

WORCESTER POLYTECHNIC INSTITUTE  
October 14, 2016

To: The WPI Faculty  
From: Mark Richman  
Secretary of the Faculty

The second Faculty meeting of the 2016-2017 academic year will be held on **Friday, October 14, 2016** at 11:00 am in **Olin Hall 107**, with refreshments at 10:45.

1. Call to Order M. Richman
  - Approval of the Agenda
  - Consideration of the Consent Agenda (including Minutes from 9-8-16)
  
2. Opening Announcements M. Richman
  
3. Provost's Remarks B. Bursten
  
4. Committee Business
  - Committee on Academic Operations (CAO) S. Sturm
    - October 2016 Undergraduate Student Graduation List
  
  - Committee on Graduate Studies and Research (CGSR) M. Demetriou
    - October 2016 Graduate Student Graduation List
  
  - Committee on Governance (COG) T. Dominko
  - Committee on Financial and Administrative Policy (FAP) T. El-Korchi
    - Motion to revise the requirements for the selection of the Chair of the Fringe Benefits Committee (FBC)
  
5. Committee Reports (for Open Discussion)
  - Committee on Information Technology Policy (CITP) C. Shue
    - Planned email service transition to cloud-based Exchange Online
  
  - Committee on Appointments and Promotions (COAP) P. Hansen
    - Motion to modify the criteria for promotion to full professor
  
6. New Business
  
7. Closing Announcements
  
8. Adjourn

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**WORCESTER POLYTECHNIC INSTITUTE-  
Faculty Meeting Minutes  
September 8, 2016**

**Summary:**

1. Call to Order
2. Opening Announcements
3. President's Remarks
4. Provost's Remarks
5. Introduction of New Faculty Members
6. Committee Business: COG/CTAF
7. Committee Reports: COAP
8. Closing Announcements
9. Adjournment

**Detail:**

1. Call to Order

The first meeting of the 2016-2017 academic year was called to order at 3:15pm in OH 107 by **Prof. Richman** (ME). Prof. Richman asked that the agenda be modified by removing the Committee on Governance (COG) from a report on open meetings concerning promotions issues that he had thought were to be held jointly by both COG and COAP. The both the modified meeting agenda and the consent agenda (as distributed), including the minutes from May 10, 2016, were approved.

2. Opening Announcements

**Prof. Richman** welcomed both returning faculty members and new faculty members to the meeting. Prof. Richman briefly highlighted two to three items that each of the standing Faculty governance committees have so far identified on their 2016-2017 agendas. (See **Addendum #1** attached to these minutes.) Prof. Richman then lightheartedly discussed the personality of the campus and the ingenuity of our students.

3. President's Remarks

**President Leshin** was gratified to see such a great turnout at the meeting, and explained that she was looking forward to meeting all the new members of the WPI Community. She announced the most recent news that the Robotics Engineering Program was just recognized by ABET with its 2016 Innovation Award.

**President Leshin** gave a presentation (see **Addendum #2** attached to these minutes) that was a condensed version of an extended presentation that she will give at the town hall meeting tomorrow. She listed the following positive developments: excellent progress is being made on implementation and fundraising for the strategic plan; construction on the Foisie Innovation Studio and Messenger Hall is on schedule; our annual research expenditures are at nearly \$30M; and we have added a talented group of new faculty and staff members this year. She summarized our challenges as follows: to focus on the opportunities of the strategic plan goals; to manage an increasingly complex legal and regulatory landscape; to manage our growth; to incorporate the perspectives of our new campus community members; and to increase the diversity and inclusiveness of the campus.

**President Leshin** elaborated on our recent accomplishments with respect to WPI's undergraduate education, research and graduate education, and reputation and visibility. She also listed several developments to come this year: the launch of WPI's Research Solutions Institute; the first round of faculty cluster hiring; a new engineering track in the Institute for Project-Based Learning; an increase in undergraduate co-op participation; the launch of an e-portfolio option for our students; 100 additional off-campus project slots and four new or expanded off-campus project centers; the launch of the Center for Graduate Student Professional Development; two additional personalized on-line courses; and a formal partnership with Tsinghua University. Finally, she emphasized that all

of our current involvement in our newest educational and research efforts is a clear sign of campus-wide engagement in implementing the strategic plan.

#### 4. Provost's Remarks

**Provost Bursten** welcomed all in attendance to the new academic year. He emphasized the critical role played by all faculty and staff members in WPI's recent top 20 Princeton Review ranking among universities with the "happiest" students. He expressed his gratitude for the privilege of being the Provost at WPI, and expressed his appreciation to Prof. Richman, Prof. McNeil, Prof. Gaudette, and Prof. Dominko for working closely with him on faculty governance matters.

**Provost Bursten** announced that 16 of last year's 17 Faculty searches were successful. He thanked Prof. Comesano and Prof. Rundensteiner for serving as co-Chairs of the VPR search committee, and he thanked Prof. Billiar and Dean Ginzberg for serving as co-Chairs of the Dean of Engineering search committee. The Provost announced that 15 new faculty searches have been authorized for this year, and that a search, co-chaired by Dean Wobbe and Deborah Bockus (Assoc. Dir. Public Services), is also underway for a new University Librarian. The Provost also announced that a new search would soon be underway for a new Dean of Arts and Sciences to replace Dean Oates.

**Provost Bursten** indicated that as co-Chair (with CFO Solomon) of the academic space committee, he is focused on issues related to campus-space allocation. He announced that a new academic calendar has been approved for 2017-2018 with better alignment between the undergraduate and graduate calendars, and that an academic calendar committee will be appointed to address any future calendar issues. **Provost Bursten** explained that he would very much like to circulate this year to visit individual academic departments to listen to comments and try to answer questions that faculty members might raise.

#### 5. Introduction of New Faculty Members

The following tenured and tenure-track faculty members were introduced: Winston (Wally) Soboyejo (Dean of Engineering) by **Provost Bursten**; Prof. Douglas Petkie (Head, PH) by **Dean Oates** (A&S); Prof. Songbai Ji (BME) and Prof. Jeannine Coburn (BME) by **Prof. Rolle** (BME); Prof. Anita Mattson (CBC) by **Prof. Gericke** (Head, CBC); Prof. Robert Walls (CS) and Prof. Jacob Whitehill (CS) by **Prof. Wills** (Head, CS); Prof. Yousef Mahmoud (ECE) by **Prof. Massoud** (Head, ECE); Prof. Elizabeth Long Lingo (BUS) and Prof. Sara Saberi (BUS) by **Prof. Sarkis** (Head, BUS).

The following continuing non-tenure track faculty members, visiting faculty members, and others with teaching responsibilities were introduced: Prof. José Alvarez-Corena (CEE) by **Prof. Tao** (CEE); Prof. Ali Fallahi (CEE/Arch) by **Prof. Van Dessel** (CEE); Prof. Tian Guo (CS) by **Prof. Craig Wills** (Head, CS); Prof. Althea Danielski (HU&A), Prof. John Galante (HU&A) and Mohamed Brahimi (HU&A) by **Prof. Boudreau** (Head, HU&A); Prof. Farley Chery (IMGD), Prof. Edward Gutierrez (IMGD) and Prof. Jeffrey Kesselman (IMGD) by **Prof. Claypool** (IMGD, CS); Prof. Lucia Carichino (MA), Prof. Simone Cassani (MA), Prof. Kelum Gajamannage (MA), Prof. Patricia Medina (MA) and Prof. Xiaodan Zhou (MA) by **Prof. Capogna** (Head, MA); Prof. Daoru (Frank) Han (ME) by **Provost Bursten**; Prof. Leslie Dodson (Undergrad. Studies) and Lt. Col. Patrick O'Sullivan (AFS) by **Dean Wobbe** (Undergrad. Studies, CBC); and Cpt. Cynthia Archambeau (AFS) by **Lt. Col. O'Sullivan** (AFS).

**Prof. Richman** (SOF, ME) introduced Sarah Miles (WPI Registrar).

#### 6. Committee Business

##### Committee on Governance (COG)/Committee on Tenure and Academic Freedom (CTAF)

**Prof. Dominko** (BBT), for the Committee on Governance, and **Prof. Clark** (HU&A), for the Committee on Tenure and Academic Freedom, moved that language concerning stopping the tenure clock as currently written in the Faculty Handbook (Part Two, Section 1A on Academic Freedom and Tenure, subsection "*Stopping the Tenure Clock*") be modified as described in the materials distributed. Prof. Dominko explained that the motion clarifies that stopping the tenure clock (with proper notification) is an entitlement, rather than an outcome to be negotiated with the Provost. The modified language clarifies the timeline of procedures that should be followed to

stop the tenure clock, and it replaces “child bearing” and “child rearing” by “parenting.” Prof. Dominko also explained that an explicit provision was added to clarify that expectations for the tenure review would not be increased for those who had stopped the tenure clock during their probationary periods, and that stopping the tenure clock is simply an extension of the time before which one is considered for tenure. (See **Addendum #3** attached to these minutes).

