WORCESTER POLYTECHNIC INSTITUTE
November 19, 2015

To: The WPI Faculty

From: M. W. Richman
Secretary of the Faculty

The third Faculty meeting of the 2015-2016 academic year will be held on **Thursday, November 19, 2015 at 3:15 pm in Olin Hall 107,** with refreshments at 3:00**.**

1.	Call to Order	M. Richman
	• Consideration of the Consent Agenda	
2.	Opening Announcements	M. Richman
3.	President's Remarks	L. Leshin
4.	Provost's Remarks	B. Bursten
5.	Reading of Memorial Resolution for Dean William Grogan	L. Schachterle
6.	Committee Business	
	Committee on Governance (COG)	
	• Nominations to fill a COG vacancy	G. Gaudette
	• Motion to modify the Comm. on Information Technology Policy (CITP) (for discussion only)	G. Gaudette C. Shue
7.	Special Report (for Open Discussion)	
	The Foisie Innovation Studio: The Current Concept and How the Faculty Can Provide its Input	D. Apelian K. Boudreau M. Ginzberg
8.	Committee Reports (for Open Discussion)	
	• Committee on Administrative and Financial Policy (FAP) - How is FAP Evolving Under Our New Administration?	D. Spanagel
9.	Old Business	
10.	New Business	
11.	Closing Announcements	
12.	Adjourn	

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WORCESTER POLYTECHNIC INSTITUTE
Faculty Meeting Minutes
October 16, 2015

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Detail:

1. Call to Order

The second meeting of the 2015-2016 academic year was called to order at 11:05am in Olin 107 by **Prof. Richman** (ME). The consent agenda, including the minutes from Sept. 8, 2015, were approved as distributed.

2. Announcement

Prof. Richman noted that WPI had received favorable coverage by U.S. News and World Reports in their issue of the Best Colleges of 2016, and he thanked Deans Heinricher, Vaz, and Wobbe as well as the public relations staff for their efforts in facilitating the positive publicity. He also thanked Pres. Leshin for providing the Faculty Governance Office with a second administrative position beginning in September 2015.

Prof. Richman introduced the Provost by reviewing all the many attributes that were outlined in the advertisement that was circulated last year when WPI was conducting its search for a new Provost last year. **Prof. Richman** good naturedly suggested that it was an oversight not to have also advertised for a new Provost on potpourri@wpi.edu. **(See Addendum #1 attached to the file copy of these minutes.)**

3. Provost's Remarks

Provost Bursten thanked all those in attendance for a successful conclusion to A-term. He then recognized **Prof. Boudreau** (HU&A) who introduced Prof. Alexandrina Agloro (HU&A), and he recognized **Prof. Lindeman** (CS) who introduced Prof. of Practice Lee Sheldon (IMGD). **Provost Bursten** also announced that this year one member of each faculty search committee will serve as a diversity advocate.

Amy Morton (Market. & Comm.) announced that a draft of the Strategic Plan will be posted on myWPI by the end of the day and will be posted for comments and input until Oct. 27.

4. Committee Business

Committee on Academic Operations:

Prof. Lindeman (CS) for CAO moved that the students identified by the Office of the Registrar as having completed the requirements for their undergraduate degrees (as of October 9, 2015) be approved for October 9, 2015 graduation. The motion **passed**.

Committee on Graduate Studies and Research:

Prof. Demetriou (ME) for CGSR moved that the students identified by the Office of the Registrar as having completed the requirements for their graduate degrees (as of October 9, 2015) be approved for October 9, 2015 graduation. The motion **passed** (with the modification that the Master in Mathematics for Education be changed to the Master in Mathematics for Educators).

Prof. Richman thanked the registrar's office, in general, and Registrar Jackson, in particular, for their hard work in assembling the two graduation lists.

5. Special Report

Provost Bursten reviewed the history of the Deans of Arts and Sciences, Engineering, and Business at WPI starting in 2007. He described the introduction of these Deans as a top-down rollout with a lack of clarity about the roles

and characteristics of the Deans, and he pointed out that Pres. Leshin announced to the Faculty in 2014 that she was committed to fixing these problems.

Provost Bursten then set out to explain why he believed that we needed these three unit Deans at WPI. Before the creation of the unit Deans, each of the 14 academic departments (with their own internal strategic leadership and management functions) reported directly to the Provost, who currently has seven additional direct reports. By contrast, he cited studies that concluded that five to eight direct reports were optimal.

Provost Bursten was amazed that WPI had not formally established a School of Engineering and a School of Arts and Science, while, by contrast, it had established a School of Business, and he pointed out the fundraising advantages of establishing Schools. He showed that between 2005 and 2015, the number of TTT faculty members had increased from 205 to 248, the number of (FTE) NTT faculty members had increased from 44 to 111, the number of FTE undergrads had increased from 2824 to 4151, the number of FTE graduate students had increased from 678 to 1287, and that our research expenditures had increased from $12.0M to $28.7M.

Provost Bursten emphasized, however, that the most compelling reason for the Deans was not to achieve organizational efficiencies. He explained that the primary purpose of the Deans was to provide leadership that would provide strategic vison to advocate for the unit, establish high standards for new and existing faculty members, increase visibility and the resource base of the unit, establish budget priorities, facilitate interdisciplinary activities, develop leadership within our Departments and Programs, and lead the academic accreditation processes. He identified the following core competencies required of the Deans: impressive credentials; leadership and communications skills; an understanding of shared governance; strategic agility to anticipate future trends; business acumen; a commitment to diversity; effective fund-raising skills; political savy; and integrity.

Provost Bursten concluded by announcing that he would bring to COG his intention to initiate a search for a Dean of Engineering. He intended to empower the Deans to align their units with our strategic plan, eliminate redundancies in the Office of Academic Affairs, and urge that the Faculty Handbook be revised to incorporate Deans. That the Handbook had not been revised, was in the Provost's view, an act of civil disobedience by the Faculty.

Prof. Richman thanked the Provost for presenting his views in this forum and opened the floor for discussion.

Prof. Kinicki (CS) pointed out that the concerns on campus about the Deans were raised long before, rather than after, the three Deans were hired. He also pointed out that the concerns were not about the need for Deans, but rather about the proper structure of the Deans. So the Provost's discussion - confined only to the three unit Deans - does not tell the whole story. Finally, he explained that the Faculty felt strongly that we should not have Schools (and silos) at WPI because our interdisciplinary activities make us stronger. **Provost Bursten** did not agree that forming Schools would create silos. In his view, Schools are important for external discussions and that he would not change his view on this point.

Prof. Weathers (BBT) asked for the current organizational structure of WPI, and how - between 2005 and 2015 – the ratio of faculty members to administrators has changed. She asked for data that would allow us to understand the value that Deans bring, and how - if we are top-heavy – we could reorganize in a better way. **Provost Bursten** suggested that if we compare ourselves to other universities, we will find that they all have Deans, Associate Deans, and Vice Provosts. In his view, even with three unit Deans, WPI will be have a lean Administration.

