

WORCESTER POLYTECHNIC INSTITUTE
November 17, 2016

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

The third Faculty meeting of the 2016-2017 academic year will be held on **Thursday, November 17, 2016** at 3:15 pm in **Olin Hall 107**, with refreshments at 3:00.

1. Call to Order M. Richman
 - Approval of the Agenda
 - Consideration of the Consent Agenda (including Minutes from 10-14-16)

2. Opening Announcements M. Richman

3. President's Remarks L. Leshin

4. Provost's Remarks B. Bursten

5. Committee Business J. Doyle
 - Committee on Academic Policy (CAP)
 - Motion to add a general statement to the Undergraduate Catalog concerning Independent Study
 - Motion to add a statement to the Undergraduate Catalog that clarifies the credit assigned to Independent Study activities
 - Motion to add a statement to the Undergraduate Catalog concerning approvals required for Independent Studies

6. Committee Report (for Open Discussion) T. Dominko
 - Committee on Governance (COG)
 - Motion to revise the Faculty Handbook Description of the Committee on Appointments and Promotions

7. Special Report (for Open Discussion) B. Vernescu
 - Vice Provost for Research
 - Faculty Input on Revisions to WPI's Conflict of Interest Policy

8. Old Business

9. New Business

10. Closing Announcements

11. Adjourn

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WORCESTER POLYTECHNIC INSTITUTE

Faculty Meeting Minutes

October 14, 2016

Summary:

1. Call to Order
2. Opening Announcements
3. Provost's Remarks
4. Committee Business: CAO, CGSR, COG/FAP
5. Committee Reports: CITP, COAP
6. Adjournment

Detail:

1. Call to Order

The second meeting of the 2016-2017 academic year was called to order at 11:00am in OH 107 by **Prof. Richman** (ME). He inserted a slight modification to the minutes of September 8, 2016 to describe Dean Oates' friendly amendment on the motion to stop the tenure clock, and indicated that two motions had been withdrawn from the consent agenda. The consent agenda and the minutes from September 8, 2016 were approved as modified.

2. Opening Announcements

Prof. Ryder (BBT) explained that a National Active Learning Day for STEM education will take place on October 25th, and she encouraged all instructors to pledge to use an active learning technique for ten minutes during their class on that day. Ideas about how to do so will be presented informally throughout the day in the Rubin Campus Center from 9am to 5pm.

VPR Vernescu (MA) explained that changes have been proposed for the Conflict of Interest Policy that currently appears in the Faculty Handbook. The intention is to get feedback from COG and CGSR, and then provide a forum for further faculty input. VPR Vernescu also announced that WPI had purchased SciVal, which is a data-mining software package that compares citations from one institution to another. He will send an email with information about training sessions for faculty members.

Prof. Richman (ME) announced that Prof. Boudreau (HU&A), Prof. Scarlata (CBC), and Prof. Weekes (MA) had been elected to the Dean of Arts and Sciences Search Committee, and he thanked Dean Heinricher, VPR Vernescu and Dean Wobbe for also allowing their names to appear on the ballot.

Prof. Richman gave his personal welcome to Dean Soboyejo (Engineering), and described his background and some of his accomplishments.

3. Provost's Remarks

Provost Bursten congratulated the faculty on WPI's recent #1 Wall Street Journal ranking in balance between teaching and research. The Provost then reported that he had recently been at the annual meeting of the National Academy of Engineering, where WPI was formally honored for receiving the Gordon Prize for Engineering and Technology Education. In particular he congratulated the four official WPI awardees: Dean Heinricher, Dean Vaz, Dean Wobbe, and Prof. Apelian.

Provost Bursten reported that, in response to a request from COG, he is working to delineate (by sometime in C-term) the roles and responsibilities of WPI's Deans, after which he hoped that the Deans could be appropriately incorporated into the Faculty Handbook. Provost Bursten also explained that, in response to a second COG request, he will be working with a sub-group of COG (including Prof. Gaudette, Prof. Loiacono, and Prof. Ryder) to formulate a plan for the growth of tenured and tenure-track faculty consistent with our strategic goals and our commitments to instructional activities.

Provost Bursten announced that he would be working with Ms. Morton (Chief Marketing Officer) and Prof. Shue (CS, Chair - CITP) on an effective mechanism for faculty members to provide feedback on the new WPI website.

4. Committee Business

CAO

Prof. Sturm (MA), for the Committee on Academic Operations, moved that the undergraduate student graduation list (previously distributed) be approved for October 7, 2016 graduation. (See **Addendum #1** attached to these minutes.) The motion **passed**.

CGSR

Prof. Demetriou (ME), for the Committee on Graduate Studies and Research, moved that the graduate student graduation list (previously distributed) be approved for October 7, 2016 graduation. (See **Addendum #2** attached to these minutes.) The motion **passed**.

COG/FAP

Prof. Dominko (BBT), for the Committee on Governance, and **Prof. El-Korchi** (CEE), for the Committee on Financial and Administrative Policy, moved to allow FAP to select any of its faculty committee-members (including the member *appointed* by COG) to serve as Chair of the Fringe Benefits Committee (FBC). (See **Addendum #3** attached to these minutes.) **Prof. El-Korchi** (CEE) explained that the current language requiring that the Chair of FBC to be an *elected* faculty member unnecessarily restricted the flexibility intended when an appointed member of FAP was added to the committee last year. The motion **passed**.

5. Committee Reports

CITP

Prof. Shue (CS), for the Committee on Information Technology Policy (CITP), outlined the planned email service transition to Microsoft cloud-based Exchange Online. (See **Addendum #4** attached to these minutes.) The transition will begin on October 18th at 10pm and be completed at 6am on October 19th. The advantages of the transition are as follows: an increase from 4 GB to 50 GB of mailbox storage; the capacity to offer alumni email services for life; lower operational costs; and enhanced sharing of calendars with students (whose email was transitioned in this manner during the summer). Prof. Shue emphasized that the new Microsoft email service is FERPA and HIPAA compliant, that our data will not be used for advertising, that our emails will remain private and secure, and that Microsoft will provide urgent (within two hours) and critical (immediate) support services.

Prof. Sarkis (BUS) asked how the security level of the cloud system compared with our current email security system. Prof. Shue explained that he is not aware of any significant issues that have arisen with the security of Microsoft's email service.

COAP

Prof. Hansen (HU&A), for the Committee on Appointments and Promotions, described the important elements of COAP's current proposal to modify the criteria for promotion to full Professor. (See **Addendum #5** attached to these minutes.) Prof. Hansen explained that the proposal reasserts the importance of teaching and scholarship; it elevates the importance of service; it defines leadership as scholarly contributions with positive external impact; it uses ideas from Ernest Boyer (1990) to broaden the definition of scholarship; and it reaffirms that "there may be exceptional candidates whose unique contributions, while not conforming to these guidelines, are deserving of promotion." The proposed criteria for promotion to full professor would require high quality teaching, high quality scholarship, a record of scholarly contributions that demonstrate a positive external impact, and involvement in a significant level of service. The proposal includes five forms of scholarship: discovery, integration, application and practice, teaching and learning, and engagement. Scholarship must be of high quality, must have external impact, and must be recognized by experts in the appropriate scholarly area.