**Dean Oates** made a friendly amendment to clarify the required timing of the notification to stop the tenure clock in the case of an adopted child. She suggested that the earliest date of notification be changed from “the date that the adoption is finalized” to “the date that the child is legally placed in the home.” The friendly amendment was accepted.

**Prof. Richman** asked for a motion to extend the meeting for ten minutes. The motion was made, seconded and **passed**.

The COG/CTAF motion **passed** as amended.

#### 7. Committee Reports

##### Committee on Appointments and Promotions (COAP)

**Prof. Hansen** (HU&A), for the Committee on Appointments and Promotions, announced that COAP will host two open meetings: the first on September 14<sup>th</sup> focusing on the criteria for promotion to full Professor; the second on September 20<sup>th</sup> focusing on the role of academic Departments in the professional development of their faculty members. Prof. Hansen briefly summarized the current draft of the modified criteria for promotion to full professor, and discussed the importance of improving the professional development available to associate professors and non tenure-track faculty members. He asked that comments and questions be directed to him or any other member of COAP by email. (See **Addendum #4** attached to these minutes.)

#### 8. Closing Announcements

**Dean Wobbe** announced, on behalf of the Major and Mission strategic planning committee, that workshop on using reflections to deepen learning would be held between A- and B-terms. Registration for the workshop is now open and she encouraged all those interested to participate.

**Prof. Rolle** (BME) introduced Petra Kluger who is visiting WPI from Reutlingen University and Fraunhofer IGB in Stuttgart, Germany.

**Prof. Richman** encouraged all in attendance to include Faculty meetings as part of their monthly routines. He also urged everyone to enjoy the reception hosted by President Leshin immediately following this meeting.

#### 9. Adjournment

The meeting adjourned at 4:53pm.

Respectfully submitted,

Mark Richman  
Secretary of the Faculty

#### **Addenda on file with these minutes:**

**Addendum #1 - Brief Summary of Governance Committee Agendas - Sept 8 2016**

**Addendum #2 - President Leshin’s Remarks – Sept 8 2016**

**Addendum #3 - COG/CTAF Motion to Modify Procedures for Stopping the Tenure-Clock – Sept 8 2016**

**Addendum #4 - COAP Report on Open Meetings on Promotions Issues - Sept 8 2016**

**Date:** October 14, 2016

**To:** WPI Faculty

**From:** Committee on Academic Operations (Prof. Sturm, Chair)

**Re:** Motion to approve the October 2016 undergraduate student graduation list

**Motion:** The Office of the Registrar reports that the following candidates have, as of October 4, 2016, completed all of the requirements for the degree designated in the department or program indicated and are eligible to receive that degree. Therefore, as Chair of the Committee on Academic Operations, I move that these students be approved for October 7, 2016 graduation.

### **Bachelor of Science**

**Biochemistry:**

Angela Maria Jimenez

**Biology and Biotechnology:**

Katherina Ainaz FathiBitaraf

Sunny Sang Huynh Nguyen\*

Minor: Bioinformatics & Comp Bio

**Biomedical Engineering:**

Collette Bora\*\*

Minor: Biology

**Chemistry:**

Benjamin Carleton Hawks

**Civil Engineering:**

Christopher Dobens

**Computer Science:**

Philipp Henry Baumann III

Barry D. Bilech

Youwei Hu

*Double Major*

Artian Kica

Sean MacEachern

Duc Minh Pham

Xiaosong Wen\*

**Electrical & Computer Engineering:**

Alexander Ronald Dymek

Robert Howard Fleming

Brian William Harvey

Adam Victor Karcs

David Patrick LaPlante\*\*

Ryan Patrick McQuaid

Steven Thomas Murdy

**Environmental Engineering:**

Michael Bowen

**Industrial Engineering:**

Mohamad Ahmad Alblaihess\*

Minor: Business

**Interactive Media & Game Development:**

Samuel Selig Wallach

**Management Engineering:**

Jacob Tyler Arnold

Concentration: Operations Management

Hayden James Collins

Concentration: Mechanical Engineering

**Mathematical Sciences:**

Youwei Hu

*Double Major*

**Mechanical Engineering:**

Christina Joyce Bottom

Nicholas Burnell

Jessica L. Faust\*

Joshua Francis Fuller

Concentration: Thermal-Fluid  
Engineering

Minor: Aerospace Engineering

Roger Marc Gelin

Korapat Lamsam

Tiago Augusto Olijnik\*

**Physics:**

Brian Alexander Scholwin

**Robotics Engineering:**

Connor Flanigan

Brian Matthew Flynn

Michelle Gagnon

William Manning

\* with distinction

\*\* with high distinction

**Date:** October 14, 2016

**To:** WPI Faculty

**From:** Committee on Graduate Studies and Research (Prof. Demetriou, Chair)

**Re:** Motion to approve the October 2016 graduate student graduation list

**Motion:** The Office of the Registrar reports that the following candidates have, as of October 4, 2016, completed all of the requirements for the degree designated in the department or program indicated and are eligible to receive that degree. Therefore, as Chair of the Committee on Graduate Studies and Research, I move that these students be approved for October 7, 2016 graduation.

**Doctor of Philosophy**

**Electrical & Computer Engineering:**

Bengi AYGUN

**Manufacturing Engineering:**

Khalid Mohammed Alzahrani

**Materials Science and Engineering:**

Inigo Anza

**Mathematical Sciences:**

Yiqing Li

**Mechanical Engineering:**

Farhad Khosravi

Gang Li

**Physics:**

Goker Arpag

**Master of Business Administration**

Ryan J. Adams

Salah Awad Baqhum

Brian Matthew Carey

Brian William Cataldo

Charles Edward Climer, Jr.

John Francis Dinand, Jr.

Marc F. Dinino

Joseph Maurice Donohue

Anthony Lee Dragich

Allison Kenya Elmer

James Leonard Garvin

Hardik Kohli

David R. Ledoux

**Master of Business Administration (cont.)**

Jonathan Charles Legare

Safi Mansoor

Anna Marie Nash

Emma Rose Palmacci, PhD

Matthew D. Rand

Mohana R. Sethuraman

Matthew J. Twerdy

Andis Vildavs

Christopher Pak Villalta

Timothy Matthew Watts

Daniel Leonard Zuber

**Master of Engineering**

**Biomedical Engineering:**

Kayla Patricia Manzi

Kimberly Joy Ornell

Luke Roger Perreault

**Electrical & Computer Engineering:**

Michael Curtis Bach

Eric Yexing Huang

**Power Systems Engineering:**

Thomas Michael Brown

Evan Benjamin Goldberg

Tyler Lewis Harvey

Angela Marie Marsh-Soderman

Pablo Manuel Rosenfeld

Rebecca Lynn Rancour Sibberson

Keith Michael Suravich

Juny Thomas

Robert Yan Wang



**Master of Mathematics for Educators**

Sarah Rose Rieder  
Roberta Tremblay Russo

**Master of Science****Aerospace Engineering:**

Jonas Saggese Banhos

**Biomedical Engineering:**

Luciano Pablo Bortolin

**Chemistry:**

Xiaomeng Liang

**Civil Engineering:**

Jose Adan Cueva  
Milad Zabeti Targhi

**Computer Science:**

Ryan Anthony Danas  
James Michael Forkey  
Rafi H. Hayne  
Antonio Rafael Vinaviles Umali

**Data Science:**

Qijie Pan

**Electrical & Computer Engineering:**

Adam Kenneth Benedict  
William Joseph Breen, Jr.  
Daniel Tice Jones  
Don Vann Keuth  
Ziyong Liu  
Junqing Qiao  
John Fredrik Scimone  
Michael George Tencza  
Mason Philip Tremblay

**Environmental Engineering:**

Eilish Christine Corey  
Tatyana Dudiac  
Xiaodi Pan  
Veronica C. Rojas Scheffer

**Fire Protection Engineering:**

Victoria Alecia Grimes  
Justin Scott Leany  
Laura Elizabeth Montville  
Samim Safaei Boroojeny  
Mariah Rose Seaboldt  
Jennifer Ellen Shepherd  
Kristina Zichelli

