WORCESTER POLYTECHNIC INSTITUTE
December 18, 2015

To: The WPI Faculty

From: M. W. Richman
Secretary of the Faculty

The fourth Faculty meeting of the 2015-2016 academic year will be held on **Friday, December 18, 2015 at 10:00 am in Olin Hall 107,** with refreshments at 9:45**.**

1.	Call to Order	M. Richman
	• Consideration of the Minutes and 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 Prof. Robert Connors	J. Pavlik
6.	Committee Business	
	Committee on Governance (COG)	
	• Motion to modify the Comm. on Information Technology Policy (CITP)	G. Gaudette C. Shue
7.	Committee Reports (for Open Discussion)	
	• Committee on Administrative and Financial Policy (FAP) - How is FAP Evolving Under Our New Administration? - Accomplishments, Opportunities, and Challenges	D. Spanagel
8.	Special Report (for Open Discussion)	
	WPI's Research Enterprise in the Strategic Plan	B. Vernescu
9.	Old Business	
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12.	Adjourn	

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WORCESTER POLYTECHNIC INSTITUTE
Faculty Meeting Minutes
November 19, 2015

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6. Committee Business
7. Special Report - The Foisie Innovation Studio
8. Adjourn

Detail:

1. Call to Order

The third meeting of the 2015-2016 academic year was called to order at 3:20pm in Olin 107 by **Prof. Richman** (ME). The consent agenda, including the minutes from Oct. 16, 2015, were approved as distributed.

2. Announcements

Prof. Richman noted that summaries of the Board of Trustees' November 5-6 Board committee meetings were currently being prepared by the faculty appointees to those committees (Academic Planning, Budget and Finance, Facilities and Infrastructure, Student Affairs, and Marketing) and will be distributed to the Faculty before the December Faculty meeting.

Prof. Richman encouraged all those in attendance to participate in the first of a series of conversations about campus diversity and inclusion to be held at 5pm tonight. On a sperate matter, he also explained that the goal was to finalize (by early next week) the ballots for the elected members of the Dean of Engineering and the Vice Provost for Research search committees.

Prof. Richman lightheartedly expressed his view that Provost Bursten's presentation on the need for Deans at WPI at the November Faculty meeting was based on an assumption that we should maintain our current academic administrative structure and, as a result, constrained the freewheeling discussion that we might have otherwise had. (See **Addendum #1** attached to these minutes.)

3. President's Remarks

President Leshin explained that tonight's open conversation on diversity and inclusion was to provide a moment of campus unity rather than to set a list of action items, and that it would be a first in several related events. She encouraged the entire community to participate tonight (at 5pm in Alden Hall) and in the future.

President Leshin made reference to Jack Marcy, an astronomy professor at UC Berkeley, who is currently facing allegations of sexually harassment by his former students. President Leshin expressed her outrage at such behavior, emphasized the responsibility that we have when we interact with our students, and declared that such harassment has no place at WPI. She pointed out that we are required by law to report any claims of sexual harassment to our Title IV coordinator (Phil Clay). When doing so, it is not appropriate to protect the identity of the student making the claim.

President Leshin reported that the Board of Trustees unanimously endorsed the Strategic Plan in its written form. The intention is to talk about different elements of the plan at future Faculty meetings beginning today with the Foisie Innovation Studio.

President Leshin explained that the old budget process is evolving into an overall institutional planning process with a budget component. The new process involves faculty input through the Chair of FAP, the

Secretary of the Faculty, and one faculty appointee on the Board of Trustees' Budget and Finance Committee.

President Leshin indicated that WPI is close to signing a three-year agreement with Southern New Hampshire University (SNHU) to provide four online systems engineering courses that will be available to students with an engineering management concentration in SNHU's MBA program. President Leshin explained that the program would initially be offered to 35 students, and that WPI would receive the tuition revenues. The students would receive no academic credit from WPI. The courses would be prepared by WPI faculty members who would be paid by WPI and retain the intellectual property involved. President Leshin emphasized that the SNHU students in this program will be from a very different demographic than are students that we attract to WPI. The arrangement has been endorsed by the marketing committee of WPI's Board of Trustees.

4. Provost's Remarks

Provost Bursten recognized Prof. Apelian (ME), who introduced new faculty member Prof. Brajendra Mishra (ME). Based on his experiences at the November Board of Trustees' meeting, Provost Bursten reported his positive impressions of the Board of Trustees and also thanked Prof. Burnham and Prof. Ludwig for their service as faculty appointees to the Board's Academic Planning Committee.

Provost Bursten explained that beginning this year, through conversations with the Deans, faculty hiring will be aligned with the strategic plan using the strategy of cluster hiring across departments.

Provost Bursten expressed his appreciation for the open discussion that followed his presentation at last month's Faculty meeting. He explained that faculty and administrators did not represent "orthogonal" interests (as he thought Prof. Richman's slide suggested) and that in his presentation last month he tried to provide a high level explanation of WPI's need for Deans and what they can provide. He assured those in attendance that we would continue to discuss the roles and responsibilities of the Deans and how we can increase efficiency and avoid administrative redundancy among the Deans.

5. Memorial Resolution for Dean William Grogan

Prof. Schachterle (HU&A) read a memorial resolution in honor of Dean William Grogan. (See **Addendum #2** attached to these minutes.) The resolution **passed** and a moment of silence was observed.

6. Committee Business

Committee on Governance:

Prof. Gaudette (BME) for COG moved 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). **Prof. Richman** identified those three nominees as Prof. Boudreau (HU&A), Prof. Dominko (BBT), and Prof. Vassallo (BUS). **Prof. Gaudette** explained that the COG vacancy occurred because Prof. McNeill resigned from the committee due to personal reasons, and that the Faculty Handbook required that such vacancies be filled for the unexpired term by a special election from a ballot of candidates nominated at a Faculty meeting. The motion **passed**. **Prof. Richman** asked for any additional nominations to fill the vacancy. There were none offered.

Prof. Shue (CS) explained a motion (that will be made formally by COG next month) to modify the charge of the Committee on Information Technology Policy (CITP), which is a permanent subcommittee of COG. (See **Addendum #3** attached to these minutes.) Prof. Shue explained that the motion will place a description of CITP in the Faculty Handbook and that it would expand CITP's charge from its specific responsibilities for issues and policies that pertain to faculty-usage of WPI computer hardware, software, websites, and other network facilities to more general purview over all Information Technology policies, procedures, and practices that affect WPI's academic and research missions. In addition it would make

clear that CITP can send motions to the Faculty through COG, and it would clarify that members of CITP can succeed themselves.

Pres. Leshin asked how CITP fit into the current University governance of IT. **Prof. Shue** explained that the members of CITP also serve as members of IT's Academic Computing Policy Committee and Working Group, and that the Chair of CITP also serves on the IT Governance Committee.

Prof. Kinicki (CS) pointed out that whereas several years ago CITP had to meet only about once per term, its workload has increased so that it now meets about once per week. This reflects the importance of its work to us.

Prof. Gaudette (BME) asked about the level of technical expertise required of the CITP members given that all of us use WPI computer resources every day even though most of us are not IT-experts. **Prof. Shue** explained that IT issues can be very technical so that, at the very least, a member would have to be willing to put in the effort to understand the issues that arise.

Prof. Apelian (ME) made the point that it would also be worthwhile for members of CITP to represent the user-experience from non-IT-experts. Prof. Shue explained that when COG, CAP, CTAf, and the Provost make their appointments to CITP, they can collectively make sure that many faculty-perspectives are represented on the committee.

7. Special Report: The Foisie Innovation Studio

President Leshin explained that a campus group is helping to envision the activities that will take place in the Foisie Innovation Studio while at the same time architects are helping us begin the actual building process. We have decided to build from scratch rather than renovate, and to add a residence hall component to maintain the residential nature of the quad. Gensler has been chosen as the architect for the building because of their expertise with these kinds of collaborative studio spaces. The new building will be large enough to include additional classroom space. It will also include a Global Impact Lab. The building will be a central node on the campus and will be focused on innovation to complement the two existing towers of theory and practice. There are two teams in place: one is a Project Team that will stay with the project through its completion; the other is the Design Input Team that will represent the activities that might take place in the new building. **President Leshin** encouraged faculty members to offer their input to the Design Input Team, and she anticipated points in the design process at which faculty input would be actively solicited. **President Leshin** is committed to having the building open in fall 2018 and is committee to a cost of $45M at high efficiency and low cost per square foot.

Prof. Apelian (ME) explained that the building will have three elements (in addition to the residences): Global Impact Lab; Innovation/Entrepreneurial Space; and Makerspace. (See **Addendum #4** attached to these minutes.)

Prof. Boudreau (HU&A) described the Global Impact Lab as the place to intensify the impact of our global projects by bringing together students, faculty, scholars in residence, and NGO's in residence to share experiences and expertise. It may well include a media impact lab to develop techniques to better disseminate project and research work. It would be a way to create a more globally connected culture on campus and to use modern technologies push that out to the world. **Dean Ginzberg** (BUS) described the Innovation/Entrepreneurial Space as an incubator with flexible reconfigurable space where students can come together to develop new ventures.

Prof Apelian (ME) introduced two students who worked as part of a larger IQP team to envision the Makerspace. **Peter Mitrano** explained that the IQP team has been looking at similar spaces at other campuses. **Morgan Mitchell** emphasized the importance of making the space open for collaboration, adaptable for the foreseeable future, and available for IQP's, MQP's, GPS, and personal projects. The space should build a sense of community that extends from campus to all parts of the world, and from past students to current students. Finally, she made the point that the three elements of the building are not separate; rather they overlap to constitute the full Foisie Innovation Studio.

Prof. Apelian (ME) emphasized that there will be many opportunities for faculty members to interact with the Design Input Team as the project progresses.

Prof. Orr (ECE) made the point that we should think about the sustainability of the building and how we can make a statement with this building about our own particular approach to sustainability. That approach includes not just environmental factors but also social justice, which fits in perfectly with the global impact piece of the building.

Prof. Kinicki (CS) asked if, at another time, it would be possible to hear about the residential piece of the building. **President Leshin** explained that the dormitory is a newer piece of the project so it is in the initial discussion phase. Right now we anticipate it at as a 140-bed freshman-sophomore level hall, but we don't have a plan to restrict the dormitory to a special community of students.

Prof. Gaudette (BME) thought that we might need a more distinctive description of the building than "Innovation Studio." **President Leshin** agreed with the general sentiment.

Prof. Burnham (PH) wished that some of the space in the new building would be devoted to an active learning studio where content from lectures and labs would be blended in a place where students could talk to all their instructors about what they are learning as they were assimilating and distilling the information. **President Leshin** pointed out that Dean Wobbe is involved in conversations about the classrooms in the building and that the emphasis will be on flexibility with respect to configuration and in the sense that the space will not be for any one department.

Prof. Richman asked if there was a motion to extend the meeting for an extra five minutes. The motion was made and **did not pass**.

8. Adjournment

The meeting adjourned at 4:35pm.

Respectfully submitted,

Mark Richman, Secretary of the Faculty

Addenda on file with these minutes:

1. **SOF, Opening Remarks 11-19-15**
2. **Memorial Resolution in Honor of Dean William Grogan 11-19-15**
3. **Description of Modifications to CITP 11-19-15**
4. **Foisie Innovation Studio 11-19-15**

Note: This motion was discussed at the November 19, 2015 Faculty Meeting

Date: December 18, 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.[*]

[*] 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.

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 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.

Appendix:

Consent Agenda Items

(Continued on next page)

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add CS 4518 Mobile and Ubiquitous Computing

Motion: On behalf of the Department of Computer Science, the Committee on Academic Operation recommends and I move, that CS 4518 (Mobile and Ubiquitous Computing) as described below, be added.

Proposed Course Description:

CS 4518 Mobile and Ubiquitous Computing
Cat. II

The goal of this course is to acquaint students with fundamental concepts and state-of-the-art computer science literature in mobile and ubiquitous computing. Topics to be covered include mobile systems issues, human activity and emotion sensing, location sensing, mobile human-computer interaction, mobile social networking, mobile health, power saving techniques, energy and mobile performance measurement studies and mobile security. The course will introduce the programming of mobile devices such as smartphones running the Android operating system.
(Credit cannot be received for CS 4518 and CS 403X.)
Recommended background: Proficiency in programming in Java, including classes, inheritance, exceptions, interfaces, polymorphism (CS 2012 or equivalent).

Anticipated Instructor: Prof. Emmanuel Agu

Rationale: Mobile and ubiquitous computing are fast-growing segments of computing. Increasingly, users access wireless networks using smart phones, tablets, laptops and other mobile devices. Mobile and ubiquitous computing are important with wide applicability to societal, industrial and scientific domains. This course exposes undergraduate students to key concepts in mobile and ubiquitous computing. Students will also learn how to program a mobile device such as a smartphone running the Android Operating system.

This course was offered in experimental form under the number CS 403x during D-term, 2015, and it is being offered again under the same number in D-term 2016. The results of student feedback from the D-2015 offering are as follows:

1. The overall rating of the quality of this course was 3.73
2. The overall rating of the instructor's teaching was 3.47
9. The amount students reported that they learned from the course was 3.57
26. b On average, what were the total hours spent in each 7-day week OUTSIDE of formally scheduled class time in work related to this course (including studying, reading, writing, homework, rehearsal, etc)?

0 hr/wk:	0
1-5 hr/wk:	8
6-10 hr/wk:	12
11-15 hr/wk:	5
16-20 hr/wk:	3

21 hr/wk or more: 2

3. Instructor comments: “Overall, students seemed to like the course. They particularly loved learning how to program Android apps. Since this topical area is currently changing fast, there are currently no up-to-date textbooks. Presenting ideas from papers was the only way to expose students to cutting edge ideas. However, they did not seem to like reading cutting edge mobile computing papers. They probably would have preferred the class to be all about app programming. In future, I am considering preparing notes and presenting some of the fundamental mobile computing concepts myself.”

4. The total number of students taking the course in D-term, 2015 was 45.
   A total of 40 students are currently registered for the course in D-term 2016, and an additional 12 are waitlisted.