Prof. Sarkis (MA) asked if there were faculty members who would be promoted under the current criteria but not under the proposed criteria. **Prof. Hansen** did not believe that anyone who had been promoted recently would

not be promoted under the proposed criteria, and he thought that others could make a stronger case for their candidacy under the proposed criteria.

Prof. Humi (MA) asked Prof. Hansen to elaborate on the Scholarship of Engagement. **Prof. Hansen** explained that the scholarship of engagement involves an exchange of knowledge and resources between a university and a local community. It is separate from, but might overlap with the scholarship of application. Prof. Humi asked if that meant that someone could be promoted to full professor based on his or her involvement with off-campus IQP advising. Prof. Hansen explained that the work would have to be made public and reviewable.

Dean Wobbe (CBC, UG Studies) thanked COAP for incorporating prior suggestions into the current proposal. She thought that activities such as leadership of academic departments and programs belonged in the category of service rather than teaching. Prof. Hansen pointed out that certain activities will cross the boundaries of teaching, scholarship and service, and that candidates would be welcome to categorize their documentation in other ways.

Prof. Gericke (CBC) asked if the definition of scholarship in the proposed criteria for promotion from associate professor to full professor would also apply to the scholarship part of the criteria used for promotion from assistant professor to associate professor. If not, could that inconsistency lead to a scenario in which someone qualifies for promotion to associate professor but does not qualify for tenure. And, if the tenure criteria also have to be changed for consistency, what effect does that have on the overall discussion? **Prof. Hansen** explained that the criteria for tenure would not be changed by the current proposal.

Prof. Juisto (IGSD) was pleased to see new ideas about scholarship reflected in these proposed criteria, and he appreciated including as a fourth pillar the need to demonstrate external impact. His concern was that we implement the policy in a transparent manner. In this spirit, he suggested that each candidate receive COAP's written review of the case for the purpose of feedback and professional development. He also suggested that COAP's membership should be diversified beyond just full professors because it is important to make broader campus-wide judgments about who is qualified to be promoted to full professor.

Prof Rulfs (BBT), as a member of CTAF, expressed her concern about using one set of criteria when CTAF considers promotion to associate professor (with tenure) and another set when COAP does so (without tenure). She did not see how COAP could independently put the current proposal forward without some corresponding changes made by CTAF. **Prof. Hansen** pointed out that it is extremely rare for someone to come up for promotion to associate professor before coming up for tenure. Prof. Rulf pointed out that it is not rare for new faculty members to be appointed as associate professors without tenure, and asked – in that case – which definition of scholarship would be used. Prof. Hansen explained that the definition of scholarship used by COAP would not be operative in those cases.

Prof. Rudolph (HU&A) wanted to know how external impact would be assessed by external reviewers when the candidate's case is based on the kind of breadth and different forms of scholarship that we value most at WPI. In particular, she expressed concern that in such cases the overall scholarly impact of such a candidate would be undervalued by individual external reviewers who were each in their own particular focus area. **Prof. Hansen** did not believe we were quite as unique as we sometimes think we are, and as a result, the mix of teaching and scholarship that we require is familiar to many reviewers. He explained that the proposed criteria require high quality scholarship, but not in any set number of the defined categories of scholarship. Prof. Rudolph was concerned about the candidate who might show considerable breadth across the categories of scholarship without a particular depth in any one.

Prof. Cocola (HU&A) expressed his concern that the wording in the rationale describing the requirement of "...impact beyond WPI within *multiple areas* across the broader continuum of scholarship...." implied a requirement of breadth that would actually be more restrictive than the current criteria. **Prof. Hansen** indicated that the wording was not meant to be interpreted in that way, and he emphasized the importance of impact beyond WPI in elevating the stature of WPI.

Prof. Gatsonis (ME) contrasted COAP's current proposal to past improvements made to the tenure process. In the case of tenure changes, the bar for tenure was not changed without first making sure that all elements of the process were also made more clear. These processes included fixing the membership on joint tenure committees and requiring annual departmental tenure reviews. Prof. Gatsonis wanted to know what triggered the need to change the criteria, whether the goal was to make the procedures clearer or to simply elevate or lower the bar for promotion, and what procedural changes were anticipated. **Prof. Hansen** explained that longstanding frustrations with the promotion process became apparent through the COACHE survey, with particularly low levels of satisfaction among associate professors and female faculty members. A task force on promotions was formed that identified problems in the promotions criteria and in the promotion processes. The current COAP proposal concerning promotions criteria differs from the strategy suggested by the task force. The procedural problems remain, and there is a wide range of views on how they may be solved, especially at the department level.

Prof. deWinter (HU&A) was concerned that the proposed criteria maintain high quality teaching and high quality research, but at the same time add a requirement of significant service. By doing so, we would therefore be raising the bar for promotion instead of balancing the workload. She questioned what a sustainable workload would be five years down the road that would not cause faculty members to burn out. **Prof. Hansen** pointed out that service was essential for the University to run, and tenure should include a greater responsibility and expectation to do one's fair share.

6. Adjournment

The meeting adjourned at 12:25pm.

Respectfully submitted,

Mark Richman
Secretary of the Faculty

Addenda on file with these minutes:

Addendum #1 – CAO Undergraduate Student Graduation List – October 14 2016

Addendum #2 – CGSR Graduate Student Graduation List – October 14 2016

Addendum #3 – COG FAP Motion to Revise FBC Membership - October 14 2016

Addendum #4 – CITP Presentation on Transition of Faculty Email to Exchange Online – October 14 2016

Addendum #5 - COAP Presentation on Promotions – October 14 2016

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Policy (Prof. Humi, Chair)
Re: Motion to add a general statement to the Undergraduate Catalog concerning Independent Study

Motion: The Committee on Academic Policy recommends and I move that the following statement be added to the undergraduate catalog:

UNDERGRADUATE INDEPENDENT STUDY (ISU)

Independent Study normally provides the opportunity for an individual student, with the approval and under the direction of a faculty member, to study and to explore in greater depth an area of particular interest to the student and faculty member. An independent study may be used as a substitute for an existing WPI course, as an opportunity to study a topic not currently offered as a course at WPI, or to conduct directed undergraduate research.

[Note: This text will appear in the “Project and Independent Study Registration” section of the undergraduate catalog (page 204 of the AY16/17 Undergraduate Catalog).]

