K., Abdel-Rasoul, M., & **Dzwonczyk, R.** (2012). Intraoperative MRI electrical noise and monitor ECG filters affect arrhythmia detection and identification. *Journal of Clinical Monitoring and Computing*, 26, 157-161.
3. **Dzwonczyk, R.** & Riha, C. (2012). Medical equipment donations in Haiti: Flaws in the donation process. *Pan American Journal of Public Health*, 31(4), 345-348.
4. **Dzwonczyk, R.,** Weaver, T., Puente, E., & Bergese, S. (2012). Postoperative nausea and vomiting prophylaxis from an economic point of view. *American Journal of Therapeutics*, 19(1), 11-15.
5. Makary, M., Chiocca, E. A., Erminy, N., Antor, M., Bergese, S., Abdel-Rasoul, M., ...**Dzwonczyk, R.** (2011). Clinical and economic outcomes of low-field intraoperative MRI-guided tumor resection neurosurgery. *Journal of Magnetic Resonance Imaging*, 34(5), 1022-1030.
6. Skordilis, M., Rich, N., Vilorio, A., Dimitrova, G., Bergese, S., & **Dzwonczyk, R.** (2011). Electroencephalogram Response of Patients Undergoing Carotid Endarterectomy: A Pilot Study. *Journal of Magnetic Resonance Imaging*, 25(7), 909-912.
7. Hrelec, C., Puente, E., Bergese, S., & **Dzwonczyk, R.** (2010). SNAP II versus BIS VISTA monitor comparison during general anesthesia. *Journal of Clinical Monitoring and Computing*, 24, 283-288.
8. Bergese, S., Bender, S., McSweeney, T., Fernandez, S., **Dzwonczyk, R.,** & Sage, K. (2010). A comparative study of dexmedetomidine with midazolam and midazolam alone for sedation during elective awake fiberoptic intubation. *Journal of Clinical Anesthesia*, (22), 35-40.
9. Jekic, M., Ding, Y., **Dzwonczyk, R.,** Burns, P., Raman, S., & Salmonetti, O. (2010). Magnetic field threshold for accurate electrocardiography in the MRI environment. *Magnetic Resonance in Medicine*, (64), 1586-1591.
10. Barua, E., Johnston J., Fujii, J., **Dzwonczyk, R.,** Chiocca, E., & Bergese, S. (2009). Anesthesia for brain tumor resection using intraoperative magnetic resonance imaging (iMRI) with the Polestar N-20 system: Experience and challenges. *Journal of Clinical Anesthesia*, 21, 371-376.
11. **Dzwonczyk, R.,** del Rio, C., McSweeney, T., Zhang, X., & Howie, M.B. (2009). Myocardial electrical activity does not affect myocardial electrical impedance measurements. *Journal of Clinical Monitoring and Computing*, 23, 217-222.
12. **Dzwonczyk, R.,** Fujii, J., Simonetti, L., Nieves-Ramos, R., & Bergese, S. (2009). Electrical noise in the intraoperative magnetic resonance imaging setting. *Anesthesia Analog*, 108, 181-186.
13. Howie, M., Del Rio, C., Khan, F., Lopez, L., **Dzwonczyk, R.,** & Bergese, S. (2009). A secure and expandable electronic patient record system using web-based technology. *Ibnosina Journal of Medicine and Biomedical Sciences*, 1, 73-79.

PEER-REVIEWED PROCEEDINGS

1. Rodriguez, C.G. M., Soto, M. G., **Dzwonczyk, R., Merrill, J.**, Greene, H., & Cater, M. (2014). *Application of sustainable solutions in international service-learning engineering projects*. Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
2. Riha, C., & **Dzwonczyk, R.** (2011). *Project HOPE clinical (Biomedical) engineering program: experiences and initiatives*. Paper presented at the IEEE Global Humanitarian Technology Conference, 499-502.

Richard J. Freuler (Professor of Practice)

JOURNAL ARTICLES

1. Vernier, M. A., Morin, C. E., Wensing, P. M., Hartlage, R. M., Carruthers, B. E., & **Freuler, R. J.** (2010). "Use of a low-cost camera-based positioning system in a first-year engineering cornerstone design project", *Computers in Education Journal*, 20(2), 6-14.

PEER-REVIEWED PROCEEDINGS

1. **Freuler, R.J., Harper, K. A., Brand, S. G.**, Morin, C. E., Wensing, P. M., & Demel, J. T. (2009). *Comparing the use of a graphical programming language to a traditional text-based language to learn programming concepts in a first-year course*. Paper presented at the American Society for Engineering Education Annual Conference & Exposition, Austin, TX.

Deborah M. Grzybowski (Assistant Professor of Practice)

BOOK CHAPTERS

1. **Grzybowski, D. M.**, Rogers, N. A., Mahmoud, A. M., & Roberts, C. J. (2013). Corneal topographic response to swelling in normal and post-LASIK corneas. In U. A. Kılıç & C. J. Roberts (Eds.), *Corneal topography: From theory to practice*. Amsterdam: Kugler Publications.
2. **Grzybowski, D.M.** & Lubow, M. (2010). Ocular disease: Mechanisms and management. In L. A. Levin & D. M. Albert (Eds.), *Idiopathic Pseudotumor Cerebri (iPTC)*. New York: Elsevier Limited.

JOURNAL ARTICLES

1. Gupta, S., Soellinger, M., **Grzybowski, D. M.**, et al. (2010). Cerebrospinal fluid dynamics in the human cranial subarachnoid space: an overlooked mediator of cerebral disease. I. Computational model. *Journal of the Royal Society Interface*, 7(49), 1195-1204.
2. Holman, D.W., Kurtcuoglu, V., **Grzybowski, D.M.** (2010). Cerebrospinal fluid dynamics in the human cranial subarachnoid space - An overlooked mediator of cerebral disease. Part II: In vitro arachnoid outflow model. *Journal Royal Society Interface*, 7(49), 1205-1218.

PEER-REVIEWED PROCEEDINGS

1. **Grzybowski, D. M., Stavrdis, O., Sorby, S. A., Merrill, J.,** Thomas, J. G., Barclay, L., & **Abrams, L.** (2014). *Impact of optional supplemental course to enhance spatial visualization skills in first-year engineering students*. Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
2. Hird, N. L. & **Grzybowski, D. M.** (2014). *Impact of computational fluid dynamics use in a first-year engineering research design project on future performance in fluid mechanics*. Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
3. Spang, M. T., **Grzybowski, D. M.**, & Strickland, A. A. (2014). *Works in progress: Impact of first-year micro-/nano-technology research project course on future research and graduate/professional school involvement*. Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
4. **Grzybowski, D. M.**, Abernathy, S., Boyd, A. C., Cain, D., Hird, N. L., Madhavan, R. R., Shi, Y., Spang, M. T., Strickland, A. A., & **Clingan, P.A.** (2013). *Student assisted approach to curriculum changes to facilitate a flipped classroom for first-year engineering micro-/nano-technology 'lab-on-a-chip' research project*. Paper presented at the 2013 International Conference on Engineering Education and Research, Marrakesh, Morocco.

Kathleen A. Harper (Senior Lecturer)

BOOKS

1. Zitzewitz, P. W., Haase, D., & **Harper, K. A.** (2013). *Glencoe physics: Principles and problems*. New York: McGraw-Hill.

JOURNAL ARTICLES

1. **Harper, K. A.** (2012). Grading homework to emphasize problem-solving process skills. *The Physics Teacher*, 50 (7), 424-426.
2. **Harper, K. A.** (2011). Grading without losing all of your time (and your mind!). *The Physics Teacher*, 49(9), 584-585.
3. Henderson, C. & **Harper, K. A.** (2009). Quiz corrections: Helping students learn from their mistakes. *The Physics Teacher* 47 (9), 581-586.

PEER-REVIEWED PROCEEDINGS

1. **Harper, K. A., Ruffley, J. P. & Abrams, L. M.** (2014). *A longitudinal study of the impact of a first-year honors engineering program*. Paper presented at the 2014 ASEE Annual Conference, Indianapolis, IN.
2. Tague, J., Czochoer, J., Baker, G. R., **Harper, K. A., Grzybowski, D. M., & Freuler, R. J.** (2013). *Engineering faculty perspectives on mathematical preparation of students*. Paper presented at the 2013 International Conference on Engineering Education and Research, Marrakesh, Morocco.
3. **Harper, K. A., Baker, G. R., & Grzybowski, D. M.** (2013). *First steps in strengthening the connections between mathematics and engineering*. Paper presented at the 120th American Society for Engineering Education Annual Conference & Exposition, Atlanta, GA.
4. **Harper, K. A., Freuler, R. J., Demel, J. T., & Brand, S. H.** (2013). *Continuing the comparison between graphical and text-based programming instruction*. Paper presented at the American Society for Engineering Education North Central Section Annual Conference, Columbus, OH.

Rachel L. Kajfez – Formerly Rachel A. Louis (Assistant Professor of Practice)

JOURNAL ARTICLES

1. Brown, P. R., Matusovich, H. M., McCord, R. E., & **Kajfez, R. L.** (2014). The use of motivation theory in engineering education research: A systematic review of literature. *European Journal of Engineering Education*, doi: 10.1080/03043797.2014.941339
2. Lee, W. C., **Kajfez, R. L.**, & Matusovich, H. M. (2013). Motivating engineering students: Evaluating an engineering student support center with the MUSIC model of academic motivation. *Journal of Women and Minorities in Science and Engineering*, 19(3), 245-271. doi: 10.1615/JWomenMinorScienEng.2013006747
3. **Kajfez, R. L.**, Mohammadi-Aragh, M. J., Brown, P. R., Mann, K., Carrico, C. A., Cross, K. J., ... McNair, L. D. (2013). Assessing graduate engineering programs with eportfolios: A comprehensive design process. *Advances in Engineering Education*, 3(3), 1-29. Retrieved from <http://advances.asee.org/vol03/issue03/papers/aee-vol03-issue03-10.pdf>
4. **Louis, R. A.** & Mistele, J. M. (2012). The differences in scores and self-efficacy by student gender in mathematics and science. *The International Journal of Science and Mathematics Education*, 10(5), 1163-1190. doi: 10.1007/s10763-011-9325-9

PEER-REVIEWED PROCEEDINGS

1. Helber, E. M., Brockman, M. L., & **Kajfez, R. L.** (2014). *Gaming with LabVIEW: An attempt at a novel software design project for first-year engineers*. Paper presented at the 6th First Year Engineering Experience Conference, College Station, TX.
2. **Kajfez, R. L.** & McNair, L. D. (2014). *Graduate student identity: A balancing act between roles*. Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
3. **Kajfez, R. L.**, Croyle, C. M., Snyder, A. N., & Mohammadi-Aragh, M. J. (2014). *Engineering education Ph.D. students: Where are they now and what was the job search process like?* Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
4. **Kajfez, R. L.** & Creamer, E. G. (2014). *A mixed methods analysis and evaluation of mixed methods research literature in engineering education*. Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
5. **Kajfez, R. L.** & Matusovich, H. M. (2013). *The practical applications of understanding graduate teaching assistant motivation and identity development*. Paper presented at the 43st ASEE/IEEE Frontiers in Education Conference, Oklahoma City, OK.
6. **Kajfez, R. L.** & Matusovich, H. M. (2013). *The future possible selves of our graduate teaching assistants in first-year engineering programs*. Paper presented at the 5th First Year Engineering Experience Conference, Pittsburgh, PA.
7. Mohammadi-Aragh, M. J. & **Kajfez, R. L.** (2013). *Surviving your first large lecture with attentive and engaged students*. Paper presented at the 120th American Society for Engineering Education Annual Conference & Exposition, Atlanta, GA.
8. **Kajfez, R. L.** & Matusovich, H. M. (2013). *Graduate teaching assistants' views of their own teaching practice competence*. Paper presented at the 120th American Society for Engineering Education Annual Conference & Exposition, Atlanta, GA.
9. **Louis, R. A.** & Matusovich, H. M. (2012). *Work in progress: Describing the responsibilities of teaching assistants in first-year engineering programs*. Paper presented at the 42st ASEE/IEEE Frontiers in Education Conference, Seattle, WA.
10. Coso, A. E., **Louis, R. A.**, London, J. S., Ngambeki, I. B., & Sattler, B. (2012). *Exploring the reasons for collaboration and cooperation among graduate student researchers*. Paper presented at the 119th American Society for Engineering Education Annual Conference & Exposition, San Antonio, TX.

11. Reap, J., Matusovich, H. M., & **Louis, R. A.** (2012). *Chocolate challenge: The motivational effects of optional projects in an introductory engineering class*. Paper presented at the 119th American Society for Engineering Education Annual Conference & Exposition, San Antonio, TX.
12. **Louis, R. A.**, Mohammadi-Aragh, M. J., & Lee, W. C. (2012). *"Wait... There is a Ph.D. in engineering education?" The first-year experience of three students in an engineering education department*. Paper presented at the American Society for Engineering Education Southeastern Section Annual Conference, Starkville, MS.
13. **Louis, R. A.** & Matusovich, H. M. (2011) *Work in Progress: Identity development of first-year engineering students through a summer college prep program*. Paper presented at the 41st ASEE/IEEE Frontiers in Education Conference, Rapid City, SD.
14. Matusovich, H. M., Berry, B. E., Meyers, K. L., & **Louis, R. A.** (2011) *A multi-institution comparison of identity development as an engineer*. Paper presented at the 118th American Society for Engineering Education Annual Conference & Exposition, Vancouver, BC.
15. **Louis, R. A.** & McNair, L. D. (2011). *Graduate student identity in engineering and education: The creation of an identity construct*. Paper presented at the 9th International ePortfolio and Identity Conference, London, UK.
16. Mistele, J. M. & **Louis, R. A.** (2011). *Exploring the middle school mathematics teacher student relationship*. Paper presented at the American Society for Engineering Education Southeastern Section Annual Conference, Charleston, SC.
17. **Louis, R. A.**, Morin, B., Cerrato, J., Keidel, J., Vincent, J., & Merrill, J. (2010). *First-year engineering program: Student instructional leadership team*. Paper presented at the American Society for Engineering Education North Central Section Annual Conference, Pittsburgh, PA.

PEER-REVIEWED PAPERS

1. **Kajfez, R. L.** & Matusovich, H. M. (2014). *Who are our graduate teaching assistants? A classification based on identity and motivation*. Paper presented at the American Educational Research Association 2014 Annual Meeting, Philadelphia, PA.
2. **Kajfez, R. L.** & Matusovich, H. M. (2013). *The motivation and identity development of graduate teaching assistants: An examination of factors over an academic term in engineering*. Paper presented at the American Educational Research Association 2013 Annual Meeting, San Francisco, CA.

NON-PEER-REVIEWED PROCEEDINGS

1. **Kajfez, R. L.**, McNair, L. D., & Adams, S. G. (2013). *TEaCH TALKS: Pedagogical training for graduate teaching assistants*. Paper presented at the 5th Conference on Higher Education Pedagogy, Blacksburg, VA.

Krista M. Kecskemety (Senior Lecturer)

JOURNAL ARTICLES

1. **Kecskemety, K. M.** & McNamara, J. J. (Under Review). Assessing the influence of wake dynamics on the performance and aeroelastic behavior of wind turbines.
2. Ita, M. E., **Kecskemety, K. M.**, Ashley, K. E., & Morin, B. C. (In-Press). Comparing student performance on computer-based vs. paper-based tests in a first-year engineering course. *Computers in Education Journal*.
3. **Kecskemety, K. M.** & McNamara, J. J. (2011). The influence of wake effects and inflow turbulence on wind turbine loads. *AIAA Journal*, 49(11), 2564-2576. doi: 10.2514/1.J051095

PEER-REVIEWED PROCEEDINGS

1. Shaler, K.L., **Keckskemety, K. M.** & McNamara, J.J. (2015). *Student wake interaction effects in wind farms using a free vortex wake model*. Paper presented at the AIAA Science and Technology Forum and Exposition, Orlando, FL.
2. **Keckskemety, K. M.** & Morin, B. C. (2014). *Student perceptions of inverted classroom benefits in a first-year engineering course*. Paper presented at the 121st American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
3. Morin, B., **Keckskemety, K. M.**, **Harper, K. A.**, & **Clingan, P.A.** (2013). *The inverted classroom in a first-year engineering course*. Paper presented at the 120st American Society for Engineering Education Annual Conference & Exposition, Atlanta, GA.
4. **Keckskemety, K. M.** & McNamara, J. J. (2012). *Impact of a trailing wake on wind turbine aeroelasticity*. Paper presented at the 53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Honolulu, HI.
5. **Keckskemety, K. M.** & McNamara, J. J. (2011). *Investigation into the impact of wake effects on the aeroelastic response and performance of wind turbines*. Paper presented at the 52nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Denver, CO.
6. **Keckskemety, K. M.** & McNamara, J. J. (2010). *The influence of wake effects and inflow turbulence on wind turbine loads*. Paper presented at the 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Orlando, FL.
7. Crowell, A. R., McNamara, J. J., **Keckskemety, K. M.**, & Goerig, T. W. (2010). *A reduced order aerothermodynamic modeling framework for hypersonic aerothermoelasticity*. Paper presented at the 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Orlando, FL.

Edward B. McCaul (Staff)

BOOKS

1. **McCaul, E.** (2014). *To retain command of the Mississippi: The civil war naval campaign for Memphis*. Knoxville, TN: University of Tennessee Press.
2. **McCaul, E.** (2010). *The mechanical fuze and the advance of artillery in the civil war*, Jefferson, NC: McFarland & Company.

PEER-REVIEWED PROCEEDINGS

1. **McCaul, E.** (2012). *If you can be seen, you can be killed: Mechanical fuzes and rifled artillery*. Paper presented at the Smithsonian Institution Civil War Sesquicentennial Symposium, Astride Two Ages: Technology and the Civil War, Washington, D.C.
2. Tomasko, D. **McCaul, E.**, & Sampson, W. (2012). *Coordinating and planning a large, multi-program visit*. Paper presented at the 2012 ABET Symposium, St. Louis, MO.

NON-PEER-REVIEWED PROCEEDINGS

1. **McCaul, E.** (2013). *John Montgomery, world war II cavalryman*. Paper presented at the Granville Historical Society, Granville, OH.
2. **McCaul, E.** (2009). *A technological failure: The FMU-35/B long delay bomb fuze*. Paper presented at the 366th Tactical Fighter Wing Reunion, Williamsburg, VA.

NON-PEER-REVIEWED PAPERS

1. **McCaul, E.** (2013). *John P. Schenkl*. Paper presented at the The Artilleryman.