Impact on Distribution Requirements and Other Courses: This course does not impact the distribution requirements of students in Computer Science. It does, however, provide an additional option for satisfying Note 1c of the *Program Distribution Requirements for the Computer Science Major* as specified on page 74 of the 2015-2016 Undergraduate Catalog.

Resource Needs:

- Prof. Emmanuel Agu is scheduled to teach the course. CS has recently made several new hires and these additional teaching resources allow offering of the new course.
- A normal classroom seating 40-50 is required
- This course does not require any laboratory sessions.
- This course does not require any library support.
- This course does not require special support from the Academic Technology center
- The course requires students to program Android Smartphones — one phone per team of three students. Although some students already own Android phones and could use those own phones for course projects, attempting to program their own phones could, in some cases, void students’ warranties. For the experimental version of the course, the Computer Science Department provided 15 Android phones for student use.
- The Department-provided phones will need to be replaced approximately every three years. At current prices, this costs approximately $400 per phone. If, as expected, enrollment grows, the Department will have to expend up to $8000 for 20 replacement phones every three years.

Implementation Date: Implementation date for this action is the 2016-2017 Academic year and alternate years thereafter.

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add AR 2301 Graphic Design

Motion: On behalf of the Humanities and Arts department, the Committee on Academic Operation recommends and I move, that Graphic Design AR 2301 as described below, be added.

Proposed Course Description:
AR 2301 Graphic Design
Cat. I

This course introduces design principles and their application to create effective forms of graphic communication. The students will learn the fundamentals of visual communication and will work on projects to analyze, organize, and solve design problems. Topics may include: the design process; figure/ground; shape; dynamic balance; Gestalt principles; typography; layout and composition; color; production and presentation in digital formats.
(Students cannot received credit for both AR 2301 and AR 130x.)

Anticipated Instructor: Roshanak Bigonah

Rationale: The purpose of this course is to provide a hands-on introduction to graphic design principles and production practices.

This course will teach students to express themselves coherently in visual media by providing them with tools and best practices for organizing the visual elements that form a composition. For IMGD Art majors, this will improve their abilities to present their work in a polished and professional manner, giving them additional skills that are valued in artistic careers. For non-majors, this course material will improve their visual literacy and enable them to create visually appealing documents, presentations, and images.

Student learning outcomes:

After completing this course, students will

- Be able to make critical choices for the organization of elements in visual media
- Have a working knowledge of design principles
- Be able to use digital imaging software to design various types of print and screen based imagery

Projected Enrollment: 25 students/year. The intended audience is IMGD-Artistic majors, as well as students seeking to complete their Humanities & Arts requirement in Art

The course was offered as an experimental course (AR130x) in A term of 2014 (26 students) and in A term 2015 (26 students). Student feedback from the first offering was generally positive, with a few suggestions for reorganizing the presentation of course material that have been incorporated into the plans for the second iteration. From the instructor's standpoint, the course was quite successful for a first offering. Students assimilated the course materials effectively, as demonstrated by student projects that met or exceeded expectations. In the second offering, student feedback showed

improved engagement with the material. The instructor reports that students seemed more interested, and some took the time to write to her or stayed after class to express their satisfaction with the material presented.

In order to increase the amount of time students spend on the course (as reported in question 26B), course assignments will be redesigned in subsequent offerings of the course. Project requirements will be made more extensive, requiring more time outside of class, and additional assignments will be added to deepen student engagement with the material outside of class time.

Course evaluation A 2014: (14 respondents)
1. "My overall rating of the quality of this course is" 0 2 1 8 3 (3.86)
2. "My overall rating of the instructor's teaching is" 1 1 3 8 1 (3.50)
9. "The amount I learned from the course was" 0 3 2 6 2 (3.54)
26B. "On average, what were the total hours spent in each 7-day week OUTSIDE of formally scheduled class time in work related to this course (including studying, reading, writing, homework, rehearsal, etc)?" 0 hr/wk **0**, 1-5 hr/wk **6**, 6-10 hr/wk **5**, 11-15 hr/wk **2**, 16-20 hr/wk **1**, 21 hr/wk or more **0**.

Course evaluation A 2015: (19 respondents)
1. "My overall rating of the quality of this course is" 0 0 1 7 11 (4.5)
2. "My overall rating of the instructor's teaching is" 0 0 0 9 10 (4.5)
9. "The amount I learned from the course was" 0 1 5 5 8 (4.1)
26B. "On average, what were the total hours spent in each 7-day week OUTSIDE of formally scheduled class time in work related to this course (including studying, reading, writing, homework, rehearsal, etc)?" 0 hr/wk **0**, 1-5 hr/wk **12**, 6-10 hr/wk **4**, 11-15 hr/wk **2**, 16-20 hr/wk **0**, 21 hr/wk or more **1**.

Resource Needs:
Instructor: This course will be taught by Prof. Roshanak Bigonah as part of her regular teaching load. Dean Oates has committed to supporting this new course with additional staff resources as needed.
Classroom: Course will be taught in **SL123** using existing hardware and software.

Impact on Distribution Requirements and Other Courses:
None at present.

Note About Course Numbering:
After consultation with Prof. Finkel, chair of the IMGD Undergraduate Committee, and other colleagues, it has been determined that this course is more coherent in the larger Art curriculum, and more consistent with other similar courses at the 2000 level (it was originally taught experimentally as a 1000 course, and was previously submitted to CAO as AR1300. The content of this proposal has not been substantially changed, merely the numbering. The number AR 2301 has been cleared with Chuck Kornik to verify that this number has not been previously used.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add AR 2401 Video Production

Motion: On behalf of the Humanities and Arts department, the Committee on Academic Operation recommends and I move that AR 2401 Video Production, as described below, be added.

Proposed Course Description:
AR 2401 Video Production
Cat. I

This course will introduce students to concepts and techniques for live action digital filmmaking. Topics will include constructing a visual narrative, principles of cinematography, visual and audio editing, working with actors, and the stylistic elements of various genres of filmmaking.
(Students cannot receive credit for both AR 2401 and AR 120x.)
Recommended background: Basic knowledge of the history and theory of film (HU 2251 or equivalent).

Anticipated Instructor: Joshua Rosenstock

Rationale: The purpose of this course is to provide a hands-on introduction to digital filmmaking techniques and concepts.

As video production and documentation become commonly included in other courses and academic projects, video production has emerged as an essential element of student digital media literacy. Further, this course is a core offering in an initiative by Humanities and Arts to create a Film Studies area of study.

Student learning outcomes:

After completing this course, students will

- Be able to make critical choices for the construction of filmic narratives, combining moving images and sounds
- Have a working knowledge of the rules of continuity editing and other established practices of narrative and documentary filmmaking
- Be able to use digital cameras, software editing tools, and other A/V equipment to produce finished short films

Projected Enrollment: 25 students/year. The intended audience is IMGD-Artistic majors, as well as students seeking to complete their Humanities & Arts requirement in Art

The course was offered as an experimental course (AR120x) in D term 2014 (and will be offered for a 2nd time in C 2016). Student feedback from the first offering (25 students) was generally positive, with a few suggestions for reorganizing the presentation of course material that have been incorporated into the plans for the second iteration. From the instructor's standpoint, the course was quite successful for a first offering. Students assimilated the course materials effectively, as demonstrated by student projects that

met or exceeded expectations. Further, as anticipated by the original course proposal, students who went on to take Humanities and Arts practicums in filmmaking clearly demonstrated a higher level of achievement than their peers who had not previously taken the experimental course.

In order to increase the amount of time students spend on the course (as reported in question 26B), course assignments have been redesigned in the revised version of the course. Project requirements have been made more elaborate, requiring more extensive production time, and additional pre-production, reading, and screening assignments have been added to deepen student engagement with the material outside of class time.

Course evaluations: (16 respondents)
3. "My overall rating of the quality of this course is" 0 1 2 6 7 (4.19)
4. "My overall rating of the instructor's teaching is" 0 0 4 3 9 (4.31)
9. "The amount I learned from the course was" 0 2 3 8 3 (3.75)
26B. "On average, what were the total hours spent in each 7-day week OUTSIDE of formally scheduled class time in work related to this course (including studying, reading, writing, homework, rehearsal, etc)?" 0 hr/wk **0**, 1-5 hr/wk **7**, 6-10 hr/wk **7**, 11-15 hr/wk **1**, 16-20 hr/wk **0**, 21 hr/wk or more **0**.

Resource Needs:
Instructor: This course will be taught by Prof. Joshua Rosenstock as part of his regular teaching load as approved by Associate Dean Boudreau. No new resources will be required, as this course replaced one previously-offered section of AR1101 (Digital Imaging & Computer Art), which is a similar introductory digital art course serving a similar audience. As there are many sections of AR1101 offered (6 this year, for example) the impact on IMGD Art students seeking the course as a prerequisite is expected to be minimal. Furthermore, this Video Production course reflects the strategic priorities of the Humanities & Arts department as it develops its academic offerings in the area of cinema. The proposed course may eventually become the gateway course into more advanced level filmmaking courses.

Classroom: Course will be taught in FL222 (IMGD Lab) using existing hardware and software. The IMGD Director has approved the scheduling of this course in the IMGD Lab.

Library resources: Course will make use of the Gordon Library's Criterion Collection of DVDs of classic works of cinema.

Information Technology: Instructor has worked with the ATC and the 2014-15 IT budgeting process to purchase video and audio production equipment to support this and other media production courses. ATC hosts a dedicated collection of equipment for student check out.

Impact on Distribution Requirements and Other Courses: None at present.

Note About Course Numbering:
In response to feedback from CAO, and after consultation with Prof. Finkel, chair of the IMGD Undergraduate Committee, and other colleagues, it has been determined that this course is more coherent in the larger Art curriculum, and more consistent with other similar courses at the 2000 level (it was originally taught experimentally as a 1000

course, and was previously submitted to CAO as AR1200. The content of this proposal has not been substantially changed, merely the numbering. The number AR 2401 has been cleared with Chuck Kornik to verify that this number has not been previously used.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add BB 4900 Capstone Experience in Biology and Biotechnology

Motion: On behalf of the Department of Biology & Biotechnology, the Committee on Academic Operations recommends and I move, that BB 4900 Capstone Experience in Biology and Biotechnology, as described below, be added.

Proposed Course Description:
BB 4900, Capstone Experience in Biology and Biotechnology
Cat I

> These classes will serve as integrative experiences for students majoring in Biology & Biotechnology. The course will help students integrate concepts from other courses in the curriculum, practice skills of critical analysis, and evaluate and communicate scientific information effectively. The specific theme of each offering will center around a current topic of biological interest, and may include such areas as genomics, cancer, environmental problems, and synthetic biology. Prior to enrolling in the seminar, a student should have completed all of the BB course distribution requirements for BBT majors at the 1000 and 2000 level, or should seek advice from the course instructor. Topics will be announced prior to registration in the year preceding the course offering.

Rationale: We are proposing to re-envision our 4000 level course offerings to include "capstone" courses that challenge students to demonstrate analysis, synthesis and evaluation skills using their accumulated knowledge. In addition, the flexibility of the 4900 format will allow us to introduce courses in new areas of biology as they emerge. All students will be required to take at least one 4900 course. In addition to the specific learning outcomes for each offering, some of which will likely be specific to the topic, all courses will have the following common learning outcomes.

In this course students will
1. use advanced skills of critical analysis to independently read and evaluate the primary scientific literature.
2. develop hypothesis and design appropriate experiments to test them
3. accurately interpret experimental data and reach appropriate inferences
4. demonstrate written and verbal skills sufficient to communicate complex scientific information
5. make arguments based on accurate interpretations of scientific data and information
6. function effectively in a collaborative scientific environment, benefitting from and contributing to shared information.

These learning outcomes closely mirror the university learning outcomes for the MQP which map well to the program learning outcomes for Biology & Biotechnology. We look on achieving learning outcomes as a developmental process, not something that happens once and is complete. These outcomes are things we would like to reinforce and use to allow students to realize and explore the integration of information and skills they have acquired elsewhere in the curriculum, thus a "capstone" experience. These courses would also give us another opportunity, in addition to the MQP, to assess student progress on the departmental learning outcomes as part of our ongoing departmental outcomes assessment.

Resource Needs: While resources may vary among individual offerings, no new acquisitions of equipment, software, supplies or personnel will be required. Courses will be offered by existing BBT faculty. *There is a linked proposal to "drop" three biology courses which actually will continue to be offered, but under the capstone umbrella.* The faculty who currently teach those classes will continue to do so under the new designation. A faculty instructor for the fourth course has been identified for next year. Most will require classrooms which can be configured for discussion formats, with the potential for occasional need for a computer classroom.
No laboratory use is anticipated. Research and Instruction Librarian support will likely be required but will not exceed that required for any other upper level course.

Impact on Distribution Requirements and Other Courses: These courses will be a new addition to the BBT curriculum and are designed as integrative courses for BBT majors. *A linked proposal to change the distribution requirements to reflect these changes has been submitted.*
BBT students may take more than one 4900 course. For BBT majors, additional 4900 courses beyond the single required course can be used as 4000 level courses to fulfill other distribution requirements. In general, any student who has completed the distribution requirements for foundational courses (1000 and 2000) will be well prepared to take these courses. This is meant to encourage students to take them at an appropriate time in their undergraduate career, likely at the end of their junior or beginning of their senior year.

We plan to offer four in the next academic year, when it will not yet be an official requirement for the seniors. In future years, the number offered will be adjusted to accommodate the size of the class. By the time it is a requirement for the entire class of majors, we will have good data on student interest, common schedule conflicts and percent enrollments to help inform these

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to drop BB 4008 *Cell Culture Theory and Applications*
BB 4010, *Advanced Molecular Genetics*, and BB 4150, *Environmental Change: Problems and Approaches*

Motion: On behalf of the Department of Biology & Biotechnology, the Committee on Academic Operation recommends and I move that BB 4008 *Cell Culture Theory and Applications*, BB 4010 *Advanced Molecular Genetics*, and BB 4150 *Environmental Change: Problems and Approaches* be dropped.