Rationale:

Independent study plays an important role in our undergraduate program. In academic year 2014-15, 144 different faculty advised 439 different independent studies for a total of 686 undergraduate students. Of these, 359 were single-student independent studies, 45 enrolled 2 students, 14 enrolled 3 students, and 21 enrolled 4 or more students. In many cases, the independent study was defined as equivalent to an existing course and provided an opportunity for a student to take the course during a term when the course was not offered. In most of the other cases, the independent study was a special topics course. In some cases the independent study was mainly undergraduate “directed research.”

Despite this high level of activity in independent study, there is currently no definition for “independent study” in the undergraduate catalog or in the faculty handbook. There is a generally accepted meaning in the academic community: An independent study is an educational activity undertaken by an individual student, guided by a faculty member, with less structure and less supervision than a traditional course.

CAP believes it is helpful to both students and faculty to have an agreed upon definition of independent study appear in the undergraduate catalog. At the same time, the definition should be broad enough to encompass the variety of independent studies that are currently available to students.

CAP also proposes that the term “IS/P” be discontinued in favor of ISU (analogous to the ISG available to graduate students). The term “IS/P” actually pre-dates the MQP and IQP, and was originally closely tied to project work. However, currently the great majority of IS/P’s in fact follow a more traditional independent study course model; at this point the “P” in IS/P is likely creating more confusion than clarity on the part of students. In particular, students may confuse IS/P with “Inquiry Seminar/Practicum.” The change to ISU does not preclude project work from comprising most or all of an independent study; it is simply more descriptive of the great majority of independent studies.

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Policy (Prof. Humi, Chair)
Re: Motion to add a statement to the Undergraduate Catalog that clarifies the credit assigned to Independent Study activities

Motion: The Committee on Academic Policy recommends and I move that the following statement be added to the undergraduate catalog:

An independent study may be used to assign credit in a particular discipline when the faculty advisor has an appointment in the department or program associated with the discipline. If disciplinary credit is not assigned to the independent study, the academic credit will be identified as Interdisciplinary (ID) and the credit will be assigned as free elective on the student's transcript.

[Note: This text will also appear in the "Project and Independent Study Registration" section of the undergraduate catalog (page 204 of the AY16/17 Undergraduate Catalog).]

Rationale:

Currently there are no restrictions whatsoever on who may serve as an advisor of an independent study. CAP believes it is important to maintain the ability of students and faculty to engage in credit bearing activity in any area that they believe is of mutual benefit. However, the committee believes there should be some level of approval when such activity is assigned credit in a particular discipline.

WPI has an obligation to ensure that faculty are qualified to do the teaching and advising work that they are assigned or take upon themselves. This obligation is recognized, for example, in the NEASC Standards for Accreditation (Standard 6.3 in the 2016 document), which states that "The preparation and qualifications of all faculty and academic staff are appropriate to the nature of their assignments." There are similar requirements imposed by ABET for engineering and AACSB for business accreditation.

For MQPs, there is a policy statement in the undergraduate catalog (page 204 of the current edition) which imposes a limitation on who may advise MQPs:

For an MQP, the project advisor or an associate advisor must be a member of the faculty in the discipline which corresponds to the major area of study of the student.

The committee believes the same level of review and oversight that applies to MQP advising is appropriate for independent study advising **when disciplinary credit is granted**. The Registrar's Office has normally followed this practice in the past. The current motion simply formalizes the practice, makes it available in the catalog to students and faculty, and moves the decision regarding the assignment of disciplinary credit out of the Registrar's Office and into the departments and programs.

The committee reviewed the policies regarding independent study at several other universities and found that the proposed policy is much more flexible and requires less oversight than most. For example:

- RPI requires a brief description of the work to be completed and asks the instructor to
"Attach course syllabus to include plan for study, meetings, student learning outcomes, assessments (*e.g., papers, recitation, performance, homework, projects, etc.*) that should reflect the Students Learning Outcomes, academic integrity statement and grading rubric."

- Duke University has a similar requirement, distinguishing “research independent study” from “course independent study” and limits the second to a deeper investigation of a subject already introduced in an existing course. The registration form requires the approval of the Director of Undergraduate Studies.
- Brown University requires a detailed description of the independent study, including a detailed list of reading assignments as well as a “well-researched bibliography”. While more than one student may register for a particular ISP, an instructor is not allowed to offer the same ISP more than once. The independent study must be approved by Brown’s Independent Study Coordinator.

The committee believes it is appropriate, given WPI’s traditional emphasis on project work, students being held responsible for their own learning, and faculty stretching themselves beyond their expertise to advise interdisciplinary projects, that our degree of oversight for independent studies should be less than that at peer institutions, just not zero.

There is no change required in the current registration process. The form used for registration of an Independent Study specifies how the credit for the work will be used. If the Independent Study is not equivalent to an existing course, then the student is asked to specify the Subject Code (for example, ME or ES or HI), the number of units assigned, and the Level (1000, 2000, 3000, or 4000). The current practice in the Registrar’s Office is to check and see if the faculty advisor has an appointment in the associated department (by reviewing the faculty listed in the Undergraduate Catalog for the department). In some cases, the Subject Code and the Level are not sufficient to determine how the Independent Study will satisfy distribution requirements, so the form asks for a description of the specific graduation requirement that the Independent Study will satisfy.

For purposes of independent study registration, “member of the faculty” may include tenured/tenure track faculty, full and part-time non-tenure track faculty, adjunct faculty, and affiliated faculty. Faculty with collaborative appointments in a given discipline may advise independent studies in that discipline. Department Heads and program directors will be asked to verify the list of approved independent study advisors in their programs on an annual basis. Department Heads or program directors wishing to authorize anyone who does not fall under any of the above categories to advise an independent study course must first obtain agreement from the Dean of Undergraduate Studies. At the end of the add/drop period for each term, the Registrar’s Office will supply Department Heads and Program Directors a list of independent study registrations in their domain.

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Policy (Prof. Humi, Chair)
Re: Motion to add a statement to the Undergraduate Catalog concerning approvals required when Independent Studies are offered more than twice by the same Instructor

Motion: The Committee on Academic Policy recommends and I move that the following statement be added to the undergraduate catalog:

Independent studies that are not substitutes for an existing WPI course and are offered more than twice by the same instructor require the approval of the Department Head or Program Director and associated Dean when disciplinary credit is granted and the Dean of Undergraduate Studies when interdisciplinary credit is granted.

[Note: This text will also appear in the “Project and Independent Study Registration” section of the undergraduate catalog (page 204 of the AY16/17 Undergraduate Catalog).]

Rationale:

Independent studies should address student needs and interests that cannot be met by the published course schedule. If those needs and interests are not being met by current course offerings, it is important that the Department Head or Program Director or, in the case of interdisciplinary independent studies, the Dean of Undergraduate Studies, be made aware so that curricular needs can be appropriately addressed. A proposal to create a new course, either as an experimental course or as a permanent course, should be follow the standard procedure and be submitted to the Committee on Academic Operations for review.