**Information Technology:**

Christopher James Chagnon  
William George Grudzinski, Jr.  
Thomas Joseph Plasse  
Sayan Sengupta  
Manjiri Madan Virkar  
Ruicheng Xu

**Management:**

Maryam Mumtaz Abdullah  
Shuo Zhang

**Manufacturing Engineering:**

Zhaolong Zhang

**Marketing & Technological Innovation:**

Geyang Li  
Jinlian Lin

**Materials Process Engineering:**

Heidi Lennon

**Materials Science and Engineering:**

Christopher Michael Collins, Jr.  
Qinjun Gu  
David Agersea Rich  
Shuxin Zheng

**Mechanical Engineering:**

Robert Joseph Aguece  
Gillian N. Allsup  
Shivaprasad Arava  
Timothy John Fekete, Jr.  
Jason P. Ferrante  
Frances Julian Gonzalez  
Fernando Jose Gonzalez Navarro  
Corey Lewis

**Mechanical Engineering (cont.):**

Miguel Angel Lopez  
Matt Malfa  
Jeffrey Edward Matthews

**Physics for Educators:**

Richard Paul Doherty II

**Physics:**

Eric James Reich

**Power Systems Management:**

Arianna Baret Peralta  
David Frederick Hughes III  
Ledum Edward Nordee  
Justin Patrick Preece  
Kojo Asante Sefah

**System Dynamics:**

Zahir Russ Balaporia  
Thomas Wittig

**Systems Engineering:**

Lucine Victoria Bahtiarian  
Jonathan Paul Blanchard  
John Paul Kruszewski  
Jack T. Morgan  
Trupti Vasant Patel  
Anne Nadler Schmidt  
Carolyn S. Westmark  
Kevin Zacchera

**Date:** October 14, 2016  
**To:** WPI Faculty  
**From:** Committee on Governance (Prof. Dominko, Chair)  
Committee on Financial and Administrative Policy (Prof. El-Korchi, Chair)  
**Re:** Motion to revise the requirements for the selection of the Chair of the Fringe Benefits Committee

**Motion:** The Committee on Governance (COG) and the Committee on Financial and Administrative Policy (FAP) recommend and I move that the current language describing the Fringe Benefits Committee's membership, be revised (in Part Two, Section 3, Subsection F of the Faculty Handbook) as delineated below.

**Details of the motion:**

Proposed Description of the Fringe Benefits Committee (with the single word in bold ~~striketthrough~~ to be deleted):

*F. The Fringe Benefits Committee*

The Fringe Benefits (FBC) is responsible for reviewing and proposing changes to the WPI fringe benefits offerings with special attention paid to the evaluation and recommendation of health care plans and health insurance providers, tuition benefits, disability plans, and retirement policies.

Recommendations from the FBC are passed to the Committee on Administrative and Financial Policy (FAP). In those instances when FAP does not accept FBC's recommendations, the two committees should meet in an attempt to resolve their differences.

The FBC consists of a Chair to be selected from FAP from among its ~~elected~~ faculty members, two members of the Faculty selected by the Committee on Governance (COG), and two additional members of the Faculty selected by FAP. Faculty members of the FBC (other than the Chair) will serve three-year staggered terms. Current faculty members who have not completed three years of service will continue on FBC.

Although formally the FBC is constituted as above, operationally it invites two continuing non-tenure-track faculty members (continuing NTTs), and five members of the WPI staff to join its deliberations and to vote on matters related to benefits that are of equal concern to WPI Faculty, continuing NTTs, and staff. One continuing NTT is selected by COG and the other is selected by FAP. Each continuing NTT serves a three-year term. The five members of the WPI staff are chosen by the V.P. of Human Resources to serve three-year staggered terms.

Either the V.P. of Human Resources or the Benefits Administrator serves as the liaison between the FBC and the Department of Human Resources. The liaison provides information requested by the FBC to conduct its deliberations in an informed manner. Neither the V.P. of Human Resources nor the Benefits Administrator should serve as one of the five invited voting WPI staff members.

**Rationale:**

In April 2016, the Faculty approved a motion to expand FAP's membership by adding a faculty member appointed by the Committee on Governance (COG). The purpose of that change was to provide a more flexible and reasonable distribution of concurrent leadership roles that fall to the various FAP faculty members. In addition to a faculty member serving as Chair of FAP, FAP appoints one of its faculty members to serve as the Chair of the Fringe Benefits Committee (FBC), and another to serve on the Retirement Planning Committee (RPC). It would undermine the purpose of the expansion of FAP's membership made last April to unnecessarily constrain the roles that FAP faculty members (whether they are elected by the Faculty or appointed by COG) are permitted to assume.

Note: This item is for discussion only.

**Date:** October 14, 2016

**To:** WPI Faculty

**From:** Committee on Appointments and Promotions (Prof. Hansen, Chair)

**Re:** Motion to modify the criteria for promotion to full professor

**Motion:** The Committee on Appointments and Promotions recommends and I move that the current “**Promotion: Criteria for Promotion in Academic Rank**” in the Faculty Handbook (Part Two, Section 1.D, page 2-7) be replaced by the following:

## **D. Promotion**

### **D. 1 Promotion in Academic Rank**

The principal reason for establishing academic ranks is to recognize various levels of contribution and to encourage the continued professional growth of individual faculty members. It is recognized that the faculty consists of members with diverse and often unique capabilities which lead to contributions that advance the scholarly community as well as the institution but cannot be measured against rigid and narrow criteria.

#### **D.1.1 The Criteria for Promotion**

The candidate for promotion to associate professor should have demonstrated high quality teaching and high quality scholarship/creativity as well as the promise for continued high quality performance in these areas. Evidence of service at an appropriate level is expected.

The candidate for promotion to full professor should demonstrate continuing high quality teaching and high quality scholarship/creativity as well as a record of scholarly contributions that demonstrates a positive external impact beyond WPI as appropriate to the candidate’s area of expertise. Evidence of significant service is expected.

The specific standards to assess performance in teaching, scholarship, and service for promotion to full professor are similar to those for promotion to associate professor, with the added expectation of significant service and scholarly contributions that demonstrate a positive external impact beyond WPI. Scholarly contributions may be in any area of the scholarship of discovery, scholarship of integration, scholarship of application and practice, scholarship of teaching and learning, or the scholarship of engagement. In every case, the high quality and positive external impact of these scholarly contributions must be recognized by peers within WPI and by knowledgeable people external to WPI. While it is expected that these criteria describe the great majority of cases, there may be exceptional candidates whose unique contributions, while not conforming to these guidelines, are deserving of promotion.

#### **D.1.2 Definition of Scholarship**

To recognize to the full range of scholarly contributions by faculty, WPI endorses a broad definition of scholarship. Scholarship exists in a continuum across diverse forms of knowledge and knowledge-making practices. Scholarship may be pursued through original research, looking for connections between disciplines, building bridges between theory and practice, communicating knowledge effectively to students and peers, or in reciprocal partnerships with broader communities. Candidates for promotion may make scholarly contributions to any area of the scholarship of discovery, the scholarship of

integration, the scholarship of application and practice, the scholarship of teaching and learning, or the scholarship of engagement.

The common characteristics for any scholarly form to be considered scholarship are: it must be public, amenable to critical appraisal, and in a form that permits exchange and use by other members of the scholarly community. The descriptions of five categories of scholarship on this continuum indicate the scope of each domain, but they are not intended to be exclusive or exhaustive. The forms that scholarship take along this continuum will vary by discipline, department or academic division.

### **Scholarship of Discovery**

The creation or discovery of new knowledge involves creative and critical thought, research skills, the rigorous testing of researchable questions suggested by theory and practice, or active experimentation and exploration with the goal of adding to knowledge in a substantive way. The scholarship of discovery is usually demonstrated through publication in peer-reviewed journals and books, presentations at disciplinary conferences, inventions and patents, or original creation in writing or multimedia, artistic works, or new technologies.

### **Scholarship of Integration**

The scholarship of integration includes the critical evaluation, synthesis, analysis, integration, or interpretation of the research or creative work produced by others. It may be disciplinary, interdisciplinary, or multidisciplinary in nature. When disciplinary and interdisciplinary knowledge is synthesized, interpreted, and connected, this integrative scholarly contribution brings new insight. Integrative or interdisciplinary work might include policy papers, reflective essays, research translations, popular publications, synthesis of the literature on a topic, and textbooks. The scholarship of integration may be shared through any form such as those typical of discovery, application, teaching, or engagement.