Current Course Descriptions:
BB 4008. Cell Culture Theory and Applications. (Cat. I)
Using readings from the literature, students will gain insight into the current uses of cultured cells in basic research and commercial production. Class discussion will explore the benefits and limitations of cells as model systems. Class size will be limited to allow a robust exchange of ideas and information among the participants.
Recommended background: A working knowledge of concepts in cell biology, genetics, and basic biochemistry (BB 2550, BB 2920, CH 4110 and CH 4120 or equivalent)

BB 4010. Advanced Molecular Genetics. (Cat. I)
Emphasis will be on learning the newer trends in molecular genetics and their applications in biology and medicine using a variety of model systems. Students will gain an understanding of the similarities and differences in the mechanisms of transcription and translation in prokaryotic and eukaryotic systems. Principles and technologies of "omic–level" approaches, such as genomics and proteomics, and how they are transforming our understanding of biological processes and human diseases will be discussed.
Recommended background: a working knowledge of concepts in microbiology, cell biology, genetics and molecular biology (BB 2002, BB 2550, BB 2920 and BB 2950 or equivalent)

BB 4150. ENVIRONMENTAL CHANGE: PROBLEMS & APPROACHES. (Cat II)
This seminar course will examine what is known about ecological responses to both natural and human-mediated environmental changes, and explore approaches for solving ecological problems and increasing environmental sustainability. Areas of focus may include, and are not limited to, conservation genetics, ecological responses to global climate change, sustainable use of living natural resources, and the environmental impacts of agricultural biotechnology. Recommended background: BB 1045, BB2040, ENV1100.

These three courses will be removed from the respective lists under THE THREE MAJORS DIVISIONS OF BIOLOGY, and from Section Three: Course Descriptions

Rationale: These courses will be taught as capstone courses under the BB 4900 umbrella course.

Impact on Distribution Requirements and Other Courses:
No other departments require or recommend these courses for their majors.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to modify the Biology and Biotechnology distribution requirements

Motion: On behalf of the Biology & Biotechnology Department, the Committee on Academic Operation recommends and I move, that the distribution requirements for Biology & Biotechnology be modified as described below.

Existing and Proposed Distribution Requirements*:

Program Distribution Requirements for the Biology and Biotechnology Major
(changes as indicated in underline)

Requirements	Minimum Units
1.Mathematical Sciences, Physics, Computer Science, Engineering (Note 1)	5/3
2. Chemistry	5/3
3. Biology & Biotechnology (Note 2)	10/3
4. Laboratory experience (Note 3)	4/3
5. Related courses (Note 4)	3/3
6. MQP	1

NOTES:

1. BB 3040, BB 3010 and BB 4801 may count toward this requirement.

2. Biology and Biotechnology coursework must include 2/3 units at the 1000 level, 4/3 units at the 2000 level, and 4/3 units at the 3000/4000 level, of which at least 1/3 unit must be a BB 4900 course. BB 1000, BB 1001, BB 1002 and BB 100X may not count toward the major requirement. At least 2/3 unit of Biology and Biotechnology coursework must be taken from each of three major divisions of biology (below).
The 2/3 unit for each division may include courses from any level (1000-4000).

3. Chosen from among the BB 2000 and 3000 level labs and the Experimental Biochemistry labs, CH 4150 and CH 4170.
• Must include at least ½ unit of work at the 2000 level.
• Only **one** Experimental Biochemistry lab may be used (either 4150 **OR** 4170).
• In addition, you may not count both CH 4150 and any of BB 3516, 3518 or 3519. Likewise, you may not count both CH 4170 and any of BB 3512, 3518 and 3520.

4. Chosen from the Related Courses List which includes additional BB 3000/4000 level courses.

The three major divisions of biology

1. Cellular and Molecular
BB 1035 Biotechnology
BB 2003 Fundamentals of Microbiology
BB 2550 Cell Biology
BB 2920 Genetics
BB 2950 Molecular Biology
BB 3003 Medical Microbiology
BB 4065 Virology
BB/CH 4190 Regulation of Gene Expression
BB 4550 Advanced Cell Biology

2. Biology of the organism
BB 1025 Human Biology
BB 3101 Anatomy and Physiology I
BB 3102 Anatomy and Physiology II
BB 3080 Neurobiology
BB 3120 Plant Physiology

Biology of the Organism continued
BB 3620 Developmental Biology
BB 3920 Immunology

3. Organisms in their environment
BB 1045 Introduction to Biodiversity
BB 2030 Plant Diversity
BB 2040 Principles of Ecology
BB 2050 Animal Behavior
BB 3140 Evolution: Pattern and Process

Related Courses
BCB 4002 Biovisualization
BCB 4003 Biological and Biomedical Database Mining
BCB 4004 Statistical Methods in Genetics and Bioinformatics

Related Courses (continued)
CE 3059 Environmental Engineering
CH 2330 Organic Chemistry III
CH 3510 Chemical Thermodynamics
CH 4110 Biochemistry I
CH 4120 Biochemistry II
CH 4160 Membrane Biophysics
CHE 3301 Introduction to Biological Engineering
Any BB 3000 or 4000 level course

Rationale:

This motion is tied to our proposal to introduce “capstone” courses. We are neither increasing nor decreasing the number or distribution of courses required, but requiring that one of the upper level courses taken be designated as a capstone (BB4900) course.

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

**Only need to include affected sections and/or notes.*

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add ENV 2700 Social Media, Social Movements, and the Environment

Motion: On behalf of the SSPS Department and the Environmental and Sustainability Studies Program, the Committee on Academic Operations recommends and we move, that ENV 2700 Social Media, Social Movements, and the Environment, as described below, be added.

Proposed Course Description:

ENV2700 Social Media, Social Movements, and the Environment
Cat.II.

Social media platforms are changing the world of social movements, giving rise to a new generation of social activism. Social media can enable local actors to link with others from across the globe to incite social and environmental change. Social media has enabled people to document and share injustices (e.g., violence; dumping of toxic waste) in places where freedom of the press is limited or non-existent, and it has enabled people across different social groups (race, class, etc.) to engage with one another on issues of shared concern. Social media has also allowed people to share resources (financial, expertise, and organizational) with other social actors across the globe, empowering communities in novel ways. This course introduces students to the phenomena of social and environmental movements, theories on why they succeed and fail, and how social media has changed the landscape of social mobilization. This course will draw on interdisciplinary readings, concepts, and case studies from the social sciences, with emphasis on geography, public policy, sociology, and media studies. Course work will include small group projects, analyses of current social movement cases, and a final project. The final project will consist of interviewing members of a current social movement (potentially using social media), evaluating whether particular social media applications have helped to enable social mobilization, and designing new or revised social media tools to further enhance social mobilization.
Recommended background: introductory environmental studies (ENV1100 or equivalent).

Anticipated Instructor: Asst. Teaching Professor Lisa Stoddard

Rationale: This course will take advantage of the expertise of Prof. Stoddard and provide an additional 2000-level course option for students completing a major or minor in environmental and sustainability studies. In particular, the course will allow students the opportunity to learn about the increasingly important role of social media and social movements in bringing about social and environmental change. The course will also serve as an appropriate second course for students looking to complete their social science requirement with an environmental course or a course on the impact of social media. Expected enrollment is 20-30 students, which is typical for 2000 level courses in environmental and sustainability studies.

Note Changes to Catalog: ENV2700 Social Media, Social Movements, and the Environment shall be added to the catalog.

Impact on Distribution Requirements and Other Courses: No changes are required to distribution requirements. ENV2700 may be counted as a core ENV course by environmental and sustainability studies majors (see note 1 of ESS distribution requirements).

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

- Instructor: Assistant Teaching Prof. Lisa Stoddard
- 30-person classroom with basic electronic set up
- No special laboratory space needed
- No special library resources needed
- No special Information Technology needed

The addition of this course was supported by the hire of Prof. Stoddard to Undergraduate Studies and SSPS.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add IMGD 2048 Technical Art and Character Rigging

Motion: On behalf of the IMGD Program, the Committee on Academic Operations recommends and I move that the course IMGD 2048 (Technical Art and Character Rigging), as described below, be added.

Proposed Course Description:
IMGD-2048 Technical Art and Character Rigging, Cat.II
This course will focus on making digital art functional in a video game environment. Students will learn the skills necessary to create and optimize their art assets through several creative and technical solutions that are all geared towards making high quality game art. This course will allow students to form a greater understanding of the bridge between pure art creation and interactive art implementation into a game engine. The course explores the many problems and technical restrictions one is faced with when trying to implement anything from animated characters to textures and focuses on how one can creatively apply technology to achieve high quality results. Topics covered include: creating complex character rigs, optimizing character meshes for rigging, shader creation, optimizing UV space and baking texture files and lighting. Recommended background: Basic knowledge of 3D modeling, texturing and animation (IMGD 2101 and IMGD 2201 or equivalent). (Credit may not be received for IMGD 2048 and IMGD 204x.)

Contact:	Prof. Rob Lindeman
Preferred term:	C16
Anticipated Instructor:	Ralph Sutter, IMGD Instructor
Expected enrollment:	24
Intended audience:	IMGD majors

Impact on Distribution Requirements and Other Courses:
This course should be added to the set of Visual Art courses listed under Note 11 in the IMGD distribution requirements, as underlined below. No impact on other courses is expected.

Note 11. 6/3 from Visual Arts, chosen from the following list:
• Essentials of Art (AR 1100) or Digital Imaging and Computer Art (AR 1101) (whichever was not taken for the Studio Art requirement – Note 4)
• Figure Drawing (AR 2202)
• Digital Painting (IMGD 2700/AR 2700)
• 3D Modeling (IMGD 2101/AR 2101)
• 3D Modeling II (IMGD 3101/AR 3101)
• Machinima (Film Making in Virtual Environments) (IMGD 2005)
• The Art of Animation (IMGD 2201/AR 2201)
• Technical Art and Character Rigging (IMGD 2048)
• Animation II (IMGD 3201/AR 3201)
• Concept Art and Creative Illustration (IMGD 3700/AR 3700)

Rationale:
The IMGD degree is designed to provide students with a broad understanding of aesthetic and technical issues related to interactive media and game development.

This course will contribute to this understanding by providing them with opportunities to create art specifically for in-game use by combining their art knowledge with the many technical restrictions and requirements one comes to expect when it comes to translating art to an interactive environment. This course will allow other IMGD art courses to focus more on actual art creation and less on the technical aspect of the creation process, since this course is specifically designed to teach students how to deal with that particular issue.

Resource Needs: This course will be taught by instructor Ralph Sutter, whose teaching is solely in the IMGD program. Ralph Sutter's normal teaching load has included teaching the experimental version of this course since he was hired, so having this as a permanent course is not a net increase in load. This course will be taught in the IMGD Lab (Fuller 222), which already contains all of the computers and software required. No additional library resources will be required. This course will use Pixologic Zbrush, Autodesk Maya, Autodesk 3ds MAX, Adobe Photoshop, Unreal, Unity and xNormal. All the needed software is installed in the IMGD Lab (FL 222) and the Zoo Lab (FL A21), both available for IMGD majors and other students taking this course.

Assessment

The success of the course will be evaluated by the aesthetic and technical quality of student projects. Instructor feedback and reflections regarding outcomes and student proficiencies will be provided. The responses to questions 1, 2, 9 and 26 on the student course evaluations will also be considered.

Experimental Course Evaluation Report

The proposed course was offered twice as an experimental course (titled IMGD 204X, Character Rigging and Technical Animation). It was offered in C Term of 2013 and C term of 2015. A total of 24 students took the course in D term of 2013 and a total of 15 student took the course in B term of 2014.

Course Evaluation Questions	D01 2013	B01 2014
Question 1	4.57 (14)	4.92 (12)
Question 2	4.64 (14)	4.75 (12)
Question 9	4.64 (14)	4.58 (12)
Question 26A	4 hr/week (12) 5 hr/week (1)	4 hr/week (10) 6 hr/week (1)
Question 26 B	6-10 hr/week (6) 11-15 hr/week (5) 16-20 hr/week (3)	1-5 hr/week (4) 6-10 hr/week (5) 11-15 hr/week (2) 16-20 hr/week (1)

Comments

IMGD 204X was generally met with a very positive response. Students felt that the materials covered were of importance and critical to their field of study.

During feedback sessions which were held at the end of each IMGD 204X offering, the general consensus was that they would like to learn more technical art-specific techniques that allowed them to get the most out of their digital art. As such, students wanted to spend less time on rigging and animation and more time on more advanced techniques such as light-baking, UV optimization, etc.
The course title, description and syllabus have been updated to implement this feedback.

Implementation Date: Academic year 2016-2017.

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add IMGD 2905 Data Analysis

Motion: On behalf of the IMGD Program, the Committee on Academic Operation recommends and I move that IMGD 2905 Data Analysis, as described below, be added.

Proposed Course Description:

IMGD 2905 Data Analysis for IMGD (Cat.I).
This course will cover basic concepts of probability and data analysis as they apply to the design and analysis of interactive media and games. Students will study appropriate use of probability distributions in the design of interactive experiences, and the use of data analysis methods to understand user behavior in games and other interactive experiences. Topics will include discrete and continuous probability distributions, programming techniques to produce samples from different distributions, descriptive statistics, exploratory data analysis and using existing tools to collect and analyze data from gameplay.
This course counts toward the Quantitative Science component of the university-wide Mathematics and Science Requirement for IMGD majors only.
Recommended background: High school algebra

Contact: Prof. David Finkel
Anticipated Instructor: Prof. Finkel

Rationale: The purposes of this course are for students to

- Understand the role of probability in the design of games and interactive experiences.
- Select appropriate probability distributions to represent real-world or fictional world situations
- Understand a variety of data analysis tools useful in understanding user behavior in interactive media and games
- Gain experience in collecting and analyzing user data from interactive media or games.