(Note: This will be presented for discussion only.)

Date: November 17, 2016

To: WPI Faculty

From: Committee on Governance (Prof. Dominko, Chair)

Re: Motion to revise COAP's Faculty Handbook description

Motion: The Committee on Governance (COG) recommends and I move that the current language describing COAP's membership, responsibilities, nomination and election process, and recusal process be revised (in Part One, Bylaw One, Section VI of the Faculty Handbook) as delineated below.

Details of the motion:

Current COAP Description: (with *italicized* words eventually changed according to color-coding, underlined words eventually deleted, and each change identified by numbered footnote for reference in the "Rationale.")

VI. The Committee on Appointments and Promotions (COAP) consists of **slx**^{#1} elected Faculty Members holding the rank of Professor, with no more than one representative from any one academic department or program.

COAP is concerned with criteria for academic appointments and promotions. It **advises** **the**^{#2} Provost on **individual**^{#3} appointments above the rank of Assistant Professor, on academic promotions from Assistant to Associate Professor that occur prior to the scheduled tenure review year, and on academic promotions from Associate Professor to Professor, after consultation with the appropriate Department Heads and others concerned^{#4}. It makes recommendations to the Provost regarding recipients of sabbatical leaves. It makes recommendations to the Faculty for changes in recognized titles of academic rank^{#5} and ***criteria of eligibility thereto***^{#5}. The Committee represents the Faculty to the President and Provost in consultation on appointment and performance evaluation of academic administrative officers.

Proposed COAP Description: (with *italicized* words changed according to color coding, underlined words added, and each change identified by numbered footnote for reference in the "Rationale.")

VI. The Committee on Appointments and Promotions (COAP)

Roles and responsibilities

COAP is concerned with criteria for academic appointments and promotions. In collaboration with COG^{#5}, COAP makes recommendations to the Faculty ***for changes in criteria for promotion from associate professor to full professor and for changes in criteria for appointment and promotion of continuing non-tenure track faculty members.***^{#5}

COAP **makes recommendations to**^{#2} the Provost on **initial**^{#3} appointments of full Professors^{#6}, on academic promotions from Assistant to Associate Professor that occur prior to the scheduled tenure review year, on academic promotions from Associate

Professor to Professor, on initial appointments of Associate and (full) teaching and research Professors, on initial appointments of Professors of Practice, on academic promotions of continuing non-tenure track Faculty members to the Associate and (full) teaching and research Professor levels, and on reappointments of Professors of Practice.^{#7}

COAP makes recommendations to the Provost regarding recipients of sabbatical leaves, and represents the Faculty to the President and Provost on appointment, reappointment, and performance evaluation of academic Department Heads.^{#8}

Membership and Election Procedure

COAP consists of **seven**^{#1} elected Faculty members holding the rank of Professor, with no more than one representative from any one academic department. Department Heads, Deans, and the Provost are not eligible to serve on COAP. The term of office for this committee is three years, and no member may serve successive terms.^{#9}

Nominations and elections for COAP are conducted by the Secretary of the Faculty. The election procedure is as follows: The Secretary prepares a nominating ballot listing eligible Faculty members by department and distributes it to all members of the Faculty, with instructions to nominate up to one person from each department. The member of each academic department who receives the largest number of nominations and is willing to serve if elected is then placed on an election ballot to be distributed to all members of the Faculty. The number to be elected annually will rotate from three to two to two in successive years. Vacancies to unexpired terms will be filled by the same nominating and election procedure as for full terms.^{#10}

Recusal

For the purpose of considering each promotion case, a Joint Promotion Committee is formed, consisting of six members of COAP, and a Nominator and an Advocate. If the candidate and one of the COAP members are from the same department, then that COAP member is recused from the Joint Promotion Committee automatically. The Joint Promotion Committee also will consider whether any of its members should be recused due to direct conflict of interest. In the event of no departmental overlap or conflict of interest, the selection of the six COAP members to sit on the Joint Promotion Committee will be governed by COAP procedures developed to lead to an overall pattern of recusals distributed over the COAP membership so as to ensure appropriate participation for each COAP member. If recusal of two COAP members is necessary, then the most recent qualified past Chair of COAP will serve for that particular case. The Joint Promotion Committee is chaired by the Chair of COAP. If the Chair is recused, then the Joint Promotion Committee is chaired by the senior-most elected member of COAP participants.^{#11}

Rationale:

The changes suggested in the motion are identified by numbered footnotes (#1 to #11) throughout both the “Current COAP Description” and the “Proposed COAP Description” provided above. Each change is identified and explained below:

Change #1: Six COAP members increased to seven.

This change was recommended by the Task Force on Promotions. The addition of one COAP member makes it possible to recuse one COAP member from each promotion case. The flexibility to recuse one member from each case will parallel the recusal mechanism used by CTAF, and will allow COAP to recuse one of its members due to any conflict of interest.

Change #2: The language “...advises the Provost...” changed to ...”makes recommendations to the Provost...”

This is purely an editorial change that reflects the common description of the relationship between COAP and the Provost in dealing with promotion cases.

Change #3: The language “..individual...” changed to “...initial...” in reference to COAP’s involvement with appointments made above the rank of Assistant Professor.

This is an editorial change that better explains that COAP’s involvement in such appointments occurs when Faculty members are *initially* hired.

Change #4: Delete “...after consultation with the appropriate Department Heads and others concerned.”

COAP does not always consult with the candidate’s Department Head, and “others concerned” is vague and ill-defined. The extent to which Promotion Committees consult with others is a procedural matter that should be provided in a separate description of promotion procedures.

Changes #5:

- Add “In collaboration with COG...” for recommendations of changes in criteria.

Explicitly stating the collaboration between COAP and COG will formalize cooperation by both committees whenever such recommendations are contemplated. This change will improve the diversity of those within the Faculty governance structure formally involved in making such recommendations.

- Focus specifically on “...changes in criteria for promotion from Associate professor to Full professor and for changes in criteria for appointment and promotion of continuing non-tenure track Faculty members.”

This change focuses COAP’s involvement specifically in criteria for promotion from Associate professor to Full professor. This is because the criteria for promotion from Assistant professor to Associate professor are primarily concerns for CTAF. Modifications in CTAF rules have historically been handled in collaboration between COG and CTAF.

Also, in order to provide a mechanism for changing and adding to the criteria described in the Faculty Handbook (Part Two, Section 7) for non-tenure track Faculty members, this change also explicitly states COG's and COAP's collaborative involvement in recommending changes to the criteria for appointment and promotion of continuing non-tenure track Faculty members.

- Delete "...in recognized titles of academic rank..." from the recommendations for change made by COAP.