John A. Merrill (Staff)

JOURNAL ARTICLES

1. Clayton, C., Jagacinski, R., & **Merrill, J. M.** (2008). CEDA: A research instrument for creative engineering design assessment. *Psychology of Aesthetics, Creativity and the Arts*, 2(3), 147-154, doi: 10.1037/1931-3896.2.3.147
2. **Merrill, J. A.**, & Charyton, C. (2009). Assessing general creativity and creative engineering design in first year engineering students. *Journal of Engineering Education*, 98(2), 145-156. doi: 10.1002/j.2168-9830.2009.tb01013.x

PEER-REVIEWED PROCEEDINGS

1. **Merrill, J. A.**, Long III, L., Snyder, A., Stech, R., Allison, C., & Jelen, B. (2013). *First-year engineering program: Student instructional leadership team – Expanded and restructured*. Paper presented at the American Society for Engineering Education North Central Section Annual Conference, Columbus, OH.
2. Allam, Y. S., Sink, S., Cerrato, J. M., & **Merrill, J. A.** (2012). *A metric-based, hands-on quality and productivity improvement simulation involving lean and sigma concepts for first-year engineering lab students*. Paper presented at the 119th American Society for Engineering Education Annual Conference & Exposition, San Antonio, TX.
3. Munoz, D., **Merrill, J. A.**, & Baker, D. (2010). *Community development & engineering: Perspectives on interdisciplinary projects in Honduras*. Paper presented at the 117th American Society for Engineering Education Annual Conference & Exposition, Louisville, KY.

Robert B. Rhoads (Staff)

PEER-REVIEWED PROCEEDINGS

1. **Rhoads, R. B.**, Whitfield, C. A., Allenstein, J. T., **Rogers, P.** (2014). *Examining the structure of a multidisciplinary engineering capstone design program*. Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.

Peter F. Rogers (Professor of Practice)

JOURNAL ARTICLES

1. **Rogers, P. F.**, & Davis, D. (Under Review). Framework for developing assessments for capstone design course outcomes.

PEER-REVIEWED PROCEEDINGS

1. **Rogers, P. F.** (2013). *Social innovation and commercialization*. Paper presented at the American Society for Engineering Education North Central Section Annual Conference, Columbus, OH.

2. **Rogers, P. F., Gill, C. & Alley, K.** (2011). *A sustainable innovation model: Challenges and opportunities for collaboration in an academic setting*. Paper presented at Include 2011: International Conference on Inclusive Design, London, UK.

Philip A. Schlosser (Senior Lecturer)

PEER-REVIEWED PROCEEDINGS

1. **Schlosser, P., Whitfield, C., Merrill, J., Riter, E., & Agarwal, K.** (2011). *Advanced energy vehicle design-build project for first-year engineering students*. Paper presented at the 118th American Society for Engineering Education Annual Conference & Exposition, Vancouver, BC.
2. **Schlosser, P. & Merrill, J. A.** (2010). First year student experiences and outcomes in a seminar on innovation and entrepreneurship. Paper presented at the 117th American Society for Engineering Education Annual Conference & Exposition, Louisville, KY.

Sheryl A. Sorby (Professor)

BOOKS

1. **Sorby, S. A.** (2011). *Developing spatial thinking workbook*. Independence, KY: Cengage Learning.

JOURNAL ARTICLES

1. Hungwe, K., **Sorby, S. A.**, Molzan, R., Charlesworth, P. & Wang, M. (2014). Supporting the development of spatial skills in middle grade and high school students. *Journal of Women and Minorities in Science and Engineering*, 20(4), 379-393.
2. **Sorby, S. A.**, Casey, B., Veurink, N. & Dulaney, A. (2013). The role of spatial training in improving spatial and calculus performance in engineering students. *Learning and Individual Differences*, 26, 20-29.
3. Veurink, N. & **Sorby, S. A.** (2012). Comparison of spatial skills of students entering different engineering majors. *Engineering Design Graphics Journal*, 76(3), 49-54.
4. **Sorby, S. A.** (2009). Developing spatial cognitive skills among middle school students. *Cognitive Processing*, 10(2), 312-313.
5. **Sorby, S. A.** (2009). Educational research in developing 3-D spatial skills for engineering students. *International Journal of Science Education*, 31(3), 459-480.

PEER-REVIEWED PROCEEDINGS

1. **Sorby, S. A.**, Cubero, S., Pasha-Zaidi, N., & Karki, H. (2014). *Spatial skills of students in the United Arab Emirates*. Paper presented at the Engineering Leaders Conference, Doha, Qatar.
2. Veurink, N. & **Sorby, S.**, (2014). *Development of spatial visualization skills through engineering curricula*. Paper presented at the 69th Midyear Conference of the Engineering Design Graphics Division of ASEE, Normal, IL.
3. Sadowski, M. A., & **Sorby, S. A.** (2014). *Defining concepts for an engineering graphics concept inventory: A delphi study*. Paper presented at the 69th Midyear Conference of the Engineering Design Graphics Division of ASEE, Normal, IL.

4. **Sorby, S. A.**, Sadowski, M. A., Steinhauer, H., & Study, N. E. (2014). *Developing a concept inventory for engineering design graphics*. Paper presented at the 69th Midyear Conference of the Engineering Design Graphics Division of ASEE, Normal, IL.
5. **Sorby, S. A.**, Nevin, E., Behan, A., Mageean, E., & Sheridan, S. (2014). *Spatial skills as predictors of success in first-year engineering*. Paper presented at the 44th ASEE/IEEE Frontiers in Education Conference, Madrid, Spain.
6. **Sorby, S.**, Nevin, E., Mageean, E., Sheridan, S. & Behan, A. (2014). *Initial investigations into spatial skills as predictors of success in first-year STEM programmes*. Paper presented at the 42nd Annual SEFI Conference, Birmingham, UK.
7. Llorens, M., Carr, M., O'Shaughnessy, S., Sheridan, D., & **Sorby, S.** (2014). *The accidental expansion of higher education and the problem of articulation*. Paper presented at the 42nd Annual SEFI Conference, Birmingham, UK.
8. **Sorby, S. A.**, Williams, B., Oliveira, J. M. N., Duffy, G., & Brabazon, D. (2014). *A history of engineering education research in Portugal and Ireland*. Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
9. Jordan, K. L., & **Sorby, S. A.** (2014). Intervention to improve self-efficacy and sense of belonging of first-year underrepresented engineering students. Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
10. **Sorby, S. A.**, Signorella, M. L., Veurink, N. L., & Liben, L. (2013). *Developing spatial skills among middle school students*. Paper presented at the 68th Midyear Conference of the Engineering Design Graphics Division of ASEE, Worcester, MA.
11. Sadowski, M. A., & **Sorby, S. A.** (2013). *Update on a delphi study for developing a concept inventory for engineering design graphics*. Paper presented at the 68th Midyear Conference of the Engineering Design Graphics Division of ASEE, Worcester, MA.
12. Veurink, N., L., **Sorby, S. A.**, & Hamlin, A. J. (2013). *Impact of spatial training on non-rotators*. Paper presented at the 68th Midyear Conference of the Engineering Design Graphics Division of ASEE, Worcester, MA.
13. **Sorby, S. A.**, Haut Donahue, T. L., & Campbell, A. (2013). *International senior design for mechanical engineering students*. Paper presented at the SEFI Annual Conference, KU Leuven, Belgium.
14. Miller, M. H., DeClerck, J. P., **Sorby, S. A.**, Roberts, L. M., Endres, W. J., & Hale, K. D. (2013). *Meeting the NAE grand challenge: Personalized learning for engineering students through instruction on metacognition and motivation strategies*. Paper presented at the 120st American Society for Engineering Education Annual Conference & Exposition, Atlanta, GA.
15. **Sorby, S. A.** (2012). *Spatial skills training to improve student success in engineering*. Paper presented at Spatial Thinking Across the College Curriculum Specialist Meeting, Santa Barbara, CA.
16. **Sorby, S.A.**, & Veurink, N. L. (2012). *Impact of visualization training on student leaving*. Paper presented at the 67th Midyear Conference of the Engineering Design Graphics Division of ASEE, Limerick, Ireland.
17. **Sorby, S. A.**, & Veurink, N. L. (2012). *Spatial skills among minority and international engineering students*. Paper presented at the 119th American Society for Engineering Education Annual Conference & Exposition, San Antonio, TX.
18. Jordan, K. L., **Sorby, S. A.**, & Amato-Henderson, S. L. (2012). *Pilot intervention to improve "sense of belonging" of minorities in engineering*. Paper presented at the 119th American Society for Engineering Education Annual Conference & Exposition, San Antonio, TX.
19. Sadowski, M. A., & **Sorby, S. A.** (2012). *A delphi study as a first step in developing a concept inventory for engineering graphics*. Paper presented at the 66th Midyear Conference of the Engineering Design Graphics Division of ASEE, Galveston, TX.
20. Jordan, K. L., **Sorby, S. A.**, Amato-Henderson, S. L., & Haut Donahue, T. L. (2011). *Engineering self-efficacy of women engineering students at urban vs. rural universities*. Paper presented at the 41st ASEE/IEEE Frontiers in Education Conference, Rapid City, SD.
21. Jordan, K. L., Amato-Henderson, **S. A.**, **Sorby, S. A.**, & Haut Donahue, T. L. (2011). *Are there differences in engineering self-efficacy between minority and majority students across academic levels?*

- Paper presented at the 118th American Society for Engineering Education Annual Conference & Exposition, Vancouver, BC.
22. **Sorby, S. A.** & Vilmann, C. R. (2011). *Going online with statics*. Paper presented at the 118th American Society for Engineering Education Annual Conference & Exposition, Vancouver, BC.
 23. Veurink, N. L., & **Sorby, S. A.** (2011). *Raising the bar? Longitudinal study to determine which students would benefit most from spatial training*. Paper presented at the 118th American Society for Engineering Education Annual Conference & Exposition, Vancouver, BC.
 24. **Sorby, S. A.** & Veurink, N. (2010). *Are the visualization skills of first-year engineering students changing?* Paper presented at the 117th American Society for Engineering Education Annual Conference & Exposition, Louisville, KY.
 25. **Sorby, S. A.** (2009). *Longitudinal results from spatial skills training interventions with pre-college students*. Paper presented at the 64th Mid-year conference of the Engineering Design Graphics Division of ASEE, Erie, PA.

Clifford A. Whitfield (Assistant Professor of Practice)

JOURNAL ARTICLES

1. **Whitfield, C. A., Rhoads, R. B.,** & Allenstein, J. T. (Under Review). Multidisciplinary capstone: Academic preparation and important outcomes for engineering practice.

PEER-REVIEWED PROCEEDINGS

1. Allenstein, J. T., **Whitfield, C. A., Rhoads, R. B., & Rogers, P.** (2014). *Assessing and the application of survey results for a multidisciplinary capstone program*. Paper presented at the 121th American Society for Engineering Education Annual Conference & Exposition, Indianapolis, IN.
2. **Whitfield, C. A.,** Allenstein, J. T., & **Rhoads, R. B.** (2014). *Impacts of a multidisciplinary engineering capstone design program from early-career alumni perspectives*. Paper presented at the Capstone Design Conference, Columbus, OH.
3. **Whitfield, C. A.,** Allenstein, J. T., **Rhoads, R. B., & Rogers, P.** (2014). *A case study on early career impacts of an industry-sponsored multidisciplinary capstone experience*. Paper presented at 52nd Aerospace Sciences Meeting of the American Institute of Aeronautics and Astronautics, National Harbor, MD.
4. Allenstein, J., **Whitfield, C.A., Rhoads, R. B., & Rogers, P.** (2013). *Examining the impacts of a multidisciplinary engineering capstone design program*. Paper presented at the 120th American Society for Engineering Education Annual Conference & Exposition, Atlanta, GA.
5. **Whitfield, C. A.** (2013). *Multidisciplinary team-based design-build-test projects with an aero premise*. Paper presented at 51st Aerospace Sciences Meeting of the American Institute of Aeronautics and Astronautics, Dallas, TX.
6. **Whitfield, C. A.,** Allenstein, J. T., & **Rhoads, R. B.** (2012). *From the industry to the student: Project management of an industry-sponsored multidisciplinary capstone project*. Paper presented at the 119th American Society for Engineering Education Annual Conference & Exposition, San Antonio, TX.
7. **Whitfield, C.A.,** West, D., & **Toms, L.** (2012). *A first-year design project software tool to emphasize problem solving with computer programming in the design process*. Paper presented at the 119th American Society for Engineering Education Annual Conference & Exposition, San Antonio, TX.
8. Allam, Y. & **Whitfield, C.A.** (2012). *Scaffolding provided to engineering students in cornerstone design project scenarios related to practices of expert designers*. Paper presented at the 119th American Society for Engineering Education Annual Conference & Exposition, San Antonio, TX.

9. **Whitfield, C. A., Freuler, R. J., Allam, Y., & Riter, E. A.** (2011). *An overview of highly successful first-year engineering cornerstone design projects*. Paper presented at the International Conference on Engineering Education, Belfast, Northern Ireland.
10. **Whitfield, C. A., Schlosser, P., Merrill, J. A., Riter, E. A., & Agarwal, K.** (2011). *Advanced energy vehicle design-build project for first-year engineering students*. Paper presented at the 118th American Society for Engineering Education Annual Conference & Exposition, Vancouver, BC.
11. **Whitfield, C. A. & Warchol, M. L.** (2011). *Flight performance characteristics of highly flexible wing rogallo-type aerodynamics with applications to UAVs*. Paper presented at the 36th AIAA Dayton-Cincinnati Aerospace Sciences Symposium.

Appendix C. List of funded and under review grants January 1, 2009 - January 31, 2015

This list contains grants funded and currently under review from members of the EEIC for January 1, 2009 – January 31, 2015. Investigators from the EEIC have been bolded, and the grants are listed under the name of highest investigator ranking to reduce redundancy. The dollar amounts shown are for the total grant across all institutions when applicable.

Lisa M. Abrams (Staff)

1. **Abrams, L. M., Sorby, S. A., & Donahue, T. H.** (2014). "*IRES: US-India Collaborative Research in Mechanical, Biomedical, and Materials Science Engineering for Undergraduates*," Funded Grant Proposal: National Science Foundation-OISE. \$229,966.
2. **Abrams, L.M.** (2013). "*Exciting Middle School Students with Electronics*," Funded Grant Proposal: Honda-OSU Partnership. \$5,000.
3. **Abrams, L.M.** (2013). "*Women in Engineering – Leading with Confidence*," Funded Grant Proposal: Thomson Reuters. \$10,000.

Mary J. Faure (Staff)

1. **Faure, M., Merrill, J., Schlosser, P., & Parkhurst, A.** (2012). "*Transforming student engineering technical presentations into multimedia video presentations, phase I*," Funded Grant Proposal: OSU OCIO Digital Impact Grant. \$15,000.

Richard J. Freuler (Professor of Practice)

1. **Freuler, R. J. & Whitfield, C. A.** (2013). "*GE Peebles Site 5D Test Cell Facility Scale Model Hardware and Testing Program*," Funded Grant Proposal: GE Aviation. \$173,991.
2. **Freuler, R. J. & Whitfield, C. A.** (2011). "*Caledonian Test Cell Facility Scale Model Hardware and Testing*," Funded Grant Proposal: Aero Systems Engineering, Inc. \$118,617
3. **Freuler, R. J. & Whitfield, C. A.** (2011). "*Winnipeg Icing Scale Facility Model Hardware and Testing*," Funded Grant Proposal: GE Aircraft Engines. \$154,747.
4. **Freuler, R. J. & Whitfield, C. A.** (2011). "*LML Athens Inlet Scale Model Hardware and Testing Program*" Funded Grant Proposal: GE Aviation. \$196,267.
5. **Freuler, R. J. & Whitfield, C. A.** (2010). "*LMS100 Exhaust System Scale Model Testing*," Funded Grant Proposal: GE Energy. \$128,782.
6. **Freuler, R. J. & Whitfield, C. A.** (2009). "*An Investigation of Aerodynamic Performance and Air Flow Quality in a Scale Model of GE Caledonian Limited's Engine Test Facility with a GENx Engine Simulator*," Funded Grant Proposal: GE Caledonian Limited. \$190,390.
7. **Freuler, R. J. & Whitfield, C. A.** (2009). "*An Investigation of the Influence of Crosswinds on Engine Inlet Flow Quality for the GENx Engine When Operating in the Mirabel Icing Spray Rig Facility*," Funded Grant Proposal: GE Aircraft Engines. \$12,000.
8. **Freuler, R. J. & Whitfield, C. A.** (2009). "*Risk Abatement Scale Model Test on Honda HF120 Flight Inlet*," Funded Grant Proposal: GE Aircraft Engines. \$26,890.
9. **Freuler, R. J., Harper, K. A., Vernier, M. A., Brand, S. H., & Demel, J. T.** (2009). "*Comparing the Use of a Graphical Programming Language to a Traditional Text Based Language to Learn Programming Concepts*," Funded Grant Proposal: National Instruments. \$51,000.

Deborah M. Grzybowski (Assistant Professor of Practice)

1. **Grzybowski, D. M.** (Under Review). “*smART:ART Integrated Formal and Informal STEM Education*,” Grant Proposal Under Review: Battelle Engineering, Technology, and Human Affairs Endowment. \$59,200.
2. **Grzybowski, D. M.** (2012). “*1282.02H OSU Library Course Enhancement Grant*,” Funded Grant Proposal: OSU Course Enhancement Grant. \$2,000.
3. **Grzybowski, D. M.** (2012). “*OLERF Equipment Grant*,” Funded Grant Proposal: The Ohio Lions District 13F. \$10,000.
4. **Grzybowski, D. M.** (2011). “*In vitro ocular response to particle application*,” Funded Grant Proposal: Institute for In Vitro Sciences, Inc. \$71,590.
5. **Grzybowski, D. M.** (2011). “*Understanding the mechanism of IIH*,” Funded Grant Proposal: The Ray Vanco Childrens Foundation. \$10,000.
6. **Grzybowski, D. M.** (2011). “*Cellular Mechanism of water egress through the arachnoid tissue to develop novel treatments for hydrocephalus and IIH*,” Funded Grant Proposal: The Reinberger Foundation. \$25,000.
7. **Grzybowski, D. M.** (2011). “*Lysosomal Storage Disease Patient Symposium*,” Funded Grant Proposal: Genzyme Corporation conference grant. \$2,100.
8. **Grzybowski, D. M.** (2010). “*Nanoengineered in vitro trabecular meshwork (TM) model for systematic investigation of aqueous humor outflow resistance*,” Funded Grant Proposal: Glaucoma Research Foundation. \$100,000.
9. **Grzybowski, D. M.** (2009). “*Fabry Registry*,” Funded Grant Proposal: Genzyme Corporation. \$4,150.
10. **Grzybowski, D. M.** (2009). “*Establishment of Biomarkers for Fabry Disease*,” Funded Grant Proposal: Genzyme Corporation. \$18,923.
11. **Grzybowski, D. M.** (2009). “*Clinical Investigation of CSF and blood biological mediators of Idiopathic Intracranial Hypertension – A Pilot Study*,” Funded Grant Proposal: OSUMC Health Services Strategic Initiative Research Grant. \$80,000.