IMGD majors need background in probability and data analysis. Probability is important, for example, in modeling the behavior of in-game characters, or determining the probability of success of an in-game action. IMGD majors must also be able to analyze the behavior of users of a game or other interactive experience. During play-testing, data is collected about the users' experience and opinions, and designers must analyze this data. During gameplay, data can be collected to identify portions of a game that are not working as intended.
Current WPI course offerings do not address these needs. The applied statistics and probability courses at WPI have as recommended background, respectively, two terms and four terms of calculus. This amount of preliminary mathematics greatly exceeds what some IMGD majors need and can reasonably fit into their schedules.

Many colleges teach a non-calculus based course in probability and statistics; we are proposing such a course directed towards the needs of IMGD majors.

The intent is for IMGD majors to take the course their second year, hence the 2000-level numbering. Expected enrollment: 25

Resource Needs:

- Information on the instructor: Prof. Finkel has extensive teaching experience in probability and statistics and uses these methods in his research. A new hire, Prof. Agloro, is teaching one of the courses Prof. Finkel was scheduled to teach, making him available to teach the proposed course.
- No special classroom requirements: Projector and screen
- Laboratory: None
- Library: No new Library resources are required.
- Information Technology: No new IT resources are required.

Impact on Distribution Requirements: See companion motion to rename the Math IMGD distribution requirement as Math or Game Analytics. The proposed course will satisfy that IMGD distribution requirement.

This course will count as 1/3 unit of Quantitative Science of the WPI Mathematics and Science Requirement for IMGD majors, as approved by the Committee on Academic Policy on November 9, 2015.

We expect that IMGD majors in the Tech track will continue to satisfy the Mathematics requirement by taking calculus, since that is important background for their Computer Science courses. Student in the IMGD Art track may elect to take the proposed course, depending on their interests.

Implementation Date: Implementation date for this action is the 2015-2016 Academic year. The first offering of this course is anticipated for D-2016.

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to modify the IMGD distribution requirements

Motion: On behalf of the IMGD Program, the Committee on Academic Operations recommends and I move that the distribution requirements for the IMGD major be modified by re-naming the current "Math" distribution requirement and adding a course to the requirement, as described below.

Proposed Revised Distribution Requirements (with new text and changed note numbers underlined)**:**

Program Distribution Requirements for the Interactive Media and Game Development Major

Requirements Minimum Units
Core IMGD (Note 1) 2/3
Math or Game analytics (Note 2) 1/3
Science 1/3
Computer Science (Note 3) 1/3
Social and Philosophical Issues (Note 4) 1/3
Studio Art (Note 5) 1/3
Audio Arts (Note 6) 1/3
English (Note 7) 1/3
IMGD (Note 8) 5/3
Major Qualifying Project 3/3
In addition to the requirements listed above, students must satisfy one of the two area requirements, Technical (Computer Science) or Artistic (Humanities and Arts):

AREA MINIMUM
Computer Science (Note 9) 10/3
Visual Arts (Notes 10, 11, 12, 13, 14) 10/3
Students have electives that can be tailored to meet specific degree requirements and interests:

ELECTIVES MINIMUM
Total Electives (Note 15) 3/3

NOTES:
1. Choose from: Critical Studies of Interactive Media and Games (IMGD 1000), The Game Development Process (IMGD 1001), Storytelling in Interactive Media and Games (IMGD 1002).
2. Any Mathematics course or IMGD 2905
3. CS 2022 and CS 3043 may not be used to satisfy this requirement.
4 Choose from Social Issues in Interactive Media Games (IMGD 2000) or Philosophy and Ethics of Computer Games (IMGD 2001).
5. Choose from: Essentials of Art (AR 1100) or Digital Imaging and Computer Art (AR 1101).
6. Choose from: Computer Techniques in Music (MU 3611), Computers and Synthesizers in Music (MU 3612), Digital Sound Design (MU 3613), or Game Audio 1 (IMGD 2030).
7. Courses with the prefix EN, WR or RH.
8. Must include (IMGD 3000 and IMGD 4000) or (IMGD 3500 and IMGD 4500).
9. At least 4/3 from: Human-Computer Interaction (CS 3041), Software Engineering (CS 3733, CS 4233), Computer Architecture (CS 4515), Computer Networks (CS 3516, CS 4516), Graphics (CS 4731), Animation

(CS 4732), or Artificial Intelligence (CS 4341)
10. 3/3 from Humanities and Arts or IMGD.
11. 1/3 from Art History
12. 6/3 from Visual Arts, chosen from the following list:
• Essentials of Art (AR 1100) or Digital Imaging and Computer Art (AR 1101) (whichever was not taken for the Studio Art requirement – Note 4)
• Figure Drawing (AR 2202)
• Digital Painting (IMGD 2700/AR 2700)
• 3D Modeling (IMGD 2101/AR 2101)
• 3D Modeling II (IMGD 3101/AR 3101)
• Machinima (Film Making in Virtual Environments) (IMGD 2005)
• The Art of Animation (IMGD 2201/AR 2201)
• Animation II (IMGD 3201/AR 3201)
• Concept Art and Creative Illustration (IMGD 3700/AR 3700)
13. At least 5/3 units at the 2000-level or higher.
14. Students completing the Artistic (Humanities and Arts) Area Requirement must complete a Technical Requirement, described below.
15. Electives must be chosen from the following areas: Computer Science, Humanities and Arts, Interactive Media and Game Development, Mathematics, Science, Social Science, Management

TECHNICAL REQUIREMENT
Each student choosing the Artistic IMGD area will fulfill a Technical Requirement consisting of six courses as follows:
A. Courses required for all IMGD majors:
1. One Mathematics Course or IMGD 2905
2. One CS course, not including CS 2022 or 3043
3. One Science (BB, CH, GE, PH) course
B. Additional requirements:
4. A second course in Computer Science, not including CS 2022 or 3043
5. Two additional courses from among Mathematical Sciences, Computer Science, Science (BB, CH, GE, PH) and Engineering (BME, CE, CHE, ECE, ES, FPE, ME, RBE), not including CS 3043.
The courses for the Technical Requirement, part A, are satisfied by the IMGD distribution requirements. The courses in part B may not double-count towards other IMGD requirements, including IMGD elective courses.

Rationale: In a companion motion, a new course IMGD 2905 Data Analysis for IMGD is proposed. This course satisfies the goals of the former Math distribution requirement, namely to expose student to methods for analyzing games and interactive media. We move to add this new course to the list on courses which satisfy this distribution requirement. Since the new course is not a Mathematics course, a change in name for the distribution requirement is appropriate.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Subject: Motion to add AE 4717 Fundamentals of Composite Materials

Motion : On behalf of the Aerospace Engineering Program, the Committee on Academic Operation recommends and I move, that the course AE 4717 Fundamentals of Composite Materials be introduced and the course description listed below be added to the undergraduate catalog.

Proposed Course Description:

AE 4717 Fundamentals of Composite Materials *(Cat. I)*
This course provides an overview of the processing techniques and mechanical behavior of composite materials relevant to aerospace applications. Topics in this course may include: classification of composites; elasticity of composite materials; the effect of reinforcements on strength and toughness; bonding mechanisms of interfaces in composite; fabrication methods for polymer-matrix composite materials; viscoelasticity and creep of composites; advanced composites materials (bio-composites, nano-composites).
Recommended background: Introductory level material science (ES 2001) and introductory level stress analysis (AE 2712, ES 2502 or equivalent).

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

Rationale:

The proposed course, AE 4717 Fundamentals of Composite Materials, will introduce students to the properties and behavior of composite materials widely used in aerospace industries. This course is aimed at providing students with a practical understanding of the different processing techniques used for fabrication of polymer-matrix composites used in lightweight aerospace structures.

Another major course objective is to provide the students with the skills needed to formulate orthotropic stress–strain relations and failure criteria as well as to predict the properties for a broad spectrum of composite materials. The final section of the course is aimed at introducing the students to state-of-art multi-functional composite materials such as nano-composites and bio-composites. Thus, this course provides students with the theoretical and practical understanding of an important class of materials widely used in aerospace engineering. The coverage of topics in AE 4717 course is also relevant to mechanical engineering, material science and engineering programs. We expect around 40-50 undergraduate students enrolled annually.

Resource Needs:
No new faculty will be needed. The Aerospace Engineering Program recently hired Prof. Karanjgaokar whose research expertise lies in aerospace materials and who is available to teach this course. AE 4717 will be offered once per year.

Impact on Distribution Requirements
The introduction of AE4717 provides to AE Majors more options to satisfy the distribution requirement.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to change PSY 140X Developmental Psychology to PSY 1404

Motion: On behalf of the SSPS Department and the Psychological Science Program, the Committee on Academic Operation recommends and I move that PSY 140X Developmental Psychology be assigned a permanent course number PSY 1404.

Proposed Course Description:

PSY 1404: Developmental Psychology (*Cat. II)*

This course surveys human development from conception to death, with an emphasis on the scientific analysis of developmental patterns. The course will cover the biological, cognitive, emotional, social, personality, linguistic, and moral development of the individual at all stages. Students may not receive credit for PSY140X and PSY 1404.
Recommended background: An introductory background in psychological science or experimental methods (PSY 1400).

Rationale:
PSY 140X has been experimental since 2012, and it has been offered in B12, A13, C15, and C16. It has been successful and we now seek to make the course permanent.

This course takes advantage of the expertise of Professors Melissa-Sue John, Erin Ottmar, and Kymberlee O'Brien. It serves as a key foundational course for the Psychology majors and minors. Furthermore, it is an important course for the STEM center and anyone else interested in human development from infancy to old age. Furthermore, course enrollments have been have steady: 19 in B12, 48 in A13 (cap was 50), and 38 in C15 (cap was 40). These enrollments are consistent with the other foundational courses PSY 1400: Introduction to Psychological Science, PSY 1401: Cognitive Psychology, and PSY 1402: Social Psychology.

Overall, the psychology majors and minors who have taken PSY 140X have enjoyed it. . (See Attachment A). They enjoy that they get to learn about human development over the course of the lifespan (from infancy to well, death). Moreover, its applications extend beyond the classroom. This course was vitally important for one of our majors (Loan Chau) to have taken before working on her MQP where she helped develop a robot (FRASIER) to assist individuals with age-related disabilities. I have spoken with other students as well, and feedback is always positive for the material covered in this course. Professor John made significant strides in her development and teaching of this course, and I anticipate the evaluations to increase with more development. We also have hired two new faculty who can contribute to the teaching of this course (Erin Ottmar and Kymberlee O'Brien). Furthermore, we are having discussions with the STEM Center in adding PSY 1404: Developmental Psychology to their curriculum for teachers. Finally, Developmental Psychology is a core foundational course in most undergraduate psychology programs throughout the country—it is important for the Psychological Science program to make this course a permanent course.

There are no impacts on students anticipated.

Resource Needs: There are no changes in needs. Professors Melissa-Sue John, Erin Ottmar, and Kymberlee O'Brien can teach this course.

Implementation Date: C term 2016

Attachment A: Course Evaluation Data

Summary of Feedback from Previous Three Offerings PSY140X

The course PSY 140X: Developmental Psychology has been offered three times: B Term 2012, A Term 2013, and C Term 2015. The course is generally well-received, especially in the most recent offering. Evaluations are anticipated to continue to improve and we have three faculty members who can teach the course.

Outcomes from questions 1, 2, and 9 on the course evaluations are summarized in Table 1 below.

Table 1: Outcomes on Questions 1, 2, and 9

Question	B12 mean	A13 mean	C15 mean
1. My overall rating of the quality of this course is	3.88	3.44	4.28
2. My overall rating of the instructor's teaching is	3.94	3.51	4.22
9. The amount I learned from the course was	4.12	3.4	4.22

Table 2: Outcomes on Question 26 B

26B. Average hours per week OUTSIDE?	A13	C15
0hr	4.65	0
1-5	39.53	56.25
6-10	37.21	25
11-14	9.30	12.5
16-20	9.30	6.25
21+	0.00	0

Note: B12 is not included because at that time it was just Question 26, not 26A and 26B.

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to change PSY 141X Abnormal Psychology to PSY 1412 Mental Health

Motion: On behalf of the SSPS Department and the Psychological Science Program, the Committee on Academic Operation recommends and I move that PSY 141X: Abnormal Psychology be changed from an experimental to a permanent course entitled PSY 1412: Mental Health as described below.

Proposed Course Description:

PSY 1412: Mental Health (*Cat. II)*

This course will introduce the wide variety of psychological disorders that exist in society (personality, anxiety, mood, psychotic, etc.). For each disorder discussed, possible causes, symptoms, preventions, and treatments will be examined. The course will cover psychopathologies throughout the entire spectrum of the lifespan (infancy to adulthood). Empirical research on understanding, diagnosing, and treating the different disorders will be emphasized. Students may not receive credit for PSY141X and PSY 1412. Recommended background: An introductory background in psychological science (PSY 1400).

Rationale:
PSY 141X was offered in B14 and B15 and was very successful. It is currently being taught and it looks to be equally successful. We now seek to make the course permanent.

This course is a required course for any student applying to clinical or counseling graduate programs. We currently have 4 alumni who are in these types of graduate programs and they would not have gained admission without this course. Furthermore, this course is a standard course in an undergraduate program and it was a very serious omission from our program at WPI. We have been fortunate to have Dr. Ashley Hart a Clinical Psychologist at UMASS Medical School and also Dr. Tom Balistrieri (former director of WPI's SDCC) teach this course for us. A new hire, Kymberlee O'Brien also has the necessary background to be able to teach this course. This course has had steady enrollment (even beyond the cap): 23 in B14 (cap 20) and 42 in B15 (cap 50). These enrollments are consistent with the other foundational courses such as PSY 1400: Introduction to Psychological Science, PSY 1401: Cognitive Psychology, and PSY 1402: Social Psychology.

We are also requesting that the name be changed from Abnormal Psychology to Mental Health. Abnormal is the traditional name for this course; however, the name is also somewhat stigmatizing. We would like to use the title Mental Health as it is more representative of what is being taught and it is ultimately a less stigmatizing title.