Prof. Gatsonis (ME) explained that the original proposal in 2007 for Deans called for a clean structure with a total of four Deans: a Dean of Arts and Sciences; a Dean of Engineering; a Dean of Business; and a Vice Provost for Graduate Studies and Research. However now we have more than four: Deans of Engineering, Arts and Sciences, and Business; a Dean of Undergraduate Studies, a Dean of Graduate Studies; a Vice Provost for Research; and a Dean of Humanities and Arts. In his view, these positions are not properly delineated and there is overlap between them. Prof. Gatsonis pointed out that WPI is unique because each of our individual programs belongs to all the units of the University, and our academic program development is conducted at the Faculty governance level across the University. He suggested that perhaps it would be simpler and more effective (without unit Deans)

just to elevate the roles of the Undergraduate and Graduate Deans, and select Associate Deans for Engineering and for Arts and Sciences for added support. **Provost Bursten** did not agree that, in the context of hiring new faculty members, WPI was very different from other universities. He also maintained that functions of our Dean of Undergraduate Studies and the Dean of Graduate Studies are completely different than the functions of the unit Deans. Finally, **Provost Bursten** thought that Prof. Gatsonis had missed the main point, which is that the issue of the unit Deans is as much about leadership as it is about organizational structure, and in the Provost's view we need stronger leadership to better compete with other universities.

Prof. Brown (ME) agreed with Prof. Gatsonis. In his experience, we have missed opportunities due to the added layers of academic administration. **Provost Bursten** explained that he would look to eliminate bureaucracy.

Prof. Hakim (ECE) emphasized that the discussion about the Deans should start with finances. According to Prof. Hakim, WPI's endowment has grown from $400M in 2008 to only $430M in 2015, while we have $230M in debt that places a substantial burden on the operating budget. Prof. Hakim pointed out that in last year's budget cycle only a small fraction of the $8M in additional budget requests could be met. In his view, WPI cannot afford the Deans.

Prof. Pahlavan (ECE) inquired about the expectations and performance evaluation criteria for the Deans. **Provost Bursten** preferred to talk about "value added" rather than "return on investment" because in his view it is a challenge to rely on quantitative measures to gauge qualitative improvements. Nevertheless, performance metrics for fundraising are being set, and it is reasonable to expect a Dean to raise funds equal to some multiple of his or her salary. Furthermore, the Deans' leadership should lead to more research funding. Finally, although it is hard to quantify, the WPI brand will be enhanced by a well known Dean.

Prof. Fehribach (MA) suggested that, in view of the many engineering faculty members who feel negatively about Deans, we try to understand why several have left WPI in the past few years. In response, **Provost Bursten** conceded that mistakes were made in the past concerning Deans and vowed that better efforts would be made in the future.

Vice Provost Vernescu (MA) recalled his experiences, before we had unit Deans, when the Provost could not respond to requests in a timely fashion and when the Provost's Office was too thinly staffed. Prof. Vernescu felt it was important to separate the idea of Deans and what they can bring to WPI from the manner in which the idea was implemented at WPI. As a Department Head, Prof. Vernescu was able to accomplish more with the Dean of Arts and Sciences than he could before she was hired, and cited his involvement on advancement and fundraising as an example.

Prof. Richman asked for a motion to extend the meeting by 15 minutes. The motion **passed**.

Prof. Vassallo (Bus) described the thinking of the Faculty before 2007 when every Department discussed the issue of Deans in separate Department meetings. As Secretary of the Faculty at the time, she compiled the minutes from those meetings, and identified the following areas that the faculty wished to address: cost-benefit analysis; the effect on interdepartmental cooperation; the effect on external visibility; concerns about losing competitive advantage; the effects on tenure and promotion processes; the result of added administrative bureaucracy; the current burdens on the Provost's Office; other alternatives to Deans; and the lack of departmental inclusiveness in the proposal to introduce Deans. **Prof Vassallo** urged the Provost to first accurately gauge and document the current feelings of the Faculty about Deans at WPI, and at the same time to respect concerns and past experiences of all involved. In response, **Provost Bursten** observed that people at WPI hang on to history for a long time.

Prof. Lindeman (CS) worried, as a negative, that the structure imposed by the unit Deans may have diminished the "bottom-up" mechanisms that help put interdisciplinary academic programs in place. As a positive, he credited the Dean of Arts and Sciences with fostering a sense of teamwork in managing the interrelated programs and departments within Arts and Sciences. Finally, he made the point that the growth of the administration should be documented with the same precision as is used to document the growth in student and faculty populations in order to shed light on the concerns of many faculty members that the Deans are part of a larger growth of the administration. **Provost Bursten** pointed out that the unit Deans are members of the Faculty who serve as role

models, and that a distinction should be made between administration within academics and outside of academics. He attributed the anger over the perceived growth in administration to poor communication over the past ten years.

Prof. Gericke (CBC) believed that there would be a bottleneck in the Provost's Office without the unit Deans in place. In his view, a more interdisciplinary environment requires more, rather than less, structure to manage. He suggested that making appropriate changes to the Faculty Handbook would allow the Deans to be more effective, and he felt that the presence of Deans frees valuable time for the Provost to think carefully before acting and to spend more time representing WPI off campus. **Prof. Gericke** made the point that Deans serve as effective sounding boards for all (and especially new) Department Heads. Finally, **Prof. Gericke** explained that the Dean of Arts and Sciences has made several contacts for the CBC Department that have proven quite valuable.

Prof. Gaudette (BME) expressed the view that WPI has flourished since 2005 because of its Faculty despite the fact that the growth in the tenured and tenure track faculty have has not kept pace with the growth in the student population. Based on a recent report in the Worcester T&G, **Prof. Gaudette** expressed concern about administrative bloat outside the academic structure at WPI. With respect to Deans, he wanted to know specifically what return on investment we would get from them, and he emphasized the importance of having them focus on and promote the Faculty. **Provost Bursten** agreed that the statistics on administrative growth could be improved. He also pointed out that while our research funding has increased, the increase in undergraduate tuition has had a far greater effect on our overall enterprise.

Prof. Boudreau (HU&A) thought it would be helpful if we could see data on administrative growth (much like COG provides every year on the growth of students and faculty) with explanations (by area) of why the growth was needed and how it might benefit us. In her view, we did need more administrative structure in 2009, such as Associate Provosts or Deans, but it wasn't clear which choice would have been best. Given that we chose to add Deans, we were on a learning curve, and the Deans were not welcome by some faculty members and by the people who had hired them. **Prof. Boudreau** was of the belief that we should continue with more honesty and transparency.

Provost Bursten agreed to provide data concerning administrative growth at WPI, and he explained that this discussion was not the only time we would focus on the concerns raised today.