Kathleen A. Harper (Senior Lecturer)

1. **Harper, K. A.** & Clark, T. M. (2015). “*Modeling Instruction for Physics and Chemistry in Ohio*,” Grant Proposal Under Review: Ohio Board of Regents - Improving Teacher Quality Program. \$141,556.
2. **Harper, K. A.** & Clark, T. M. (2014). “*Modeling Instruction for Physics and Chemistry in Ohio*,” Funded Grant Proposal: Ohio Board of Regents - Improving Teacher Quality Program. \$150,509.
3. **Harper, K. A.** & Clark, T. M. (2013). “*Modeling Instruction for Physical Science and Chemistry in Ohio*,” Funded Grant Proposal: Ohio Board of Regents - Improving Teacher Quality Program. \$149,040.
4. **Harper, K. A.** & Clark, T. M. (2012). “*Modeling Instruction for Physical Science and Chemistry in Ohio*,” Funded Grant Proposal: Ohio Board of Regents - Improving Teacher Quality Program. \$159,277.
5. **Harper, K. A.** & Clark, T. M. (2011). “*Modeling Instruction for Physical Science and Chemistry in Ohio*,” Funded Grant Proposal: Ohio Board of Regents - Improving Teacher Quality Program. \$170,730.
6. **Harper, K. A.** & Clark, T. M. (2010). “*Modeling Instruction for Physical Science and Chemistry in Ohio*,” Funded Grant Proposal: Ohio Board of Regents - Improving Teacher Quality Program. \$134,090.
7. Clark, T. M. & **Harper, K. A.** (2009). “*Modeling Instruction for Physical Science and Chemistry in Ohio*,” Funded Grant Proposal: Ohio Board of Regents - Improving Teacher Quality Program. \$171,167.

Rachel L. Kajfez (Assistant Professor of Practice)

1. Paretti, M., Knott, M., Reid, K., Pembridge, J., Sun, L., Davids, L., Orr, M., Apter-Desselles, M., Mohammadi-Aragh, M., Bruce, J., **Kajfez, R. L., & Abrams, L., M.** (Under Review). “*Collaborative Research: Enhancing Problem- and Project-Based Facilitation in First-Year Engineering Instructors,*” Grant Proposal Under Review: National Science Foundation-IUSE. \$2,346,105.
2. Benson, L. C., Kennedy, M., Vargas, P., & **Kajfez, R. L.** (Under Review). “*Collaborative Research: Student Perspectives on Researcher Identity and Transformation of Epistemologies (SPRITE),*” Grant Proposal Under Review: National Science Foundation-REE. \$469,741.
3. Riter, E. & **Kajfez, R. L.** (Under Review). “*Toy Adaptation Program,*” Grant Proposal Under Review: Columbus Foundation Traditional Grant. \$20,000.
4. Irving, K. E., Malone, K., Heckler, A., & **Kajfez, R. L.** (2014). “*EiE-Ohio – Building 21st century learner,*” Funded Grant Proposal: Ohio Board of Regents - Improving Teacher Quality Professional Development Program. \$131,109.
5. **Kajfez, R. L.** & Riter, E. (Under Review). “*Toy Adaptation Program: A Plan for Continuation and Growth,*” Grant Proposal Under Review: Battelle Engineering, Technology, and Human Affairs Endowment. \$46,100.
6. Riter, E. & **Kajfez, R. L.** (Under Review). “*Toy Adaptation Program,*” Grant Proposal Under Review: Women & Philanthropy at The Ohio State University. ~\$20,000 (grant does not require a budget).
7. Mohammadi-Aragh, M. J. & **Kajfez, R. L.** (Under Review). “*Collaborative Research: First-Year Engineering Structures Effect on Community and Identity: A Case Study of Two Different Approaches,*” Grant Proposal Under Review: National Science Foundation-REE. \$299,886.
8. **Kajfez, R. L.** & Mohammadi-Aragh, M. J. (Under Review). “*Collaborative Research: STEM Motivation and Learning: The Impact of Instruction on Goals,*” Grant Proposal Under Review: National Science Foundation-IUSE. \$249,806.

Krista M. Kecskemety (Senior Lecturer)

1. **Kecskemety, K. M. & Kajfez, R. L.** (2014). “*UCAT Seed Grant Proposal: Grading Training of Technical Writing Assignments in First-Year Engineering,*” Funded Grant Proposal: OSU University Center for the Advancement of Teaching-Seed Grant. \$9,000.

John A. Merrill (Staff)

1. **Merrill, J. A., Kajfez, R. L., Pinnell, M., & Underwood, H.** (Under Review). “*Collaborative Research: Community Engaged Learning in Engineering: From Identity to Motivation and Beyond,*” Grant Proposal Under Review: National Science Foundation-IUSE. \$245,506.

Peter F. Rogers (Professor of Practice)

1. David, D., **Rogers, P.** & Ding, L. (Under Review). “*Development and Validation of Assessments for Industry-Valued Professional and Technical Learning Outcomes in Engineering Education,*” Grant Proposal Under Review: National Science Foundation-IUSE. \$600,000.
2. **Rogers, P.,** Siston, R., & Ruegsegger, M. (2010). “*Social Innovation and Commercialization,*” Funded Grant Proposal: OSU Engagement Impact Grant. \$75,000.

Sheryl A. Sorby (Professor)

1. **Sorby, S. A.,** Uttal, D., & Carr, M. (Under Review). *"Enhancing Middle School Mathematics Achievement through Spatial Skills Instruction,"* Grant Proposal Under Review: Department of Education-IES. \$3,500,000.
2. **Sorby, S. A.** & Steinhauer, H. (2014). *"Collaborative Research: A Concept Inventory for Engineering Design Graphics,"* Funded Grant Proposal: National Science Foundation-IUSE. \$795,892.
3. Metz, S., Delson, N., Ekker, D., Mihelich, B., & **Sorby, S. A.** (2014). *"Adapting Tested Spatial Skills Curriculum to On-Line Format for Community College Instruction: A Critical Link to Retain Technology Students,"* Funded Grant Proposal: National Science Foundation-ATE. \$825,000.
4. **Sorby, S. A.,** Hamlin, A., & Veurink, N. (2011). *"Collaborative Research: Addressing the STEM Gender Gap: Does Spatial Skills Training Enhance Middle School Girls' STEM-Relevant Spatial Skills, Attitudes, Beliefs and Self-Efficacy,"* Funded Grant Proposal: National Science Foundation-GSE. \$525,000.
5. Sadowski, M. & **Sorby S. A.** (2011). *"Conducting a Delphi Study as the First Step in Developing a Concept Inventory for Engineering Design Graphics,"* Funded Grant Proposal: National Science Foundation-TUES. \$199,988.
6. Miller, M., Declerck, J., Endres, W., & **Sorby, S. A.** (2011). *"Meeting the NAE Grand Challenge: Personalized Learning for Engineering Students through Instruction on Metacognition and Motivation Strategies,"* Funded Grant Proposal: National Science Foundation-IEECI. \$390,050.
7. **Sorby, S. A.,** Amato, S., & Donahue, T. (2010). *"Research in Engineering Self-Efficacy of Minority Students,"* Funded Grant Proposal: National Science Foundation-IEECI. \$399,827.

Clifford A. Whitfield (Assistant Professor of Practice)

1. **Whitfield, C. A.** (Under Review). *"Advanced Reconfigurable Engagement System (ARES) Hypersonic Cruise Missile (HCM) Technical Analysis,"* Grant Proposal Under Review: Northrop Grumman. \$250,000.
2. **Whitfield, C. A. & Freuler, R. J.** (2014). *"GE9X Engine Simulator Design, Fabrication, and Calibration Testing; with GE90/GENx Conversion Capability,"* Funded Grant Proposal: GE Aviation. \$304,500.
3. **Whitfield, C. A. & Freuler, R. J.** (2014). *"GE LEAP-X Engine Simulator Design, Fabrication, and Calibration Testing,"* Funded Grant Proposal: GE Aviation. \$224,300.
4. **Whitfield, C. A.** (2011). *"Phase II Development of an Advanced Energy Vehicle First-Year Engineering Cornerstone Design-Build Project,"* Funded Grant Proposal: College of Engineering, OSU. \$26,000.

Appendix D. Fiscal balance sheet (2010-2014) for the EEIC

	College of Engineering 2010	College of Engineering 2011	College of Engineering 2012	College of Engineering 2013	College of Engineering 2014
Sources Uses Row	Balance	Balance	Balance	Balance	Balance
GFSA Carry forward	(-92,931)	44,258	80,749	114,476	29,116
Total Beginning Equity	(-92,931)	44,258	80,749	114,476	29,116
GFSA Current Budget	3,749,393	4,541,635	4,502,163	5,340,343	5,613,583
Total Sources	3,749,393	4,541,635	4,502,163	5,340,343	5,613,583
9-Month Faculty	355,029	401,767	105,972	151,711	628,125
12-Month Faculty	196,606	405,751	519,284	480,202	535,266
A&P	367,013	397,008	428,916	457,913	474,640
Classified	17,905	8,000	13,772	11,367	13,197
Faculty Specials	570,114	783,526	833,364	1,276,589	654,290
Release Time	0	(-12,634)	3,645	(-22,781)	60,300
Graduate Assistants	540,174	643,743	645,114	613,990	768,143
Other Students	285,174	305,558	374,045	520,922	501,974
Work Study	1,069		165		
Additional Pay	114,015	159,525	159,243	182,888	214,155
Other Salaries	37,150		4,856	3,230	22,618
Benefits	525,575	673,033	683,905	831,868	887,836
Fee Authorizations	653,464	620,476	615,993	733,314	786,785
Supplies & Services	140,050	279,362	291,050	308,737	270,134
Equipment	14,117	36,432	14,456	19,120	21,243
Other			94		
	3,817,454	4,701,546	4,693,875	5,569,070	5,838,707
Transfers Out		58,005	44,241		7,454
Expense Transfers	205,250	138,397	181,198	143,367	150,000
Net Transfers Total	205,250	196,402	225,439	143,367	157,454
Net Equity	44,258	80,749	114,476	29,116	(-38,554)

**Pattern of Administration
Department of Engineering Education
Revised: 04/10/2015**

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Pattern of Administration

Department of Engineering Education

I Introduction

This document provides a brief description of the Department of Engineering Education (EED) as well as a description of its guidelines and procedures. It supplements the Rules of the University Faculty (<http://trustees.osu.edu/university/facultyrules>) and other policies and procedures of the university to which the department and its faculty are subject. The latter rules, policies and procedures, and changes in them, take precedence over statements in this document. This document, together with the department's current Appointments, Promotion and Tenure (APT) Document, constitutes the department's governance documents.

This Pattern of Administration is subject to continuing revision. It must be reviewed and either revised or reaffirmed on appointment or reappointment of the department chair. However, revisions may be made at any time as needed. All revisions, as well as periodic reaffirmation, are subject to approval by the college office and the Office of Academic Affairs.

II Department Mission

The EED advances the engineering profession and enables student success by developing and delivering state-of-the-art, innovative, multidisciplinary engineering courses and programs; by modeling and advocating scholarly, evidence-based teaching within the College of Engineering; and by integrating pedagogical discovery, practice, and dissemination through world-class engineering education research.

III Academic Rights and Responsibilities

In April 2006, the university issued a reaffirmation of academic rights, responsibilities, and processes for addressing concerns. This statement can be found on the Office of Academic Affairs website, <http://oaa.osu.edu/rightsandresponsibilities.html>.

IV Faculty

Faculty Rule 3335-5-19 (<http://trustees.osu.edu>) defines the types of faculty appointments possible at The Ohio State University and the rights and restrictions associated with each type of appointment. For purposes of governance, the faculty of this department includes tenure-track, clinical, research, and associated faculty members - each with a current appointment having a compensated Full Time Equivalent (FTE) of at least 50% in the department.

The EED makes clinical appointments. Clinical faculty titles are Assistant Professor of Practice in Engineering Education, Associate Professor of Practice in Engineering Education, and Professor of Practice in Engineering Education. The appointment cap on clinical faculty in relation to the total of tenure-track, clinical, and research faculty is established in the College's Pattern of Administration (see <http://oaa.osu.edu/governance>) and is defined as a simple majority. University Faculty Rule 3335-7-03 states that "in all tenure-initiating units not in health

sciences, the number of clinical track faculty members must be fewer than the number of tenure-track faculty members in each unit." From its inception, the department has extended governance rights to clinical faculty. Clinical faculty may vote in all matters of department governance except tenure-track promotion and tenure decisions.

The Department of Engineering Education makes research appointments. Research faculty titles are Research Assistant Professor of Engineering Education, Research Associate Professor of Engineering Education, and Research Professor of Engineering Education. Research faculty can comprise no more than 20% of the tenure-track faculty. From its inception, the department has extended governance rights to research faculty. Research faculty may vote in all matters of department governance except tenure-track promotion and tenure decisions and clinical promotion decisions.

From its inception, the department has extended department governance rights to associated faculty on multi-year contracts (e.g., senior lecturers). Associated faculty on multi-year contracts may vote in all matters of department governance except tenure-track faculty promotion and tenure decisions, clinical faculty promotion decisions, and research faculty promotion decisions.

Associated faculty on one-year contracts with this department are invited to participate in discussions on non-personnel matters but may not participate in personnel matters, including promotion and tenure reviews, and may not vote on any matter.

Emeritus faculty in this department are invited to participate in discussions on non-personnel matters but may not participate in personnel matters, including promotion and tenure reviews, and may not vote on any matter.

Detailed information about the appointment criteria and procedures for the various types of faculty appointments made in this department is provided in the Appointments, Promotion, and Tenure Document (see <http://oaa.osu.edu/governance>).

V Organization of Department Services and Staff

Department support services are organized by functions as follows:

- Administrative assistance for chair, associate chair(s), and program directors
- Instructional laboratory (mechanical and electronics) support
- Instructional technology and computer system support in collaboration with Region One computing facilities
- Student Instructional Leadership Team (SILT)

Staff members report to supervisors in their functional areas, who in turn report to the chair. Staff supervisors meet periodically with the chair and associate chair(s) to coordinate their activities.

VI Overview of Department Administration and Decision-Making

Policy and program decisions are made in a number of ways: by the department faculty as a whole, by standing or special committees of the department, or by the chair. The nature and

importance of any individual matter determine how it is addressed. Department governance proceeds on the general principle that the more important the matter to be decided, the more inclusive participation in decision making needs to be. Open discussions, both formal and informal, constitute the primary means of reaching decisions of central importance.

VII Department Administration

A Chair

The primary responsibilities of the chair are set forth in Faculty Rule 3335-3-35, <http://trustees.osu.edu>. This rule requires the chair to develop, in consultation with the faculty, a Pattern of Administration with specified minimum content. The rule, along with Faculty Rule 3335-6, <http://trustees.osu.edu>, also requires the chair to prepare, in consultation with the faculty, a document setting forth policies and procedures pertinent to promotion and tenure.

Other responsibilities of the chair, not specifically noted elsewhere in this Pattern of Administration, are paraphrased and summarized below.

- To have general administrative responsibility for department programs, subject to the approval of the dean of the college, and to conduct the business of the department efficiently. This broad responsibility includes the acquisition and management of funds and the hiring and supervision of faculty and staff.
- To plan with the members of the faculty and the dean of the college a progressive program; to encourage research and educational investigations.
- To evaluate and improve instructional and administrative processes on an ongoing basis, to promote improvement of instruction by providing for the evaluation of each course when offered, including written evaluation by students of the course and instructors, and periodic course review by the faculty.
- To evaluate faculty members annually in accordance with both university and department established criteria; to inform faculty members when they receive their annual review of their right to review their primary personnel file maintained by their department; and to place in that file a response to any evaluation, comment, or other material contained in the file.
- To recommend appointments, promotions, dismissals, and matters affecting the tenure of members of the department faculty to the dean of the college, in accordance with procedures set forth in Faculty Rule 3335-6 (<http://trustees.osu.edu>) and this department's Appointments, Promotion, and Tenure Document.
- To see that all faculty members, regardless of their assigned location, are offered the departmental privileges and responsibilities appropriate to their rank and in general to lead in maintaining a high level of morale.

- To see that adequate supervision and training are given to those members of the faculty and staff who may profit by such assistance.

Day-to-day responsibility for specific matters may be delegated to others, but the chair retains final responsibility and authority for all matters covered by this Pattern of Administration, subject when relevant to the approval of the dean, Office of Academic Affairs, and Board of Trustees.

Operational efficiency requires that the chair exercise a degree of autonomy in establishing and managing administrative processes. The articulation and achievement of department academic goals, however, is most successful when all faculty members participate in discussing and deciding matters of importance. The chair will therefore consult with the faculty on all educational and academic policy issues and will respect the principle of majority rule. When a departure from majority rule is judged to be necessary, the chair will explain to the faculty the reasons for the departure, ideally before action is taken.

B Associate Chair(s)

The chair shall designate one or more associate chairs. An associate chair need not have faculty status. The associate chair(s) shall assist the chair in overall administration of the department as summarized below.

- To serve during the chair's absence in situations requiring administrative decision or signature when the chair cannot be reached within a reasonable period of time.
- To coordinate the hiring, training, and professional development of graduate teaching associates (GTAs) and undergraduate teaching assistants (UTAs).
- To finalize teaching assignments for all graduate teaching associates and undergraduate teaching assistants.
- To finalize the master schedule of classes including times and locations of course offerings in coordination with the Office of the University Registrar.
- To coordinate departmental committees.
- To coordinate departmental minor programs in collaboration with appropriate advising staff.
- To lead and coordinate awards nominations including keeping abreast of awards for which faculty and staff may be eligible. Responsibilities shall be to identify and maintain a list of all deadlines for national and international honors and awards, as well as those awarded by the College and University. The associate chair(s) shall share relevant information with faculty and staff on a timely basis, decide in consultation with the chair which nominations should be forwarded from competing nominations when necessary, and coordinate preparation of the nominations of faculty and staff for outstanding

contributions. Upcoming opportunities and successes shall be reported through the departmental newsletter and at faculty and staff meetings.

- Additionally, to assist with:
 - Personnel, fiscal, and overall business matters,
 - Finalization of faculty teaching assignments,
 - Space and facilities allocations, and
 - Coordination of development opportunities in collaboration with advancement staff.

C Program Directors

The department chair shall work with the associate chair(s) to designate one or more program directors, to provide leadership for each of the department's major program areas including Fundamentals of Engineering, Engineering Technical Communications, Multidisciplinary Courses and Programs, and the Engineering Education Graduate Program. The program directors are responsible for coordinating annual course reviews and peer evaluations of teaching for their program. The peer evaluations of teaching will be conducted per the APT document. Program Directors are part of the Leadership Team.

In addition, the department chair or associate chair(s) may assign one or more program managers from the faculty to be responsible for coordinating different subprogram areas within the areas above.

D Committees

Much of the development and implementation of the department's policies and programs is carried out by standing and ad hoc committees. The chair is an ex officio member of all department committees and may vote as a member on all committees except the Committee of Eligible Faculty and the Promotion and Tenure Committee.

The department shall have at least the following standing committees:

- Leadership Team,
- Professional Development Committee,
- Undergraduate Studies Committee,
- Graduate Studies and Research Committee,
- Health, Safety, and Technology Committee;
- Promotion and Tenure Committee,

In addition, more formal or ad-hoc committees and working groups will be established whenever the chair deems it necessary for the continued wellbeing of the department. All committees are advisory to the chair and/or through the chair, to the department faculty, and staff. Except as indicated below, all committee members and chairs shall be appointed by the chair for up to three year terms commencing in the autumn semester to be filled on a rolling basis.