This course is essential to the undergraduate program. We have more and more students interested in clinical, counseling, social work, and related areas of psychology. Students applying to graduate school in these areas must take this course and previously we had to send students to other schools to take this course or Professor Skorinko has had to offer it as an ISP to those who need it (very unideal). The first round of this course got rave reviews. (See Attachment A.) Students have stopped by the Program Director's office tell her how much they enjoyed the class and how important it was that we offer it. So far this B term (2015), several students in the course have raved about the class and instructor. This is unheard of! Students

are reaching out to the Program Director to provide unsolicited feedback. This course not only attracts psychology majors and minors but any other student generally interested in mental health. It has become an important step with helping promote and connecting students with the SDCC as well. It has also allowed our program to make connections with UMASS Medical School and we have gain research experiences for our students interested in this area at UMas Med (and a requirement for these research experiences is taking this course!). Finally, this course aims to increase knowledge and reduce stigma surround mental health and it is a core (and often times required) course in most undergraduate psychology programs—it is important for the Psychological Science program to make this course a permanent course.

No impacts on students are anticipated.

Resource Needs:

- There are no changes in needs. We have been successful at hiring adjunct professors whose expertise is in clinical and counseling to teach this course. We also have hired Kymberlee O'Brien who can also teach this course.

Implementation Date: The course was implemented in B 2014. The new course number will go into effect for the 2016-2017 academic year.

Attachment A: Course Evaluation Data

Summary of Feedback from Previous Three Offerings PSY141X

The course PSY 141X: Abnormal Psychology has been offered two times: B Term 2014, and B Term 2015. The course is very well-received, and vital for students interested in clinical, counseling, or social work.

Outcomes from questions 1, 2, and 9 on the course evaluations are summarized in Table 1 below.

Table 1: Outcomes on Questions 1, 2, and 9

Question	B14 mean
1. My overall rating of the quality of this course is	4.76
2. My overall rating of the instructor's teaching is	4.71
9. The amount I learned from the course was	4.33

Table 26B: Outcomes on Question 26

26B. Average hours per week OUTSIDE?	B14 %
0hr	0.0
1-5	42.9
6-10	42.9
11-15	0.0
16-20	14.3
21+	0.0

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add PSY 2408 Health Psychology

Motion: On behalf of the SSPS Department and the Psychological Science Program, the Committee on Academic Operation recommends and I move that PSY 2408 Health Psychology (as described below) be added.

Proposed Course Description:

PSY 2408: Health Psychology (Cat II)

In health psychology, we will review global and domestic health-related problems to discuss the links between health and psychology and discuss potential interventions. Health psychology is interdisciplinary in nature and relevant to students interested in health-related topics whether from a psychological, biological, biomedical, global, or preventative measures. Major health problems will be discussed: for example, AIDS is the number one cause of death worldwide; obesity (in children and adults) is a growing epidemic; the aging U.S. population will cause unprecedented health needs. Finally, stress infiltrates chronic health outcomes such as cancer, diabetes, and cardiovascular disease. We will also review what 'positive health' means including nutrition, exercise, social support, managing stress, and habits for maintaining good health. Students will engage in research-based learning when considering psychological, cultural, and biological interventions for real world health crises.
Recommended background: An introductory background in psychological science (PSY 1400, or PSY 1402, or equivalent).

Anticipated Instructor: Kymberlee O'Brien

Rationale: Health psychology offers a link between the biological and psychological disciplines, with a unique focus on physical and psychological health outcomes, and how they relate to widening global health disparities. Moreover, with a growing pre-health student population, this course provides critical foundation for MCAT, which now requires a psychology/social science. Given its interdisciplinary nature, the course should resonate with students from a variety of disciplines across campus, such as psychology, biology, biomedical, health, etc. We currently see a good number of majors and minors who are interested in psychology and biology. Finally, this course will add an additional and much needed course for psychology majors and minors.

Impact on Distribution Requirements and Other Courses: This will provide an additional course for Psychology majors and minors to take.

Implementation Date: This course will be offered in D-term, 2016

Resource Needs: This course does not require new resources. There are no new resources needed to deliver this course. In the last year, we hired two new faculty members who will assist with teaching our undergraduate courses. The instructor (Professor O'Brien) will provide any research – based learning in basic electrophysiological systems in Professor Skorinko's Social Psychology Inquiry (SPI) Lab. The electrophysiological system is a non-invasive system that measures different physiological measures (e.g., heart rate, galvanic skin response, temperature). It is used frequently by Health Psychologists. They system is getting installed now for a research project (approved by WPI's IRB).

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add PSY 2502 Psychophysiology

Motion: On behalf of the SSPS Department and the Psychological Science Program, the Committee on Academic Operation recommends and I move that PSY 2502 Psychophysiology as described below, be added.

Proposed Course Description:

PSY 2502 Psychophysiology (Cat. II)

"Mind-Body" connection may be an overused term, but in social science research, there is a growing use of physiological measures to infer psychological states, that is, to "get under the skin." Sophisticated physiological measures are now commonly used to examine psychological processes. We will review the biological measures (e.g., sympathetic and parasympathetic nervous system, facial electromyography, and neuroendocrine monitoring) that can provide insight into emotional, cognitive, attitudinal, and motivational responses to psychological events, such as social rejection or helping others. The primary focus of the course is to investigate how psychophysiology can be applied to the study of social psychological phenomena, specifically (e.g., how can prejudice or related biases in attitudes be measured 'under the skin', social evaluation, lie detection, emotion regulation, stress of conformity, the benefits of prosocial behavior).
Recommended background: An introductory background in psychological science or experimental methods (PSY 1400, or PSY 1402, or PSY 3500, or equivalent).

Anticipated Instructor: Kymberlee O'Brien

Rationale: Psychophysiology reflects the growing sophistication in Social Psychological studies to assess how social processes happen 'under the skin'. By examining sensitive social topics including discrimination, social exclusion, prosocialty, learned helplessness, intergroup stress, for example, with implicit physiological indicators, we may be able to infer more about the internal psychological processes not always reflected in self-reported surveys. This course reviews the most well-known topics in social psychology that can be measured via physiological indices, but also adds unique components related to law (lie detection), health (stress measures), cognition, aging (the measurement of telomeres), and should be interesting to a wide variety of students from psychology, biology, biomedical, and pre-health.

Moreover, with a growing pre-health student population, this course also provides critical foundation for pre-health students and the MCAT, which now requires a psychology/social science. Given the interdisciplinary nature of this course, it should resonate with students from a variety of disciplines across campus, such as psychology, biology, biomedical, health, etc. We currently see a good number of majors and minors who are interested in psychology and biology.

Resource Needs: This course does not require new resources. There are no new resources needed to deliver this course. In the last year, we hired two new faculty members who will assist with teaching our undergraduate courses.

The instructor (Professor O'Brien) will provide any research – based learning in basic electrophysiological systems in Professor Skorinko's Social Psychology Inquiry (SPI) Lab. The

electrophysiological system is a non-invasive system that measures different physiological measures (e.g., heart rate, galvanic skin response, temperature). It is used frequently by those who use psychophysiological measures in their research; therefore, it is an important research and teaching tool. They system is getting installed now for a research project (approved by WPI's IRB).

Impact on Distribution Requirements and Other Courses: This will provide an additional and much needed course for Psychology majors and minors to take.

Implementation Date: This course will be offered in the 2016-2017 Academic Year.

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add WR 1020 Introduction to Rhetoric

Motion: On behalf of the Humanities and Arts Department and the Professional Writing Program, the Committee on Academic Operations recommends and I move that WR 1020 Introduction to Rhetoric, as described below, be added.

Proposed Course Description:

WR 1020, Introduction to Rhetoric (Cat I)
This course will apply classical and modern rhetorical concepts to analyze various texts and speeches in order to identify the means of persuasion to a particular end. Students will write short analytical papers that critically assess various rhetorical and communicative approaches. The goal of this course is to enable students to see rhetoric in action in order to both engage with the material critically as well as produce effective discourse to meet various situations.
Credit cannot be received for WR 1020 and WR 101X.

Contact: Jennifer deWinter
Expected enrollment: 20
Course type: Writing intensive course
Intended audience: All PW majors and Writing & Rhetoric minors; first- and second-year students looking to fulfill their depth or breadth requirements in HUA.

Anticipated Instructor: Profs. Jennifer deWinter and Lorriane Higgins

Rationale: The purpose of this course is to introduce students to the specialized terminology and analytical approaches that are specific to communication. The study of rhetoric provides a form of critical engagement with public address and argumentation that enables students to logically engage with the presentation of the ideas, not just the ideas themselves. Based on this analytical mode, students should be able to codify aspects of effective communication that they would then be able to apply to meet different situations.

This course would act as a recommended prerequisite to later courses in rhetorical theory and practice, such as Rhetoric of Visual Design, Rhetoric of Professionalism, Rhetorical Theory, and Digital Rhetoric.

Finally, this course would provide first-year students who might be interested in rhetorical studies an entrance level course that they can take to fulfill either the depth or breadth requirement of the HUA project.

This course would fulfill WR learning objectives:
1. Developing analytical tools for rhetorical analysis,
2. Drafting and revision processes including appropriate different styles, and
3. Writing for defined ends using appropriate language, examples, and explanations.

Assessment: Student feedback from prior Introduction to Rhetoric courses offering has been very positive. Specific outcomes from questions for the two terms offered are:

- Question 1: B13 4.53
  B14 4.33
- Question 2: B13 4.68
  B14 4.42

- Question 9: B13 4.58
  B14 4.17

Student comments were positive concerning the value of the class. Further, twenty people were enrolled in the course (cap of 20) of which nineteen (19) students completed comments on their evaluations for 2013. Of these, five (5) reported working on this course 11-15 hours per week and fourteen (14) reported working 16-20 hours per week in response to 26b. In the 2014 section offering, seventeen people were enrolled of which fourteen completed the course evaluation. Responses to 26b show that one (1) student worked 1-5 hours in the course, six (6) students worked 6-10 hours in the course, and five (5) students worked 11-15 hours in the course.

Resource Needs: The course will run once a year. The WR curriculum course allocation has been projected for five years with this course included, and the current faculty can teach this course within their current load requirements. In 2012, Writing and Rhetoric conducted a major curriculum revision, and this course was considered in that revision. As part of this revision, we saw that some of our courses, such as Elements of Writing, were taught up to eight times per year. We conscientiously reallocated courses and faculty assignments to offer depth and breadth in WR. In essence, we simply reduced the number of sections offered of a class that fulfills no targeted requirement. As such, no new resources are needed.

Impact on Distribution Requirements: Students can take this as part of the HUA requirement for either depth or breadth. It will impact the PW and the Writing and Rhetoric minor distribution requirements by asking students to choose between either Elements of Writing, Writing About Science & Technology, or Introduction to Rhetoric.

There are no proposed changes to the minor in WR. The current class can be included in the possible 1 1/3 electives in WR that students can take.

Implementation Date: Implementation date for this action is C term of 2016.
Course will most likely be offered A term or B term of every year unless enrollment drops, in which case, we will only offer it in A term.

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add WR 2010 Elements of Style

Motion: On behalf of the Humanities and Arts Department and the Professional Writing Program, the Committee on Academic Operations recommends and I move that WR 2010 Elements of Style, as described below, be added.

Proposed Course Description:

WR 2010 Elements of Style (Cat.I)
This course will cover basic principles of prose style for expository and argumentative writing. Students will learn to evaluate writing for stylistic choices and will learn revision strategies for addressing those problems. The ultimate goal of the course is to help students write sentences and paragraphs that are clear, concise, and graceful. In the first part of the course, students will review parts of speech, basic sentence types, and sentence and paragraph structure in order to understand how sentences are put together and the impact their construction has on readers. Then, through hands-on writing exercises and extensive revision of their own and others' writing, students will learn strategies for tightening their prose (concision), achieving "flow" (cohesion and coherence) and improving usage (language specificity and precision).
Credit cannot be received for WR 2010 and WR 201X.
Recommended background: Basic knowledge of rhetorical writing (e.g. WR 1010, Elements of Writing, WR 1011, Writing About Science & Technology, or WR 1020, Introduction to Rhetoric)

Contact: Jennifer deWinter
Expected enrollment: 20
Course type: Writing intensive course
Intended audience: All PW majors and Writing & Rhetoric minors; first- and second-year students looking to fulfill their depth or breadth requirements in HUA.

Anticipated Instructor: Profs. deWinter, Higgins, and Madan

Rationale: Style is one of the five canons of rhetoric and a field of study within itself. The purpose of this course is to help students develop their sentence-level writing skills, focusing on grammar, word choice, cohesion, and ethical representation. This will prepare students to make conscious stylistic decisions in their own writing as well as to improve their editorial comments on other's writing. Research continues to show that style and grammar are often conflated with intelligence; poor comma usage is often equated to poor thinking in the work place. Style and grammar are considered advanced topics in Writing and Rhetoric, requiring students to already have rhetorical awareness, an ability to research and write a thesis-driven paper, and an ability to contribute meaningfully to work shopping and revision. Once students have acquired holistic writing skills, they can focus on the craft of their sentences to revise for emphasis, grace, and genre-specific conventions in service to their larger rhetorical goals. At other institutions, this course is typically offered at the sophomore or junior level with advanced courses in graduate programs. We currently have no space in the curriculum to focus exclusively on sentence-level writing in our present course offerings.

This course would fulfill WR learning objectives:

1. Drafting and revision processes including appropriate different styles,
2. Developing and working on writing with an understanding on complex grammar, and
3. Analyzing different writing styles in order to emulate them appropriately.

Assessment: Student feedback for this course has been positive. In the first class, I received 6 completed questionnaires (the class was offered late in the registration cycle), and in the second offering, 18 students returned the evaluations (the course is capped at 20). Answers to questions 1, 2, and 9 are as follows:

- Question 1: B13 4.67
  D14 4.06
- Question 2: B13 4.67
  D14 4.44
- Question 9: B13 4.17
  D14 3.39

Concerning question 26b: One section reported 4 hours per week on homework, and in the other, the bulk of the students reported 11-15 hours per week. Based on this, the faculty have a model for providing students with meaningful work commiserate with 1/3 unit worth of work.