The recognized titles of faculty members serve as a University-wide definition of the Faculty at WPI. Changes and additions to these titles have in the past been coordinated by COG in appropriate collaboration with CTAF, COAP, Department Heads, and the Provost. Recent examples of COG coordination of this type include the elimination of the Instructor title (in April 2014), and – over a three-year period – the introduction of titles for non-tenure track Faculty members, including appointment, evaluations, and promotion procedures for continuing non-tenure track Faculty members (concluding in March 2012).

Change #6 "...initial appointments above the rank of Assistant Professor..." to "...initial appointments of Full Professors..."

This change avoids duplication of effort between COAP and CTAF by leaving initial appointments at the Associate Professor level to CTAF, and is parallel to the change made in 2000 to give CTAF the simultaneous responsibility to recommend both for or against tenure and for or against promotion to Associate Professor.

Change #7: Add ... "...on initial appointments of Associate and (full) teaching and research Professors, on initial appointments of Professors of Practice, on promotions of continuing non-tenure track Faculty members to the Associate and (full) teaching and research Professor levels, and on reappointments of Professors of Practice."

This change reflects the new responsibilities of COAP that were assigned when the non-tenure track Faculty structure was put in place in 2012. These added responsibilities are outlined in the Faculty Handbook (Part Two, Section 7, Subsection E) but were never incorporated into the Faculty Handbook charge for COAP.

Change #8: Replace evaluation of "academic administrative officers" with evaluation of "...Department Heads."

This change reflects current and past practice, in which COG has been responsible for the Faculty evaluations of administrative officers and COAP has been involved with Department Head evaluations.

Change #9: Add "...Department Heads, Deans, and the Provost are not eligible to serve on COAP. The term of office for this committee is three years, and no member may serve successive terms."

These additions are purely to clarify the current and intended practice, and they are parallel to the CTAF membership rules.

Change #10: Add “Nominations and elections for COAP are conducted by the Secretary of the Faculty. The election procedure is as follows: The Secretary prepares a nominating ballot listing eligible Faculty members by department and distributes it to all members of the Faculty, with instructions to nominate up to one person from each department. The member of each academic department who receives the largest number of nominations and is willing to serve if elected is then placed on an election ballot to be distributed to all members of the Faculty. The number to be elected annually will rotate from three to two to two in successive years. Vacancies to unexpired terms will be filled by the same nominating and election procedure as for full terms.”

This recommendation was made by the task Force on Promotions to elevate the importance, status, and primacy of service on COAP. The proposed election procedure is exactly parallel to the CTAF election procedures.

Change #11: Add: ”For the purpose of considering each promotion case, a Joint Promotion Committee is formed, consisting of six members of COAP, and a Nominator and an Advocate. If the candidate and one of the COAP members are from the same department, then that COAP member is recused from the Joint Promotion Committee automatically. The Joint Promotion Committee also will consider whether any of its members should be recused due to direct conflict of interest. In the event of no departmental overlap or conflict of interest, the selection of the six COAP members to sit on the Joint Promotion Committee will be governed by COAP procedures developed to lead to an overall pattern of recusals distributed over the COAP membership so as to ensure appropriate participation for each COAP member. If recusal of two COAP members is necessary, then the most recent qualified past Chair of COAP will serve for that particular case. The Joint Promotion Committee is chaired by the Chair of COAP. If the Chair is recused, then the Joint Promotion Committee is chaired by the senior-most elected member of COAP participants.

The recusal mechanism proposed here is consistent with the recommendation of the Task Force on Promotions, and exactly parallels the recusal process used by CTAF. The need for a recusal mechanism due to conflicts of interest is clear. In addition, (like the CTAF procedures) the proposal includes an automatic recusal of any COAP member in the same department as the promotion candidate. This is to eliminate the current non-uniformity in which certain candidates may have more departmental representation on the promotion committee than others.

The (proposed) formation of a Joint Promotion Committee that formally includes the Nominator and the Advocate will ensure that in each case the Nominator and Advocate play a more significant role in the promotion-deliberations. However, the exact role and privileges, if any, of the Nominator and the Advocate are to be determined. This will improve the level of communication between COAP members and those who know the promotion candidate’s qualifications best.

(DRAFT: For Faculty Input)
WPI ANNUAL CONFLICT OF INTEREST POLICY

Revised for November 17, 2016

Intention:

Worcester Polytechnic Institute is committed to ensuring that its research and other activities are conducted in a manner that upholds the integrity and credibility of its faculty, staff, students, and associates. This policy establishes a shared ethical standard of ensuring that relationships with business entities are transparent, grounded in objectivity, and do not improperly influence professional judgment, exercise of WPI responsibilities, or performance of WPI-related activities. This policy and its procedures promote compliance with all applicable federal and state laws, regulations, and sponsor policies regarding financial conflict of interest, including among others the policies of the National Science Foundation, the National Institutes of Health, Public Health Service, and private foundations.

WPI recognizes the value of entrepreneurship, as well as engagement in external organizations and activities. It encourages faculty, staff, and students to engage in appropriate outside relationships and activities, including consulting and starting their own companies. However, the financial interests that accompany such relationships may lead to real or apparent financial conflicts of interest. These financial interests need to be disclosed, reviewed, and managed in accordance with this policy and the associated procedures.

Who is covered? This policy applies to all faculty and exempt staff employed by WPI. It also applies to all other individuals with responsibility for the design, conduct, or reporting of sponsored research at WPI, including students, consultants, and affiliate faculty.

Annual Disclosure. Annually, covered individuals, including those who are temporarily away from campus (e.g., leave, sabbatical), must complete a Conflict of Interest (COI) Disclosure listing all significant financial interests and relationships/commitments outside of WPI which are related to their institutional responsibilities at WPI. "Institutional responsibilities" may include, but are not limited to teaching, research, departmental administration, committee membership, purchasing of goods and services etc. Covered individuals must disclose their own financial interests as well as those held by members of their families.

Updated Disclosure. In addition to the annual disclosure requirements, all covered individuals must complete a new disclosure within 30 days of a substantial change in a business or financial interest that relates to their WPI institutional responsibilities. A "substantial change" includes, but is not limited to, the acquisition of a new financial interest or an increase in the value of an existing financial interest to a value that qualifies it as a significant financial interest.

What must be disclosed? Covered individuals must disclose all significant financial interests ("SFIs") that reasonably appear to be related to the individual's institutional responsibilities. An SFI must be disclosed even if the individual does not believe that it creates a conflict of interest.