6. Closing Announcements

Prof. Spanagel (HU&A) – in place of the scheduled committee report from FAP - commented that, as Chair of FAP, he reported that FAP was working through its agenda, and that the committee will report to the Faculty at a future meeting.

Prof. Heinricher (Dean, UG) announced that the Massachusetts Department of Elementary and Secondary Education (DESE) will be on campus next week to complete their review of WPI's Teacher Preparation Program. Katie Elmes in the STEM Education has already reached out to many faculty members to participate in interviews with the visiting team. The DESE team may request meetings with additional faculty members, so Prof. Heinricher asked others to participate if they are able to do so.

Prof. Shue (CS) announced WPI will be reviewing the decision to utilize Blackboard, and anyone who is interested in joining the task force to help in that review should contact him for more information.

7. Adjournment

The meeting adjourned at 12:45pm.

Respectfully submitted,

Mark Richman, Secretary of the Faculty

Addenda on file with these minutes:

1. **SOF, Attributes of a Provost 10-16-15**
2. **Provost, Special Report on Deans 10-16-15**

Date: November 19, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to remove AREN 3001 (Architectural Graphics and Communication)

Motion: On behalf of the Architectural Engineering Program, the Committee on Academic Operation recommends and I move that AREN 3001 (Architectural Graphics and Communication)
be removed from the undergraduate catalog.

Description of Course to be dropped:
AREN 3001. ARCHITECTURAL GRAPHICS AND COMMUNICATION. Cat. I. With this course, students develop an understanding of the architectural design process and the graphic means for communicating and exchanging design content during the execution of a building project. The course covers the following topics: Nature of design (problems, solutions and process), building siting and orientation aimed at reducing energy requirements, architectural drawings (plans, elevations and cross sections), isometric projections and detail drawings. Most of these topics build upon the systematic use of electronic modeling software. This course is lab oriented.
Recommended background: AREN 2023.

Proposed Changes to AREN Distribution requirements (additions underlined, see next motion):
FROM NOTES

2. Must include topics in architectural design (AREN 2002 and AREN 3002), and architectural history (AR 2114), or approved equivalents.

Rationale:
This course will be replaced by the following new course: Architectural Design I (AREN 2002). According to ABET, "*graduates are expected to be able to discuss the basic concepts of architecture in a context of architectural design and history*". The Architectural Engineering curriculum currently includes one course that focuses on architectural representation (AREN 3001), and one course that focuses on architectural design (AREN 3002). The exposure of AREN students to a variety of different architectural design experiences is currently limited, especially when compared to course offerings and requirements at peer programs across the country. AREN 3001 focuses primarily on architectural graphics and communication skills, and includes a small design exercise near the end of term. The course will be replaced by a new course that places more emphasis on developing architectural design skills through actual project based design activities. Graphics and communication skills will be taught alongside the design work as an integral part of the design process. The change in focus will broaden student's exposure to architectural design, which will increase their ability to pursue a wider range of graduate school options.

There is no impact on student schedules or other departments. The course is typically offered during A-term and is a category I course. The course that replaces this course will also be offered in A-term and is also a category I course. There are no changes to resource requirements. The new course will also be taught in the architectural engineering studio. AREN 3001 is currently listed as recommended background for AREN 3002. A new course (AREN 2002) will become the recommended background course for AREN 3002.

Implementation Date:
Implementation date for this action is the 2016-2017 academic year.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add AREN 2002 (Architechtural Design I)

Motion: On behalf of the Architectural Engineering Program, the Committee on Academic Operation recommends and I move that AREN 2002 (Architechtural Design I), as described below, be added, and that the AREN distribution requirements be modified to include the new course.

Proposed Course/Catalog Description:

AREN 2002. ARCHITECTURAL DESIGN I (Category I) This course aims to develop an understanding of the architectural design process as an activity based upon observation, critical inquiry, and communication. Through a series of design exercises, this course aims to teach the basic architectural design skills needed for the creation of spaces that respond to human needs in terms of materiality, use, and scale. Graphic means for communicating and exchanging design content will be taught alongside the design exercises and as an integral part of the design process. The course covers the following topics: Nature of design, siting and context, human scale, architectural drawings (plans, elevations and cross sections), isometric projections and detail drawings. This is a studio course that uses modeling software, hand drawings, and physical model making.
Recommended background: Basic knowledge of architectural engineering systems, including materials and methods of construction, is recommended (AREN 2023, or equivalent).
Suggested background: It is suggested that students have knowledge of computer aided design tools (CE 3030, or equivalent)

Proposed Changes to AREN Distribution Requirements (additions underlined):
FROM NOTES

2. Must include topics in architectural design (AREN 2002 and AREN 3002), and architectural history (AR 2114), or approved equivalents.

Rationale:
This course replaces **ARCHITECTURAL GRAPHICS AND COMMUNICATION (AREN 3001).** According to ABET, "*graduates are expected to be able to discuss the basic concepts of architecture in a context of architectural design and history*". The Architectural Engineering curriculum currently includes one course that focuses on architectural representation (AREN 3001), and one course that focuses on architectural design (AREN 3002). The exposure of AREN students to a variety of different architectural design experiences is currently limited, especially when compared to course offerings and requirements at peer programs across the country. AREN 3001 focuses primarily on architectural graphics and communication skills, and includes a small design exercise near the end of term. The new course will be replace AREN 3001, places more emphasis on developing architectural design skills through actual project based design activities. Graphics and communication skills will be taught alongside the design work as an integral part of the design process. The change in focus will broaden student's exposure to architectural design, which will increase their ability to pursue a wider range of graduate school options.

There is no impact on student schedules or other departments. AREN 3001 was typically offered during A-term and is a category I course. This new course will also be offered in A-term and is also a category I course.

At its inception in 2012, AREN 3001 was designed as a junior level course. The first 3 years of program operations have shown however that most students take AREN 3001 during their sophomore year, and take AREN 3002 in their junior year. AREN 2002 will be listed as a recommended background course for AREN 3002. Designation as a 2000 level course is more appropriate as this course is an introductory level architectural design studio.

There are no changes to resource requirements for this new course, the new course will also be taught in the architectural engineering studio. AREN 3001 is currently listed as recommended background for AREN 3002. The new course (AREN 2002) will become the recommended background course for AREN 3002.

Implementation Date: Implementation date for this action is the 2016-2017 academic year.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to drop CHE 3910 (Chemical and Environmental Technology)

Motion: On behalf of the Department of Chemical Engineering, the Committee on Academic Operation recommends and I move, that CHE 3910. Chemical and Environmental Technology be dropped and the appropriate changes (described below) be made to the undergraduate catalog.