Resource Needs: The course will run two times per year. The WR curriculum course allocation has been projected for five years with this course included, and the current faculty can teach this course within their current load requirements. In 2012, Writing and Rhetoric conducted a major curriculum revision, and this course was considered in that revision. As part of this revision, we saw that some of our courses, such as Elements of Writing, were taught up to eight times per year. We conscientiously reallocated courses and faculty assignments to offer depth and breadth in WR. In essence, we simply reduced the number of sections offered of a class that fulfills no targeted requirement. As such, no new resources are needed.

Impact on Distribution Requirements: Students can take this as part of the HUA requirement for either depth or breadth. Professional Writing majors can take this course as part of their distribution requirements. IMGD art track students often take this course as part of their HUA requirements.

There are no proposed changes to the minor in WR. The current class can be included in the possible 1 1/3 electives in WR that students can take.

Implementation Date: Implementation date for this action is D term of 2016.
Courses will be offered B and D terms unless the course starts to become under-enrolled, in which case, we will offer the course in B term.

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to renumber and modify MA 3211 Theory of Interest

Motion: On behalf of the Department of Mathematical Sciences, the Committee on Academic Operation recommends and I move that MA 3211 Theory of Interest have its name and number changed to MA 2211 Theory of Interest, as described below.

Current Course Description:

MA 3211 THEORY OF INTEREST (Cat I)

An introduction to actuarial mathematics is provided for those who may be interested in the actuarial profession. Topics usually included are: measurement of interest, including accumulated and present value factors; annuities certain; amortization schedules and sinking funds; and bonds.

Recommended background: MA 1024 and the ability to write computer programs.

Proposed Course Description:

MA 2211 THEORY OF INTEREST I (Cat. I)

An introduction to actuarial mathematics is provided for those who may be interested in the actuarial profession. Topics usually included are: measurement of interest, including accumulated and present value factors; annuities certain; amortization schedules and sinking funds; and bonds.
Recommended background: Single variable calculus (MA 1021 and MA 1022, or equivalent).
Students may not receive credit for both MA 2211 and MA 3211

Anticipated Instructor: Jon Abraham, Marcel Blais, Barry Posterro, Stephan Sturm, or Gu Wang.

Rationale: Better computing power makes this course more appropriate at the sophomore level. It is no longer necessary for students to learn complicated short cuts and other computational tricks to find answers. The past three times this course has been taught, a different instructor has taught it – and the consensus view is that a 2000 level is more appropriate. This course has been taken by an average of 32 students per year 2010-2014, of which about 24 have been MA or MAC majors. The reason for adding "I" to the course name is to differentiate it from a new course to be proposed "Theory of Interest II".

This course covers material which students are likely to encounter in a professional setting during their careers. As such, it is intended that the course instruction include some discussion of ethical issues which may arise around the calculation, usage, and reporting of information related to these topics.

Resource Needs:
- There are five instructors who are able to teach this course
- A standard classroom with seating for up to 36 students will be needed
- A weekly conference will be offered
- It is not expected that any library resources will be needed
- Depending on the instructor, Echo Course Capture software may be used

Impact on Distribution Requirements: In its current designation as MA 3211, this course has been listed as one of four actuarial mathematics courses. In its new designation as MA 2211, it will listed instead as an introductory course for both MA and MAC majors. One additional note – this course will no longer be available to meet a requirement for a 3000 level math course for Physics majors. A summary of the current and recommended revised distribution requirements is attached.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add MA 2212 Theory of Interest II

Motion: On behalf of the Department of Mathematical Sciences, the Committee on Academic Operation recommends and I move that MA 2212 Theory of Interest II, as described below, be added.

Proposed Course Description:

MA 2212 THEORY OF INTEREST II (Cat 1)

This course covers topics in fixed income securities. Topics are chosen to cover the mechanics and pricing of modern-day fixed income products and can include: yield curve theories; forward rates; interest rate swaps; credit-default swaps; bonds with credit risk and options; bond duration and convexity; bond portfolio construction; asset-backed securities, including collateralized debt obligations and mortgage-backed securities with prepayment risk; asset-liability hedging; applications of binomial interest rate trees.
Recommended background: An introduction to theory of interest (MA 2211 or equivalent).

Anticipated Instructor: Jon Abraham, Marcel Blais, Barry Posterro, Stephan Sturm, or Gu Wang

Rationale: One of the goals of our actuarial classes is to prepare our students to meet the qualification standards as set by the actuarial profession. With respect to the topic "theory of interest", there is too much material to be covered in a single course. This added course will provide our students with a more complete array of actuarial courses, will continue to produce students with the academic background employers are seeking, will bring our actuarial program into alignment with our competitor schools, and will help us take another step towards becoming a Center of Actuarial Excellence. The anticipated enrollment in this course is 25 students per year.

This course covers material which students are likely to encounter in a professional setting during their careers. As such, it is intended that the course instruction include some discussion of ethical issues which may arise around the calculation, usage, and reporting of information related to these topics.

Resource Needs:
- The recent hiring of a new NTT faculty member was intended to support the additional load related to expansion of the actuarial program
- There are five instructors who are able to teach this course
- A standard classroom with seating for up to 36 students will be needed
- A weekly conference will be offered
- It is not expected that any library resources will be needed
- Depending on the instructor, Echo Course Capture software may be used

Impact on Distribution Requirements: No other departments will be impacted. A summary of the current and recommended revised distribution requirements is attached.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to modify MA 3212 Life Contingencies

Motion: On behalf of the Department of Mathematical Sciences, the Committee on Academic Operation recommends and I move that MA 3212 Life Contingencies have its name and course description changed as described below.

Current Course Description:

MA 3212 LIFE CONTINGENCIES (Cat I)

A continuation of a study of actuarial mathematics with emphasis on the theory and application of contigency mathematics in the areas of life insurance and annuities. Topics usually included are: survival functions and life tables; life insurance; life annuities; net premiums; and premium reserves.
Recommended background: MA 3211 and either MA 2621 or MA 2631.

Proposed Course Description:

MA 3212 ACTUARIAL MATHEMATICS I (Cat. I)

A study of actuarial mathematics with emphasis on the theory and application of contingency mathematics in various areas of insurance. Topics usually included are: survival functions and life tables; life insurance; property insurance; annuities; net premiums; and premium reserves.
Recommended background: An introduction to the theory of interest (MA 2211 or equivalent), and familiarity with basic probability (either MA 2621 or MA 2631, or equivalent).

Anticipated Instructor: Jon Abraham or Barry Posterro

Rationale: The term “Life Contingencies” is somewhat specialized, relating to a major traditional purpose of insurers to provide life insurance. However, the course material has broader application than just life insurance, and the more accepted general term for this material is now “Actuarial Mathematics”. The course description has been changed only slightly – it has been generalized to reflect the various applications of the underlying material. The anticipated enrollment in this course is 20-25 students per year.

This course covers material which students are likely to encounter in a professional setting during their careers. As such, it is intended that the course instruction include some discussion of ethical issues which may arise around the calculation, usage, and reporting of information related to these topics.

Resource Needs:
- There are two instructors who are currently able to teach this course
- A standard classroom with seating for up to 25 students will be needed
- A weekly conference will be offered
- It is not expected that any library resources will be needed
- Depending on the instructor, Echo Course Capture software may be used

Impact on Distribution Requirements: No other departments will be impacted. A summary of the current and recommended revised distribution requirements is attached.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add MA 3213 Actuarial Mathematics II

Motion: On behalf of the Department of Mathematical Sciences, the Committee on Academic Operation recommends and I move that MA 3213 Actuarial Mathematics II, as described below, be added.

Proposed Course Description:

MA 3213 ACTUARIAL MATHEMATICS II (Cat. I)

A continuation of the study of actuarial mathematics with emphasis on calculations in various areas of insurance, based on multiple insureds, multiple decrements, and multiple state models. Topics usually included are: survival functions; life insurance; property insurance; common shock; Poisson processes and their application to insurance settings; gross premiums; and reserves.
Recommended background: An introduction to actuarial mathematics (MA 3212 or equivalent)

Anticipated Instructor: Jon Abraham or Barry Posterro

Rationale: One of the goals of our actuarial classes is to prepare our students to meet the qualification standards as set by the actuarial profession. With respect to the topic "actuarial mathematics", there is too much material to be covered in a single course. This added course will provide our students with a more complete array of actuarial courses, will continue to produce students with the academic background employers are seeking, will bring our actuarial program into alignment with our competitor schools, and will help us take another step towards becoming a Center of Actuarial Excellence. The anticipated enrollment in this course is 20 students per year.

This course covers material which students are likely to encounter in a professional setting during their careers. As such, it is intended that the course instruction include some discussion of ethical issues which may arise around the calculation, usage, and reporting of information related to these topics.

Resource Needs:
- The recent hiring of a new NTT faculty member was intended to support the additional load related to expansion of the actuarial program
- There are two instructors who are able to teach this course
- A standard classroom with seating for up to 25 students will be needed
- A weekly conference will be offered
- It is not expected that any library resources will be needed
- Depending on the instructor, Echo Course Capture software may be used

Impact on Distribution Requirements: No other departments will be impacted. A summary of the current and recommended revised distribution requirements is attached.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add MA 4892 Topics in Actuarial Mathematics

Motion: On behalf of the Department of Mathematical Sciences, the Committee on Academic Operation recommends and I move that MA 4892 Topics in Actuarial Mathematics, as described below, be added.

Proposed Course Description:

MA 4892 TOPICS IN ACTUARIAL MATHEMATICS (Cat. II)

Topics covered in this course would vary from one offering to the next. The purpose of this course will be to introduce actuarial topics that typically arise in the professional actuarial organization's curriculum beyond the point where aspiring actuaries are still in college. Topics might include ratemaking, estimation of unpaid claims, equity linked insurance products, simulation, or stochastic modeling of insurance products.
Recommended background: Could vary by the specific topics being covered, but would typically include an introduction to the theory of interest and an introduction to actuarial mathematics (MA 2211 and MA 3212 or equivalent)

Anticipated Instructor: Jon Abraham, Marcel Blais, Barry Posterro, Stephan Sturm, or Gu Wang

Rationale: One of the goals of our actuarial classes is to prepare our students to meet the qualification standards as set by the actuarial profession. This added course will provide our students with a more complete array of actuarial courses, will continue to produce students with the academic background employers are seeking, will bring our actuarial program into alignment with our competitor schools, and will help us take another step towards becoming a Center of Actuarial Excellence. The anticipated enrollment in this course is 15-20 students per year.

This course may cover material which students are likely to encounter in a professional setting during their careers. If so, it is intended that the course instruction include some discussion of ethical issues which may arise around the calculation, usage, and reporting of information related to these topics.

This course would be offered as "TOPICS IN ACTUARIAL MATHEMATICS (Specific Topic)". A student could take this course multiple times, but only if the "Specific Topic" is not duplicated.

Resource Needs:
- The recent hiring of a new NTT faculty member was intended to support the additional load related to expansion of the actuarial program
- There are five instructors who are able to teach this course
- A standard classroom with seating for up to 25 students will be needed
- A weekly conference or lab is not anticipated for this course
- It is not expected that any library resources will be needed
- Depending on the instructor, Echo Course Capture software may be used

Impact on Distribution Requirements: No other departments will be impacted. A summary of the current and recommended revised distribution requirements is attached.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to modify MA 4213 Risk Theory

Motion: On behalf of the Department of Mathematical Sciences, the Committee on Academic Operation recommends and I move that MA 4213 Risk Theory, have its name changed to Loss Models – Risk Theory, that it be changed from a Category II course to a Category I course, and that its description be modified as described below.

Current Title and Course Description:

MA 4213 RISK THEORY (Cat. II)

This course covers topics in risk theory as it is applied, under specified assumptions, to insurance. Topics covered include: economics of insurance, short term individual risk models, single period and extended period collective risk models, and applications.
Recommended background: MA 2631.
(This course will be offered in 2015-16, and in alternating years thereafter.)

Proposed Title and Course Description:

MA 4213 LOSS MODELS – RISK THEORY (Cat I)

This course covers topics in loss models and risk theory as it is applied, under specified assumptions, to insurance. Topics covered include: economics of insurance, short term individual risk models, single period and extended period collective loss models, and applications.
Recommended background: An introduction to probability (either MA 2621 or MA 2631, or equivalent).

Anticipated Instructor: Jon Abraham, Barry Posterro, or Gu Wang

Rationale: We currently have two courses - MA 4213 and MA 4214 – which together cover the topic known as Loss Models (a more modern term for the same material we have been covering in those courses). Changing the name of this course will make its material more recognizable to practicing actuaries, but will not change the material covered by the course. As a category II course, this course has seen enrollments of about 35 students the last three times it has been offered. As a Category I course, we anticipate enrollment to be around 18 students each time it is offered.

This course covers material which students are likely to encounter in a professional setting during their careers. As such, it is intended that the course instruction include some discussion of ethical issues which may arise around the calculation, usage, and reporting of information related to these topics.

Resource Needs:
- The recent hiring of a new NTT faculty member was intended to support the additional load related to expansion of the actuarial program
- There are three instructors who are currently able to teach this course
- A standard classroom with seating for up to 25 students will be needed
- A weekly conference will be offered
- It is not expected that any library resources will be needed
- Depending on the instructor, Echo Course Capture software may be used

Impact on Distribution Requirements: No other departments will be impacted. A summary of the current and recommended revised distribution requirements is attached.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to modify MA 4214 Survival Models

Motion: On behalf of the Department of Mathematical Sciences, the Committee on Academic Operation recommends and I move that MA 4214 Survival Models have its name changed to Loss Models – Survival Models, that it be changed from a Category II course to a Category I course, and that it be modified as described below.

Current Course Description:

MA 4214 SURVIVAL MODELS (Cat. II)

Survival models are statistical models of times to occurrence of some event. They are widely used in areas such as the life sciences and actuarial science (where they model such events as time to death, or to the development or recurrence of a disease), and engineering (where they model the reliability or useful life of products or processes). This course introduces the nature and properties of survival models, and considers techniques for estimation and testing of such models using realistic data. Topics covered will be chosen from: parametric and nonparametric survival models, censoring and truncation, nonparametric estimation (including confidence intervals and hypothesis testing) using right-, left-, and otherwise censored or truncated data. Recommended background: MA 3631. (This course will be offered in 2016-17, and in alternating years thereafter.)