Significant Financial Interests include any of the following when reasonably related to the covered individual's institutional responsibilities:

1. Remuneration. Any remuneration (income) received from an outside entity in the calendar year preceding the COI disclosure, or anticipated during the calendar year following the disclosure. Disclosure is required when the annual amount received from an entity is \$5,000 or greater.
2. Equity Interests. Any equity (ownership) interests in a business entity. This includes stock, stock options, warrants, futures, purchase rights, or convertible securities. Disclosure is required when the market value of the equity exceeds \$5,000 for a given entity, or when a covered individual owns 5% or more of an entity's total equity. Equity in non-publicly-traded entities, or any other equity where the value cannot be readily determined through reference to market prices, must be disclosed regardless of the amount or value.
3. Royalties Paid in Connection with Intellectual Property Rights. The value of any royalties paid in connection with intellectual property rights, e.g., patents and copyrights, and any agreements to share in royalties related to such rights.
4. Travel Expenses. Covered individuals must disclose travel that is estimated to exceed \$5000 and is paid for or reimbursed by an outside entity (except as described in the following section). New sponsored travel expenses should be reported within 30 days of the trip by way of an updated disclosure.

Disclosure Not Required. Covered individuals are not required to disclose the following:

1. Salaries, royalties, or other remuneration paid by WPI to the covered individual. This includes remuneration paid from grant funds awarded to WPI.
2. Income (including honoraria) from seminars, lectures, or teaching engagements sponsored by a federal, state, or local government agency, an institution of higher education, an academic teaching hospital, a medical center, or a research institute affiliated with an institution of higher education.
3. Income from service on advisory or review panels for a federal, state, or local government agency, an institution of higher education, an academic teaching hospital, a medical center, or a research institute affiliated with an institution of higher education.
4. Income and equity related to certain investments, such as mutual funds or blind trusts, where the covered individual does not directly control the investment decisions being made.
5. Travel expenses paid for or reimbursed by a governmental agency, an institution of higher education, an academic teaching hospital, a medical center, or a research institute that is affiliated with an institution of higher education.

Review. WPI's Chief Compliance Officer or designee will review each annual or updated disclosure. The Chief Compliance Officer, in consultation with the individual's Department Head, will determine if any of the disclosed SFIs constitute a real or apparent conflict of interest.

If the individual disclosing the SFI has any active research projects or proposals, the Office of Sponsored Programs (OSP) will conduct a further review. OSP will determine (1) whether or not the SFI is related to the individual's research, and (2) whether the SFI could constitute a real or apparent conflict of interest.

If the Chief Compliance Officer and/or OSP believe that a disclosed SFI could constitute a real or apparent conflict of interest, they will refer the matter to the Conflict Management Committee (CMC).

Conflict Management Committee. The Conflict Management Committee is charged with determining (1) whether or not it is possible to manage an identified conflict of interest, and (2) if so, what conditions and restrictions are needed in order to do so. The committee may issue a written Conflict Management Plan describing these conditions in detail. Conflict Management Committee membership shall consist of a faculty member selected annually by the Committee on Governance (COG) to chair the committee, the Chair of the Committee on Graduate Studies and Research (CGSR), an additional member selected by CGSR, the Vice Provost for Research, Chief Compliance Officer, the Director of Sponsored Programs (non-voting), Associate Director, Post-Award & Compliance (non-voting), and HR Compliance Manager (non-voting). COG shall also annually appoint an alternate to the Committee to serve in the event of the recusal or absence of one of the other appointed faculty members. In the event that more than one alternate is needed, the Vice Provost for Research shall appoint additional alternates as necessary. Recusal shall be required when it appears that a member of the Conflict Management Committee will be unable to fairly judge a potential conflict raised by a disclosure statement.

Appeals Process. Should the individual not agree with the Conflict Management Committee's conditions or restrictions, he/she can appeal in writing to the Provost within ten (10) days after receipt of notification from the Vice Provost for Research, detailing why such conditions and restrictions are inappropriate. The Provost will then consult with the Conflict Management Committee and make a decision, which will be final.

Human Subject Protocols. Disclosures associated with the submissions of protocols for Institutional Review Board (IRB) review will be reviewed following the same process as for sponsored research proposals. Protocols will not be approved until all conflicts are resolved or addressed in a management plan.

Reporting to funding agencies. The designated institutional official will report financial conflicts of interest or non-compliance to PHS in accordance with PHS regulations. If the funding for the research is made available from a prime PHS-awardee, such reports shall be made to the prime awardee prior to the expenditure of any funds and within 60 days of any subsequently identified financial conflict of interest such that the prime awardee may fulfill their reporting obligations to the PHS.

Sanctions. In the event of an individual's failure to comply with this Policy, the Conflict Management Committee may suspend all relevant activities or take other disciplinary action until the matter is resolved to the committee's satisfaction. The institution will promptly notify sponsors, if applicable, of the action taken.

Retrospective Review. In addition, if a Financial Conflict of Interest was not identified or managed in a timely manner, WPI will complete a retrospective review of the covered individual's activities and the research project to determine whether the research conducted during the period of non-compliance was biased in its design, conduct or reporting. If bias is found, WPI will promptly notify the sponsor and submit a mitigation report in accordance with applicable regulations.

Training. Individuals will comply with training requirements mandated by sponsors. OSP will notify individuals of such requirements when applicable. Sponsors may require the completion of training prior to the expenditure of grant funds.

Record Retention. WPI will retain all disclosure forms, conflict management plans, and related documents for a period of three years from the date the final expenditure report is submitted to the sponsor, unless any litigation, claim, financial management review, or audit is started before the expiration of the three-year period. In that case, the records shall be retained until all litigation, claims or audit findings involving the records have been resolved.

Public Accessibility. With regard to any PHS-funded research, WPI will make accessible to the public, within five business days of written request, information concerning any Significant Financial Interest disclosed to the institution that meets all of the following criteria:

1. The Significant Financial Interest is related to the PHS-funded research;
2. WPI has determined that a conflict of interest exists; and
3. The Significant Financial Interest is still held by the individual.

Subrecipients. Subrecipients on federal grants and contracts must have an active and enforced conflict of interest policy that meets the requirements of the funding agency. If a subrecipient does not have such a policy, they will be required to comply with WPI's policy.

Definitions

Family means the covered individual's spouse/partner, dependent children, and any other dependents living in the covered individual's household.

Institutional Review Board (IRB) Any boards established or contracted to review protocols for human subjects research whether federally funded or not.

Public Health Service or PHS means the Public Health Service of the U.S. Department of Health and Human Services, and any components of the PHS to which the authority of the PHS may be delegated (including the National Institutes of Health).

Sponsored Research means any research-related activity, including training, which is funded by a grant, contract, cooperative agreement, or fellowship awarded to WPI.

Appendix: Consent Agenda Motions

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to add experimental course ISE 281X (Listening and Speaking for Non-native Speakers of English)

Motion: On behalf of the Department of Humanities and Arts, the Committee on Appointments and Promotions recommends and I move that an experimental course ISE 281X (Listening and Speaking for Non-Native Speakers of English), as described below be added for terms B 17 and B-18.

Proposed Course Description:

ISE281X Listening and Speaking for Non-native Speakers of English. Cat I.

This course addresses the academic needs of high-intermediate/advanced non-native English language learners by developing their listening and speaking skills. Students will engage in activities to practice and improve listening skills, and participate in speaking activities to improve comprehensibility through pronunciation improvement. Recommended background: Oral communication skills (ISE 1803) or equivalent skills.