Description of Course to be dropped:

CHE 3910. CHEMICAL AND ENVIRONMENTAL TECHNOLOGY
Cat. II Day trips to industrial plants provide an insight into the real world of the chemical industry. Advanced technologies for commercially producing major organic chemicals and the monomers and polymers derived from them are described. Petroleum refining, catalytic and thermal petrochemical processes, soaps and detergents, specialty chemicals, and antibiotic production processes are presented at the industrial level. Large scale unit operations and processes are seen on the plant trips. Students see how plant layout is integrated with process and product control and environmental protection at each facility. Particular attention is paid to plant scale processes and equipment for control of chemical spills, hazards, and environmental pollution, for safety and accident prevention, and for compliance with local and national laws. Recommended background: general understanding of Organic Chemistry and Material Balances is assumed. This course will be offered in 2016-17, and in alternating years thereafter.

Proposed Changes to the Undergraduate Catalog:

CHE 3910 should be removed from the catalog. It appears in three places in the 15-16 catalog: p. 64 (in list of courses that count towards Chemical Engineering with Environmental Concentration), p. 85 (in list of courses that can be used towards Humanities and Arts with Environmental Studies Concentration), and p. 138 (course description). CHE 4063. Transport and Transformations in the Environment should be added to the list on p. 85 as a substitute.

Rationale:
This course is an elective Engineering Science and Design course taken primarily by chemical engineering majors. The current instructor for the course is retiring from teaching. Students interested in environmental technology will be directed towards CHE 4063. Transport and Transformations in the Environment that has overlapping content.

Impact on Distribution Requirements and Other Courses: As indicated above, this course is one of several options for Chemical Engineering students interested in an Environmental Concentration and Humanities and Arts Majors interested in an Environmental Studies Concentration. Both Concentrations have enough other options without this course.

If there is a course to replace this, which one? Interested students will be advised to take CHE 4063. Transport and Transformations in the Environment.

Resource requirements: This course has been taught by an adjunct professor who is retiring from teaching.

Implementation Date: Implementation date for this action is the 2016-17 Academic year.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to drop CHE 3920 (Air Quality Management)

Motion: On behalf of the Department of Chemical Engineering, the Committee on Academic Operation recommends and I move, that CHE 3920. Air Quality Management be removed from the undergraduate catalog.

Description of Course to be dropped:

CHE 3920. AIR QUALITY MANAGEMENT
Cat. II This course discusses the sources, sinks, ambient concentrations and effects of major gaseous and particulate air pollutants. The course is problem oriented and applied engineering methods to develop strategies for managing air quality on a local, regional and global scale. Topics include: indoor air quality, regional air shed modelling, global atmospheric change and design and efficiencies of air pollution control devices. Recommended background: knowledge of chemistry, mathematics and engineering principles. This course will be offered in 2016-17, and in alternating years thereafter.

Proposed Changes to the Undergraduate Catalog:

CHE 3920 should be removed from the catalog. It appears in five places in the 15-16 catalog: p. 64 (in list of courses that count towards Chemical Engineering with Environmental Concentration), p. 75 (in a list of courses that count towards Civil Engineering with Environmental Concentration), p. 80 (in a list of elective courses for Environmental Engineering Majors), p. 85 (in list of courses that can be used towards Humanities and Arts with Environmental Studies Concentration), and p. 138 (course description). CHE 4063. Transport and Transformations in the Environment should be added to the list on p. 85 as a substitute.

Rationale:
This course is an elective Engineering Science and Design course taken primarily by chemical engineering majors. The current instructor for the course is retiring from teaching. Students interested in environmental technology will be directed towards CHE 4063. Transport and Transformations in the Environment that has overlapping content.

Impact on Distribution Requirements and Other Courses: As indicated above, this course is one of several options for Chemical Engineering students interested in an Environmental Concentration and Humanities and Arts Majors interested in an Environmental Studies Concentration, and Environmental Engineering Majors. Both Concentrations and the Environmental Engineering Major have enough other options without this course.

If there is a course to replace this, which one? Interested students will be advised to take CHE 4063. Transport and Transformations in the Environment.

Resource requirements: This course has been taught by an adjunct professor who is retiring from teaching.

Implementation Date: Implementation date for this action is the 2016-17 Academic year.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add AE 2712 (Introduction to Aerospace Structures)

Motion: On behalf of the Aerospace Engineering Program, the Committee on Academic Operation recommends and I move, that AE 2712 Introduction to Aerospace Structures as described below, be added.

Proposed Course/Catalog Description
AE 2712 Introduction to Aerospace Structures *(Cat. I)*
This course introduces the basic concepts of stress analysis and extensively covers mechanics of aerospace structures under bending loads. Topics include: Three-dimensional stress and strain, stress transformation and Mohr's circle, basic constitutive relationships, statically determinate and indeterminate one-dimensional problems, thermal stresses, and stress distributions and deflections of structural elements under bending loads. The laboratory component of this course will introduce the students to basic constitutive behavior of isotropic and anisotropic composites materials.
Recommended background: differential (MA 1021or equivalent) and integral (MA 1022 or equivalent) calculus, vector algebra (MA1023 or equivalent), and double and triple integration (MA 1024 or equivalent).

Anticipated Instructor
Prof. Richman (primary) and Prof. Karanjgaokar.

Rationale:
The proposed AE 2712 Introduction to Aerospace Structures course will provide AE majors the opportunity to study the fundamentals of mechanics encountered in aerospace structures. The proposed AE 2712 Introduction to Aerospace Structures course, along with the revised AE 3712 Aerospace Structures and the existing AE 4712 Structural Dynamics, will address the ABET requirement for comprehensive coverage of aircraft and space structures. The addition of a laboratory component of AE 2712 will provide the students with a practical understanding of basic constitutive relationships for isotropic and anisotropic composite materials used in aerospace structures.

While the proposed course will emphasize aerospace systems, the coverage of fundamental mechanics of structures will make it accessible and of interest to ME majors with an interest in AE, as well as other engineering majors. Based on previous enrollment data of AE 3712 Aerospace Structures, we expect that 40-50 AE and 10-20 ME students will take AE 2712 each year.

The proposed AE 2712 has been primarily developed by Professor Richman who has been teaching ES2502 Stress for more than 20 years and has also developed, and taught for more than 10 years, the AE 3712 Aerospace Structure course. The AE Program Committee reviews the required courses annually as part of the ABET preparation and will make any necessary revisions based on student feedback.

Impact on Distribution Requirements: The introduction of AE 2712 Intro to Aerospace structures has no impact on the AE distribution requirements. For students entering in the 2016-17 AY, AE 2712 Intro to Aerospace Structures will replace ES 2502 Stress Analysis as the recommended course to fulfill the existing distribution requirements. This course replacement will be reflected in the revised AE Course Recommendation chart that is distributed to students during academic advising.

Implementation Date: Implementation date for this action is the 2016-2017 Academic year.