### **Scholarship of Application and Practice**

Scholarship of application involves the use of a scholar's disciplinary knowledge to address important individual, institutional, and societal problems. The scholarship of application and practice might apply the knowledge, techniques, or technologies of the arts and sciences, business or engineering to the benefit of individuals and groups. This may include translational research, commercialization, start-ups, technology transfer, assistive technologies, learning technologies, or applied research supported by industrial or corporate partners or by government agencies. Contributions to the scholarship of application and practice are shared with stakeholders and open to review and critique by stakeholders and by peers.

### **Scholarship of Teaching and Learning**

The scholarship of teaching and learning is the development and improvement of pedagogical practices that are shared with others. Effective teachers engage in scholarly teaching activity if they undertake assessment and evaluation to promote improvement in their own teaching and in student learning. Scholarly teaching activity becomes the scholarship of teaching and learning when faculty members make their teaching public, so that it can be reviewed, critiqued and built on by others, through publications, presentations or other forms of dissemination.

### **Scholarship of Engagement**

The scholarship of engagement involves collaborative partnerships with communities (local, regional, state, national, or global) for the mutually beneficial exchange of knowledge and resources. Examples of the scholarship of engagement might include, but are not limited to: community-based programs that enhance WPI's curriculum, teaching and learning; educational or public outreach programs; other partnerships with communities beyond the campus to address critical societal issues, prepare educated

citizens, or contribute to the common good. Contributions in the scholarship of engagement are of benefit to the external community, visible and shared with stakeholders, and open to review and critique by community stakeholders and by peers.

### **D.1.3 Criteria for Evaluation of Scholarly Contributions: Quality, Impact and Peer Review**

The contributions by the candidate for promotion will be evaluated by peers according to the following shared standards and criteria—high quality and external impact.

The high quality and external impact of the candidate's scholarly contributions must be recognized by peers within WPI and by knowledgeable people external to WPI. Positive external impact beyond WPI defines the standard by which to judge when high quality scholarly contributions reach a threshold that merits promotion to full professor. Contributions to any area across the continuum of scholarship are valued equally by WPI.

All scholarly contributions will be evaluated by peers who are experts in—and therefore appropriate evaluators of—the area(s) of scholarship and impact. Where appropriate, peer reviewers may include experts whose institutional affiliation is beyond the academy if they are well-placed to testify to or evaluate the quality and external impact of the candidate's scholarly contributions.

### **D.1.4 Documentation and Evidence for Promotion**

The candidate for promotion to full Professor will submit a portfolio representative of their overall career, with an emphasis on work since tenure and/or promotion to Associate Professor. A continuum of scholarship necessarily implies that the scholarly contributions of an individual faculty member may combine or cut across traditional categories of teaching, scholarship and service in ways that are unique to each particular case. Nevertheless, the documentation submitted for evaluation by the candidate for promotion should provide evidence in each of the following areas:

1. High quality teaching is an essential (but not sufficient) requirement for promotion. The candidate must demonstrate continuing high quality contributions in teaching. Evidence of high quality teaching may include some or all of the following: student and alumni evaluations of courses and projects; faculty peer evaluations; the quality of the Major Qualifying Projects, Interactive Qualifying Projects, and the Humanities Inquiry Seminar or Practicum; academic advising, mentoring and first-year student advising; graduate theses and dissertations supervised by the candidate; mentoring of graduate students; K-12 outreach and educational programs; textbook authorship; teaching innovations and curriculum development; designing, implementing, assessing, and disseminating innovative instructional methods and materials; corporate and professional education; project center directorship; leadership of academic departments, programs, and teaching centers; community engagement.
2. High quality scholarship/creativity is an essential (but not sufficient) requirement for promotion. The candidate must demonstrate continuing high quality contributions in scholarship and/or creativity. Evidence of high quality scholarship/creativity may include some or all of the following: peer-reviewed publications such as journal articles, conference papers, and/or book chapters; books; presentations at professional meetings; artistic exhibitions, performances or productions; professional awards; citations in the professional literature; grant proposals and grant funding awarded; offices held in professional societies; journal editorships; reviews of papers, proposals and books; consulting; invention and innovation; patents; leadership of research centers and labs; community engagement.

3. Significant service is an essential (but not sufficient) requirement for promotion. The candidate's activities must demonstrate significant contributions in service as evidenced by some or all of the following: service to WPI (e.g. faculty governance and ad-hoc committees, assistance to administrative offices); service to departments or programs (curriculum committees, MQP area coordinators, faculty recruitment, seminar series participation and coordination); service to the profession (participation in national and international committees and panels, in chapters of professional societies, in conference organization); and service to the community (board and committee membership in social or cultural institutions, local or national government participation).
4. External impact beyond WPI is an essential (but not sufficient) requirement for promotion. The candidate must demonstrate an external impact beyond WPI as appropriate to the candidate's area of expertise. External impact may be evidenced by some or all of the following: quantitative and qualitative measures from external and internal sources; citations or reviews; keynote addresses; offering workshops for other institutions or national and international societies; adoption of teaching materials or practices at other institutions; impact on communities through teaching, scholarship or service; dissemination or circulation of scholarship in the media; recognition by professional or civic associations; influence on policy formulation.

Though the documentation for the promotion review is categorized in terms of teaching, scholarship/creativity, service, and impact, the candidate is invited and encouraged to make arguments for the high quality and impact of their work in other ways if those other ways are more appropriate to the form and purposes of their scholarly contributions; alternative ways to demonstrate high quality and impact will not be viewed as inferior strategies but will be judged on their own merit.

[End of Motion]

**Rationale:**

This motion is one of several to be developed in response to the [Report of the Task Force on Academic Promotion](#). Changes to nomination procedures and related matters will be proposed separately. The existing criteria for promotion (attached) require high quality teaching and high quality scholarship/creativity, demonstrated leadership in one of those areas, and "some appropriate degree in activities of service to WPI."

To provide improved clarity for the criteria for promotion to full professor, this proposal:

- 1) reasserts the dual importance of high quality **teaching** and high quality **scholarship/creativity** to the WPI mission
- 2) elevates **significant service** as an essential but not sufficient requirement for promotion
- 3) redefines leadership as scholarly contributions with an **external impact beyond WPI**
- 4) **broadens** the definition of **scholarly contributions** to include the scholarship of *discovery, integration, application and practice, engagement, or teaching and learning*.
- 5) affirms that "**exceptional candidates** whose unique contributions, while not conforming to these guidelines, are deserving of promotion."

This proposal requires that tenured faculty continue to demonstrate high quality teaching *and* high quality scholarship for promotion because they are each essential elements in the mission of WPI:

*WPI educates talented men and women in engineering, science, management, and humanities in preparation for careers of professional practice, civic contribution, and leadership, facilitated by active lifelong learning. This educational process is true to the founders' directive to create, to discover, and to convey knowledge at the frontiers of academic inquiry for the betterment of society. Knowledge is created and discovered in the scholarly activities of faculty and students ranging across educational methodology, professional practice, and basic research. Knowledge is conveyed through scholarly publication and instruction.*

The tenured members of the Faculty are uniquely expected to make contributions to all areas of teaching, scholarship, and service. Without continuing scholarly contributions from the tenured faculty, WPI cannot fulfill its mission to educate men and women and to create, discover and convey knowledge for the public good. WPI does not award tenure and promotion to associate professor for high quality contributions in one area only. Likewise, WPI does not award promotion to full professor without continuing contributions of high quality in both teaching and scholarship/creativity. This longstanding commitment to excellence in teaching and scholarship is one of WPI's greatest strengths and most precious assets. The Faculty's commitment to high quality teaching *and* to high quality scholarship is responsible for WPI's recent recognition as the best school in the nation for combining scholarly research with classroom instruction.

This proposal requires that candidates for full professor demonstrate "significant service." This is a change from the Task Force recommendation that outstanding accomplishments in service could be equated with those in teaching and scholarship and define leadership for promotion to full professor. That option was discussed at the Faculty Meeting, January 2016, and feedback from the meeting strongly opposed to taking that step. Service remains a critical responsibility of the tenured faculty, and "significant service" represents an appropriate expectation of those to whom much has been given and a substantial improvement over the current criteria. Broadening the definition of scholarship to encompass the broader continuum of knowledge is a much more effective means for scholarly contributions that are slighted or denigrated as service, but respected and rewarded as scholarship, to be made visible and recognized as providing the basis for promotion.