Contact: Profs. Esther Boucher-Yip or Althea Danielski

Expected enrollment: 15

Course type: Lecture/Lab

Intended audience: If the course becomes permanent: potentially all high-intermediate/advanced level non-native English-speaking students

Anticipated Instructor: Prof. Esther Boucher-Yip

Rationale:

Currently, there are three course offerings for international non-native speakers at the 1000-level (ISE 1800, ISE 1801, ISE1803) and one course at the 2000-level (ISE 2800). The proposed course, at the 2000-level, will serve students who want to further develop discrete skills in listening, speaking and pronunciation. The proposed course will also fill a gap in our current permanent curriculum for international students that addresses the development of the four language skills. In this course, students will engage in and practice general and academic listening skills, and improve intelligibility through the use of correct grammar forms and complex vocabulary. Students will also improve their pronunciation by practicing individual sounds that correspond to the phoneme sounds in English.

Resource Needs: No new resources are required. Prof. Esther Boucher-Yip taught the oral communication course (ISE 1803) and will be assigned to teach this high-intermediate/advanced-level listening and speaking course.

Assessment: (1) questions 1, 2, 9, and 26 of student course evaluations; (2) students' feedback apart from course evaluations; (3) instructor's feedback and reflections; and (4) course population number.

Impact on Distribution Requirements: This course will have no impact on current distribution requirements. International students can choose to use this course to fulfill depth in the HUA sequence (with WR courses) or breadth.

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to add experimental course ISE 282X Intensive Reading for Non-Native Speakers of English

Motion: On behalf of the Department of Humanities and Arts, the Committee on Academic operations recommends and I move that the experimental course ISE 282X (Intensive Reading for Non-Native Speakers of English), as described below, be added for terms A-17 and A-18.

Proposed Course Description:

ISE 282X Intensive Reading for Non-native Speakers. Cat I.

The goal of this course is to provide non-native English language students the skills to work with the highest levels of academic and professional reading. Students will develop active and critical reading skills by annotating self-selected textbook readings, academic journal articles, research reports, current news reports and essays. Students will create summaries, critiques, and reactions, and learn to analyze, synthesize and cite multiple sources when doing academic work. Students will also increase their vocabulary of high-level academic and professional terms.

Recommended background: Composition for Non-native Speakers of English (ISE 1801) or equivalent skills.

Contact: Profs. Althea Danielski or Esther Boucher-Yip

Expected enrollment: 15

Course type: Lecture/Lab

Intended audience: If the course becomes permanent: potentially all high-intermediate and advanced level non-native English-speaking students.

Anticipated Instructor: Prof. Althea Danielski

Rationale:

As part of the English for International Students course sequence, this proposed course would serve the needs of high-intermediate/advanced English language learners by developing their skills in reading comprehension. While we have several writing-intensive classes, we do not currently have a reading-intensive course; this proposed course would fill that gap and allow our students to progress and excel at this vital academic skill. The main ideas in academic texts and professional journals are often veiled in complicated language structures and advanced vocabulary; our students will practice identifying, decoding and engaging with the ideas in these texts. Students will learn specific strategies to annotate and summarize complex texts, analyze and critique arguments and essays, and locate research and readings of importance to their academic and professional disciplines. Students will also work on improving their comprehension of vocabulary specific to their disciplines, and the corresponding rules of usage.

Resource Needs: No new resources are required. Prof Althea Danielski currently teaches the introductory academic reading course (ISE 1800) and will be assigned to teach this high-intermediate/advanced-level reading course.

Assessment: (1) questions 1, 2, 9, and 26 of student course evaluations; (2) students' feedback apart from course evaluations; (3) instructor's feedback and reflections; and (4) course population number.

Impact on Distribution Requirements: This course will have no impact on current distribution requirements. International students can choose to use this course to fulfill depth in the HUA sequence (with WR courses) or breadth.

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to add experimental course ISE 380X (Loaded Language: Power and Discourse in International English)

Motion: On behalf of the Department of Humanities and Arts, the Committee on Academic operations recommends and I move that the experimental course ISE 380X (Loaded Language: Power and Discourse in International English), as described below, be added for terms D-17 and D-18.

Proposed Course Description:

ISE 380X Loaded Language: Discourse and Power in International English Cat I.

This course, for international non-native English speakers, examines how the varieties of this global language can define identity, reflect social structures, and create and maintain power differentials. The course examines discourse, coded language and labels, accents, and strategies for communicating across cultures. We will explore the effects of World Englishes on our own minds, our classroom, our campus, our local community, and the global stage. Our aim is to understand not just how we use English, but also how English uses us. Our goal is to use that knowledge to act as ethical speakers of International English.

Recommended background: Composition for Non-native English Speakers (ISE 1801) or equivalent skills. This course satisfies the Seminar Inquiry requirement.

Contact: Profs Althea Danielski or Esther Boucher-Yip

Expected enrollment: 15

Course type: Lecture/Lab

Intended audience: If the course becomes permanent: advanced-level non-native English speakers

Anticipated Instructor: Profs Danielski and Boucher-Yip as an alternate.

Rationale:

There are currently no course offerings at the 3000-level for international non-native English speakers who want to continue in their English language development and pursue their interests in English language-related topics. This experimental course would appeal to international students since in most countries around the globe, the English language can be found in some form or another. This course examines and explores the status of the English language and its worldwide diversity. It looks at how social and political factors influence people's attitudes towards it, and the relationship between one's linguistic heritage and sense of identity. Students will understand the diversity of the English language around the world and the ways in which different varieties of English are categorized.

Resource Needs: No new resources are required.

Assessment: (1) questions 1, 2, 9, and 26 of student course evaluations; (2) students' feedback apart from course evaluations; (3) instructor's feedback and reflections; and (4) course population number.

Impact on Distribution Requirements: This course will have no impact on current distribution requirements. International students can choose this course to fulfill depth in the HUA sequence (with WR courses) or breadth. This course also satisfies the Seminar Inquiry requirement

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to add ID 3200 (Sheltered English Immersion Endorsement Course for Teachers)

Motion: On behalf of the Department of Humanities and Arts, the Committee on Academic Operation recommends and I move that ID3200 (Sheltered English Immersion Endorsement Course for Teachers). as described below, be added.

Proposed Course Description:

ID3200, Sheltered English Immersion Endorsement Course for Teachers (Cat. I). This course is to prepare undergraduates looking to become future Commonwealth teachers with the knowledge and skills to effectively shelter their content instruction, so that the growing population of English language learners (ELLs) can access curriculum, achieve academic success, and contribute their multilingual and multicultural resources as participants and future leaders in the 21st century global economy.

Recommended background: Teaching Methods or equivalent.