Resource Needs: AE 2712 will be offered once per year. With the recent addition Professor Karanjgaokar in the area of aerospace structures, the AE Program has two faculty members who can teach the course. The lab equipment for this course are in HL 216 and the laboratory sessions will run in HL216. This room currently houses the wind tunnel and other apparatus used for the fluid-related labs in AE 3711 Aerodynamics, so no additional space is required.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to revise AE 3712 (Aerospace Structures)

Motion: On behalf of the Aerospace Engineering Program, the Committee on Academic Operations recommends and I move that the catalog course description for the course AE 3712 Aerospace Structures be modified as described below.

Proposed (Revised) Course description: (Additions are indicated with an underline, deletions with ~~overstrike~~.) This revised description should replace the current description for AE 3712 in the undergraduate catalog.

AE 3712. AEROSPACE STRUCTURES.
Cat. I
~~This is a course that covers stress analysis of aerospace structures~~. This course provides an overview of theoretical and practical aspects of mechanics of structures relevant to aerospace applications under different loading conditions. It begins with an overview ~~of stress, strain, three-dimensional elasticity theory, and stress-strain relations for anisotropic materials~~ of energy methods used in mechanics of aerospace structures. ~~stress, strain, three-dimensional elasticity theory, and stress-strain relations for anisotropic materials.~~ Applied topics include general torsion of solid circular and noncircular cross sections, torsion of thin-walled multi-celled members, ~~bidirectional bending of unsymmetric cross sections,~~ flexural shear flow in and shear center of thin walled multi-celled members, buckling and stability of columns, and aerospace structures under combined loading. The laboratory component of this course will provide students with testing and measurement experience related to determination of shear center and the behavior of structures undergoing buckling.
Recommended background: Introductory level aerospace structures (AE 2712, or equivalent.)

Anticipated Instructor
Prof. Richman (primary) and Prof. Karanjgaokar.

Rationale:
This revision realigns the content of this course with the newly introduced AE 2712 Introduction to Aerospace Structures.

Implementation Date: Implementation date for this action is the 2016-2017 academic year.

Resource Needs: The equipment for this course is in HL 216 and the laboratory sessions will be held in HL216. This room currently houses the wind tunnel and other apparatus used for the fluid-related labs in AE 3711 Aerodynamics, so no additional space is required.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to add AE 5106 (Air Breathing Propulsion)

Motion: On behalf of the Aerospace Engineering Program, the Committee on Graduate Studies and Research recommends and I move that AE 5106 (Air Breathing Propulsion) be added, as described below.

Proposed Course Description:

AE 5106 Air Breathing Propulsion (2 credits)
This course covers at the introductory graduate level the design and performance of air-breathing propulsion engines. Topics covered will be chosen from: jet propulsion theory, gas turbine, ramjet, scramjet, gas dynamics of inlet and nozzle flows, component matching, thermodynamic cycle analysis of the propulsion systems, and combustion control in propulsion systems.

Impact on Degree Requirements:

The AE 5106 Air Breathing Propulsion will become one of the courses under the Fluids and Propulsion Core Area of Study for students entering in the 2016-17 academic year.

Rationale:
The proposed AE 5106 Air Breathing Propulsion course will provide graduate students the fundamental knowledge about air-breathing engine operations including gas dynamics, compressible flows, thermodynamics, and combustion. Air-breathing engines play an essential role in most of civil and military air transportation applications. The coverage of topics make the course also relevant to the mechanical engineering program and we expect around 20-25 graduate students enrolled annually. The course will be offered onsite with an online component and thus, expected to draw interest from professionals in the large, regional jet-propulsion industry.

Resources and Anticipated Instructors: Professor Im (primary) and Professors Gatsonis, Blandino, Olinger, Linn (secondary). No new faculty will be needed. Prof. Im was hired in 2014 with research expertise in air-breathing propulsion is available to teach this course. He has been teaching the undergraduate courses in rocket and air breathing propulsion. AE 5106 Air Breathing Propulsion will be offered once per year.

Implementation Date: Implementation date for this action is the 2016-2017 academic year.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to add AE 5383 (Composite Materials)

Motion: On behalf of the Aerospace Engineering Program, the Committee on Graduate Studies and Research recommends and I move that AE 5383 (Composite Materials) be added, as described below.

Proposed Course Description:

AE 5383 Composite Materials (2 credits)
This course covers the anisotropic constitutive behavior and micromechanics of composite materials, and the mechanics of composite structures at an introductory graduate level. Topics covered will be chosen from: classification of composites (reinforcements and matrices), anisotropic elasticity, composite micromechanics, effect of reinforcement on toughness and strength of composites, laminate theory, statics and buckling of laminated beams and plates, statics of laminated shells, residual stresses and thermal effects in laminates.

Impact on Degree Requirements: The AE 5383 Composite Materials will become one of the courses under the Materials and Structures Core Area of Study for students entering in the 2016-17 academic year.

Rationale:
The proposed AE 5383 course will provide graduate students with the fundamental knowledge about mechanics of composite materials and structures. Most modern aerospace applications employ composite structures and thus a clear understanding of the underlying principles involved in mechanics of composites has become essential. The AE 5383 will be offered once per year and will become one of the courses under the Materials and Structures Core Area of Study. The coverage of topics in AE 5383 is relevant also to mechanical engineering, as well as material science and engineering programs. Faculty from Material Science and Engineering have endorsed the course. We expect around 15-20 graduate students enrolled annually. The course will be offered onsite with an online component and thus, expected to draw interest from the professionals in the large regional materials industry.

Resources and Anticipated Instructors: Prof. Karanjgaokar (primary) and Professor Richman (secondary). No new faculty will be needed. Prof. Karanjgaokar was hired in 2015 with research expertise in aerospace materials is available to teach this course. AE 5383 Composite Materials will be offered once per year.

Implementation Date: Implementation date for this action is the 2016-2017 academic year.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to modify Aerospace Engineering Core and Breadth Areas of Study

Motion: On behalf of the Aerospace Engineering Program, the Committee on Graduate Studies and Research recommends and I move that the Core and Breadth Areas of Study as given in the "Degree Requirements" section in the Aerospace Engineering section of the 2015-2016 Graduate Catalog (pp. 26-27) be modified, as described below.

Description of Proposed Revisions to be included in Graduate Catalog (with additions underlined and deletions ~~struck-through~~):

Degree Requirements: The AE degrees are based on a graduate curriculum which is composed of three areas of study: Fluids and Propulsion; Materials and Structures; Dynamics and Controls. Each area of study consists of a Core and Breadth component as shown in Table 1.