"External impact beyond WPI" defines the standard by which to judge when high quality scholarly contributions reach a threshold that merits promotion to full professor. In the past, leadership in teaching or scholarship has been unclear, especially for someone putting forward a case for promotion based on leadership in teaching. Excellent teaching by itself does not indicate leadership without demonstrating external dissemination and impact. Teaching and learning is a well-developed area of scholarship, and its external impact can be assessed by peers within WPI and knowledgeable people external to WPI, like any other area of scholarship. External impact beyond WPI is specific enough to motivate faculty to make contributions that extend beyond our campus and flexible enough to accommodate a variety scholarly contributions.

Scholarship is defined as multiple areas along a continuum in order to recognize and reward the variety of scholarly contributions made by faculty. Scholarly contributions may be recognized in any area of the scholarship of discovery, scholarship of integration, scholarship of application and practice, the scholarship of teaching and learning, and scholarship of engagement. These broader categories of faculty work have been the subject of wide-ranging discussion nationwide for the last 25 years. WPI has been a national and international leader in several of these domains without using these terms in our own criteria for promotion. By reconsidering scholarship from this perspective, scholarly contributions may be understood as combining or cutting across the traditional categories of teaching, scholarship and service. The candidate would define the area(s) of their scholarly contributions in order to demonstrate that they have had an external impact.

The broadening of this definition of scholarship, especially the inclusion of the scholarship of engagement and the scholarship of teaching and learning, is a bold and significant change by WPI that



provides multiple pathways to professor, especially for women faculty. As COAP noted in its presentation to the Faculty last January, WPI has a problem promoting women to full professor. Several studies of promotion suggest that women are more likely to be promoted to full professor when the criteria for promotion are explicitly broadened to include teaching as well as scholarship or to include multiple forms of scholarship as areas for scholarly contributions.

By requiring high quality teaching and high quality scholarship/creativity, significant service, and an impact beyond WPI within multiple areas across the broader continuum of scholarship, the proposed criteria provide flexibility and multiple paths for promotion. Recognizing the breadth of faculty contributions to WPI *and* the expectation of an impact beyond WPI are equally important if the university is to achieve its aspiration to elevate its stature, enhance its reputation, and be recognized the world's leading global polytechnic.

## **Criteria for Promotion in Academic Rank** (Faculty Handbook, Part Two, Section 1.D, page 2-7)

The principal reason for establishing academic ranks is to recognize different levels of contribution and to encourage the continued growth of faculty members. It is recognized that the faculty consists of members with diverse and often unique capabilities which lead to contributions which cannot be measured against rigid and narrow criteria. Nevertheless, the usual expectations can be stated in terms of disciplinary or interdisciplinary accomplishments in teaching, scholarship and/or creativity, and service.

The candidate for promotion to assistant professor should have demonstrated effectiveness in teaching and have made a beginning in scholarship/creativity

The candidate for promotion to associate professor should have exhibited growth in teaching and have made some significant contributions in the area of scholarship/creativity.

The candidate for promotion to professor should have recent accomplishments of high quality in both teaching and scholarship/creativity and should have demonstrated leadership in one of these areas. This leadership must be recognized by peers within WPI and by knowledgeable people outside WPI.

In addition, all candidates for promotion should have participated to some appropriate degree in activities of service to WPI.

While these criteria serve as general guidelines, outstanding candidates should not be deprived of promotion because of the uniqueness of their contribution.

To clarify the above criteria, the usual interpretations of teaching, scholarship and/or creativity, and service are included below:

Teaching includes the conduct of courses; the direction of projects and independent studies; and academic advising. In evaluating teaching qualifications, the Committee on Appointments and Promotions will consider innovations in teaching and adaptability to the needs of WPI, effectiveness as measured by students, alumni, and colleagues, and the candidate's overall impact and importance in WPI academic programs.

Scholarship and/or creativity can take many forms. It may be demonstrated, for example, by publications in respected research or scholarly journals, by non-routine presentations at meetings of professional or scholarly societies or at seminars at other colleges, or by authorship of well-regarded textbooks or monographs. Creativity may be shown, for example, by applying knowledge as a consultant or inventor, and through artistic publications, exhibitions, or productions. In evaluating this activity, the Committee will consider how it is regarded by knowledgeable peers.

Service may include, for example, active participation in Faculty or departmental governance, involvement in student affairs, officer or committee work in professional societies, and industrial or government liaison leading to support of WPI. Although not entirely separable from teaching or scholarship/creativity there are many service activities of a semi-administrative nature. Examples of such activities would be organization of conferences or seminars, some aspects of consulting, establishing project centers, and writing proposals.

Approved by the Faculty, September 1978  
Approved by the Provost

## **Appendix: Consent Agenda Motions**

**Date:** October 14, 2016

**To:** WPI Faculty

**From:** Committee on Academic Operations (Prof. Sturm, Chair)

**Re:** Motion to change the CE 3044 (Foundation Engineering) from Cat. II to Cat. I

**Motion:** On behalf of the Civil and Environmental Engineering Department, the Committee on Academic Operation recommends and I move that the CE 3044 (Foundation Engineering) be changed from a Cat. II to a Cat I course.

**Rationale:** CE 3044, Foundation Engineering has been offered during D'12, D'13, D'14, D'15, D'16 and D'17 and will be offered each year going forward.

**Impacts on students:** CE 3044 Foundation Engineering is the essential design course in Geotechnical Engineering and one of the core areas for all the civil and environmental engineering students. The proposed change of CE 3044 from Cat. II to Cat. I will provide more chances for civil and environmental students to have the essential background and meet their degree requirements. Such a change will not cause any negative impact on the programs offered by the CEE department.

**Resource Needs:**

Please summarize basic resources needed to deliver this course:

- **Mingjiang Tao, Associate Professor Full Time, T has taught CE 3044, Foundation Engineering during D'12, D'13, D'14, D'15, D'16 and D'17 and will be offered each year going forward.**
- **No special requirements are needed; a classroom with 10 to 40 seats is sufficient.**
- **No laboratory, either computer or otherwise is required.**
- **No additional library resources are required.**
- **No addition information technology is required.**

**Implementation Date:** Implementation date for this action is 2017-18 **Academic** year, has been offered during D'12, D'13, D'14, D'15, D'16 and D'17 and will be offered each year going forward.

(Note: Cat. II to Cat. I must go to full faculty for a vote. Cat. I to Cat. II only needs to go to CAO.)

**Date:** October 14, 2016

**To:** WPI Faculty

**From:** Committee on Academic Operations (Prof. Sturm, Chair)

**Re:** Motion to change the CE 3074 (Environmental Analysis) from Cat. II to Cat. I

**Motion:** On behalf of the Civil and Environmental Engineering Department, the Committee on Academic Operation recommends and I move that the CE 3074 (Environmental Analysis) be changed from a Cat. II to a Cat I. course.

**Rationale:** CE 3074 Environmental Analysis has been offered during B'11, B'12, B'13, B'14, B'15, and B'16 and will be offered each year going forward.

**Impacts on students:** This course has been a popular selection by students majoring in Civil or Environmental Engineering. It has been offered each year since 2011 with an average enrollment of 32 students. To date, there are 36 students registered for B2016. Offering the course annually provides for a higher quality experience for the student, because the instructor is able to provide more direct feedback and engagement than she would with a larger class size.

**Resource Needs:**

Please summarize basic resources needed to deliver this course:

- **No additional resources are needed. Suzanne LePage, Instructor/ Lecturer, Full Time, NTT has taught CE 3074 Environmental Analysis during B'11, B'12, B'13, B'14, B'15, and B'16 and will be offered each year going forward.**
- **No special requirements are needed; a classroom with 10 to 40 seats is sufficient.**
- **No laboratory, either computer or otherwise is required.**
- **No additional library resources are required.**
- **No addition information technology is required.**

**Implementation Date:** Implementation date for this action will be the 2017-18 Academic year, although the course has already been offered annually since 2011.

(Note: Cat. II to Cat. I must go to full faculty for a vote. Cat. I to Cat. II only needs to go to CAO.)

**Date:** October 14, 2016

**To:** WPI Faculty

**From:** Committee on Academic Operations (Prof. Sturm, Chair)

**Re:** Motion to add ENV2310 (Environmental Governance and Innovation)

**Motion:** On behalf of the Environmental and Sustainability Studies program and the Department of Social Science and Policy Studies, the Committee on Academic Operation recommends and I move that ENV2310 (Environmental Governance and Innovation) as described below, be added.

**Proposed Course Description:**

ENV 2310 Environmental Governance and Innovation (Cat. II).