Proposed Course Description:

MA 4214 LOSS MODELS – SURVIVAL MODELS (Cat. I)

Survival models are statistical models of times to occurrence of some event. They are widely used in areas such as the life sciences and actuarial science (where they model such events as time to death, or to the development or recurrence of a disease), and engineering (where they model the reliability or useful life of products or processes). This course introduces the nature and properties of survival models, and considers techniques for estimation and testing of such models using realistic data. Topics covered will be chosen from: parametric and nonparametric survival models, censoring and truncation, nonparametric estimation (including confidence intervals and hypothesis testing) using right-, left-, and otherwise censored or truncated data. Recommended background: An introduction to mathematical statistics (MA 3631 or equivalent).

Anticipated Instructor: Jon Abraham, Barry Posterro, or Gu Wang

Rationale: We currently have two courses - MA 4213 and MA 4214 – which together cover the topic known as Loss Models (a more modern term for the same material we have been covering in those courses). Changing the name of this course will make its material more recognizable to practicing actuaries, but will not change the material covered by the course. As a category II course, this course has seen enrollments of about 32-35 students the last three times it has been offered. As a Category I course, we anticipate enrollment to be around 15-18 students each time it is offered.

This course covers material which students are likely to encounter in a professional setting during their careers. As such, it is intended that the course instruction include some discussion of ethical issues which may arise around the calculation, usage, and reporting of information related to these topics.

Resource Needs:

- The recent hiring of a new NTT faculty member was intended to support the additional load related to expansion of the actuarial program
- There are three instructors who are currently able to teach this course
- A standard classroom with seating for up to 25 students will be needed
- A weekly conference will be offered
- It is not expected that any library resources will be needed
- Depending on the instructor, Echo Course Capture software may be used

Impact on Distribution Requirements: No other departments will be impacted. A summary of the current and recommended revised distribution requirements is attached.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add MA 4216 Actuarial Seminar

Motion: On behalf of the Department of Mathematical Sciences, the Committee on Academic Operation recommends and I move that MA 4216 Actuarial Seminar, as described below, be added.

Proposed Course Description:

MA 4216 ACTUARIAL SEMINAR (Cat I)

Students will need to complete some or all of the following: attend speaker talks, attend company visits to campus, take part and help out with Math Department activities, take part and help out with Actuarial Club activities, prepare for actuarial exams, or complete other activities as approved by the instructor(s). This seminar will be offered on a pass/fail basis. Recommended background: Interest in being an actuarial mathematics major.

Anticipated Instructor: Jon Abraham or Barry Posterro

Rationale: One of the goals of our actuarial classes is to prepare our students to become professional actuaries. This is achieved in part through formal classroom instruction, but also requires some extracurricular effort on the part of students. This seminar will provide some structure and accountability, so that students will meet this requirement.

This seminar provides an opportunity to talk with students about a variety of ethical issues which may arise in their professional careers as actuaries. This could take the form of speakers, student-led research and reporting, or a review of various professional guidelines and Codes of Conduct relating to ethics in business.

This course will not add to the teaching load of the instructor.

Resource Needs:
- There are two instructors who are able to teach this course
- Classrooms will be scheduled on an ad hoc basis as needed
- A weekly conference or lab is not anticipated for this course
- It is not expected that any library resources will be needed
- No support from the Academic Technology Center will be needed

Impact on Distribution Requirements: No other departments will be impacted. A summary of the current and recommended revised distribution requirements is attached.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to modify the Actuarial Mathematics (MAC) distribution requirements

Motion: On behalf of the Department of Mathematical Sciences, the Committee on Academic Operation recommends and I move that the Actuarial mathematics (MAC) distribution requirements be modified as shown on the next page (with the current and proposed requirements are shown side by side).

Rationale: There are five places where changes to the catalog description of the distribution requirements are recommended, items A-D below. Items A, B, and D are related to the eight motions previous motions, while item C is of a "clean-up" nature. The letters A to D below correspond to A to D on the next page.

A. Adding the Actuarial Seminar, a proposed new graduation requirement

B. Currently we require 18 math courses, and further specify 9 of them (2 transition, 4 core, 3 actuarial). The proposed new requirements will continue to require 18 courses, but further specify 10 of them (2 transition, 4 core, 4 actuarial). Note, too, that we do not list MA 2211 as a required actuarial course, but it's strongly recommended background for other actuarial courses – this makes it another foundation course that students should consider taking. Currently, students typically take these 9 foundation courses: Calc 1-4, Stats 1-2, Lin Alg, Dif Eq, and Bridge to Higher Math.

C. We are making the choice of business courses more flexible, allowing students to choose up to four courses – will still recommend a few specific courses to align with the professional needs of actuaries, both here and during academic advising.

D. Adding the Actuarial Seminar

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

Actuarial Mathematics (MAC) Graduation Requirements

CURRENT MAC REQUIREMENTS

REQUIREMENTS

1.	Mathematics (including MQP) (See notes 1-5)	7 units
2.	Basic Science (See note 6)	2/3
3.	Computer Science	2/3
4.	Business (See note 7	4/3
5.	Additional courses or independent studies (except MS, PE courses, and other degree requirements) from any area	1/3

NOTES

1. Must include MA 3831 and MA 3832, or their equivalents, at least one of MA 3257, MA 3457, or equivalent, and at least one of MA 3631, MA 4632, or equivalent.
2. Must include two of the following: MA 2073, MA 2271, MA 2273, MA 2431, MA 2631, or their equivalents
3. Must include three of the following: MA 3211, MA 3212, MA 4213. MA 4214, or their equivalents
4. May include independent studies directed towards Society of Actuaries exams only if the material was not previously covered in a WPI course
5. May not include both MA 2631 and MA 2621
6. Science courses must be chosen from the following disciplines: BB, CH, ES, GE, PH
7. Must include exactly one of ACC 2101 or BUS 2060, and exactly one of FIN 2200 or BUS 2070, or their equivalents

PROPOSED MAC REQUIREMENTS

REQUIREMENTS

1.	Mathematics (including MQP) (See notes 1-5)	7 units
2.	Basic Science (See note 6)	2/3
3.	Computer Science	2/3
4.	Business (See note 7)	4/3
5.	Additional courses or independent studies (except MS, PE courses, and other degree requirements) from any area	1/3
6.	Actuarial Seminar (see Note 8)	0/3

NOTES

1. Must include MA 3831 and MA 3832, or their equivalents, at least one of MA 3257, MA 3457, or equivalent, and at least one of MA 3631, MA 4632, or equivalent.
2. Must include two of the following: MA 2073, MA 2271, MA 2273, MA 2431, MA 2631, or their equivalents
3. Must include four of the following: MA 2212, MA 3212, MA 3213, MA 4213, MA 4214, MA 4892 or their equivalents
4. May include independent studies directed towards Society of Actuaries exams only if the material was not previously covered in a WPI course
5. May not include both MA 2631 and MA 2621
6. Science courses must be chosen from the following disciplines: BB, CH, ES, GE, PH
7. Business courses must be chosen from courses with any of the following prefixes: ACC, BUS, or FIN. BUS 2060, BUS 2070, and FIN 2260 are recommended.
8. The actuarial seminar is a graduation requirement. Students must complete this seminar in at least four terms while at WPI. Please consult with the actuarial faculty for more details about this requirement.

A

B

C

D

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to change distribution requirements for the Architectural Engineering Major

Motion: On behalf of the Architectural Engineering Program, the Committee on Academic Operation recommends and I move that the distribution requirements for the Architectural Engineering Major be modified as described below:

Proposed changes:

1) *4-Units* of Mathematics and Basic Science Requirement
   a. Add MA 2071 (Matrices and Linear Algebra).
   b. Remove MA 2611 (Applied Statistics I)
   c. Remove subcategory "Statistics and Probability"
   d. Remove CH3510 from electives
   e. Add subcategory entitled "Thermodynamics"
   f. Add PH2101(Principles of Thermodynamics) to thermodynamics subcategory (Note 1)
   g. Change Electives credit from 2/3 units to 1/3 Units

   The proposed change requires that students take a course in matrices and linear algebra, and a course in thermodynamics. This new mathematics requirement will strengthen student ability to learn important computational techniques relevant to, for example, finite element methods for analysis of structural systems. The requirement for a thermodynamics course will enhance student preparedness for energy related courses, such as HVAC systems design, building physics, and building energy modeling. Statistics has been eliminated as a required course because it is no longer mandated by ABET. Students can however still opt into a statistics course as a mathematics and basic science elective. We anticipate no major impact on student schedules or other departments.

2) *5 1/3*-Units of Engineering Science and Design

   a. Remove ES 3004 (Fluid Mechanics).
   b. Add AREN 3024 (Building Physics) as a General Architectural Engineering requirement (move from Building mechanical System category to general Architectural engineering category)
   c. Add FP3080 (Introduction to Building Fire safety System Design) as a course that fulfills the Building Mechanical Systems requirement.

   Building Physics will replace Fluid Mechanics as a general architectural engineering distribution requirement. The building physics course covers important topics and concepts related to heat, air, and moisture transport in building systems. The course also includes a section on fluid mechanics as applied to building engineering. The proposed change provides students with a much broader base relevant to such areas as HVAC system design, building envelope design, and building performance. We anticipate no major impact on student schedules or other departments.

3) Add the following sentence to the Architectural Engineering Program Chart title
"This chart summarizes course recommendations"

Proposed (Revised) AREN Program Chart:

Add following sentence below chart title:
"This chart summarizes course recommendations"

ARCHITECTURAL ENGINEERING PROGRAM CHART

4 UNITS OF MATHEMATICS AND BASIC SCIENCE

Mathematics		**5/3 Units**
MA 1021	Calculus I	
MA 1022	Calculus II	
MA 1023	Calculus III	
MA 1024	Calculus IV	
MA 2051	Ordinary Differential Equations	
~~**Statistics and Probability**~~		**2/3 Units**
~~MA 2611~~	~~Applied Statistics I~~	
MA 2621	Probability for Applications	
Physics		**2/3 Units**
PH 1110 or PH 1111	Mechanics	
PH 1120 or PH 1121	Electricity and Magnetism	
Chemistry		**1/3 Units**
CH 1010 or CH 1020	Chemistry I or Chemistry II	
Electives		**2/3 Units**
~~CH 3510~~	~~Thermodynamics (Note 1)~~	

Replace with; MA 2071 (Matrices and Linear Algebra)

Add Thermodynamics subcategory (list PH2101)

Change to 1/3 Units

1 UNIT OF ARCHITECTURAL ENGINEERING COMPLEMENTS

AR 2114	Modern Architecture in the American Era, 1750-2001 and Beyond
AREN 3001	Architectural Graphics and Communication
AREN 3002	Architectural Design

5 1/3 UNITS OF ENGINEERING SCIENCE AND DESIGN (Notes 2, 3)

General Architectural Engineering		**2/3 Units**
AREN 2023	Introduction to Architectural Engineering Systems	
~~ES 3004~~	~~Fluids Mechanics~~	
Construction/Construction Management (select two)		**2/3 Units**
CE 3020	Project Management	
CE 3022	Legal Aspects of Professional Practice	
CE 3025 (required)	Project Evaluation	
Building Mechanical Systems (select two)		**2/3 Units**
AREN 3003 (required)	Principles of HVAC Design for Buildings	
AREN 3024	Building Physics	
AREN 3026	Building Envelope Design	
Building Structural Engineering (select three)		**3/3 Units**
CE 2000	Analytical Mechanics I (or ES 2501)	
CE 2001	Analytical Mechanics II (or ES 2502)	
CE 2002	Introduction to Analysis and Design	
CE 3041	Soil Mechanics	
Building Electrical Systems		**2/3 Units**
AREN 2025	Building Electrical Systems	
AREN 3005	Lighting Systems	

Move AREN 3024 to General Architectural Engineering requirements

Replace with; AREN 3024 with FP3080 (Intro. To Building Fire safety System Design)

Students can achieve design proficiency in either the structural or mechanical area.

Design Focus on the Structural Area (select two)		**2/3 Units**
CE 3006	Design of Steel Structures	
CE 3008	Design of Reinforced Concrete Structures	
CE 3010	Structural Engineering	
CE 4017	Prestressed Concrete Design	

OR

Design Focus on the Mechanical Area (select two)		**2/3 Units**
AREN 3006	Advanced HVAC System Design	
AREN 3025	Building Energy Simulation	
ES 3005	Radiation Heat Transfer Applications	
FPE 3070	Fundamentals of Fire Safety Analysis	
Major Qualifying Project (Note 4)		**3/3 Units**

Note1: Can be satisfied with CH 3510 as a mathematics and Basic Elective, or ES 3001, Introduction to Thermodynamics as a Free Elective, or other approved equivalent course.
Note 2: Must include 1/3 unit in Experimentation (fulfilled by AREN 3003, AREN 3025, ME 3901, CE 3026 or approved equivalent).
Note 3: The courses in the above Engineering Science and Design chart can be replaced by other approved equivalents.
Note 4: Must include the Capstone Design activity.

5 UNITS ADDITIONAL DEGREE REQUIREMENTS

Humanities and Arts	6/3 Units
Social Sciences ‡	2/3 Units
IQP	3/3 Units
Physical Education	1/3 Units
Free Electives	3/3 Units

Replace the four notes with the 6 notes listed in the section below.