D.1. Leadership Team

The Leadership Committee shall have at least eight members plus the department chair. Members will include the associate chair(s); the program directors; program managers; and other at large members of the EED faculty and staff selected by the chair. The department chair serves as chair of the Leadership Team.

The Leadership Team will advise the chair on budgetary policy, personnel resources, and operational matters. The Leadership Team is responsible for long range planning and for proposing administrative policies for approval by the faculty and staff. It will meet at least once per academic term.

D.2. Professional Development committee

In keeping with the department's mission to enable student success, we recognize the importance of supporting our faculty and staff in professional development activities. It is the department's position that professional development is essential to life-long learning. Participation in activities connected with networking, training, research and scholarship, lead to professional and personal growth, and, further, strengthen the quality of teaching in our courses. These activities can include but are not limited to conference attendance, research projects leading to publication, and participation in workshops related to pedagogy, technology, or further training. The Professional Development Committee shall provide policy oversight, periodically review and revise the departmental professional development handbook, promote professional development among employees, oversee a formal mentoring plan, and identify and publicize suggested professional development opportunities. Committee membership will include faculty, staff, and students (graduate and undergraduate). The chair of the Professional Development Committee will be appointed by the department chair for a three-year term. The appointments of the faculty and staff members on the Professional Development Committee will be for three years, and individual appointments will be staggered. The student representatives will usually be selected from among the graduate and undergraduate teaching associates for one-year terms.

D.3. Undergraduate Studies Committee

Undergraduate Studies Committee members shall include faculty and staff members representing different areas within the department. The composition of the committee should be such that all areas of the department undergraduate curriculum offerings are represented and will include the program directors for the Fundamentals of Engineering and the Engineering Technical Communications programs. It shall also include at least one person from the College's Undergraduate Education and Student Services office, and one graduate and one undergraduate student representative. The chair of the Undergraduate Studies Committee will be appointed by the department chair for a three-year term, and will also serve as a member of the College's Core Curriculum and UG Services Committee. The appointments of the faculty and staff members on the Undergraduate Studies Committee will be for three years, and individual appointments will be staggered. The student representatives will usually be selected from among the graduate and undergraduate teaching associates for a one-year term. The Undergraduate Studies Committee's

responsibilities will include all undergraduate curriculum matters related to the undergraduate courses offered by this department. These responsibilities include, but are not limited to, the following: ensuring that undergraduate course syllabi are reviewed and kept current, ABET accreditation related issues, review of course assessment reports from program directors, and assisting the chair and associate chair(s) in undergraduate recruitment. The student representatives will not be eligible to attend discussion of matters relating to specific students or to vote on those matters.

A member of the Undergraduate Studies Committee will be appointed by the department chair during the spring term of the preceding year to serve as the departmental representative to the College Committee on Academic Affairs for each academic year.

D.4. Graduate Studies and Research Committee

Graduate Studies Committee members shall include faculty and staff members representing different areas within the department. The composition of the committee should be such that areas of the department graduate curriculum offerings are fairly represented. It shall also include at least three faculty members with level P status in the Engineering Education graduate program and one graduate student representative. The chair of the Graduate Studies Committee will be appointed by the department chair for a three-year term and will also serve as a member of the College's Graduate Program Chairs Committee. The appointments of the faculty and staff members on the Graduate Studies Committee will be for three years, and individual appointments will be staggered. The student representative will be selected from among the engineering education graduate students for a one-year term.

The Graduate Studies Committee's responsibilities will include all graduate curriculum matters related to the graduate courses offered by the department. The Committee will recruit and select prospective graduate students, recommend the award of fellowships and graduate teaching and research associateships to incoming students, ensure that the graduate curriculum and the program graduate study rules are kept current, review course assessment reports from program directors, administer the graduate examinations required by the program and the Graduate School, and carry out any other charges related to graduate studies that may be requested by the department chair. Committee responsibilities will also include coordination of large engineering education research projects that involve multiple sections of departmental courses, promotion of research and scholarship of teaching and learning in engineering, coordination of regular seminars, and seeking collaboration with other units with similar scholarly interests. The Committee will also strive to achieve synergy to ensure that departmental research is coordinated in a way to create efficiencies and is consistent with department goals and objectives.

D.5. Health, Safety, and Technology Committee

The Health, Safety, Technology, and Space Utilization Committee will consist of faculty and staff broadly knowledgeable about health and safety, computing, instructional technology and facilities needs in the department. The committee chair will be appointed by the department chair. A representative from the Region One computing facilities staff shall serve on the committee. The purpose of the Committee shall be to increase and maintain the interest of

employees in health and safety issues, to inform employees about health and safety standards and updates, and to help reduce the risk of workplace injuries and illnesses. Responsibilities also include maintaining a plan for computing, instructional technology, and facilities for the department.

D.6. Promotion and Tenure Committee

This committee and its function is described in detail in a separate departmental Appointments, Promotion and Tenure document.

E Advisory Groups

E.1. Advisory Council

The Advisory Council shall serve as a link between the department and our alumni as well as engineers who associate with our programs. As an advisory body, they will participate regularly in strategic planning with departmental administrators and periodically review academic and research programs of the faculty and staff. The Advisory Council develops and maintains its own charter. The chair and vice-chair shall be elected by the committee. Normal duties of members include attending two meetings per year, responding to email with questions and comments prior to each meeting, and mutually agreed upon special task force assignments. Coordination will be provided by the chair and/or associate chair(s) of the department.

E.2. Student Instructional Leadership Team

The Student Instructional Leadership Team (SILT) is a committee of experienced graduate and undergraduate TAs with the objective to aid engineering undergraduates in each version of the First-Year Engineering Program (Standard, Honors, Scholars, and Transfers). The team offers assistance in a wide range of topics, including engineering graphics courses, service-learning courses, seminars, and computer programming. SILT provides professional development opportunities for student employees and strives to enhance the program's learning environments, and create consistency. Committee members must have served in a teaching role for at least one year prior to their term. FE (Non honors) GTAs and UTAs must have taught both ENGR 1181 and 1182 in the past; FE (Honors) UTAs must have served as an in-class UTA for at least one semester. Oversight and coordination will be provided by an associate chair and/or faculty member of the department.

VIII Faculty and Staff Meetings

The chair will provide to the faculty and staff a schedule of department faculty and staff meetings at the beginning of each academic term. The schedule will provide for at least one meeting per semester and normally will provide for monthly meetings. A call for agenda items and completed agenda will be delivered to faculty and staff by e-mail before a scheduled meeting. Reasonable efforts will be made to call for agenda items at least seven days before the meeting and to distribute the agenda by e-mail at least three business days before the meeting. A

meeting of the department faculty and staff will also be scheduled on written request of 25% of the department faculty and staff. The chair will make reasonable efforts to have the meeting take place within one week of receipt of the request. The chair will distribute minutes of faculty and staff meetings to faculty and staff by e-mail—within seven days of the meeting if possible. These minutes may be amended at the next faculty and staff meeting by a simple majority vote of the faculty and staff who were present at the meeting. The intent is to be inclusive of faculty and staff who satisfy eligibility requirements for voting.

Special policies pertain to voting on personnel matters, and these are set forth in the department's Appointments, Promotion and Tenure Document.

For purposes of discussing department business other than personnel matters and for making decisions where consensus is possible and a reasonable basis for action, a quorum will be defined as a simple majority of all faculty and staff members eligible to vote.

Either the chair or one-third of all faculty and staff members eligible to vote may determine that a formal vote conducted by written ballot is necessary on matters of special importance. For purposes of a formal vote, a matter will be considered decided when a particular position is supported by at least a majority of all faculty and staff members eligible to vote. Balloting will be conducted by e-mail when necessary to assure maximum participation in voting. When conducting a ballot by email, faculty, and staff members will be given one week to respond.

When a matter must be decided and a simple majority of all faculty and staff members eligible to vote cannot be achieved on behalf of any position, the chair, upon consultation with the associate chair(s), will make the final decision.

The department accepts the fundamental importance of full and free discussion but also recognizes that such discussion can only be achieved in an atmosphere of mutual respect and civility. Normally department meetings will be conducted with no more formality than is needed to attain the goals of full and free discussion and the orderly conduct of business. However, Robert's Rules of Order will be invoked when more formality is needed to serve these goals.

IX General Meetings

The chair will provide to the faculty, staff, graduate teaching associates, and undergraduate teaching assistants a schedule of department general meetings at the beginning of each academic term. The schedule will provide for at least one meeting per semester and will include a multiple-day teaching orientation prior to the start of autumn semester. These meetings will be used for professional development, community building, and brainstorming departmental policy options. A call for agenda items and completed agenda will be delivered via e-mail before a scheduled general meeting.

X Distribution of Faculty Duties and Responsibilities

The Office of Academic Affairs requires departments to have guidelines on the distribution of faculty duties and responsibilities (See the OAA Policies and Procedures Handbook, Volume 1, Chapter 2, Section 1.4.5, <http://oaa.osu.edu/handbook.html>).

During on-duty periods, faculty members are expected to be available for interaction with students, research, and departmental meetings and events even if they have no formal course assignment. On-duty faculty members should not be away from campus for extended periods of time unless on an approved leave (see section XIII) or on approved travel. The definition of on-duty is defined by Faculty Rule 3335-5-07:

Faculty members who are on duty are accountable for meeting the formal and informal obligations associated with research, service, and/or teaching or clinical practice. Duties and responsibilities are assigned annually in accordance with the workload guidelines laid out in the pattern of administration of each faculty member's tenure initiation unit and, as appropriate, regional campus.

Full-time faculty members are expected to be on duty for an average of nineteen working days a month, with working days defined as weekdays that are not designated as university holidays. Faculty members on nine-month appointments are commonly on duty for nineteen working days a month averaged over a nine-month period. The most common pattern for a nine-month on-duty period under semesters includes the autumn and spring semesters and the May session.

Breaks within a given semester, summer term, or session, as well as any days between the end of the exam period and the beginning of the next semester or session, will be considered off-duty days. Faculty on twelve-month appointments are on duty on all working days except for the days they accrue and designate as vacation days. Terms of duty for full-time associated faculty on nine- or twelve-month appointments should parallel the terms for nine- and twelve-month tenure-track faculty unless otherwise specified in their annual letter of appointment; terms for shorter-term associated faculty are specified in their annual letter of appointment.

Table POA-1 (on last page) summarizes the varying expectations for teaching, scholarship, service, and professional development for the different categories of faculty within the EED. The guidelines outlined here do not constitute a contractual obligation. Fluctuations in the demands and resources of the department and the individual circumstances of faculty members may warrant temporary deviations from these guidelines. Assignments and expectations for the upcoming year are addressed as part of the annual review by the department chair.

A full-time faculty member's primary professional commitment is to The Ohio State University and the guidelines below are based on that commitment. Faculty who have professional commitments outside of Ohio State during on-duty periods (including teaching at another institution; conducting research for an entity outside of Ohio State; external consulting; etc.) must disclose and discuss these with the chair in order to ensure that no conflict of commitment exists. Information on faculty conflicts of commitment is presented in the OAA Faculty Conflict of Commitment policy (<http://oaa.osu.edu/assets/files/documents/conflictofcommitment.pdf>).

A Tenure-track Faculty

Tenure-track faculty members are expected to contribute to the university's mission via teaching, scholarship, and service. When a faculty member's contributions decrease in one of these three areas, additional activity in one or both of the other areas is expected. In addition, ongoing professional development is encouraged and expected.

Teaching

All tenure-track faculty are expected to contribute to the department's teaching, including large enrollment and specialized courses in both the undergraduate and graduate curriculums. The standard teaching assignment for full-time tenure-track faculty members is four 3-credit hour standard courses per academic year. Faculty members are also expected to advise undergraduate and graduate students and supervise independent studies, theses, and dissertations.

Adjustments to the standard teaching assignment may be made to account for teaching a new class, the size of the class, whether the class is taught on-line or team-taught, and other factors that may affect the preparation time involved in teaching the course.

The standard teaching assignment may vary for individual faculty members based on their research and/or service activity. Faculty members who are especially active in research can be assigned an enhanced research status that includes a reduced teaching assignment. Likewise, faculty members who are relatively inactive in research can be assigned an enhanced teaching status that includes an increased teaching assignment. Faculty members who are engaged in extraordinary service activities (to the department, college, university, and in special circumstances professional organizations within the discipline) can be assigned an enhanced service assignment that includes a reduced teaching assignment.

The chair is responsible for making teaching assignments on an annual basis and may decline to approve requests for adjustments when approval of such requests is not judged to be in the best interests of the department. All faculty members must do some formal instruction and advising over the course of the academic year.

Scholarship

All tenure-track faculty members are expected to be engaged in scholarship as defined in the department's Appointments, Promotion, and Tenure Document (<http://oaa.osu.edu/governance.html>). Over a four-year rolling period, a faculty member who is actively engaged in scholarship will be expected to publish regularly in high quality peer-reviewed journals as well as in other appropriate venues, such as edited book chapters of similar quality and length as articles. Faculty engaged in basic or applied research are expected to attract external funding to support their research program.

Service

Tenure-track faculty members are expected to be engaged in service and outreach to the department, university, profession, and community. Typically this will include service on two committees within the department and two outside of the department. This pattern can be adjusted depending on the nature of the assignment (e.g., service as committee chair, service on a particularly time-intensive committee, leadership in a professional society, organizing a professional conference, leadership in an educational outreach activity, service in an administrative position within the department, college, or university).

All faculty members are expected to attend and participate in faculty meetings, recruitment activities, and other department events.

Professional Development

Faculty members are expected to be engaged in ongoing professional development to increase their own and the department's effectiveness. Typically this will include participation in one to two professional development activities per year. Professional development may involve improving one's capabilities in teaching, research, service, or professional self-management. The department's Professional Development Handbook may be referred to for more details.

Special Assignments

Information on special assignments (SAs) is presented in the Office of Academic Affairs Special Assignment Policy (<http://oaa.osu.edu/assets/files/documents/specialassignment.pdf>). The information provided below supplements these policies.

Untenured faculty will normally be provided an SA for research for one semester, during their probationary period. Reasonable efforts will be made to award SA opportunities to all other faculty members subject to the quality of faculty proposals, including their potential benefit to the department or university and the need to assure that sufficient faculty are always present to carry out department work. The department's Promotion and Tenure Committee will evaluate all SA proposals and make recommendations to the chair. The chair's recommendation to the dean regarding an SA proposal will be based on the quality of the proposal and its potential benefit to the department or university and to the faculty member as well as the ability of the department to accommodate the SA at the time requested.

B Clinical Faculty

Clinical faculty members are expected to contribute to the university's mission via teaching and service and to a lesser extent scholarship. Service expectations are similar to those for the tenure-track. Ongoing professional development is encouraged and expected.

Teaching

All clinical faculty are expected to contribute to the department's teaching in courses or instructional situations involving professional skills. The standard teaching assignment for full-time clinical faculty members is six courses per academic year.

Scholarship

All clinical faculty members are expected to be engaged in scholarship as defined in the department's Appointments, Promotion, and Tenure Document (<http://oaa.osu.edu/governance.html>). A clinical faculty member who is actively engaged in scholarship will be expected to participate in research through collaboration with tenure-track faculty and publish regularly in high quality peer-reviewed conference proceedings. Faculty engaged in basic or applied research are expected to attract internal and/or external funding to support teaching and learning within the EED. There is no requirement for graduate student support.

Service

Clinical faculty members are expected to be engaged in service and outreach to the department, university, profession, and community. Typically this will include service on two committees within the department and one outside of the department. This pattern can be adjusted depending on the nature of the assignment (e.g. service as committee chair, service on a particularly time-intensive committee, organizing a professional conference, leadership in an educational outreach activity, service in an administrative position within the department, college, or university).

All faculty members are expected to attend and participate in faculty meetings, recruitment activities, and other department events.

Professional Development

Faculty members are expected to be engaged in ongoing professional development to increase their own, and the department's, effectiveness. Typically this will include participation in one to two professional development activities per year. Professional development may involve improving one's capabilities in teaching, research, service, or professional self-management. The department's Professional Development Handbook may be referred to for more details.

C Research Faculty

Research faculty members are expected to contribute to the university's mission via research. Research expectations are similar to those for the tenure-track, albeit proportionally greater since 100% of effort for faculty members on the research track is devoted to research. Specific expectations are spelled out in the letter of offer.

All faculty are expected to attend and participate in faculty meetings, recruitment activities, and other department events.

D Associated Faculty

Associated faculty include compensated tenure-track and clinical faculty with <50% FTE, visiting faculty, senior lecturers, and lecturers. Compensated associated faculty members are expected to contribute to the university's mission via teaching or research depending on the terms of their individual appointments.

Faculty members with tenure-track or clinical titles and appointments <50% FTE will have reduced expectations based on their appointment level.

Expectations for compensated visiting faculty members will be based on the terms of their appointment and are comparable to that of tenure-track or clinical faculty members, weighted by the percentage FTE.

Lecturers are expected to contribute to the university's mission via teaching. The standard teaching assignment for full-time lecturers is eight courses per academic year.

Senior lecturers are expected to contribute to the university's mission via teaching and also be engaged in scholarship as defined in the department's Appointments, Promotion, and Tenure Document (<http://oaa.osu.edu/governance.html>). Senior lecturers are expected to be engaged in service and outreach to the department, university, profession, and community; typically this will include service on one committee within the department. Senior lecturers are expected to be engaged in ongoing professional development to increase their own, and the department's, effectiveness. Typically this will include participation in at least one professional development activity per year. Professional development may involve improving one's capabilities in teaching, research, service, or professional self-management. The department's Professional Development Handbook may be referred to for more details.

All faculty are expected to attend and participate in faculty meetings, recruitment activities, and other department events.

E Courtesy Appointments for Faculty

Faculty with appointments in other units of the University are eligible to be appointed to and hold no-salary (0% FTE courtesy) appointments in the EED. The rights and responsibilities of such faculty appointed within EED are determined by EED as set forth in this document. No-salary regular-tenure track faculty affiliation with EED carries the expectation of significant contribution to EED, equivalent to the teaching of one three credit course each year, or equivalent service in research and other scholarly activities, outreach education and international programs. In general, no-salary faculty privileges can include:

- Advising graduate students in accordance with their graduate faculty status.
- Teaching at the undergraduate and, if approved by the Graduate School, the graduate level.
- Attending and participating in faculty meetings, but without voting privileges.
- Serving on departmental committees.
- Serving on search committees.

F Parental Modification of Duties

The Department of Engineering Education strives to be a family-friendly unit in its efforts to recruit and retain high quality faculty and staff members. To this end, the department is committed to adhering to the College of Engineering's guidelines on parental modification of duties to provide its faculty with flexibility in meeting work responsibilities within the first year of childbirth/adoption. See the college pattern of administration at (<http://oaa.osu.edu/governance.html>) for details.

The faculty and staff member requesting the modification of duties for childbirth/adoption and the department chair should be creative and flexible in developing a solution that is fair to both the individual and the unit while addressing the needs of the university. Expectations must be spelled out in an MOU that is approved by the dean.