With global attention dominated by environmental catastrophe and despair, we will spotlight new work that has brought together scientists, environmentalists, engineers, and artists to tackle the most serious problems facing communities. We will explore the political ecology implications of control over essential resources and the positive consequences of rethinking and democratizing basic social needs for a more sustainable future. Recent exciting case studies will feature examples of simple solutions that inspire elegant, transferrable, and inexpensive applications of technological design. We will examine the role and obligation that scientists have to collaborate with interdisciplinary and public policy efforts that benefit people with sustainable approaches to architecture, food, energy, transportation, and infrastructure.

Recommended background: introductory environmental studies course.  
Students who completed ENV230X cannot receive credit for ENV2310.

**Anticipated Instructor:** Prof. Ingrid Shockey

**Rationale:** This course takes advantage of the expertise of Prof. Shockey and provides necessary content to ENV students as it brings together the core themes that cut across several courses in the distribution requirements (e.g., ENV1100, ENV210X, ENV2600, ENV2800). The enrollment projection for this course is 20-30 students, which is typical for 2000 level courses in environmental and sustainability studies. The course will also serve as an appropriate second course for students looking to complete their social science requirement in environmental studies. This course will also contribute to the proposed BUS concentration in Innovation for Social Change.

**Note Changes to Catalog:** ENV2310 Environmental Governance and Innovation shall be added to the catalog.

This course was previously offered as ENV230X:

Outcomes from questions 1, 2, 9, and 26b of course ENV 230X evaluations.

Course 230X				
Year and (N)	Q # 1	Q # 2	Q # 9	Q # 26
2013 (N=21)	4.6	4.6	4.2	6-10*
2014 (N=17)	4.6	4.6	3.9	6-10*

\* These responses represent the mode. The numbers represented here are total populations of each course (N=21 and N=17 respectively).

**Implementation Date:** Implementation date for this action is term D of the 2016-2017 Academic year. It will then be offered every other year (as per Category II courses).

**Resource Needs:**

Please summarize basic resources needed to deliver this course, including the following:

- Builds off the expertise of Professor Shockey
- 30-person classroom with basic electronic set up
- No special laboratory space needed
- No special library resources needed
- No special information technology needed

Prof. Shockey will teach this course on an overload basis, supported by the existing SSPS Dept. operating budget.

**Impact on Distribution Requirements and Other Courses:** This will contribute to the International Studies course options, the proposed Innovation for Social Change concentration proposed by the Foisie Business School, as well and ENV distribution requirements. Introduction of the course does not require a change in distribution requirements for the ENV major, although changes are under development.

**Date:** October 14, 2016

**To:** WPI Faculty

**From:** Committee on Academic Operations (Prof. Sturm, Chair)

**Re:** Motion to add ENV 2900 (The Green Economy and Models for Alternative forms of Development)

**Motion:** On behalf of the Environmental and Sustainability Studies and the Department of Social Science and Policy Studies, the Committee on Academic Operation recommends and I move that ENV 2900 (The Green Economy and Models for Alternative forms of Development) as described below, be added.

**Proposed Course Description:**

ENV 2900 The Green Economy and Models for Alternative Forms of Development (Cat.II):

This course examines the limitations of traditional economic models and charts a new course for current policies and practices. To chart this path we draw upon and synthesize examples from existing alternative economies (e.g., different forms of dematerialization, hybrid organizations, solidary economy, sharing economy). The course critically examines current paradigms of greening and seeks to expand thinking that will encompass new, alternative, and socially just conceptions of economy and economic development. A particular emphasis is laid on the spatial implications of de-growth oriented activities which partly challenge existing models and research methods in economic geography.

Suggested background: Basic knowledge of economics and environmental governance.

**Anticipated Instructor:** Robert Krueger

**Rationale:** This course adds a dimension to current course offerings by examining the role of the economy in producing and solving environmental problems. Moreover, it looks beyond the classic growth paradigm into emerging alternatives.

**Implementation Date:** Implementation date for this action is C term of the 2016-2017 Academic year.

**Resource Needs:**

Please summarize basic resources needed to deliver this course, including the following:

- Robert Krueger is working on a book on this topic and has published and lectured widely on this topic. Krueger has come off two years of a limited teaching load as he worked as associate department head of social sciences and policy studies and associate dean of arts and sciences. Freeing Krueger from



these administrative responsibilities opens up new opportunities to use his talents and experience in the classroom.

- Classroom for 40

**Impact on Distribution Requirements and Other Courses:** This course will attract students who have interest in the Science, Technology Policy (STP) program. It could attract additional double majors for either ENV or STP. This course will count toward the social science requirement and toward the distribution requirements for the Environmental and Sustainability Studies Program as well as the Science, Technology, Policy Program.

**Date:** October 14, 2016  
**To:** WPI Faculty  
**From:** Committee on Academic Operations (Prof. Sturm, Chair)  
**Re:** Motion to add ENV 3100 (Adventures in Sustainable Urbanism)

**Motion:** On behalf of the Environmental and Sustainability Studies Program and the Department of Social Science and Policy Studies, the Committee on Academic Operation recommends and I move that ENV 3100 (Adventures in Sustainable Urbanism) as described below, be added.

**Proposed Course Description:**

ENV 3100 Adventures in Sustainable Urbanism (Cat. II).

This course will take students on an adventure, both in the class and in the field. Students will examine the history of sustainable development, its antecedents, that factors that have influence its evolution, and how the sustainable city came into existence. Students will be invited on a number of virtual field trips to sustainable cities from around the world. The goal will be to explore the underlying factors of sustainable urbanism, why it looks the way it does in different places, and how students can exercise their own agency in developing alternatives. Students will also develop their own field trips for publication on the course website.

Suggested background: introduction to environmental studies and a passion for urban exploration.

**Anticipated Instructor:** Robert Krueger

**Rationale:** This course will allow students the opportunity to explore, in depth, the factors that shape the sustainable city and reflect on how it will affect their professional lives. Additionally, the course has a strong communication component; not only will students understand how and why others communicate in the ways that they do, it but how they communicate with others. Finally, it offers an international dimension.

**Implementation Date:** Implementation date for this action is D term of the 2016-2017 Academic year.

**Resource Needs:**

Please summarize basic resources needed to deliver this course, including the following:

- Robert Krueger is an internationally recognized scholar of sustainable urban development. Krueger has come off two years of a limited teaching load as he worked as associate department head of social sciences and policy studies and associate dean of arts and sciences. Freeing Krueger from these administrative responsibilities opens up new opportunities to use his talents and experience in the classroom.
- Classroom for 30

**Impact on Distribution Requirements and Other Courses:** Students can use this course to fulfill distribution requirements in the Environmental and Sustainability Studies, International and Global Studies, and Science Technology Policy programs. Students who take this course will also receive credit toward the university social science requirement.

**Date:** October 14, 2016

**To:** WPI Faculty

**From:** Chair of Committee on Academic Operations (Prof. Sturm, Chair)

**Re:** Motion to modify distribution requirements for Industrial Engineering major

**Motion:** On behalf of the Industrial Engineering Program and the Foisie School of Business, the Committee on Academic Operation recommends and I move that the distribution requirements for Industrial Engineering major be modified as described below.

**Description of the proposed modifications:**

**Existing Distribution Requirements\*:** (On Page 63 of the 2016-2017 Undergraduate Catalog) (with underlined items to be changed, as described in the proposed modification below)

2. Industrial Engineering Topics must include courses in the following three topic areas:

- a. The IE Core consists of 9/3 units: BUS 1010 (Leadership Practice), BUS 2080 (Data Analysis for Decision Making) or MA 2210\* (Mathematical Methods in Decision Making), BUS 3020 (Achieving Effective Operations), CS 2119 (Application Building with Object-Oriented Concepts) or CS 2102 (Object-Oriented Design Concepts), OIE 2850 (Engineering Economics), OIE 3410 (Materials Management in Supply Chains), OIE 3420 (Quality Planning, Design and Control), OIE 3460 (Simulation Modeling and Analysis), and OIE 3510 (Stochastic Models).
- b. IE Electives (3/3 units): Any 3000- or 4000-level Operations Research courses in MA, MIS 3720, 4720, OIE 3405, 4410, 4420, 4460.

**Proposed Modifications to the Distribution Requirements:**

Replace BUS 1010 (Leadership Practice) by either OIE 4420 (Practical Optimization) or OIE 3405 (Work Systems and Facility Planning), and drop one of these two courses from the current list of IE Electives if it is taken as a required one by an IE major.