Table 1: Core and Breadth Areas of Study in AE

Fluids and Propulsion
Core
AE 5101/ME 5101. Advanced Fluid Dynamics (2 credits)
~~AE 5102/ME 5102. Advanced Gas Dynamics (2 credits)~~
AE 5106 Air Breathing Propulsion (2 credits) or
AE 5111/ME 5111. Spacecraft Propulsion (2 credits)
Breadth
AE 5102/ME 5102. Advanced Gas Dynamics (2 credits)
AE 5103/ME 5103. Computational Fluid Dynamics (2 credits)
AE 5104/ME 5104. Turbomachinery (2 credits)
AE 5105/ME 5105. Renewable Energy (2 credits)
AE 5110/ME 5110. Introduction to Plasma Dynamics (2 credits)
~~AE 5111/ME 5111. Spacecraft Propulsion (2 credits)~~
ME 513. Thermodynamics (3 credits)
ME 516. Heat Transfer (3 credits)
FPE 580. Combustion (3 credits)
Dynamics and Control
Core
AE 5223/ME 5223. Space Vehicle Dynamics and Control (2 credits) or
AE 5224/ME 5224. Air Vehicle Dynamics and Control (2 credits)
~~AE 5202ME 5202. Advanced Dynamics (2 credits)~~
AE 5220/ME 5220. Control of Linear Dynamical Systems (2 credits)
Breadth
AE 5200/ME 5200. Mechanical Vibrations (2 credits)
AE 5202ME 5202. Advanced Dynamics (2 credits)
AE 5221/ME 5221. Control of Nonlinear Dynamical Systems (2 credits)
AE 5222/ME 5222. Optimal Control of Dynamical Systems (2 credits)
~~AE 5223/ME 5223. Space Vehicle Dynamics and Control (2 credits)~~
~~AE 5224/ME 5224. Air Vehicle Dynamics and Control (2 credits)~~
Materials and Structures
Core
AE 5383 Composite Materials (2 credits)
AE 5380/ME 5380. Foundations of Elasticity (2 credits) or
AE 5381/ME 5381. Applied Elasticity (2 credits)
~~AE/ME 5382. Aeroelasticity (2 credits)~~
Breadth
AE/ME 5382. Aeroelasticity (2 credits)
ME 5303/CE 5303. Applied Finite Element Methods in Engineering (2 credits)
ME 5311/MTE 511. Structure and Properties of Engineering Materials (2 credits)
ME 5312/MTE 512. Properties and Performance of Engineering Materials (2 credits)
ME 5356/MTE 556. Smart Materials (2 credits)
ME 5361/MTE 561. Mechanical Behavior and Fracture of Materials (2 credits)

Rationale: The changes in the list of courses in the Fluids and Propulsion and Materials and Structures Core Areas of Study allow for the inclusion of courses that represent accurately the Core Area of Study definitions.

Resources and Anticipated Instructors: No new faculty will be needed.

Implementation Date: Implementation date for this action is the 2016-2017 academic year.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to add RBE 594 (Capstone Project Experience in Robotics Engineering)

Motion: On behalf of the Robotics Engineering Program, the Committee on Graduate Studies and Research recommends and I move that RBE 594 (Capstone Project Experience in Robotics Engineering) be added, as described below.

Proposed Course Description:

RBE 594 Capstone Project Experience in Robotics Engineering (3 credits)
This project-based course integrates robotics engineering theory and practice, and provides the opportunity to apply the skills and knowledge acquired in the Robotics Engineering curriculum. The project is normally conducted in teams of two to four students. Students are encouraged to select projects with practical significance to their current and future professional responsibilities. The projects are administered, advised, and evaluated by WPI faculty as part of the learning experience, but students are also encouraged to seek mentorship from experienced colleagues in the Robotics Engineering profession. Prerequisites: Since the Capstone Project will draw on knowledge obtained throughout the degree program, it is expected that students will have completed most or all of the coursework within their plan of study before undertaking the capstone project.

Course Outcomes:
At the end of this capstone course (project):

1. Students will be able to explain how multiple areas of RBE study are thematically related based on material from the various courses they have taken during their RBE MS program of study.

2. Students will be able to propose, plan, and execute a project that is representative of MS level work in robotics engineering.

3. Students will be able to clearly explain their capstone project as appropriate to audiences such as RBE faculty, knowledgeable professionals in the robotics engineering field, and the lay public.

Rationale: The proposed capstone experience course will be a more efficient means of satisfying the RBE M.S. non-thesis option capstone requirement.

Resources and Anticipated Instructors: As discussed in the companion motion, the introduction of course RBE 594 represents a net reduction in resources required compared to the resources required by the existing program. If approved, Prof. Fred Looft will teach the first offering of RBE 594 Capstone Project Experience in Robotics Engineering in spring 2016 based on his experience teaching SYS 585 Systems Engineering Capstone Experience.

Implementation Date: Implementation date for this action is the spring semester of the 2015--2016 academic year.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to modify the Degree Requirements for the non-thesis M.S. in RBE

Motion: On behalf of the Robotics Engineering Program, the Committee on Graduate Studies and Research recommends and I move that the "Degree Requirements" section in the 2015-2016 Graduate Catalog (pp. 157-159) be modified by reducing the six credit M.S. Capstone requirement to three credits, as described below.

Description of Proposed Revisions to the Graduate Catalog (with additions underlined and deletions ~~struck through~~):

Degree Requirements
For the M.S.
The M.S. program in Robotics Engineering requires 30 credit hours of work. Students may select a non-thesis option, which requires a ~~6~~3-credit capstone design/practicum, or a thesis option which requires a 9-credit thesis. All entering students must submit a plan of study identifying the courses to be taken and a prospective project topic before the end of the first semester in the program. The plan of study must be approved by the student's advisor and the RBE Graduate Program Committee, and must include the following minimum requirements:

1. Robotics Core (15 credits)*
• Foundations (9 credits)
RBE 500 Foundations of Robotics
RBE/ME 501 Robot Dynamics
RBE 502 Robot Control

• Core (6 credits)
Any RBE 500+ other than the above.
(*) *At least 15 credits are needed. Any additional credits accrued from these courses will be counted as Electives.*

2. Engineering Context (3 credits):
3 credits hours selected from the following courses:
ETR 500 Entrepreneurship and Innovation
MIS 576 Project Management
OBC 501 Interpersonal and Leadership Skills
BUS 546 Managing Technological Innovation
Courses prefixed by SYS at the 500 level or above.

3. Capstone/Thesis (~~6~~3-9 credits):
A ~~6~~3 credit hour capstone ~~design project/practicum~~ experience or a 9 credit hour thesis.

4. Electives (3-9 credits):
Sufficient course work selected from courses at the 500 level or above with a prefix of RBE, CS, ECE, MA, ME, or SYS to total 30 credit hours. Courses at the 4000 level may also be taken as electives with the prior approval of the RBE Graduate Committee.