XI Course Offerings and Teaching Schedule

The department chair and/or associate chair(s) will annually develop a schedule of course offerings and teaching schedules in consultation with the faculty, both collectively and individually. While every effort will be made to accommodate the individual preferences of faculty, the department's first obligation is to offer the courses needed by students at times and in formats, including on-line instruction, most likely to meet student needs. To assure classroom availability, reasonable efforts must be made to distribute course offerings across the day and week. To meet student needs, reasonable efforts must be made to assure that course offerings match student demand and that timing conflicts with other courses students are known to take in tandem are avoided. A scheduled course that does not attract the minimum number of students required by Faculty Rule 3335-8-17 (<http://trustees.osu.edu>) will normally be cancelled and the faculty member scheduled to teach that course will be assigned to another course for that or a subsequent semester. Finally, to the extent possible, courses required in any curriculum or courses with routinely high demand will be taught by at least two faculty members across semesters of offering to assure that instructional expertise is always available for such courses.

XII Allocation of Department Resources

The chair is responsible for the fiscal and academic health of the department and for assuring that all resources—fiscal, human, and physical—are allocated in a manner that will optimize achievement of department goals.

The chair will discuss the department budget at least annually with the faculty and staff and attempt to achieve consensus regarding the use of funds across general categories. However, final decisions on budgetary matters rest with the chair.

Research space shall be allocated on the basis of research productivity including external funding and will be reallocated periodically as these faculty-specific variables change.

The allocation of office space will include considerations such as achieving proximity of faculty in subdisciplines and productivity and grouping staff functions to maximize efficiency.

The allocation of salary funds is discussed in the Appointments, Promotion and Tenure Document.

XIII Leaves and Absences

The university's policies and procedures with respect to leaves and absences are set forth in the Office of Academic Affairs Policies and Procedures Handbook (<http://oaa.osu.edu/handbook.html>) and Office of Human Resources Policies and Procedures website, www.hr.osu.edu/policy/policyhome.htm. The information provided below supplements these policies.

A Discretionary Absence

Faculty and staff are expected to complete a travel request or an Application for Leave form (<https://eleave.osu.edu>) well in advance of a planned absence (for attendance at a professional meeting or to engage in consulting) to provide time for its consideration and approval and time to assure that instructional and other commitments are covered. Discretionary absence from duty is not a right, and the chair retains the authority to disapprove a proposed absence when it will interfere with instructional or other comparable commitments. Such an occurrence is most likely when the number of absences in a particular semester is substantial. Rules of the University Faculty (<http://trustees.osu.edu/university/facultyrules>) require that the Office of Academic Affairs approve any discretionary absence longer than 10 consecutive business days (See Faculty Rule 3335-5-08) and must be requested at <https://eleave.osu.edu/>.

B Absence for Medical Reasons

When absences for medical reasons are anticipated, faculty and staff members are expected to complete an Application for Leave form as early as possible. When such absences are unexpected, the faculty member, or someone speaking for the faculty member, should let the chair know promptly so that instructional and other commitments can be managed. Faculty members are always expected to use sick leave for any absence covered by sick leave (personal illness, illness of family members, medical appointments). Sick leave is a benefit to be used—not banked. For additional details see OHR Policy 6.27, www.hr.osu.edu/policy/index.aspx.

C Unpaid Leaves of Absence

The university's policies with respect to unpaid leaves of absence and entrepreneurial leaves of absence are set forth in OHR Policy 6.45, www.hr.osu.edu/policy/index.aspx. The information provided below supplements these policies.

D Faculty Professional Leave

Information on faculty professional leaves is presented in the OAA Policy on Faculty Professional Leaves (<http://oaa.osu.edu/assets/files/documents/facultyprofessionalleaves.pdf>). The information provided below supplements these policies.

The department's Promotion and Tenure Committee will review all requests for faculty professional leave and make a recommendation to the department chair. The committee will evaluate the merit of the off-campus experience and the scheduling of such absences. Consideration should be given to the importance of the assignment and the likelihood of suitable arrangements for handling the faculty member's duties and assignments during any absence.

The chair's recommendation to the dean regarding an FPL proposal will be based on the quality of the proposal and its potential benefit to the department and to the faculty member as well as the ability of the department to accommodate the leave at the time requested.

XIV Supplemental Compensation and Paid External Consulting

Information on faculty supplemental compensation is presented in the OAA Policy on Faculty Compensation (<http://oaa.osu.edu/assets/files/documents/facultycompensation.pdf>). Information on paid external consulting is presented in the university's Policy on Faculty Paid External Consulting (<http://oaa.osu.edu/assets/files/documents/paidexternalconsulting.pdf>). The information provided below supplements these policies.

This department adheres to these policies in every respect. In particular, this department expects faculty members to carry out the duties associated with their primary appointment with the university at a high level of competence before seeking other income-enhancing opportunities. All activities providing supplemental compensation must be approved by the department chair regardless of the source of compensation. External consulting must also be approved. Approval will be contingent on the extent to which a faculty member is carrying out regular duties at an acceptable level, the extent to which the extra income activity appears likely to interfere with regular duties, and the academic value of the proposed consulting activity to the department. In addition, it is university policy that faculty may not spend more than one business day per week on supplementary compensated activities and external consulting combined.

Faculty who fail to adhere to the university's policies on these matters, including seeking approval for external consulting, will be subject to disciplinary action.

XV Financial Conflicts of Interest

Information on faculty financial conflicts of interest is presented in the university's Policy on Faculty Financial Conflict of Interest (<http://orc.osu.edu/files/2013/02/Policy-on-Faculty-Financial-Conflict-of-Interest.pdf>). A conflict of interest exists if financial interests or other opportunities for tangible personal benefit may exert a substantial and improper influence upon a faculty member or administrator's professional judgment in exercising any university duty or responsibility, including designing, conducting or reporting research.

Faculty members with external funding or otherwise required by university policy are required to file conflict of interest screening forms annually and more often if prospective new activities pose the possibility of financial conflicts of interest. Faculty who fail to file such forms or to cooperate with university officials in the avoidance or management of potential conflicts will be subject to disciplinary action.

In addition to financial conflicts of interest, faculty must disclose any conflicts of commitment that arise in relation to consulting or other work done for external entities. Further information about conflicts of commitment is included in section IX above.

XVI Grievance Procedures

Members of the department with grievances should discuss them with the chair who will review the matter as appropriate and either seek resolution or explain why resolution is not possible. Content below describes procedures for the review of specific types of complaints and grievances.

A Salary Grievances

A faculty or staff member who believes that his or her salary is inappropriately low should discuss the matter with the chair. The faculty or staff member should provide documentation to support the complaint.

Faculty or staff members who are not satisfied with the outcome of the discussion with the chair and wish to pursue the matter may be eligible to file a more formal salary appeal (the Office of Academic Affairs Policies and Procedures Handbook, <http://oaa.osu.edu/handbook.html>).

Staff members who are not satisfied with the outcome of the discussion with the chair and wish to pursue the matter should contact Consulting Services in the Office of Human Resources (www.hr.osu.edu/).

B Faculty Misconduct

Complaints alleging faculty misconduct or incompetence should follow the procedures set forth in Faculty Rule 3335-5-04, <http://trustees.osu.edu>.

C Faculty Promotion and Tenure Appeals

Promotion and tenure appeals procedures are set forth in Faculty Rule 3335-5-05, <http://trustees.osu.edu>.

D Sexual Harassment

The university's policy and procedures related to sexual harassment are set forth in OHR Policy 1.15, www.hr.osu.edu/policy/index.aspx.

E Student Complaints

Normally student complaints about courses, grades, and related matters are brought to the attention of individual faculty members. In receiving such complaints, faculty should treat students with respect regardless of the apparent merit of the complaint and provide a considered response. When students bring complaints about courses and instructors to the department chair, the chair will first ascertain whether or not the students require confidentiality. If confidentiality is not required, the chair will investigate the matter as fully and fairly as possible and provide a response to both the students and any affected faculty. If confidentiality is required, the chair will explain that it is not possible to fully investigate a complaint in such circumstances and will advise the student(s) on options to pursue without prejudice as to whether the complaint is valid or not.

Faculty complaints regarding students must always be handled strictly in accordance with university rules and policies. Faculty should seek the advice and assistance of the chair and others with appropriate knowledge of policies and procedures when problematic situations arise. In particular, evidence of academic misconduct must be brought to the attention to a departmental associate chair or designee before being brought to the Committee on Academic Misconduct (see www.oaa.osu.edu/coam/home.html and <http://senate.osu.edu/committees/COAM/COAM.html>).

F Code of Student Conduct

In accordance with the Code of Student Conduct (<http://trustees.osu.edu/rules/code-of-student-contact.html>), faculty members will report any instances of academic misconduct to the Committee of Academic Misconduct.

Table POA-1. Guidelines on annual teaching, scholarship, service, and professional development targets for the different categories of faculty within the Department of Engineering Education

	Category of Faculty		
	Tenure-Track	Clinical	Lecturer
TEACHING			
Number of standard courses *	4	6	8
SCHOLARSHIP			
Peer-reviewed journal articles	1-2	0-1	0
Peer-reviewed conference proceedings articles	1-2	1-2	0-1
Other (non peer-reviewed) scholarly publications	1-2	0-1	0-1
Graduate student advisees	2-4	0	0
Graduate committee service	1-2	0-1	0
Funding applications	2-4 (as PI or coPI) NOTE: external funding is expected	1-2 (as PI, coPI, collaborator or key personnel)	0-1 (as collaborator or key personnel)
Funding awarded	enough to support individual's research program	enough to support individual's scholarship of teaching and learning program	n.a.
SERVICE			
Departmental committees	2	2	0-1
College or University committees	1	0-1	0
Other service	1	1	0-1
PROFESSIONAL DEVELOPMENT			
Activities per year	1-2	1-2	1-2

* A standard course is defined as a 3 credit hour lecture course enrolling 30 students. The actual number of courses per year will be adjusted based on course characteristics (e.g., number of students, contact hours, TA presence, laboratory, level of course, first time preparation, honors), career stage of the faculty member (e.g., first year tenure-track faculty will be expected to teach 2 courses or sections per year during their first year, 3 courses or sections per year during their second year, and the full 4 courses or sections per year thereafter), and level of research activity. There will be a reduction in teaching load based on departmental assignments that an individual may have. The suggested course reductions for each of the faculty categories, in terms of "standard" course sections, are as follows:

- | | |
|---------------------------------|-----|
| 1) Departmental Committee chair | 0-2 |
| 2) Program Directors | 0-2 |
| 3) Associate chair(s) | 1-3 |
| 4) Department chair | 3-4 |

Appointments, Promotions, and Tenure

***Criteria and Procedures for the
Department of Engineering Education (EED)***

Current drafted version March 3, 2015

Revised version approved by EED faculty on **March 12, 2015**

***Based on <http://oaa.osu.edu/handbook.html> (viewed 12 December 2014) and
<http://trustees.osu.edu/university/facultyrules> (viewed 12 December 2014).***

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1. Preamble

This document is a supplement to the general descriptions of appointment, promotion, and tenure (APT) criteria, procedures, and documentation that are outlined in the [Rules of the University Faculty](#) and the [Office of Academic Affairs Policies and Procedures Handbook](#). It specifically elaborates details of the APT criteria, procedures, and documentation outlined Chapter 6 of the Rules of the University Faculty ([Rules of the University Faculty Concerning Faculty Appointments, Reappointments, Promotion and Tenure](#)); Chapter 7 of the Rules of the University Faculty ([Rules of the University Faculty Concerning Regular Clinical Track Faculty and Regular Research Track Faculty Appointment, Reappointment and Non-reappointment, and Promotion](#)); the Office of Academic Affairs annually updated procedural guidelines for promotion and tenure reviews (see the current Office of Academic Affairs (OAA) Policies and Procedures Handbook: Volume 3 [Promotion and Tenure Review](#)); and other policies and procedures of the college and university to which the department and its faculty are subject.

Should those rules and policies change, the department shall follow the new rules and policies until such time as it can update this document to reflect the changes. In addition, this document must be reviewed, and either reaffirmed or revised, at least every four years on appointment or reappointment of the department chair.

This document must be approved by the dean of the college and the Office of Academic Affairs before it may be implemented. It sets forth the department's mission and, in the context of that mission and the missions of the college and university, its criteria and procedures for faculty appointments, and its criteria and procedures for faculty promotion, tenure and rewards, including salary increases. In approving this document, the dean and Office of Academic Affairs accept the mission and criteria of the department and delegate to it the responsibility to apply high standards in evaluating continuing faculty and candidates for positions in relation to its mission and criteria.

The faculty and the administration are bound by the principles articulated in Faculty Rule 3335-6-01.

2. Department Mission

The Department of Engineering Education (hereinafter the **Department** or **EED**) advances the engineering profession and enables student success by developing and delivering state-of-the-art, innovative, multidisciplinary engineering courses and programs; by modeling and advocating scholarly, evidence-based teaching within the College of Engineering; and by integrating pedagogical discovery, practice, and dissemination through world-class engineering education research.

3. Definitions

3.1. Committee of the Eligible Faculty

3.1.1. Tenure-Track Faculty

The eligible faculty for new appointment reviews of tenure-track faculty consists of all tenure-track faculty whose tenure resides in the department and all clinical faculty whose primary appointment is in the department as provided by the Rules of the University Faculty. For an appointment at senior rank, a second vote is taken by the faculty members eligible to vote on the rank under consideration.

The eligible faculty for senior rank of new appointments, reappointment, promotion and tenure, and promotion reviews of tenure-track faculty consists of all tenured faculty of higher rank than the candidate whose tenure resides in the department excluding the department chair, the dean and assistant and associate deans of the college, the executive vice president and provost, and the president.

For tenure reviews of probationary professors, eligible faculty are tenured professors whose tenure resides in the department excluding the department chair, the dean and assistant and associate deans of the college, the executive vice president and provost, and the president.

3.1.2. Clinical Faculty

The eligible faculty for new appointment reviews of clinical faculty consists of all tenure-track faculty whose tenure resides in the department and all clinical faculty whose primary appointment is in the department. For an appointment at senior rank, a second vote is taken by the faculty members eligible to vote on the rank under consideration.

The eligible faculty for senior rank of new appointments, reappointment, contract renewal, and promotion of clinical faculty consists of all tenured faculty of higher rank than the candidate whose tenure resides in the department and all non-probationary clinical faculty of higher rank than the candidate whose primary appointment is in the department excluding the department chair, the dean and assistant and associate deans of the college, the executive vice president and provost, and the president.

3.1.3. Research Faculty

The eligible faculty for new appointment reviews of research faculty consists of all tenure-track faculty whose tenure resides in the department, all clinical faculty whose primary appointment is in the department, and all research faculty whose primary appointment is in the department. For an appointment at senior rank, a second vote is taken by the faculty members eligible to vote on the rank under consideration.

The eligible faculty for senior rank of new appointments, reappointment, contract renewal, and promotion reviews of research faculty consists of all tenured faculty of higher rank than the candidate whose tenure resides in the department, all non-probationary clinical faculty of higher rank than the candidate whose primary appointment is in the department, and all non-

probationary research faculty of higher rank than the candidate whose primary appointment is in the department excluding the department chair, the dean and assistant and associate deans of the college, the executive vice president and provost, and the president.

3.1.4. Conflict of Interest

A conflict of interest exists when an eligible faculty member is related to a candidate or has a comparable close interpersonal relationship, has substantive financial ties with the candidate, is dependent in some way on the candidate's services, has a close professional relationship with the candidate (dissertation advisor), or has collaborated so extensively with the candidate that an objective review of the candidate's work is not possible. Generally, faculty members who have collaborated with a candidate on at least 50% of the candidate's published work since the last promotion will be expected to withdraw from a promotion review of that candidate.

3.1.5. Minimum Composition

In the event that the department does not have at least three eligible faculty members who can undertake a review, the department chair, after consulting with the dean, will appoint additional faculty members from another department within the college.

3.2. Promotion and Tenure Committee

The department has a Promotion and Tenure Committee that assists the Committee of the Eligible Faculty in managing the personnel and promotion and tenure issues. The committee consists of a small number professors and associate professors as outlined in the department Pattern of Administration. The committee's chair and membership are appointed by the department chair. The term of service is three years, with reappointment possible.

When considering cases involving clinical faculty the Promotion and Tenure Committee may be augmented by up to two non-probationary clinical faculty members.

When considering cases involving research faculty the Promotion and Tenure Committee may be augmented by one non-probationary clinical faculty member and up to two non-probationary research faculty members.

3.3. Quorum

The quorum required to discuss and vote on all personnel decisions is two-thirds of the eligible faculty not on an approved leave of absence. A member of the eligible faculty on Special Assignment may be excluded from the count for the purposes of determining quorum only if the department chair has approved an off-campus assignment.

Faculty members who recuse themselves because of a conflict of interest are not counted when determining quorum.

3.4. Recommendation from the Committee of Eligible Faculty

In all votes taken on personnel matters only “yes” and “no” votes are counted. Abstentions are not votes. Faculty members are strongly encouraged to consider whether they are participating fully in the review process when abstaining from a vote on a personnel matter.

Absentee ballots and proxy votes are not permitted.

3.4.1. New Appointment

A positive recommendation from the Committee of Eligible Faculty for a new appointment is secured when two-thirds of the votes cast are positive.

3.4.2. Reappointment, Promotion and Tenure, Promotion, and Contract Renewal

A positive recommendation from the Committee of Eligible Faculty for reappointment, promotion and tenure, promotion, and contract renewal is secured when a simple majority of the votes cast are positive.

3.5. Scholarship of Teaching and Learning in Engineering

The scholarship of teaching and learning (SoTL) in engineering is practiced when faculty members apply the scholarly literature on student learning in their classrooms, perform experiments in the context of their own teaching, and publish the results of their studies with the larger community of engineering educators. It is "public and open to critique and evaluation; is in a form that others can build on; involves question-asking, inquiry, and investigation, particularly about student learning." (Borrego and Streveler, 2014; Streveler et al., 2007; Hutchings and Schulman, 1999).

3.6. Engineering Education Research

Engineering education research is "public, open to critique and evaluation, and involves asking questions about student learning, but also includes these unique components:

- (1) Begins with a research question focusing on the 'why' or 'how' of learning (Paulsen, 2001).
- (2) Ties the question to learning, pedagogical, or social theory and interprets the results of the research in light of theory. This allows for the research to build theory and can increase the significance of the findings.
- (3) Pays careful attention to design of the study and the methods used. This will enable the study to hold up to scrutiny by a broad audience, again creating a potential for greater impact of results." (Borrego and Streveler, 2014; Streveler et al., 2007).

4. Appointments

4.1. Criteria

The department is committed to making only faculty appointments that enhance or have strong potential to enhance the quality of the department consistent with the Department Mission.

Important considerations include the individual's record to date in teaching, scholarship, and service; the potential for professional growth in each of these areas; and the potential for interacting with colleagues and students in a way that will enhance their academic work and attract other outstanding faculty and students to the department. No offer will be extended in the event that the search process does not yield one or more candidates who would enhance the quality of the department. The search is either cancelled or continued, as appropriate to the circumstances.