**Rationale:** Industrial Engineering Program is ABET accredited. The current coverage of the engineering content in IE curriculum is only less than 0.5% above the minimum ABET requirement. Consequently, to better comply with the ABET expectations and to avoid potential future concern, it will be useful to remove BUS 1010 from the core requirements and replace it with an engineering oriented course. Since optimization is a critical method in the field of industrial engineering and the current core curriculum has limited coverage on this subject, and additionally, the application of optimization is important, it is valuable and logical to include either OIE 4420 or OIE 3405 as a required course to replace BUS 1010. If junior IE students take either course prior to their MQPs, they will be equipped with more IE tools to complete their projects. In the future, IE majors will be encouraged to take BUS 1010 as a free elective or as part of the course requirements for a minor offered through the Foisie School of Business.

The OIE faculty group, as well as the IE alumni and advisory board members, recognize the importance and value of leadership and change management skills, and will support the development of IE students' competency in these areas in several ways, which include: (1) to continue incorporating a module (such as case discussions, assignment/exam questions, or guest speeches) on "leading change" in all required IE courses (i.e., OIE 2850, OIE 3410, OIE 3420,

OIE 3460, OIE 3510, and OIE 4420/OIE 3405); (2) to continue creating opportunities for IE students to gain knowledge and practice their skills through various projects (course projects, IQP, MQP, etc.) and extracurricular activities (e.g., WPI-IE Chapter operations and events) throughout the entire program; and (3) to continue monitoring and evaluating our IE alumni's progress on leadership practice and improvement within five years of graduation through our IE Alumni Survey.

**Implementation Date:** Implementation date for this action is the 2017-2018 Academic Year.

**Resources:** No new resources are required.

**Date:** October 14, 2016  
**To:** WPI Faculty  
**From:** Committee on Academic Operations (Prof. Sturm, Chair)  
**Subject:** Motion to add a Minor in Sustainability Engineering

**Motion:** On behalf of the Department of Social Science and Policy Studies, the Department of Civil and Environmental Engineering, and the program in Architectural Engineering, the Committee on Academic Operations recommends and I move that a minor in Sustainability Engineering described below, be added.

### **Description of the Proposed Minor in Sustainability**

**Catalog description:** This academic minor is intended for students who are interested in gaining knowledge and experience in the principles and practices of engineering design for sustainability, and of the critical role of engineering decisions on the sustainability of the resulting designs. Every engineering discipline impacts the environmental and social sustainability of the planet, and knowledge of the principles of sustainability in engineering design will contribute substantially to professional practice.

While this minor is intended primarily for engineering students, it is open to all students. For non-engineering students the expected background courses may increase the total minor program to more than two units.

**Review Committee:** The Minor Program Review Committee consists of Profs. John Bergendahl, Robert Krueger, and Steven Van Dessel. The Office of Sustainability, directed by Prof. Emeritus John Orr, will assist with oversight of the minor.

**Requirements:** Candidates for the Sustainability Engineering Minor must meet the following requirements:

1. Complete and obtain approval for the *Application for the Minor in Sustainability Engineering* available from the Registrar or the Office of Sustainability.
  - I. Define a focus for the minor. Some examples are given below but these are not comprehensive. Note that the focus must be distinct from the content of your major and must be supported by the courses in the minor.
  - II. List the academic activities that will be included in the minor, following the general rules for minors at WPI as well as the rules below.
2. Complete two units of work for the minor, one unit of which may be double counted with other degree requirements. The two units must meet the following requirements:
  - I. Must include ES 2800, Environmental Impacts of Engineering Decisions.
  - II. May include at most 1/3 U of relevant 1000-level work from the following list (List A):
    - ENV 1100, Introduction to Environmental Studies
    - Relevant GPS FY 1100 credit.
  - III. Must include 2/3 U of relevant Humanities, Business, and/or SSPS work selected from the following list (List B):
    - ECON 2117, Environmental Economics
    - ENV 2201, Planning for Sustainable Communities
    - ENV 2400, Environmental Problems and Human Behavior
    - ENV 2600, Environmental Problems in the Developing World

- ENV 2700, Social Media, Social Movements, and the Environment
- ENV 4400, Senior Seminar in Environmental Studies
- ETR 2900, Social Entrepreneurship
- GOV 2311, Environmental Policy and Law
- GOV 2312, International Environmental Policy
- GOV 2319, Global Environmental Politics
- HI 2401, U.S. Environmental History
- HI 3317, Topics in Environmental History
- PY 2717, Philosophy and the Environment

IV. Must include at least 2/3 U of engineering work from the following list (List C):

- AREN 3003, Principles of HVAC Design for Buildings
- AREN 3024, Building Physics
- AREN 3025, Building Energy Simulation
- CHE 3702, Energy Challenges of the 21st Century
- CHE/CE 4063, Transport and Transformations in the Environment
- CE 3059, Environmental Engineering
- CE 3070, Urban and Environmental Planning
- CE 3074, Environmental Analysis
- ECE 3500, Introduction to Contemporary Electric Power Systems
- ES 2001, Introduction to Materials Science
- ES 3001, Introduction to Thermodynamics
- ES 3003, Heat Transfer
- ME 4422, Design and Optimization of Thermal Systems
- ME 4429, Thermofluid Application and Design
- ME 5105, Renewable Energy

3. To accommodate new sustainability-related courses and independent study and project activities, up to two thirds units may be substituted for the activities listed in items III and IV with the approval of the Sustainability Engineering Minor program review committee. This committee may be contacted through the Registrar or the Director of Sustainability.
4. See the WPI Undergraduate Catalog for additional rules for all minors, in particular that the MQP cannot be used in satisfying any Minor and that at most one unit may be double counted with another degree requirement.

### ***Guidance for Students***

#### Possible Focus Areas (not exhaustive):

The following focus areas and sample programs may be helpful in selecting the activities that compose the two units of credit for the minor, but they are not meant to be restrictive in any way.

- Sustainable Engineering in the Developing World
- Engineering Design for Sustainability
- Sustainable Manufacturing
- Clean and Renewable Energy
- Sustainable Engineering Materials

- Resource Recovery and Reuse
- Green Buildings

### Example Programs

#### *Clean and Renewable Energy*

- FY 1100, Power the World
- ES 2800, Environmental Impacts of Engineering Decisions
- CHE 3702, Energy Challenges of the 21st Century
- AREN 3025, Building Energy Simulation
- ENV 2201, Planning for Sustainable Communities
- ENV 2600 Environmental Problems in the Developing World

#### *Engineering Design for Sustainability*

- FY 1100, Recover, Reuse, and Recycle: Building a Lasting World
- ES 2800, Environmental Impacts of Engineering Decisions
- CE 3059, Environmental Engineering
- AREN 3025, Building Energy Simulation
- ENV 2600, Environmental Problems in the Developing World
- CE 3070, Urban and Environmental Planning

#### *Sustainable Engineering in the Developing World*

- ES 2800, Environmental Impacts of Engineering Decisions
- ENV 2600, Environmental Problems in the Developing World
- ETR 2900, Social Entrepreneurship
- CE 3070, Urban and Environmental Planning
- ECE 3500, Introduction to Contemporary Electric Power Systems
- GOV 2319, Global Environmental Politics

#### *Green Buildings (Focus not available to Architectural Engineering students)*

- ES 2800, Environmental Impacts of Engineering Decisions
- GOV 2311, Environmental Policy and Law
- ETR 2900, Social Entrepreneurship
- AREN 3003, Principles of HVAC Design for Buildings
- AREN 3024, Building Physics
- CE 3070, Urban and Environmental Planning

**Rationale:** At WPI “sustainability” is defined broadly as encompassing environmental stewardship, social justice, and economic security. Many opportunities are available for students to incorporate one or more of these aspects through their course and project work. Currently, the major and minor programs in

Environmental and Sustainability Studies are available to students focusing on the human interaction and policy dimensions. This minor in Sustainability Engineering will complement these offerings and will provide structure to programs for students who seek to develop a solid base for the inclusion of sustainability principles in engineering design and practice. The contents of the minor draw from engineering as well as from the social science, policy studies, and humanities disciplines.

**Program Goals:** Upon completion of this minor students will possess the basic knowledge to recognize and analyze the impact of their engineering decisions on the environmental, social, and economic aspects of sustainability. They will understand the need to include an examination of these factors in their engineering work, and they will possess enough basic knowledge to allow them to pursue in depth the necessary specialized knowledge required in each engineering task.

**Implementation Date:** Upon approval, the catalog description will immediately be made available via the WPI Sustainability website and will be published in the next edition of the Undergraduate Catalog. Students who meet the requirements will be able to obtain the Minor in Sustainability Engineering beginning with academic year 2016-2017.

**Resources:** No new courses are requested for this minor. The only faculty time impact will be the time required for the minor program review committee to review the applications and consult with students.