Thesis Option
The M.S. thesis consists of 9 credit hours of work, normally spread over at least one academic year. A thesis committee will be set up during the first semester of thesis work. This committee will be selected by the student in consultation with the major advisor and will consist of the thesis advisor, who must be a full-time WPI RBE faculty member, and two other faculty members, at least one of whom is a WPI RBE faculty member, whose expertise will aid the student's research program. An oral presentation before the Thesis Committee and a general audience is required. In addition, all WPI thesis regulations must be followed.

Non-Thesis Options
As an alternative to a 9-credit research-based thesis, students may elect a ~~project or practicum to include a design/research component in their graduate program.~~ 3-credit capstone from the following options:

- Capstone Project Experience in Robotics Engineering (RBE 594),
- Robotics Engineering Practicum (RBE 596), or
- Directed Research (RBE 598).

All of the non-thesis options must demonstrate significant graduate-level work involving Robotics Engineering, include substantial analysis and/or design, and conclude with a written report and presentation.

~~For an M.S. Degree in Robotics Engineering this can be accomplished by completing a 6-credit capstone design project RBE 598 or a practicum RBE 596. The capstone design must demonstrate significant graduate-level work involving Robotics Engineering. The capstone design project must include substantial analysis and/or design related to robotics engineering and will conclude with a substantial written report submitted to the advisor.~~
~~A practicum provides students an opportunity to put into practice the principles that have been studied in previous courses. It will generally be conducted off campus and will involve a real-world robotics-engineering situation. Overall conduct of the practicum will be supervised by a WPI RBE faculty member; an on-site liaison will direct day-to-day activity. For a student from industry, the practicum may be sponsored by his or her employer. The project must include substantial analysis and/or design related to robotics engineering and will conclude with a substantial written report submitted to the advisor and on-site liaison~~.

The Capstone Project Experience in Robotics Engineering (RBE 594) is a project-based course that integrates theory and practice, and provides the opportunity to apply the skills and knowledge acquired in the Robotics Engineering curriculum. The project is normally conducted in teams of two to four students. Students are encouraged to select projects with practical significance to their current and future professional responsibilities. The projects are administered, advised, and evaluated by WPI faculty as part of the learning experience, but students are also encouraged to seek mentorship from experienced colleagues in the Robotics Engineering profession.

The Robotics Engineering Practicum (RBE 596) provides students an opportunity to put into practice the principles that have been studied in previous courses. It will generally be conducted off campus and will involve a real-world robotics-engineering situation. Overall conduct of the practicum will be supervised by a WPI RBE faculty member; an on-site liaison will direct day-to-day activity. For a student from industry, the practicum may be sponsored by his or her employer. The project must include substantial analysis and/or design related to robotics engineering and will conclude with a substantial written report submitted to the advisor and on-site liaison.

The Directed Research (RBE 598) option provides a research-oriented means to satisfy the capstone requirement. The student and research advisor will agree on the specific topics and deliverables on a per-project basis. The project must include substantial research, analysis and/or design related to robotics engineering and will conclude with a substantial written report and public presentation.

Summary of Credit Requirements

		Non-Thesis		Thesis	
		MS Only	**BS/MS**	**MS Only**	**BS/MS**
Robotics Core	**Foundations**	9	9	9	9
	Other Core	6	6	6	6
Engineering Context		3	3	3	3
Electives		9	9	3	3
Thesis		–	–	9	MQP+6
Capstone Course / Research / Practicum		3	3	–	–
Double Counted Courses		–	(12)	–	(9)
Total		30	18	30	18

BS/MS in Robotics Engineering

~~The requirements for the M.S. in Robotics Engineering are structured so that undergraduate students are able to pursue a five-year Bachelors/Masters program, in which the Bachelors degree is awarded in any major offered at WPI and the Masters degree is awarded in Robotics Engineering. WPI allows the double counting of up to 12 credits for students pursuing a 5-year Bachelors-Masters program. This overlap can be achieved through the following mechanisms:~~

~~• Up to three graduate courses in RBE, CS, ECE, or ME taken by the student may be counted towards meeting the engineering/science/elective requirements of the student's undergraduate major, subject to approval by his/her major department.~~

~~• Up to two 4000-level undergraduate courses taken by the student in his/her undergraduate major program may be counted towards the requirements of the Masters Degree in Robotics Engineering if they can be placed in one of the requirement categories listed above and are approved by the Robotics Engineering Graduate Program Committee.~~

~~• Up to three credits can be earned towards fulfillment of the capstone design requirement by double counting a senior undergraduate project if it involves substantial use of Robotics Engineering at an advanced level, subject to approval by the Robotics Engineering Graduate Program Committee. In this case, students may satisfy the capstone design requirement by completing 3 credits of capstone design project RBE 598 or practicum RBE 596, not necessarily related to the senior undergraduate project.~~

WPI allows the double counting of up to 12 credits for students pursuing a 5-year Bachelors-Masters program. This 12 credit overlap can be achieved through the following mechanisms:

- Up to 12 graduate credits in RBE, CS, ECE, or ME taken by the student may be counted towards meeting the engineering/science/elective requirements of the student's undergraduate major, subject to approval by his/her major department.

- Up to 4 credits (2/3 undergraduate units) of 4000-level undergraduate courses taken by the student in his/her undergraduate major program may be counted towards the requirements of the Masters Degree in Robotics Engineering if they can be placed in one of the requirement categories listed above and are approved by the Robotics Engineering Graduate Program Committee.

- Up to 3 credits (1/2 undergraduate unit) can be earned towards fulfillment of the thesis requirement by double counting a Major Qualifying Project, provided that

    - the MQP involves substantial use of Robotics Engineering at an advanced level,

    - the thesis research is a continuation or extension of the MQP work,

    - the student satisfies the thesis requirement by completing at least 6 additional credits of RBE 599 Thesis Research, and

    - the thesis advisor and Robotics Engineering Graduate Program Committee approve the double counting.

MQP work may not be double-counted toward the non-thesis option.

Rationale: The Robotics Engineering M.S. program offers thesis and non-thesis options. The thesis option remains essentially unchanged. We propose to revise the non-thesis option, applying to the majority of RBE M.S. students, to address problems that have become manifest.

The existing non-thesis option requires a 6-credit capstone. This requirement has proven unwieldy and burdensome on both faculty and students, it does not scale well as the Robotics Engineering M.S. program has expanded, and it presents an obstacle to on-line students. The current proposal addresses these problems by reducing the capstone to 3 credits, which is consistent with other WPI M.S. programs[1], and by introducing a capstone experience course as a more efficient, yet effective, means of satisfying the capstone requirement and meeting its goals.

We expect that most non-thesis students will satisfy the capstone experience through the new Capstone Experience course. However, the Directed Research and Practicum options will remain available to students.

The existing M.S. program allows B.S./M.S. students to double count up to 3 credits of MQP on the grounds that they would still be required to earn an additional 3 credits to reach the 6 credit graduate capstone requirement. However, we are concerned that under the current proposal, students could use this double-counting option without integrating graduate-level work into the capstone. Thus we have adjusted the proposal to disallow this double-counting, ensuring that the graduate capstone is at a graduate level.