4.1.1. Tenure-Track Faculty

Background: Faculty Rule 3335-6-02 and Faculty Rule 3335-6-03.

An appointee to the rank of assistant professor will have strong potential to help the department achieve its mission and to enhance its quality and reputation. Specifically, an appointee will have:

- an earned doctorate or other terminal degree in engineering or engineering education or field of study relevant to the discipline of engineering education;
- demonstrated excellence in verbal and written communication;
- a record of notable research appropriate to engineering or the engineering education discipline;
- a potential for excellence in teaching, both in the classroom and in student advising;
- a potential for excellence in scholarship, associated primarily with research that enhances the state-of-the-art in engineering education;
- a potential for leadership in service, both to the profession and to the university;
- an attitude conducive of good citizenship, including a commitment to interact with others in a professional, collegial, ethical, and constructive fashion; and
- a strong potential to achieve tenure and advance through the tenure-track faculty ranks.

Appointments at the rank of associate professor or professor will be made consistent with the criteria for promotion to those ranks, as discussed later in Sections 7.1.1 and 7.1.2, respectively. Generally, an initial appointment at one of these levels will require that the candidate has achieved higher and/or more sustained levels of accomplishment in most of the above areas, as opposed to being based primarily on potential or on number of years of experience.

4.1.2. Tenure-Track Faculty at Regional Campuses

Background: Faculty Rule 3335-6-02.

In recognition of the differing mission of the regional campuses, for regional campus faculty appointments relatively less weight will be placed on the quantity of an applicant's research compared to main campus appointments and more emphasis will be placed on teaching potential or excellence. However, candidates must be involved in recognized scholarly activity

appropriate to the discipline of engineering education. The quality of research of regional campus appointments is expected to be comparable to that of Columbus appointments. The length of probationary period for regional campus faculty is the same as that for Columbus faculty.

4.1.3. Clinical Faculty

Background: Faculty Rule 3335-7-05.

Clinical faculty members in the department will develop, enhance, and teach courses generally emphasizing engineering fundamentals or professional practice issues and incorporating practical, multidisciplinary design experiences. In addition, clinical faculty may engage in the development and delivery of instructional pedagogy transfer and consultative services for other academic units at OSU, primarily in the context of mentoring other faculty or students in such activities. They will participate in faculty governance to the extent outlined in Section 3.1 above and in the department's Pattern of Administration document. Clinical faculty members will be referred to as "Assistant Professor of Practice", "Associate Professor of Practice", or "Professor of Practice" in Engineering Education.

An appointee to the rank of assistant professor of practice will have strong potential to help the department achieve its mission and to enhance its quality and reputation, by contributing in the manner described in the previous paragraph. Specifically, an appointee will have:

- an earned doctorate or other terminal degree in engineering or engineering education or field of study relevant to the discipline of engineering education, or equivalent experience;
- demonstrated excellence in verbal and written communication;
- a record of successful professional experience and productive activities in previous employment involving professional practice, indicating advanced knowledge and capability in the appointee's area of specialization within engineering and engineering education;
- a history of involvement in professional activities appropriate to the appointee's area of specialization, and documented professional accomplishment in these activities;
- a potential for excellence in teaching courses involving professional practice in engineering and engineering education, both in the classroom and in student advising;
- a potential for excellence in scholarship, associated typically with leadership in academic program development involving professional practice in engineering education and related state-of-the-practice activities that directly engage students;
- a potential for leadership in service, both to the profession and to the university;
- an attitude conducive of good citizenship, including a commitment to interact with others in a professional, collegial, ethical, and constructive fashion; and
- a strong potential to advance through the clinical faculty ranks.

Appointments at the rank of associate professor of practice or professor of practice will be made generally consistent with the criteria for promotion to those ranks, as discussed in Section 7.1.4, but with the recognition that some of the criteria may not have been possible to meet in the case of new hires. Generally, an initial appointment at one of these levels will require that the candidate has achieved higher and/or more sustained levels of accomplishment in most of the above areas, as opposed to being based primarily on potential or on number of years of experience.

4.1.4. Clinical Faculty at Regional Campuses

Background: Faculty Rule 3335-7-05.

In recognition of the differing mission of the regional campuses, for regional campus faculty appointments relatively less weight will be placed on the quantity of an applicant's scholarship compared to main campus appointments and more emphasis will be placed on teaching potential or excellence. However, candidates must be involved in recognized scholarly activity appropriate to the discipline of engineering education. The quality of scholarship of regional campus appointments is expected to be comparable to that of Columbus appointments. The length of probationary period for regional campus faculty is the same as that for Columbus faculty.

4.1.5. Research Faculty

Background: Faculty Rule 3335-7-32.

Research faculty members in the department are expected to focus their efforts on research. They will be expected to advise graduate students, and may participate in limited educational activities such as developing and teaching courses related to their research, but are not expected and will not be required to do the latter. They will participate in faculty governance to the extent outlined in Section 3.1 above and in the department's Pattern of Administration document. Research faculty members will be referred to as "Research Assistant Professor", "Research Associate Professor", or "Research Professor" in Engineering Education.

An appointee to the rank of research assistant professor will have strong potential to help the department achieve its mission and to enhance its quality and reputation, by contributing in the manner described in the previous paragraph. Specifically, an appointee will have:

- an earned doctorate or other terminal degree in engineering or engineering education or field of study relevant to the discipline of Engineering education, or equivalent experience;
- demonstrated excellence in verbal and written communication;
- a record of notable research in the engineering education discipline;
- a potential for excellence in advising of graduate students;
- a potential for excellence in scholarship, associated primarily with research that enhances the state-of-the-art in engineering education;
- a potential for leadership in service, both to the profession and to the university;

- an attitude conducive of good citizenship, including a commitment to interact with others in a professional, collegial, ethical, and constructive fashion; and
- a strong potential to advance through the research faculty ranks.

Appointments at the rank of research associate professor or research professor will be made generally consistent with the criteria for promotion to those ranks, as discussed in Section 7.1.4, but with the recognition that some of the criteria may not have been possible to meet in the case of new hires. Generally, an initial appointment at one of these levels will require that the candidate has achieved higher and/or more sustained levels of accomplishment in most of the above areas, as opposed to being based primarily on potential or on number of years of experience.

4.1.6. Associated Faculty

Background: Faculty Rule 3335-5-19.

Associated faculty appointments may be as short as a few weeks to assist with a focused project, a semester to teach one or more courses, or for up to three years when a longer contract is useful for long-term planning and retention. With the exception of visiting faculty, associated faculty may be reappointed.

Lecturer or Senior Lecturer

An appointee to a lecturer or senior lecturer position will have strong potential to help the department achieve its mission and to enhance its quality and reputation, by contributing to teaching. In addition, an appointee to a lecturer position normally will have an advanced degree in engineering or a related field, or equivalent experience; an appointee to a senior lecturer position normally will have an earned doctorate in engineering or engineering education, or in a closely-allied discipline appropriate to the appointee's area of specialization, or relevant experience. Specifically, an appointee to either position will have:

- demonstrated excellence in verbal and written communication;
- a potential for excellence in teaching;
- a potential for excellence in scholarship of teaching and learning; and
- an attitude conducive of good citizenship, including a commitment to interact with others in a professional, collegial, ethical, and constructive fashion.

Assistant Professor, Associate Professor, Professor with FTE below 50%

Appointment at tenure-track titles is for individuals at 49% FTE or below, either compensated (1-49% FTE) or uncompensated (0% FTE). The rank of associated faculty with tenure-track titles is determined by applying the criteria for appointment of tenure-track faculty. Associated faculty members with tenure-track titles are eligible for promotion (but not tenure) and the relevant criteria are those for promotion of tenure-track faculty.

Visiting Assistant Professor, Visiting Associate Professor, Visiting Professor

Visiting faculty appointments may either be compensated or not compensated. Visiting faculty members on leave from an academic appointment at another institution are appointed at the rank held in that position. The rank at which other (non-faculty) individuals are appointed is determined by applying the criteria for appointment of tenure-track faculty. Visiting faculty members are not eligible for tenure or promotion. They may not be reappointed for more than three consecutive years at 100% FTE.

4.1.7. Courtesy Appointments for Faculty

Courtesy appointments are no-salary joint appointments for Ohio State faculty (tenure-track, clinical, research, or associated faculty) from other tenure-initiating units. Candidates for such appointments will have significant experience in engineering fundamentals and/or engineering education, and will be ready and able to engage effectively with the department's faculty in activities that help the department achieve its mission and enhance its quality and reputation. Appropriate active involvement includes research collaboration, graduate student advising, teaching some or all of a course from time to time, or a combination of these. A courtesy appointment is made at the individual's current Ohio State rank, with promotion in rank recognized.

4.2. Procedures

The department follows the Faculty Policy on Faculty Recruitment and Selection and the Policy on Faculty Appointments in the Office of Academic Affairs [Policies and Procedures Handbook](#) which provides important information on the following topics:

- Recruitment of tenure-track, clinical, research faculty, and associated faculty
- Appointments at senior rank or with prior service credit
- Hiring faculty from other institutions after April 30
- Appointment of foreign nationals
- Letters of offer

4.2.1. Tenure-Track Faculty

A national search is required to ensure a diverse pool of highly qualified candidates for all tenure-track positions. Exceptions to this policy must be approved by the College and the Office of Academic Affairs in advance. Search procedures must be consistent with the university policies set forth in the most recent update of A Guide to Effective Searches

www.hr.osu.edu/hrpubs/guidesearches.pdf).

Searches for tenure-track faculty proceed as follows:

The dean of the college provides approval for the department to commence a search process. This approval may or may not be accompanied by constraints with regard to salary, rank, and field of expertise.

The department chair appoints a search committee consisting of three or more faculty who reflect the field of expertise that is the focus of the search (if relevant) as well as other fields within the department.

The search committee:

- Includes a Diversity Advocate appointed by the department chair who is responsible for providing leadership in assuring that vigorous efforts are made to achieve a diverse pool of qualified applicants.
- Develops a search announcement for internal posting in the university Personnel Postings through the Office of Human Resources Employment Services (www.hr.osu.edu/) and external advertising, subject to the department chair's approval. The announcement will be no more specific than is necessary to accomplish the goals of the search, since an offer cannot be made that is contrary to the content of the announcement with respect to rank, field, credentials, salary. In addition, timing for the receipt of applications will be stated as a preferred date, not a precise closing date, in order to allow consideration of any applications that arrive before the conclusion of the search.
- Develops and implements a plan for external advertising and direct solicitation of nominations and applications. If there is any likelihood that the applicant pool will include qualified foreign nationals, the search committee must assure that at least one print (as opposed to on-line) advertisement appears in a location likely to be read by qualified potential applicants. The university does not grant tenure in the absence of permanent residency ("green card"), and strict U. S. Department of Labor guidelines do not permit sponsorship of foreign nationals for permanent residency unless the search process resulting in their appointment to a tenure-track position included an advertisement in a field-specific nationally circulated professional journal.
- Screens applications and letters of recommendation and presents to the full faculty a summary of those applicants (minimum of two, and usually three to five) judged worthy of interview. If the faculty agrees with this judgment, on-campus interviews are arranged by the search committee chair, assisted by the department office. If the faculty does not agree, the department chair in consultation with the faculty determines the appropriate next steps (solicit new applications, review other applications already received, cancel the search for the time being).

On-campus interviews with candidates must include opportunities for interaction with faculty groups, including the search committee; graduate and undergraduate students; the department chair; the associate dean for undergraduate education and student services; and the dean or designee. In addition, all candidates make a presentation to the faculty and graduate students on their scholarship, and teach a class. The latter could be an actual class or a mock instructional situation. All candidates interviewing for a particular position must follow the same interview format.

Following completion of on-campus interviews, the eligible faculty meet to discuss perceptions and preferences, and to vote on each candidate. The eligible faculty reports a recommendation on each candidate to the department chair.

If the offer involves senior rank, the eligible faculty members vote also on the appropriateness of the proposed rank. If the offer may involve prior service credit, the eligible faculty members vote on the appropriateness of such credit. The eligible faculty reports a recommendation on the appropriateness of the proposed rank or the appropriateness of prior service credit to the department chair.

In the event that more than one candidate achieves the level of support required to extend an offer, the department chair decides which candidate to approach first. The details of the offer, including compensation, are determined by the department chair.

Potential appointment of a foreign national who lacks permanent residency must be discussed with the Office of International Affairs. The university does not grant tenure in the absence of permanent residency status. The department will therefore be cautious in making such appointments and vigilant in assuring that the appointee seeks residency status promptly and diligently.

4.2.2. Tenure-Track Faculty at Regional Campuses

The hiring of regional campus faculty is initiated by the dean of the regional campus, since funding for such positions comes from these campuses. The regional campus faculty have the primary responsibility for determining the position description for a regional campus faculty search, but it should consult with and reach agreement on the description with the department chair. The regional campus search committee must include at least one representative from the department. Candidates are interviewed by, at a minimum, the regional campus dean, department chair, the department eligible faculty, and regional campus search committee. The regional campus may have additional requirements for the search not specified in this document.

A decision to make an offer requires agreement by the department chair and regional campus dean. Until agreement is reached, negotiations with the candidate may not begin, and the letter of offer must be signed by the department chair and the regional campus dean.

No tenure-track appointment to a regional campus faculty position in EED will be made if it would result in the total number of FTE tenure-track faculty in EED on all regional campuses exceeding 20% of the number of FTE tenure-track faculty in the department on main campus.

4.2.3. Clinical Faculty

Searches for clinical faculty generally proceed identically as for tenure-track faculty, with the exception that the candidate's presentation during the on-campus interview may be on clinical/professional practice rather than scholarship, and exceptions to a national search only requires approval by the college dean.

4.2.4. Clinical Faculty at Regional Campuses

The hiring of regional campus faculty is initiated by the dean of the regional campus, since funding for such positions comes from these campuses. The regional campus faculty have the primary responsibility for determining the position description for a regional campus faculty search, but it should consult with and reach agreement on the description with the department chair. The regional campus search committee must include at least one representative from the department. Candidates are interviewed by, at a minimum, the regional campus dean, department chair, the department eligible faculty, and regional campus search committee. The regional campus may have additional requirements for the search not specified in this document.

A decision to make an offer requires agreement by the department chair and regional campus dean. Until agreement is reached, negotiations with the candidate may not begin, and the letter of offer must be signed by the department chair and the regional campus dean.

No clinical appointment to a regional campus faculty position in EED will be made if it would result in the total number of FTE clinical faculty in EED exceeding 50% of the number of FTE faculty in the department.

4.2.5. Research Faculty

Searches for research faculty generally proceed identically as for tenure-track faculty, with the exception that during the on-campus interview the candidate is not asked to teach a class, and exceptions to a national search only requires approval by the college dean.

4.2.6. Associated Faculty

The appointment, review, and reappointment of all compensated associated faculty is decided by the department chair in consultation with the Department Leadership Team.

Appointment and reappointment of uncompensated visiting faculty may be proposed by any faculty member in the department and is decided by the department chair in consultation with the Department Leadership Team.

Compensated associated appointments are generally made for a period of one year, unless a shorter or longer period is appropriate to the circumstances. All associated appointments expire at the end of the appointment term and must be formally renewed to be continued. Visiting appointments may be made for one term of up to three years or on an annual basis for up to three consecutive years.

Lecturer and senior lecturer appointments are usually made on a semester by semester or annual basis. After the initial appointment, and if the department's curricular needs warrant it, a multiple year appointment may be offered.

4.2.7. Courtesy Appointments for Faculty

Any EED faculty member may propose a 0% FTE (courtesy) appointment for a tenure-track, clinical, research, or associated faculty member from another Ohio State department. A proposal that describes the uncompensated academic service to the department justifying the

appointment is considered at a regular faculty meeting. If the proposal is approved by the eligible faculty, the department chair extends an offer of appointment. The department chair reviews all courtesy appointments every three years to determine whether they continue to be justified, and takes recommendations for renewal or nonrenewal before the faculty for a vote at a regular meeting.

5. Annual Review Procedures

Each faculty member will be expected to prepare an **Annual Activity Report** detailing his/her professional activity over the previous calendar year. This report, accompanied by a current curriculum vitae, normally will be due in spring semester. The department chair will annually provide at least four weeks advance notice to all faculty of the exact due date of this material. The report will contain information on scholarship, teaching, service, and professional development as specified on the forms provided for this purpose. The Annual Activity Report form will follow the promotion and tenure dossier outline prepared by the Office of Academic Affairs, but will also include a planning document that includes updated annual goals for teaching, scholarship, service, and professional development. Information from the Annual Activity Report will be used in annual evaluations as noted below, and in determining salary increases (see Section 6). Supplementary information may be offered by the faculty member, or may be requested by the department chair. The Annual Activity Report and any other materials submitted by the faculty member as part of the annual review will be included in that faculty member's personnel file.

In addition to the annual review by the department chair, a review will be conducted by a subcommittee of the Promotion and Tenure Committee. This subcommittee will provide general feedback to each faculty member about their general accomplishments and progress towards promotion. The Annual Activity Report will be shared with the subcommittee, and the subcommittee will provide each faculty member with feedback, either written or by meeting with the faculty member.

5.1. Probationary Tenure-Track Faculty

Background: Faculty Rule 3335-6-03.

The department chair will prepare a written annual review for each probationary tenure-track faculty member. This review will be conducted as follows:

- in the second year of the candidate's appointment, with the advice of the entire Promotion and Tenure Committee;
- in other years in which a more elaborate formal review is not required, with the advice of a subcommittee of the Promotion and Tenure Committee consisting of at least two members selected annually at a meeting of the Promotion and Tenure Committee.

Should any annual review suggest that the faculty member's likelihood of meeting expectations for promotion and tenure is poor, the case will be presented to and reviewed by the entire Promotion and Tenure Committee, which will decide whether or not to recommend renewal of the faculty member's appointment.

The review will be based on relevant materials including the Annual Activity Report submitted by the faculty member, and normally will be given to the faculty member before the end of spring semester. The review will summarize strengths and weaknesses, contain a clear statement of the area(s) of performance needing improvement, and whenever possible suggest ways and means to bring about improved performance.

The department chair then will meet with the faculty member to discuss the review, and the faculty member will be offered an opportunity to comment on the review. If necessary, a response to the faculty member's comments will be prepared by the same person(s) who prepared the review, and a copy of this new statement will be sent to the faculty member. A copy of all summary statements and responses, if any, will be included in the faculty member's personnel file.

5.1.1. Regional Campus Tenure-Track Faculty

Annual review of the probationary faculty member is first conducted on the regional campus, with a focus on teaching and service. The review then moves to the department and proceeds as described above. In the event of divergence in performance assessment between the regional campus and the department, the department chair discusses the matter with the regional campus dean/director in an effort to clarify and reconcile the divergence, so that the faculty member receives consistent assessment and advice.

5.1.2. Fourth Year Review

The fourth year review normally will be conducted during the spring semester of the candidate's fourth year of service, and will be conducted similarly to a promotion and tenure review (see Section 7, with promotion and tenure criteria applied with respect to achievement to date and potential for achievement till the promotion and tenure review). The Promotion and Tenure Committee vote will determine whether or not to recommend renewal of the faculty member's appointment. Other than the later review in the semester, the only major difference in procedure is that external evaluation letters will not be solicited by the department for the fourth year review.