Proposed Revised Distribution requirements NOTES:

1. Mathematics must include differential and integral calculus, differential equations, probability, and matrices and linear algebra. Science must include 2/3 unit in calculus-based physics (either the PH1110 or PH1111 series), 1/3 unit in chemistry, 1/3 unit in thermodynamics (can be fulfilled by PH 2101 or other approved equivalent course such as ES 3001*).
2. Must include topics in architectural design (AREN 2002 and AREN 3002), and architectural history (AR 2114), or approved equivalents.
3. Must include 5 1/3 units in the four areas of Architectural Engineering, distributed as follows or with approved equivalents:

a) 2/3 units in the general architectural engineering area (AREN 2023) and building physics (AREN 3024)
b) 2/3 units in construction/construction management including project evaluation (CE 3025), and either legal aspects of professional practice (CE 3022) or project management (CE 3020).
c) 2/3 units in building mechanical systems including principles of HVAC design for buildings (AREN 3003) and either building envelope design (AREN 3026) or building fire safety system design (FP 3080).
d) 2/3 units in building electrical systems with topics in: building electrical systems (AREN 2025) and lighting systems (AREN 3005)
e) 2/3 units in advanced courses in building mechanical systems selected from topics in advanced HVAC system design (AREN 3006), topics related to radiation heat transfer (ES 3005 or approved equivalent), fundamentals of fire safety analysis (FP 3070) and building energy simulation (AREN 3025).
   or
   2/3 units in advanced courses in building structures selected from topics in steel design (CE 3006), concrete design (CE 3008), pre-stressed concrete design (CE 4017), and structural engineering (CE 3010).

4. Must include 1/3 unit in Experimentation (fulfilled by AREN 3003, AREN 3025, ME 3901, CE 3026 or approved equivalent).
5. Must include the Capstone Design activity through the MQP in one of the architectural engineering areas.
6. Great Problem Seminar (GPS) courses can only be used to fulfill the HUA, SSPS, or the Free Elective requirements.

* If ES 3001 is used to satisfy the thermodynamics requirement then it counts as a free elective and a Math and Basic Science course must be taken to complete the 4 Unit requirement

Rationale

The AREN program has been developed according to the 2011-2012 ABET criteria for engineering programs, however ABET requirements changed in 2012-2013. Provided below are the old and new ABET Curriculum Requirements for Architectural Engineering.

2011-2012 ABET Curriculum requirements for Architectural engineering programs (Old)

"The program must prepare graduates to be proficient in mathematics through differential equations, probability and statistics, calculus-based physics, and general chemistry; be proficient in statics, strength of materials, thermodynamics, fluid mechanics, electric circuits, and engineering economics; be proficient in a minimum of two (2) of the three (3) basic curriculum areas of structures, building mechanical and electrical systems, and construction/construction management; have engineering design capabilities in

at least two (2) of the three (3) basic curriculum areas of architectural engineering, based upon design exposure that has been integrated across the breadth of the program; and have an understanding of architectural design and history leading to architectural design that will permit communication and interaction with the other design professionals in the execution of building projects."

2012-2013 ABET Curriculum requirements for Architectural engineering programs (New)
"The program must demonstrate that graduates can apply mathematics through differential equations, calculus-based physics, and chemistry. The four basic architectural engineering curriculum areas are building structures, building mechanical systems, building electrical systems, and construction/construction management. Graduates are expected to reach the synthesis (design) level in one of these areas, the application level in a second area, and the comprehension level in the remaining two areas. The engineering topics required by the general criteria shall support the engineering fundamentals of each of these four areas at the specified level. Graduates are expected to discuss the basic concepts of architecture in a context of architectural design and history."

The new ABET curriculum requirements have become less prescriptive in terms of specific topics to be taught and therefore leave more flexibility to individual programs to develop their own curriculum as long the 4 basic areas are covered.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to change the requirements for the minor in Architectural Engineering

Motion: On behalf of the Architectural Engineering Program, the Committee on Academic Operation recommends and I move that the requirements for the minor in Architectural Engineering be modified as described below:

Current Structure of the AREN Minor:

2 Units in Architectural Engineering
Required courses
AREN 2023 Introduction to Architectural Engineering Systems
AREN 3001 Architectural Graphics and Communication
AREN 3003 Principles of HVAC Design for Buildings

Elective courses (select three)
AREN 2025 Building Electrical Systems
AREN 3005 Building Lighting Systems
AREN 3006 Advanced HVAC System Design
AREN 3024 Building Physics
AREN 3025 Building Energy Simulation
AREN 3026 Building Envelope Design

Proposed Structure of the AREN Minor:

2 Units in Architectural Engineering

Must include:
AREN 2023 Introduction to Architectural Engineering Systems
AREN 2002 Architectural Design I
AREN 3003 Principles of HVAC Design for Buildings.

Rationale:
The abovementioned changes in required courses for the minor in architectural engineering are a direct result of the proposed changes in distribution requirements and course description outlined in approved companion motions. Building physics becomes a required course for the minor as it constitutes a foundation course. There is no impact on student schedules or other departments.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Academic Operations (Prof. Lindeman, Chair)
Re: Motion to add PSY 2410 School Psychology

Motion: On behalf of the SSPS Department and the Psychological Science Program, the Committee on Academic Operation recommends and I move that PSY 2410 School Psychology, as described below, be added.

Proposed Course Description:

PSY 2410: School Psychology (Cat.II)

School psychology focuses on understanding children and adolescents' mental health, behavioral health and learning needs in order to work with educators and parents to help students succeed academically and socially. This course will provide an overview of the field of school psychology, drawing from educational, developmental, and cognitive research. Students will critically examine the theoretical, methodological, and practical approaches to understanding how in and out of school interventions and contexts influence the academic, social, and emotional development of children. Topics will include school readiness and transitions, behavioral and self-regulatory skills, socio-cultural diversity and skill gaps, assessment tools and classification, teacher-child interactions, and school-based interventions that promote positive development. This course differs from PSY 2401: Psychology of Education in that it focuses on school systems rather than education more broadly. Students planning IQPs in educational settings will find this course particularly useful.
Recommended background: An introductory background in psychological science or education (PSY 1400, or PSY 1401, or PSY 2401, or equivalent).

Anticipated Instructor: Erin Ottmar

Rationale: This course will also provide an additional course for Psychology major and minors to take to fulfill their degree requirements. More importantly,
this course aims to provide undergraduate students with an additional course that would expose them to applied and societal issues related to learning sciences and educational research. This course is also intended to help form a bridge between the undergraduate psychology program and the graduate Learning Sciences and Technology program. The hope is that undergraduate students who become interested in this topic would subsequently minor in Psychology, conduct research, and/or pursue a Masters degree program in Learning Sciences.

Impact on Distribution Requirements and Other Courses: This will provide an additional course for Psychology majors and minors to take.

Resource Needs:
There are no new resources needed to deliver this course. In the last year, we hired two new faculty members who will assist with teaching our undergraduate courses.

Implementation Date: Implementation date for this action is C term during the 2015-2016 academic year. It will then be offered every other year (as per Category II courses).

Date: December 18, 2015
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to add ECE 5532 Distributed and Renewable Power Generation

Motion: On behalf of the Electrical and Computer Engineering Department, the Committee on Graduate Studies and Research recommends and I move that the following new on-line graduate course ECE 5532 Distributed and Renewable Power Generation be added, as described below.

Proposed Course Description:

ECE 5532 Distributed and Renewable Power Generation (3 credits)
This course introduces the characteristics and challenges of interconnecting increasing numbers of Distributed Energy Resources (DERs) to the Electric Power System (EPS). Topics include: challenges to distribution and transmission system protection; local voltage control; ride through; optimal interconnection transformer configurations; and practical engineering approaches to maintain system reliability and protection. The current and evolving interconnection standard (IEEE 1547) is included. Prerequisites: Since the course material builds on power system analysis capabilities, including system protection and controls, ECE 5500 Power System Analysis and either ECE 5520 Power System Protection & Control or ECE 5521 Protective Relaying are required. Also, it is recommended that students take this course after completing ECE 5530 Power Distribution.

Rationale: The specific impetus for this course is the growth in distributed, often renewable, electric power generation. At low levels of penetration, the aggregate of distributed generators never exceeds a fraction of the power supplied to the distribution system from transformers fed by the transmission system. As a result, system protection and control logic is largely unaffected. As the use of solar and wind generation increases; however, these intermittent sources can begin to affect local protection, control and even regional transmission system operation. Graduate students in WPI's power system programs have asked for this course. They want to further their understanding of these effects and learn how to best accommodate them while maintaining system reliability and protection.

Resources and Anticipated Instructors: Dr. Babak Enayati. Resource impact is expected to be low. The primary demand for this course is expected to be in the CPE Power Systems programs. CPE will provide compensation for the instructor and will work with the ECE department in identifying appropriate instructors. No on campus classroom resources will be required, as the course will be offered online or off-campus. For the same reason, no on campus library, laboratory, or IT resources will be needed.

Method of Delivery:
For the CPE student cohorts we expect that one faculty member (full-time or adjunct) will deliver this course online or in an on-corporate-cohort-site classroom. Typical course enrollment is expected to range from 12 to 25 students.

Implementation Date: Implementation date for this action is Spring 2016.

Date: December 18, 2015
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to add ME 5313 Introduction to Nanomechanics

Motion: On behalf of the Mechanical Engineering Department, the Committee on Graduate Studies and Research recommends and I move that ME 5313 Introduction to Nanomechanics be added, as described below.

Proposed Course Description:

ME 5313 Introduction to Nanomechanics (2 credits)
This course introduces students to nanomechanics. Topics covered include an introduction to mechanical systems, forces at the nano to atomic scales, cantilever theory, mechanics of 0D, 1D and 2D nanomaterials, polymer chain nanomechanics, molecular recognition, wear friction and adhesion at the nanoscale, scale dependence of frictional resistance, nano-indentation, surface elasticity and viscoelasticity mapping, lubrication principles at the nanoscale, interfacial forces in confined fluids, mechanics of electrorheological and magnetic fluids. Recommended Background: ME 4875 or consent of Instructor.

Rationale: Although several faculty members in the mechanical engineering department do research in the area of nanomechanics and the research areas of other faculty members in other departments are directly related to nanomechanics,currently the mechanical engineering department does not offer a fundamental course on nanomechanics. This proposed advanced course connects many topics in emerging areas of research, and therefore, it is appropriate for the graduate level. Students in ME/BME/BB will potentially be interested in such an offering as it intimately connects nanotechnology to mechanics and biological sciences.

Nanomechanics is a branch of nanoscience and technology that deals with the mechanical properties of physical systems at the nanometer length scales. Materials such as carbon nanotubes and graphene are fast becoming increasingly important for making high strength and light weight composites with multifunctionality. Therefore, understanding the nanomechanics of such materials including their tribological properties will be useful for future engineering applications. In particular, the nanomechanics of cantilevers are useful in studying specific versus nonspecific interactions of biological molecules for creating immunoassays/diagnostic medical devices.

Resources and Anticipated Instructors: Prof. Panchapakesan will be the primary instructor for this course. A regular classroom capable of holding 20-30 students with a computer/projector is adequate. No laboratory is required for this course. No particular library resources are needed for this category. Library database such as web of science is available through WPI website. No special software is necessary for this course.

Implementation Date: The course would be offered every D-term starting with D-term 2016

Date: December 18, 2015
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to revise AE/ME 5101 Advanced Fluid Dynamics

Motion: On behalf of the Aerospace Engineering Program and the Mechanical Engineering Department, the Committee on Graduate Studies and Research recommends and I move that AE 5101/ ME5101 (Advanced Fluid Dynamics) be revised, as described below..

Proposed Revised Course Description: (Additions underlined and deletions ~~struck through~~.)

AE 5101/ME 5101. ~~Advanced~~ Fluid Dynamics (2 credits)
This course presents ~~an introduction to graduate level~~ the following fundamental topics in fluid dynamics ~~. Topics covered include: the~~ concept of continuum in fluids; kinematics and deformation for Newtonian fluids; the mass conservation equation, momentum and energy equations for material volumes ~~systems~~ and control volumes; the differential form of mass conservation, momentum and energy equations. ~~Navier-Stokes equations~~; This course covers also applied topics chosen from: unidirectional steady incompressible viscous flows; ~~and~~ unidirectional transient incompressible viscous flows; lubrication flows~~;~~ similarity and dimensional analysis. ~~Vorticity~~ This is an introductory graduate-level course and may be taken independent of AE 5107/ME 5107.
~~dynamics and rotating flows; laminar boundary layers; separation; potential flows; introduction to turbulence; Stokes flow; surface tension and surface driven flows.~~

Rationale: This course along with the proposed AE 5107/ME 5107 will provide a comprehensive coverage of fluid dynamics at the introductory graduate level. The course will be alternate with AE 5107/ME 5107.

Resources and Anticipated Instructors: Professors Blandino, Gatsonis, Im, Olinger, Linn (Primary instructors). There will be no need for new resources as this will alternate with AE 5107/ME 5107.

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

Date: December 18, 2015
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to add AE 5107/ ME 5107 Applied Fluid Dynamics

Motion: On behalf of the Aerospace Engineering Program and the Mechanical Engineering Department, the Committee on Graduate Studies and Research recommends and I move that AE 5107/ ME5107 Applied Fluid Dynamics be added, as described below..

Proposed Course Description:

AE/ME 5107 Applied Fluid Dynamics (2 credits)
This course presents applications of incompressible and compressible fluid dynamics at an introductory graduate level. Topics are chosen from: potential flows; boundary layers; vorticity dynamics and rotating flows; aerodynamics; introduction to turbulence; micro/nano flows. This course can be taken independent of AE 5101/ME 5101.

Rationale: This course, along with the revised AE 5101/ME 5101, provide a comprehensive coverage of fluid dynamics at the introductory graduate level. The course will be alternate with AE 5101/ME 5101.

Resources and Anticipated Instructors: Professors Blandino, Gatsonis, Im, Olinger, Linn (Primary instructors). There will be no need for new resources as this will alternate with AE 5101/ME 5101 course which has been offered yearly.

Enrollment Data
Based on data from AE 5101/ME 5101 offerings, this course is expected to enroll close to 40 students.

Impact on Distribution Requirements
The course adds flexibility to graduate and undergraduate students by increasing the number of courses available and enriching our offerings.

Assessment
The course will be reviewed by the ME Graduate Committee and AE Program Committee as part of our regular course assessment process.

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