The Graduate Catalog recognizes that some MQPs can lead to M.S. theses, stating (WPI 2015-16 Graduate Catalog, p. 6): “A student’s advisor and graduate coordinator will also determine what role the MQP will play in the BS/MS program. Sometimes the MQP provides a foundation for a thesis.”

[1] E.g., Applied Mathematics, Applied Statistics, Business, Civil & Environmental Engineering, Financial Mathematics, Interactive Media & Game Development, Materials Science and Engineering, Power Systems Engineering, Power Systems Management, System Dynamics, Systems Engineering.

Consistent with this guidance, we propose to allow students to double count the MQP toward the thesis by completing an additional 6 credits of related thesis work with advisor and RBE Graduate Program Committee approval.

Resources and Anticipated Instructors: Despite introducing a new course RBE 594, this proposal represents a *net reduction* in resources required compared to the resources required by the existing program. For example, in Fall 2015, over 60 new M.S. students enrolled in RBE. Suppose that 50 of them undertake capstones; the rest elect thesis or practicum. Under the existing program, faculty will typically spend 2 hours/week per student (in-person meetings, reading /evaluating proposals and reports, email) over 2 semesters for a total of 50 students x 2 hr/week/student x 14 weeks/semester x 2 semesters = 2800 hours. Under the current proposal, the same 50 students can be accommodated in 2 offerings of RBE 594. Recognizing that this course takes more faculty effort than a typical course, say 25 hours/week, the faculty workload would be 2 offerings x 25 hr/week/offering x 14 weeks/semester = 700 hours.

If approved, Prof. Fred Looft will teach the first offering of RBE 594 Capstone Project Experience in Robotics Engineering in spring 2016 based on his experience teaching SYS 585 Systems Engineering Capstone Experience.

It should be noted that the proposal also shifts some of the student effort into additional coursework; however, that represents an incremental increase in faculty workload.

Implementation Date: Implementation date for this action is the spring semester of the 2015--2016 academic year.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Governance (Prof. Gaudette, Chair)
Re: Motion to use the runners-up in last year's COG election as nominees to fill a current vacancy on COG

Motion: The Committee on Governance (COG) recommends and I move that, in order to fill the current vacancy on COG, the Faculty nominate the three highest vote-getters who were not elected in last year's COG election but who are still willing to serve, and that a special campus-wide election be held to elect the new COG member, who will serve out the remainder of the unexpired term (in this case, until June 30, 2017).

Rationale:
Normally, we fill vacancies on a committee simply with the next runner-up (who is still willing to serve) from the previous year's election for that committee. The replacement serves out what remains of the academic year (technically through June 30), and then we fill what remains of the unexpired term (beyond July 1) by election (held in the spring).

However, when the vacancy occurs on COG, the Faculty Handbook indicates that, "Vacancies that occur during the academic year are filled for the unexpired term by special election *from a ballot of candidates nominated at a Faculty meeting*."

The motion proposes a way for the nominations to be formally made at a Faculty meeting, as the Handbook requires. But, rather than requiring attendance by nominators at a single particular Faculty meeting, it relies on the systematic campus-wide nomination process by which nominees for COG are normally identified.

Date: November 19, 2015
To: WPI Faculty
From: Committee on Governance (Prof. Gaudette, Chair)
Committee on IT Policy (Prof. Shue, Chair)
Re: Motion to Update the Charge and Membership Rules of the CITP

Motion: On behalf of the Committee on Information Technology Policy (CITP), the Committee on Governance (COG) recommends and I move that the charge and membership rules of the CITP be updated as described below, and that the updated description of the CITP be inserted into PART ONE, Bylaw One, Section I (as subsection I.a) following the description of COG in the Faculty Handbook.

Description of Proposed Changes (with deletions ~~struck through~~ and additions underlined):

~~The responsibilities of the Committee on Information Technology Policy (CITP) will include but will not be limited to working with representatives from the information technology (IT) division on any and all issues and policies that pertain to faculty usage of WPI computer hardware, software, websites, and other network facilities. In particular, the sub-committee will be concerned with the implications that any such policy may have on the academic freedom, privacy, and working environment of the Faculty and the academic policy and practices of the university.~~

I.a The Committee on Information Technology Policy (CITP) is a permanent subcommittee of COG that shall have purview over all Information Technology policies, procedures, and practices that affect WPI's academic and research missions. The committee works with representatives from the Information Technology Services (ITS) division and other departments, as needed, on all matters related to computing at WPI.

The five-person CITP includes three faculty members: one selected by COG; one selected by CAP; and one selected by CTAF. In addition, the sub-committee will include a member appointed by the Provost from the Division of Academic Affairs, and, *ex officio*, the ~~Vice President of Information Technology~~ Chief Information Officer. The sub-committee elects its Chair from among the three faculty members selected by COG, CAP, and CTAF. The members selected by COG, CAP, and CTAF serve staggered three-year terms, and also serve as the three faculty members appointed to IT's Academic Computing Policy Committee and Working Group. The elected Chair of CITP also serves on the IT Governance Committee. The Provost's appointment to CITP is made each year, with consideration given to the advantages of having members serve longer than one year.*

Although the faculty members appointed to CITP ~~selected~~ need not be members of the standing committees that select them, each individual should have a sound appreciation for the issues with which those committees and other standing committees deal on a regular basis. In addition, each

*Because CITP is not a standing Committee of the Faculty, Section Three, paragraph IV.E of the Bylaws prohibiting committee members from succeeding do not apply.

should have the technical background required to provide constructive input when dealing with the issues that the CITP will likely confront.

It will be the responsibility of the faculty members of the CITP to update the appropriate Faculty committees, including COG, CAP, and CTAF, on any new or modified policies proposed in their work ~~with the IT division, and to bring to COG for its consideration any policy proposal related to information technology that will affect the academic environment at WPI or the working routines of the Faculty~~. The Committee may propose new technology-related policies for consideration by COG. With COG's approval, any such proposal will be forwarded to the Faculty for its consideration**.**

Rationale: The WPI community has embraced the significant growth of computing technologies and the resulting societal impacts. At WPI, computing affects all parts of the university's academic and research mission, as well as the university's function. Accordingly, the implementation of computing technology can effectively create *de facto* policy for the university, without otherwise being reviewed or approved by the Faculty. This motion expands the role of CITP to consider the broader impact of technology on the university and community, in addition to direct impact on faculty.

In previous years, CITP has operated in an advisory capacity to IT Services. While CITP will continue to do so, this motion indicates that CITP may also originate motions and explore policy matters independently, where appropriate.

The motion clarifies that provision IV.E from Section Three of the Faculty Handbook, which prohibits elected and appointed members of a standing committee from succeeding themselves, does not apply.