5.1.3. Exclusions and Extensions

Faculty Rule 3335-6-03 (D) provides for a total amount of time of up to three years in one-year increments to be excluded from the probationary period of a tenure-track faculty for birth or adoption of a child, personal illness, care of sick or injured person or other factors beyond a faculty member's control that significantly interferes with productivity; and for a total amount of time of up to six years in one-year increments, as an extension of the probationary period of a tenure-track faculty for less than full-time service (based on the principle that the usual probationary period represents full-time service). While an eligible individual may request an exclusion or extension at any time within the limits of the rule, the department's Promotion and Tenure Committee will consider during the annual review process whether to *recommend* that a faculty member apply for an exclusion or extension if eligible.

5.2. Tenured Faculty

The department chair will prepare a written annual review for each tenured faculty member. The review will be based on relevant materials including the Annual Activity Report submitted by the faculty member, and normally will be given to the faculty member before the end of spring semester. The review will summarize strengths and weaknesses, contain a clear statement of the area(s) of performance needing improvement, and whenever possible suggest ways and means to bring about improved performance.

The department chair will meet with the faculty member to discuss the review, and the faculty member will be offered an opportunity to comment on the review in writing. If necessary, the department chair will prepare a response to the faculty member's comments, and a copy of this new statement will be sent to the faculty member. A copy of all summary statements and responses, if any, will be included in the faculty member's personnel file.

5.3. Tenured Faculty at Regional Campuses

Annual review of the tenured faculty member is first conducted on the regional campus, with a focus on teaching and service. The review then moves to the department and proceeds as described above. In the event of divergence in performance assessment between the regional campus and the department, the department chair discusses the matter with the regional campus dean in an effort to clarify and reconcile the divergence, so that the faculty member receives consistent assessment and advice.

5.4. Clinical Faculty

The department chair will prepare a written annual review for each clinical faculty member of each rank. The review will be based on relevant materials including the Annual Activity Report submitted by the faculty member, and normally will be given to the faculty member before the end of spring semester. The review will summarize strengths and weaknesses, contain a clear statement of the area(s) of performance needing improvement, and whenever possible suggest ways and means to bring about improved performance.

The procedure will include an additional stage for the final annual review to be completed before the end of the penultimate year of the faculty member's current appointment contract. The department chair will appoint an *ad hoc* committee consisting of both clinical faculty and tenure-track faculty. The former will be selected by the department chair. The latter will be a subset of the Promotion and Tenure Committee, selected by the department chair in consultation with the Promotion and Tenure Committee chair. This committee will review the cumulative performance of the faculty member whose appointment contract term is ending and will make recommendations to the department chair regarding whether the contract should be renewed, and if so whether the faculty member should be considered for promotion to the next clinical faculty rank (in which case see Section 7).

The department chair will meet with the faculty member to discuss the review, and the faculty member will be offered an opportunity to comment on the review in writing. If necessary, the department chair will prepare a response to the faculty member's comments, and a copy of this

new statement will be sent to the faculty member. A copy of all summary statements and responses, if any, will be included in the faculty member's personnel file.

5.5. Clinical Faculty at Regional Campuses

Annual review of the clinical faculty member is first conducted on the regional campus, with a focus on teaching and service. The review then moves to the department and proceeds as described above. In the event of divergence in performance assessment between the regional campus and the department, the department chair discusses the matter with the regional campus dean in an effort to clarify and reconcile the divergence, so that the faculty member receives consistent assessment and advice.

5.6. Research Faculty

The department chair will prepare a written annual review for each research faculty member of each rank. The review will be based on relevant materials including the Annual Activity Report submitted by the faculty member, and normally will be given to the faculty member before the end of spring semester. The review will summarize strengths and weaknesses, contain a clear statement of the area(s) of performance needing improvement, and whenever possible suggest ways and means to bring about improved performance.

The procedure will include an additional stage for the final annual review to be completed before the end of the penultimate year of the faculty member's current appointment contract. The department chair will appoint an *ad hoc* committee consisting of tenure-track, clinical and research faculty. The clinical and research faculty will be selected by the department chair. The tenure-track faculty will be a subset of the Promotion and Tenure Committee, selected by the department chair in consultation with the Promotion and Tenure Committee chair. This committee will review the cumulative performance of the faculty member whose appointment contract term is ending and will make recommendations to the department chair regarding whether the contract should be renewed, and if so whether the faculty member should be considered for promotion to the next research faculty rank (in which case see Section 7).

The department chair will meet with the faculty member to discuss the review, and the faculty member will be offered an opportunity to comment on the review. If necessary, the department chair will prepare a response to the faculty member's comments, and a copy of this new statement will be sent to the faculty member. A copy of all summary statements and responses, if any, will be included in the faculty member's personnel file.

5.7. Associated Faculty

Compensated associated faculty members in their initial appointment on a one-year appointment must be reviewed before reappointment. The department chair, or designee, prepares a written evaluation and meets with the faculty member to discuss his or her performance, future plans, and goals. The department chair's recommendation on renewal or nonrenewal of the appointment is final. If the recommendation is to renew, the department chair may extend a multiple-year appointment.

Compensated associated faculty members on a multiple-year appointment are reviewed annually by the department chair, or designee. The department chair, or designee, prepares a written evaluation and meets with the faculty member to discuss his or her performance, future plans, and goals. The chair will decide whether or not to reappoint by no later than end of the penultimate year of the contract. The department chair's recommendation on reappointment is final.

6. Merit Salary Increases and Other Rewards

6.1. Criteria

A salary increase can consist of one or more of the following three components: mandatory (independent of merit), special "catch-up" or "market" salary adjustments, and merit. The procedures and criteria described below are related to the merit component of a salary increase.

The criteria for salary adjustments will be the same as those for promotion and tenure in Section 7. Salary recommendations will be based on performance during the past year and on the appropriateness of the salary level to the individual's overall record.

Faculty on leave for part or all of an academic year will be evaluated without prejudice for being on leave. If an individual is away for part of an academic year, then the evaluation of teaching will be based on any course(s) taught while present. A similar procedure will be followed for evaluation of department and university service.

6.2. Procedures

Each faculty member, even one on leave, will be asked to submit an Annual Activity Report and current curriculum vitae to the department chair, as described in Section 5. The department chair will review this material and other pertinent information and will make recommendations to the dean of the College of Engineering in accordance with procedures established by the college and university during that year. Each faculty member will receive a written salary adjustment recommendation in a timely manner before the start of classes in the autumn semester from the department chair.

6.3. Documentation

Pertinent information for salary increases includes the Annual Activity Report with any related documents provided as described in Section 5 and a current curriculum vitae submitted to the department chair by the faculty member. Supplementary information may be offered by the faculty member, or may be requested by the department chair. A faculty member who fails to submit the required documentation, or who submits documentation insufficient to permit an informed evaluation of their performance, may be denied a merit increase.

7. Promotion and Tenure and Promotion Reviews

7.1. Criteria

7.1.1. Promotion to Associate Professor With Tenure

Background: Faculty Rule 3335-6-02.

The criteria for an appointment to an assistant professor position (Section 4.1.1) involve *potential*. The criteria for promotion to associate professor with tenure involve *achievement* of a "very good" (see Section 7.3) record combined with the potential for higher and more sustained achievement. They are:

- the achievement of a very good record in teaching, both in the classroom and in student advising;
- the achievement of a very good record in scholarship, associated usually with research that enhances the state-of-the-art in engineering education and that has led to the establishment of an independent research identity and reputation;
- the achievement of a very good record of service, both to the profession and to the university;
- professional and ethical conduct consistent with the [AAUP Statement on Professional Ethics](#); and
- a strong potential to achieve higher and more sustained levels of accomplishment and thereby to advance to professor.

Research will be a critical evaluation component in the tenure and promotion process. In this research-intensive department, a faculty member with an average research record will not be granted tenure even if he/she has an excellent teaching and service record. On the other hand, teaching and service are also important criteria in the evaluation.

The candidate must show strong and sustained evidence of substantial promise for continued growth and productivity. In summary, tenure will be reserved for faculty members who have clearly demonstrated the ability and potential to become distinguished scholars and recognized leaders in engineering education, who are effective teachers in the classroom and in advising, and who provide high quality service to the university and to the community.

Section 7.3 lists the typical examples of evidence to support a case for promotion, and the methods that will be used to evaluate this evidence.

7.1.2. Promotion to Professor

Background: Faculty Rule 3335-6-02.

The criteria for promotion to professor involve *sustained* achievement combined with the attainment of *distinction* in the field. They are:

- the sustained achievement of a very good record in teaching, both in the classroom and in student advising;
- the sustained achievement of a very good record in scholarship, associated usually with research that enhances the state-of-the-art in engineering education;
- the sustained achievement of a very good record of service, both to the profession and to the university;
- professional and ethical conduct consistent with the [AAUP Statement on Professional Ethics](#); and
- a total body of high-quality work and recognition as a leader in the field of engineering education that leads to national or international distinction.

Section 7.3 lists the typical examples of evidence to support a case for promotion, and the methods that will be used to evaluate this evidence.

7.1.3. Regional Campus Faculty

Background: Faculty Rule 3335-6-07.

Expectations for regional campus faculty differ somewhat from those for faculty on the main campus. The primary mission of the regional campuses is to provide high quality undergraduate education and serve the academic needs of their communities. Therefore, the relative emphasis on teaching and service expected of regional campus faculty will typically be greater. While the department expects regional campus faculty to achieve a record of high-quality scholarship and publications, it recognizes that greater teaching and service commitments and less access to research resources for regional campus faculty require different research expectations. In general, regional campus faculty are not expected to have a research output that is as high as that for main campus faculty, but the overall quality of this research is expected to be comparable.

7.1.4. Promotion of Clinical Faculty

Background: Faculty Rule 3335-7-05.

Promotion to Associate Professor of Practice

The criteria for an appointment to an assistant professor of practice position (Section 4.1.3) involve *potential*. The criteria for promotion to associate professor of practice involve *achievement* combined with the potential for higher and more sustained achievement. They are:

- the achievement of a very good record in teaching courses involving professional practice in engineering and/or engineering education, both in the classroom and in student advising, and a potential for excellence in teaching;
- the achievement of a very good record in scholarship, associated typically with leadership in academic program development in engineering and/or engineering education and related

state-of-the-practice activities that directly engage students, and a potential for excellence in scholarship;

- the achievement of a very good record of service, both to the profession and to the university, and a potential for excellence in service;
- professional and ethical conduct consistent with the [AAUP Statement on Professional Ethics](#); and
- a strong potential to achieve higher and more sustained levels of accomplishment and thereby to advance to professor of practice.

Academic program development and effective teaching will be the most critical evaluation components in the promotion process. On the other hand, service is also an important criterion in the evaluation. The candidate must show strong and sustained evidence of substantial promise for continued growth and productivity.

Promotion to Professor of Practice

The criteria for promotion to professor of practice involve *sustained* achievement combined with the attainment of *distinction* in the field. They are:

- the sustained achievement of a very good record in teaching courses involving professional practice in engineering and/or engineering education, both in the classroom and in student advising, and a potential for excellence in teaching;
- the sustained achievement of a very good record in scholarship, associated typically with leadership in academic program development in engineering and/or engineering education and related state-of-the-practice activities that directly engage students;
- the sustained achievement of a very good record of service, both to the profession and to the university;
- professional and ethical conduct consistent with the [AAUP Statement on Professional Ethics](#); and
- a total body of high-quality work and recognition as a leader in the field that leads to national or international distinction in at least one of teaching, scholarship, or service.

Section 7.3 lists the typical examples of evidence to support a case for promotion, and the methods that will be used to evaluate this evidence.

7.1.5. Promotion of Research Faculty

Background: Faculty Rule 3335-7-32.

Promotion to Research Associate Professor

The criteria for an appointment to a research assistant professor position (Section 4.1.3) involve *potential*. The criteria for promotion to research associate professor involve *achievement* combined with the potential for higher and more sustained achievement. They are:

- the achievement of a very good record in graduate student advising, and a potential for excellence in advising;
- the achievement of a very good record in scholarship, associated primarily with research that enhances the state-of-the-art in engineering education;
- the achievement of a very good record of service, both to the profession and to the university, and a potential for excellence in service;
- professional and ethical conduct consistent with the [AAUP Statement on Professional Ethics](#); and
- strong potential to achieve higher and more sustained levels of accomplishment and thereby to advance to research professor.

Research will be a critical evaluation component in the promotion process. The candidate must show strong and sustained evidence of substantial promise for continued growth and productivity.

Promotion to Research Professor

The criteria for promotion to research professor involve *sustained* achievement combined with the attainment of *distinction* in the field. They are:

- the sustained achievement of a very good record in graduate student advising;
- the sustained achievement of a very good record in scholarship, associated primarily with research that enhances the state-of-the-art in engineering education;
- the sustained achievement of a very good record of service, both to the profession and to the university;
- professional and ethical conduct consistent with the [AAUP Statement on Professional Ethics](#); and
- a total body of high-quality work and recognition as a leader in the field that leads to national or international distinction.

Section 7.3 lists the typical examples of evidence to support a case for promotion, and the methods that will be used to evaluate this evidence.

7.1.6. Promotion of Lecturers

Promotion to Senior Lecturer

The criteria for an appointment to a lecturer position (Section 4.1.3) involve *potential*. The criteria for promotion to senior lecturer involve *achievement* combined with the potential for higher and more sustained achievement. They are:

- the achievement of a very good record in teaching courses involving professional practice in engineering and/or engineering education, both in the classroom and in student advising;

- the achievement of a very good record in the scholarship of teaching and learning;
- the achievement of a very good record of service, both to the profession and to the university;
- professional and ethical conduct consistent with the [AAUP Statement on Professional Ethics](#); and
- a strong potential to achieve higher and more sustained levels of accomplishment and thereby to advance to a higher faculty track.

Effective teaching and academic program development will be the most critical evaluation components in the promotion process. On the other hand, service is also an important criterion in the evaluation. The candidate must show strong and sustained evidence of substantial promise for continued growth and productivity.

7.2. Procedures

Background: Faculty Rule 3335-6-04 and Faculty Rule 3335-7-08.

The department's procedures for promotion and tenure and promotion reviews are fully consistent with those set forth in Faculty Rules and the Office Academic Affairs annually updated procedural guidelines for promotion and tenure reviews found in Volume 3 of the Policies and Procedures Handbook. The following sections, which state the responsibilities of each party to the review process, apply to all faculty tracks in the department.

7.2.1. Candidate Responsibilities

Candidates are responsible for submitting a complete, accurate dossier fully consistent with Office of Academic Affairs guidelines. Candidates should not sign the Office of Academic Affairs Candidate Checklist without ascertaining that they have fully met the requirements set forth in the Office of Academic Affairs core dossier outline including, but not limited to, those highlighted on the checklist.

If external evaluations are required candidates are responsible for reviewing the list of potential external evaluators developed by the department chair and the Promotion and Tenure Committee. The candidate may add no more than three additional names, but is not required to do so. The candidate may request the removal of no more than two names, providing the reasons for the request. The department chair decides whether removal is justified.

7.2.2. Promotion and Tenure Committee Responsibilities

The responsibilities of the Promotion and Tenure Committee are as follows:

- To review this document annually and to recommend proposed revisions to the faculty.
- To consider annually, in spring semester, requests from faculty members seeking a non-mandatory review in the following academic year and to decide whether it is appropriate for such a review to take place. Only professors on the committee may

consider promotion review requests to the rank of professor. A two-thirds majority of those eligible to vote on a request must vote affirmatively for the review to proceed.

- The committee bases its decision on assessment of the record as presented in the faculty member's CV and on a determination of the availability of all required documentation for a full review (student and peer evaluations of teaching). Lack of the required documentation is necessary and sufficient grounds on which to deny a non-mandatory review.
 - A tenured faculty member may only be denied a formal promotion review under Faculty Rule 3335-6-04 for one year. If the denial is based on lack of required documentation and the faculty member insists that the review go forward in the following year despite incomplete documentation, the individual should be advised that such a review is unlikely to be successful.
 - Consistent with Office of Academic Affairs policy, only faculty members who are citizens or permanent residents of the United States may be considered for non-mandatory tenure review. The committee must confirm with the department chair that an untenured faculty member seeking non-mandatory tenure review is a U.S. citizen or permanent resident (has a "green card"). Faculty members not eligible for tenure due to lack of citizenship or permanent residency are moreover not considered for promotion by this department.
 - A decision by the committee to permit a review to take place in no way commits the eligible faculty, the department chair, or any other party to the review to making a positive recommendation during the review itself.
- Annually, in late spring through early autumn semester, to provide administrative support for the promotion and tenure review process as described below.
 - **Late Spring:** Select from among its members a Procedures Oversight Designee who will serve in this role for the following year. The Procedures Oversight Designee cannot be the same individual who chairs the committee. The Procedures Oversight Designee's responsibilities are described in the Office of Academic Affairs annual procedural guidelines.
 - **Late Spring:** Suggest names of external evaluators to the department chair.
 - **Early Autumn:** Review candidates' dossiers for completeness, accuracy (including citations), and consistency with Office of Academic Affairs requirements; and work with candidates to assure that needed revisions are made in the dossier before the formal review process begins.
 - Meet with each candidate for clarification as necessary and to provide the candidate an opportunity to comment on his or her dossier. This meeting is not an occasion to debate the candidate's record.
 - Draft an analysis of the candidate's performance in teaching, scholarship and service to provide to the full eligible faculty with the dossier; and seek to clarify

any inconsistent evidence in the case, where possible. The committee neither votes on cases nor takes a position in presenting its analysis of the record.

- Revise the draft analysis of each case following the faculty meeting, to include the faculty vote and a summary of the faculty perspectives expressed during the meeting; and forward the completed written evaluation and recommendation to the department chair.
- Provide a written response, on behalf of the eligible faculty, to any candidate comments that warrant response, for inclusion in the dossier.
- Provide a written evaluation and recommendation to the department chair in the case of joint appointees whose tenure-initiating unit is another department. The full eligible faculty does not vote on these cases since the department's recommendation must be provided to the other tenure-initiating unit substantially earlier than the committee begins meeting on this department's cases.

7.2.3. Eligible Faculty Responsibilities

The responsibilities of the members of the eligible faculty are as follows:

- To review thoroughly and objectively every candidate's dossier in advance of the meeting at which the candidate's case will be discussed.
- To attend all eligible faculty meetings except when circumstances beyond one's control prevent attendance; to participate in discussion of every case; and to vote.

7.2.4. Department Chair Responsibilities

The responsibilities of the department chair are as follows:

- Where relevant, to verify the prospective candidate's residency status. Faculty members who are neither citizens nor permanent residents of the United States may not undergo a non-mandatory review for tenure, and tenure will not be awarded as the result of a mandatory review until permanent residency status is established. Faculty members not eligible for tenure due to lack of citizenship or permanent residency are moreover not considered for promotion by this department.
- **Late Spring Semester:** To solicit external evaluations from a list including names suggested by the Promotion and Tenure Committee, the chair and the candidate. (Also see External Evaluations below.)
- To make adequate copies of each candidate's dossier available in an accessible place for review by the eligible faculty at least two weeks before the meeting at which specific cases are to be discussed and voted.
- To remove any member of the eligible faculty from the review of a candidate when the member has a conflict of interest but does not voluntarily withdraw from the review.