**Date:** October 14, 2016

**To:** WPI Faculty

**From:** Committee on Graduate Studies and Research (Prof. Demetriou, Chair)

**Re:** Motion to approve a new graduate course CS 5007 (Introduction to Programming Concepts, Data Structures and Algorithms)

**Motion:** On behalf of the Computer Science Department, the Committee on Graduate Studies and Research recommends and I move that the following new graduate course be added, as described below.

**Proposed Course Description:**

**CS 5007 Introduction to Applications of Computer Science with Data Structures and Algorithms (3 credits)**

This is an introductory graduate course teaching core computer science topics typically found in an undergraduate Computer Science curriculum, but at a graduate-level pace. It is primarily intended for students with little formal preparation in Computer Science to gain experience with fundamental Computer Science topics.

After a review of programming concepts the focus of the course will be on data structures from the point of view of the operations performed upon the data and to apply analysis and design techniques to non-numeric algorithms that act on data structures. The data structures covered include lists, stacks, queues, trees and graphs. Projects will focus on the writing of programs to appropriately integrate data structures and algorithms for a variety of applications.

This course may not be used to satisfy degree requirements for a B.S., M.S., or Ph.D. degree in Computer Science or a minor in Computer Science. It may satisfy the requirements for other degree programs at the discretion of the program review committee for the particular degree.

Prerequisites: Experience with at least one high-level programming language such as obtained in an undergraduate programming course.

**Rationale:** In Fall 2015, the Computer Science department offered an introductory graduate course teaching core Computer Science concepts. The course was designed to support the large number of non-CS majors who need to take CS courses as part of their intended major, including Data Science, Robotics Engineering and Electrical and Computer Engineering. The proposed course serves the needs of those incoming students who need to improve their computational skills.

Professor Thierry Pettit taught this course in Fall 2015 to 29 students, including 13 Data Science majors, 5 ECE majors and 3 RBE majors. The following table reports the results of the end-of-course evaluation forms.

<b>Year</b>	<b>Instructor</b>	<b>Enrollment</b>	<b>Q2 eval</b>	<b>Q9 eval</b>
Fall 2015	T. Pettit	29 (21 responses)	4.67	4.43

Of these 29 students, 13 students (11 DS Majors) registered for additional CS graduate courses in the Spring 2016 semester (in total, 20 graduate courses).

**Impact on Degree Requirements:** The CS 5007 Introduction to Programming Concepts, Data Structures and Algorithms may not be used to satisfy degree requirements for a B.S., M.S., or Ph.D. degree in Computer Science or a minor in Computer Science. It may satisfy the requirements for other degree programs at the discretion of the program review committee for the particular degree.

**Resources and Anticipated Instructors:** This course will be offered every year. There are no additional resources required for this proposal since it is expected to have an adjunct teach the course. The department will find a suitable faculty member (full-time or adjunct) to teach this course as needed. Given the introductory nature of the course, there are many faculty members that could teach it.

**Implementation Date:** Implementation date for this action is the 2017-2018 academic year.

**Date:** October 14, 2016  
**To:** WPI Faculty  
**From:** Committee on Graduate Studies and Research (Prof. Demetriou, Chair)  
**Re:** Motion to add BME 555 (BioMEMS and Tissue Microengineering)

**Motion:** On behalf of the Department of Biomedical Engineering, the Committee on Graduate Studies and Research recommends and I move that BME 555 (BioMEMS and Tissue Microengineering) be added to the WPI Graduate Catalog, as described below.

**Proposed Course Description:**

**BME 555. BioMEMS and Tissue Microengineering (3 credits)**

This course covers microscale biological and physical phenomena and state-of-the-art techniques to measure and manipulate these processes. Topics include scaling laws, microfabrication, machining three-dimensional microstructures, patterning biomolecules, and designing and building microfluidic devices. We will cover various biomedical problems that can be addressed with microfabrication technology and their associated engineering challenges, with special emphasis on applications related to quantitative biology, tissue microengineering, controlling the cellular microenvironment, and clinical/diagnostic lab-on-a-chip devices.

**Rationale:** This course filled a gap in the BME curriculum in the topic of micropatterning in 2- and 3-dimensions, which is increasingly a technique used in the field to study cellular processes, to assess the role of cellular microenvironment at the micron scale, and to engineer functional tissues. The course includes hands-on labs to teach practical techniques including photomask design and printing, photolithography, soft lithography, and cell and tissue patterning. The labs make extensive use of the BME-Microfabrication Laboratory (BME-MFL) at Gateway Park, run by the course instructor.

This elective course is relevant to graduate research work in the Biomedical Engineering, Chemical Engineering, Chemistry and Biochemistry, Physics, and other WPI departments. It is planned to be offered every other year to maintain a pool of about 12-15 students.

This course has been offered once previously Sp' 14 as BME 595T (Special Topics in Biomedical Engineering) and will be offered again as BME 595T in Sp' 17. For a first offering, the course was very well received. Criticisms were easily addressable, including more tutorials for CAD photomask design (which have been developed already for the undergraduate microfluidics laboratory course), and a broad survey introduction to help select a final project for the course. Most students highly recommended the course.

The purpose of the motion is to add the course to the catalog with a permanent course number.

Data from previous course offerings:

**Spring 2014:**

Enrollment: 14  
Reviews: Q1: 4.84  
          Q2: 4.69  
          Q9: 4.54

**Impact on Degree Requirements:** The BME 555. BioMEMS and Tissue Microengineering provides an additional option for graduate students to fulfill their BME degree requirements.

**Resources and Anticipated Instructors:** No new resources required. The course will be taught by Professor Dirk Albrecht. Professor Albrecht developed and delivered the previous offering of this course.

**Implementation Date:** Implementation date for this action is the 2017-2018 academic year.

**Date:** October 14, 2016  
**To:** WPI Faculty  
**From:** Committee on Graduate Studies and Research (Prof. Demetriou, Chair)  
**Re:** Motion to add BME 564 (Cell and Molecular Biology for Engineers)

**Motion:** On behalf of the Department of Biomedical Engineering, the Committee on Graduate Studies and Research recommends and I move that BME 564 (Cell and Molecular Biology for Engineers) be added to the WPI Graduate Catalog, as described below.

**Proposed Course Description:**

**BME 564. Cell and Molecular Biology for Engineers (3 credits)**

An advanced course in cell and molecular biology for engineering graduate students, with an emphasis on molecular approaches to measuring and manipulating cell responses for biomedical engineering applications. Course topics will include in depth exploration of the molecular basis of cellular function, including protein biochemistry, signal transduction, cell-extracellular matrix interactions and regulation of gene expression. Tools and techniques used in modern cell and molecular biology will be discussed in the context of current research literature.

*NOTE: This course can be used to satisfy a life science requirement in the graduate biomedical engineering program. It cannot be used to satisfy a biomedical engineering course requirement (undergraduate or graduate).*

**Rationale:** The course fulfills a Life Science distribution requirement for all graduate degree programs in Biomedical Engineering (M.S., M.E., Ph.D.). Biomedical Engineering graduate students are required to demonstrate proficiency in the Life Sciences. Graduate students in Biomedical Engineering are expected to have a strong undergraduate background in engineering, but many do not have a strong undergraduate background in biology, and may not have the necessary preparation for graduate course work in Biology and Biotechnology or other life sciences departments. Alternatively, the distribution requirement may be met by taking one of three Life Sciences courses offered in the Biomedical Engineering department (BME 560: Physiology for Engineers, BME 562: Laboratory Animal Surgery, or BME 595C: Cell and Molecular Biology for Engineers). These BME courses are designed to provide an introduction to their respective fields (physiology, cell biology) to provide a life sciences foundation for Biomedical Engineering graduate students.

Course has already been offered three times previously as BME 595C (Special Topics in Biomedical Engineering). The purpose of the motion is to add the course to the catalog with a permanent course number.

Data from previous course offerings:

**Spring 2009:**

Enrollment: 13  
Reviews: Q1: 4.58  
          Q2: 4.83 (University 4.33)  
          Q9: 4.08

**Spring 2011:**

Enrollment: 22

Reviews: Q1: 4.38

Q2: 4.46 (University 4.23)

Q9: 3.77

**Spring 2016:**

Enrollment: 9

Reviews: Q1: 4.38

Q2: 4.50 (University 4.34)

Q9: 4.13

**Impact on Degree Requirements:** This course provides an additional option for graduate students to fulfill their BME degree requirements.

**Resources and Anticipated Instructors:** No new resources required. The course will be taught by Professor Marsha Rolle.

**Implementation Date:** Implementation date for this action is the 2017-2018 academic year.