- To attend the meetings of the eligible faculty at which promotion and tenure matters are discussed and respond to questions raised during the meeting.
- **Mid-Autumn Semester:** To provide an independent written evaluation and recommendation for each candidate, following receipt of the eligible faculty's completed evaluation and recommendation.
- To meet with the eligible faculty to explain any recommendations contrary to the recommendation of the committee.
- To inform each candidate in writing after completion of the department review process:
 - of the recommendations by the eligible faculty and department chair
 - of the availability for review of the written evaluations by the eligible faculty and department chair
 - of the opportunity to submit written comments on the above material, within ten days from receipt of the letter from the department chair, for inclusion in the dossier. The letter is accompanied by a form that the candidate returns to the department chair, indicating whether or not he or she expects to submit comments.
- To provide a written response to any candidate comments that warrants response for inclusion in the dossier.
- To forward the completed dossier to the college office by that office's deadline, except in the case of associated faculty for whom the department chair recommends against promotion. A negative recommendation by the department chair is final in such cases.
- To receive the Promotion and Tenure Committee's written evaluation and recommendation of candidates who are joint appointees from other tenure-initiating units, and to forward this material, along with the department chair's independent written evaluation and recommendation, to the department chair of the other tenure-initiating unit by the date requested.

7.2.5. Procedures for Regional Campus Faculty

Regional campus faculty are first reviewed by the regional campus faculty according to the process established on that campus and then by the regional campus dean. The regional campus review focuses on teaching and service.

The regional campus dean forwards the written evaluation and recommendation of the regional campus review to the department chair, from which point the review follows the procedures described for the Columbus campus faculty.

7.2.6. External Evaluations

External evaluations of scholarly activity and research are obtained for all promotion reviews in which scholarship must be assessed. These include all tenure-track promotion and tenure or

promotion reviews, all clinical promotion reviews, all research promotion reviews, and all adjunct faculty promotion reviews.

A minimum of five credible and useful evaluations must be obtained for tenure-track and research-track faculty. A minimum of three credible and useful evaluations must be obtained for clinical-track faculty. A credible and useful evaluation:

- Is written by a person highly qualified to judge the candidate's scholarship (or other performance, if relevant) who is not a close personal friend, research collaborator, or former academic advisor or post-doctoral mentor of the candidate. Qualifications are generally judged on the basis of the evaluator's expertise, record of accomplishments, and institutional affiliation. This department will only solicit evaluations from full professors at institutions comparable to Ohio State. In the case of an assistant professor seeking promotion to associate professor with tenure, a minority of the evaluations may come from associate professors.
- Provides sufficient analysis of the candidate's performance to add information to the review. A letter's usefulness is defined as the extent to which the letter is analytical as opposed to perfunctory. Under no circumstances will "usefulness" be defined by the perspective taken by an evaluator on the merits of the case.

Since the department cannot control who agrees to write and or the usefulness of the letters received, at least twice as many letters are sought as are required, and they are solicited no later than the end of the spring semester prior to the review year. This timing allows additional letters to be requested should fewer than five useful letters result from the first round of requests.

As described above, a list of potential evaluators is assembled by the Promotion and Tenure Committee, the department chair, and the candidate. If the evaluators suggested by the candidate meet the criteria for credibility, a letter is requested from at least one of those persons. Faculty Rule 3335-6-04 requires that no more than half the external evaluation letters in the dossier be written by persons suggested by the candidate. In the event that the person(s) suggested by the candidate do not agree to write, neither the Office of Academic Affairs nor this department requires that the dossier contain letters from evaluators suggested by the candidate.

The department follows the Office of Academic Affairs suggested format, provided at <http://oaa.osu.edu/sampledocuments.html>, for letters requesting external evaluations.

Under no circumstances may a candidate solicit external evaluations or initiate contact in any way with external evaluators for any purpose related to the promotion review. If an external evaluator should initiate contact with the candidate regarding the review, the candidate must inform the evaluator that such communication is inappropriate and report the occurrence to the department chair, who will decide what, if any, action is warranted (requesting permission from the Office of Academic Affairs to exclude that letter from the dossier). It is in the candidate's self-interest to assure that there is no ethical or procedural lapse, or the appearance of such a lapse, in the course of the review process.

All solicited external evaluation letters that are received must be included in the dossier. If concerns arise about any of the letters received, these concerns may be addressed in the department's written evaluations or brought to the attention of the Office of Academic Affairs for advice.

7.3. Documentation

Each faculty member being reviewed will complete the Office of Academic Affairs core dossier, and will make available to the Promotion and Tenure Committee copies of all publications authored or co-authored by the candidate and copies of all student evaluations of instruction for courses taught by the candidate. Other significant documents normally considered during the reviews will include external letters of evaluation, peer evaluations of teaching, and prior annual performance evaluations. Supplementary documentation may be offered by the candidate, or may be requested by the Liaison Subcommittee, the Promotion and Tenure Committee chair, or the department chair.

In each of the three major categories and in a few specific subcategories of each (outlined below), ratings of the candidate's record will be provided on a scale ranging from **poor**, through **fair, good, very good**, to **excellent**. As noted in Section 7.1.1, a record rated as very good is tantamount to meeting expectations for promotion in that category. The Promotion and Tenure Committee rarely will rate the record of a promotion candidate as poor or fair, but these ratings may be seen more frequently in annual or fourth-year reviews in situations where substantial improvement is required to meet expectations. A record rated as good means that expectations have not been met; a record rated as excellent means that expectations have been exceeded.

7.3.1. Teaching

The teaching component of the review will include summary evaluations of classroom teaching, curricular development, and advising of students.

Classroom Teaching

Evidence that will be evaluated to assess the classroom teaching sub-category of teaching will include:

- Student evaluations of instruction
- Peer observations of instruction
- Awards for teaching
- Letters (not solicited by the candidate) from former students regarding teaching effectiveness
- Letters (not solicited by the candidate) from other faculty regarding teaching effectiveness

The EED approach to teaching assessment and feedback has two components. Direct formal assessment of teaching will be conducted using the OSU student evaluation of instruction (SEI) questionnaires and the department's official peer evaluation of teaching forms. SEIs will be

used in each regular course, and at least two peer reviews of teaching (by faculty selected in consultation with the Promotion and Tenure Committee chair) will be conducted within one year before the fourth year review and any promotion and/or tenure review. These will be part of the candidate's record to be considered in such reviews. Informal feedback intended for formative purposes can be provided using the EED student evaluation of teaching questionnaires in each regular course and via informal reviews by peers. These will not be part of the candidate's record to be considered in promotion and tenure reviews unless SEIs are not available for the same course.

Each of the two peer reviewers will prepare a separate assessment. It is assumed that the person being observed will have been informed in advance when an assessment is to be conducted. A subsequent visit will be added if the candidate so requests. Classroom visits are expected during the years preceding the fourth year review, mandatory review for promotion and tenure, and review for promotion to professor. The total direct assessment, however, will be comprehensive, so that material from the range of courses taught by the candidate will be examined and evaluated. The candidate may obtain copies of peer reviews of teaching by request to the department chair's office.

Curricular Development

Evidence that will be evaluated to assess the curricular development sub-category of teaching will often include:

- Curricular and content development and innovations
- Textbook and course material development
- Pedagogical innovations
- Publications about teaching
- Awards for curricular development
- Letters (not solicited by the candidate) from other faculty regarding curricular contributions

Advising

Each faculty member is expected to perform his/her fair share of academic advising to undergraduate and graduate students, and to provide appropriate advice regarding course and program matters as well as career and graduate school choices. The primary distinguishing factor in this sub-category of teaching will be the role of the candidate in advising graduate student research leading to Ph.D. and M.S. (thesis) degrees, and (to a lesser extent) senior honors theses by undergraduates. Evidence that will be evaluated to assess the advising sub-category of teaching will often include:

- Achievements (e.g., publications and awards) of Ph.D., M.S. thesis, and senior honors thesis students advised
- Sustained progress toward the degree by Ph.D. and M.S. thesis students advised

- Service on Ph.D. dissertation and M.S. thesis committees of students who have other primary advisors
- Service as a faculty mentor in the Second-year Transformational Experience Program
- Letters (not solicited by the candidate) from other faculty regarding advising contributions

7.3.2. Scholarship

Scholarship for tenure-track and research faculty involves primarily research that advances the state-of-the-art in engineering education. Scholarship for clinical-track faculty involves active engagement in the scholarship of teaching and learning in engineering. The scholarship component of the review will include summary evaluations of quality, quantity, significance/impact, and funding.

Quality

"Quality" refers to the degree to which the candidate's scholarship represents superior intellectual achievement: the originality, novelty, and intrinsic value of scholarly contributions. Evidence that will be evaluated to assess the quality of scholarship will often include:

- Independent external evaluators' opinions of the quality of the work (when available)
- Promotion and Tenure Committee members' own opinions of the quality of the work
- Prestige (reputation and visibility), selectivity, and impact factors of publication outlets
- Patents, patent applications, and similar evidence of technological innovation
- Competitive peer-reviewed grants, contracts, and gifts for which the candidate is the PI or a critically important co-PI
- Invited presentations at other institutions
- Invitations to serve on editorial boards of prestigious journals
- Invitations to serve on editorial boards or program committees of prestigious journals or conferences
- Invitations to serve on government or professional organization policy-making panels and boards
- Special commendations and honors for the quality of scholarship, e.g., professional society Fellow designation

Because of the wide range of areas within engineering education, research papers may appear in diverse journals and proceedings. In many areas of the discipline, conference publications are rigorously reviewed and prestigious, and can be as significant as publications in premier journals. The appendix of this document (Section 11) includes a discussion of legitimate and community-recognized publishing strategies for Engineering Education faculty members.

Quantity

"Quantity" refers to the total body of scholarly results the candidate has produced and effectively disseminated to the broader community, typically through publication. Evidence that will be evaluated to assess the quantity of scholarship will include:

- Number of equivalent papers (i.e., accounting for multiple authorship and paper length) appearing in or fully accepted by top publication outlets, and that can be attributed to the candidate's research publication efforts
- Number of publications appearing in other outlets
- Number of substantial work products other than traditional publications (such as software), if applicable

The number of other publications will be considered evidence of quantity, but generally will have less weight than publications in top publication outlets. Similarly, work products that have been taken into account in hiring the candidate generally will be of less importance in quantity-of-scholarship determination than those produced later. For faculty members hired as associate professor or with years credited toward tenure, the totality of the record will be considered when assessing quantity, along with the expectation for productivity while at OSU.

Ohio State specifically asks the candidate to include in the dossier, for each publication that the candidate wishes to be considered as a serious contribution, a description of both the intellectual contribution (qualitative) and effort contribution (quantitative). The Promotion and Tenure Committee may contact non-student co-authors to confirm such descriptions, and will generally consider this information to be more authoritative than speculation about order of authorship in determining the candidate's contribution to joint work.

In some situations, non-traditional scholarly products and methods of dissemination will need to be evaluated. The candidate should provide appropriate documentation to permit adequate evaluation.

Significance/Impact

"Significance/impact" refers to the degree to which the candidate's work is fundamentally important for the field, as well as the extent to which it has been recognized, cited, adopted, and/or built upon by others. Evidence that will be evaluated to assess the significance/impact of scholarship will often include:

- Independent external evaluators' opinions of the significance/impact of the work (when available)
- Promotion and Tenure Committee members' own opinions of the significance/impact of the work
- Citations of the candidate's work by others
- Actual adoption and use of the candidate's scholarly results and techniques, or other work products, by others

Funding

As noted above, competitive peer-reviewed grants, contracts, and gifts to support scholarship (and where they are from) will be considered in evaluating the quality of the candidate's scholarly program. Such funding is also an independently important aspect of scholarship because of the expectation that tenure-track and research faculty will obtain funding to support graduate students to do research and will contribute to the financial stability of the department. Evidence that will be evaluated to assess funding of scholarship will often include:

- Grants, contracts, and gifts for which the candidate is the PI or a critically important co-PI
- Number of graduate students supported with external funding
- Total amount of external funding for the candidate's research program
- Letters (not solicited by the candidate) from collaborators, especially the PI, documenting the importance of the candidate's role in obtaining the funding and accomplishing the work for funded projects where the candidate is a co-PI

All external funding that supports students and for which the EED and/or an EED-related center gets appropriate expenditure credit will be considered equally important in rating the funding sub-category of scholarship.

7.3.3. Service

The service component of the review will include summary evaluations of internal service and external service.

Internal Service

Every faculty member is expected to contribute to the effective governance of the department, and senior faculty are expected to contribute to the effective governance of the college and university as well. Evidence that will be evaluated to assess the internal (department, college, and university) sub-category of service will often include:

- Effective involvement and active participation in assigned department, college, and university committees
- Demonstration of initiative and follow-through in identifying and helping to address specific departmental problems
- Observations made by Promotion and Tenure Committee members who have served with the candidate on committees and/or have been served by the candidate's activities

External Service

Evidence that will be evaluated to assess the external (professional and community) sub-category of service will often include:

- Professional activities such as service on conference organizing and program committees, editorships, reviewing, etc.

- Reviewing of proposals for funding agencies
- Public service related to the candidate's professional expertise
- Outreach and funding of outreach activities
- Consulting activities

8. Appeals

The [Rules of the University Faculty](#) regarding appeals will apply.

Disagreement with a negative decision is not grounds for appeal. In pursuing an appeal, the faculty member is required to document the failure of one or more parties to the review process to follow written policies and procedures.

9. Seventh Year Review

The [Rules of the University Faculty](#) regarding seventh-year review will apply.

10. Literature Cited

Borrego, M., and Streveler, R.A. (2014) Preparing engineering educators for engineering education research, Appears in A. Johri and B.M. Olds (Eds.), *Cambridge Handbook of Engineering Education Research* (pp. 457-473), New York, NY: Cambridge University Press.

Hutchings, P., and Schulman, L.S. (1999) The scholarship of teaching: New elaborations, new developments. *Change*, 31(5): 10-15.

Paulsen, M.P. (2001) The relationship between research and the scholarship of teaching. Appears in C. Kreber (Ed.), *Scholarship revisited: Perspectives of the scholarship of teaching* (Vol. 86, pp. 19-29), San Francisco, CA: Jossey-Bass.

Streveler, R.A., Borrego, M., and Smith, K.A. (2007) Moving from the 'scholarship of teaching' to 'educational research': An example from engineering. Appears in D.R. Robertson and L.B. Nilson (Eds.), *To Improve the Academy* (Vol. 25, pp. 139-149). Boston, MA: Anker.

11. Appendix A: Publication Strategies for EED Faculty

The Department of Engineering Education (EED) Appointments, Promotion, and Tenure (APT) document includes this statement regarding judgments about research quality: "Because of the wide range of applications of engineering education, research papers may appear in very diverse journals and proceedings. In addition, in many areas of the discipline, conference publications are rigorously reviewed adding to their prestige in the field."

It is, nonetheless, tempting to try to rate a candidate's publication outlets. This analysis must be based on the outlets' overall quality or significance (as opposed to the quality or significance of the candidate's papers that are published there). Below we provide guidance on how this should be done in EED.

Research faculty in most disciplines are expected to publish the results of scholarly activities in "archival" publications, i.e., "place[s] or collection[s] containing records, documents, or other materials of historical interest" [*The American Heritage Dictionary of the English Language, Third Edition*, Houghton Mifflin, 1992]. In many fields, the archival publications are academic journals and books. The obviously correct publication strategy is to publish in these outlets.

While these outlets are available in engineering education (e.g., *Journal of Engineering Education* [JEE], *International Journal of Engineering Education* [IJEE], *European Journal of Engineering Education* [EJEE], etc.) and serve as the highest form of publication, many conference proceedings are peer-reviewed, published, and archived elevating their prestige in the field. The consequence is that there is a second reasonable publication strategy for EED faculty: to publish papers in such conference proceedings in addition to publishing similar papers in journals. Indeed, sometimes publications that are originally written for major conference proceedings are then published in special issues of journals. Thus, it is not always clear whether a given paper is a journal paper or a conference proceedings paper. In the EED, faculty will list these such papers as journal publications and will not include them in their list of conference papers even if modifications of the original document were needed.

The papers submitted to most engineering education conferences are typically 8-10 camera-ready pages, not short abstracts that are commonly reviewed and/or published by conferences in many other fields. These full papers are typically subject to peer review at the abstract and draft paper stages (which may require multiple iterations) normally by two to three referees.

The most respected researchers in the field publish in certain conference proceedings, and, of course, all the top conference proceedings are searchable and retrievable on-line from digital libraries run by the professional organizations serving (e.g., American Society for Engineering Education [ASEE]). In fact, these societies are usually the main conference sponsors. Some proceedings are even archived in educational databases (e.g., proceedings from the IEEE's Annual Frontiers in Education [FIE] conference).

Why do many engineering education faculty prefer to publish papers in conference proceedings in addition to journals? There are three main reasons. First, the engineering education field is fast-moving, and the generally much shorter turn-around time of conference proceedings (submission to publication) makes for more timely publication of results. Second, an accepted

paper is the faculty member's ticket to speak (for 12-30 minutes) in front of an audience of peers, to get rapid additional turn-around on ideas, and to establish new working relationships. The opportunity to meet new people and to have this sort of personal interaction is an important factor in much engineering education research, which tends to be interdisciplinary by nature. Finally, as top journals offer on-line access through society-sponsored digital libraries, the circulation of paper subscriptions—which other scholars might routinely browse for interesting papers—is declining. In fact, some professional society journals in engineering education are now exclusively on-line, with no print versions whatsoever (e.g., *Advances in Engineering Education*). Conferences, with their opportunities for personal interaction, are thus becoming more rather than less important in terms of research visibility. We would not be surprised to see other fields move in this direction in the future, and for the same reasons.

Of course, not all engineering education faculty agree that papers published in top conference proceedings are prestigious forms of publication. There is divided opinion about what is the best strategy for publishing. However, we emphasize that the question of appropriate engineering education publication patterns was not invented here; nor was the prevailing belief that it is perfectly legitimate to focus one's publication efforts on major conference proceedings. We believe that a balance of publications is needed in engineering education.

Not all conferences, and not all journals, are of comparable quality. A given journal or conference proceedings will be evaluated as a top publication outlet using the following criteria:

1. there is a consensus among knowledgeable members of the Promotion and Tenure Committee that its overall reputation for publishing quality work is excellent;
2. acknowledged leaders in the field consistently publish in it;
3. it consistently has a documented acceptance rate that suggests only the best submitted papers pass its peer review process;
4. it is among the top publication outlets in its subarea of engineering education in terms of the journal "impact factor" as defined by the ISI Web of Knowledge (<http://www.isiwebknowledge.com>), or other "impact rating" services with credible approaches to assessing publication impact.