Anticipated Instructor: Prof. Esther Boucher-Yip

Rationale:

The Massachusetts Department of Elementary and Secondary Education (DESE), the state agency that issues teacher licenses, in 2011 announced changes in teacher licensure requirements that impact teacher preparation programs, including the Teacher Preparation Program at WPI. Starting July 1, 2014 core academic teachers must have an SEI Endorsement. All WPI undergraduates who graduate from WPI's Teacher Preparation Program are considered core academic teachers.

The proposed course supports the new state requirement that will strengthen our students' skills in teaching English Language Learners (ELLs) and will be incorporated into the Teacher Preparation Program requirement sequence. In keeping with this requirement we are proposing that the course be taught every year (Cat II to Cat I). The purpose of this course is to help teachers effectively carry out their responsibility for the teaching and learning of ELLs as well as to understand the social and cultural issues that contributes to and impact their educational success. In addition, this course will expand future teachers' knowledge of how language functions within academic content teaching and learning, and how children and adolescents acquire a second language. Finally, this course will provide future teachers practical research-based protocols, methods, and strategies to integrate subject area content, language, and literacy development. This course is now required for all students seeking initial licensure to teach in Massachusetts.

This course was taught for the first time as an experimental course in A-term 2013 and in A-term 2015:

Student feedback

Outcomes from questions 1,2, 9 and 26 of course evaluations (summary for both sections A-2013 and A- 2015; 17 responses):

	A-13	A-15
Q.1	4.0	3.82
Q.2	3.83	3.73
Q.9	3.33	3.80
Q.26		
1-5 hrs	3	5
6-10hrs	2	6
16-20hrs	0	1

Sample of students' feedback

"I liked that we had the chance to present to the class a couple of times so that it wasn't overwhelming. I also liked how there were a variety of lecture and activities."

"It was taught with enthusiasm."

"A lot of helpful information about how to teach non-native students; a good preparation for teaching."

"I feel like I learned a lot in this course. It was very helpful by understanding the needs of ELL students. I like the reflection questions a lot as well."

"The professor created a very relaxed atmosphere which made going to class very enjoyable."

Instructor feedback and reflections

This state-created SEI course, which was designed by DESE officials, prepares core academic teachers and future teachers to use principles of learning to shelter instruction for English Language Learners (ELLs) in Pre-K-12 classrooms. As this is a state mandated course, course content included set readings and course materials. In meeting the course goals and the intended outcomes as described by DESE, I lectured on topics related to language acquisition, social and cultural issues that impact the schooling of ELLs, and the expectations of the Massachusetts English Language Development (ELD) *World Class Instructional Design and Assessment* (WIDA) standards to support ELL student's success with the 2011 *Massachusetts Curriculum frameworks for English Language Arts and Literacy* and other Massachusetts content standards. Based on feedback from the Massachusetts Department of Elementary and Secondary Education, given WPI's unique focus on preparing students to become secondary STEM educators, future coursework will focus on math, science, and engineering standards.

While students performed satisfactorily in quizzes, written assignments, and capstone projects, I found that they struggled with the implementation of level-appropriate strategies in delivering content effectively. Many students found it challenging to modify and adapt traditional lesson plans to SEI-endorsed plans which requires the inclusion of language goals in each lesson. Since there were limited opportunities during class time to practice new teaching strategies, assessing the implementation of these lessons were based on planned lessons. Although students presented and demonstrated specific activities in class, the relevance and impact of

their redesigned lessons for ELLs were not evident. However, student reflections indicate that the time they spent observing teachers in a local high school (as part of their coursework) provided new perspectives and was helpful in learning to plan their lessons.

If this course becomes permanent, I will use more instructional videos to demonstrate methods and strategies to integrate subject area content (specifically STEM subjects) with language and literacy development. Using course materials directly relevant to STEM subjects which our students are preparing to teach in high schools would increase students' engagement with the course content. I will also work with the Director of the Teacher Preparation Program to provide our students with more opportunities to experience (either by observing or student-teach) diverse classrooms and opportunities to interact with multicultural and multilingual learners. In addition, the Teacher Preparation Program was recently accepted into a pilot program run by the Massachusetts Department of Elementary and Secondary Education. As part of this pilot, the program will be given equipment to run virtual simulations of school scenarios including teaching ELL students. To increase students' work on course activities outside of the scheduled class time, I will utilize Canvas to post practice quizzes, reflection questions, and videos for analysis and discussion online.

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

Resource Needs: The proposed course will be taught by Prof Boucher-Yip who had taught this course twice as an experimental course. The use of a (small) multimedia classroom will be required. No special software or additional library resources will be needed.

The course will continue to be assessed through student course evaluations, instructor feedback and reflections, and discussions with the Director of the Teacher Preparation Program at WPI and the Massachusetts Department of Elementary and Secondary Education.

Impact on Distribution Requirements and Other Courses: The new course will have no impact on current distribution requirements. Students can receive credits for either ID 320X or ID 3200, but not both.

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to add BB 2916 (Phage Hunters: The Quest) and BB 3526 (Phage Hunters: The Analysis)

Motion: On behalf of the Department of Biology & Biotechnology, the Committee on Academic Operation recommends and I move that BB 2916 (Phage Hunters: The Quest) and BB 3526 (Phage Hunters: The Analysis) as described below, be added.

Proposed Course Descriptions:

BB 2916. PHAGE HUNTERS: THE QUEST *Cat I (1/6 unit)*

Students in this course will become part of a national crowd sourcing initiative to isolate and identify novel bacteriophage. Students will design experiments to initially isolate phage (bacterial viruses) from environmental samples they have collected, then characterize and determine their DNA sequence. The DNA sequences will be used in the follow-on bioinformatics course BB 3550 Phage Hunters: The Analysis. Students in this course will make significant contributions to the field of genomics while gaining skill in the process of scientific inquiry, including hypothesis generation and testing, and practice in common microbiologic techniques.

Recommended background: A working knowledge of biotechnology or microbiology (BB 1035 or BB 2003, or equivalent).

Students enrolled in this course may wish to consider enrollment in BB 3526 (Phage Hunters: The Analysis)

Students may not receive credit for both BB 291X and BB 2916

Anticipated Instructor: Michael Buckholt

BB 3526. PHAGE HUNTERS: THE ANALYSIS *Cat I (1/6 unit)*

In this computer lab students will work with phage genomic sequences obtained from novel bacteriophages isolated in BB2910, Phage Hunters: The Quest. The raw genome files will be finished and oriented; students will then search the sequence to identify and map existing genes and other genomic components (sequence annotation). Additional course goals are to do an initial comparative genomic analysis and post-annotation experimentation. The ultimate goal is to produce novel bacteriophage genome sequences that are ready to be submitted to GenBank, the US repository of DNA sequence information at the National Institute of Health.

Recommended background: a working knowledge of genome structure and function (BB 2920, BB2950, or equivalent).

Students planning to take this course may wish to consider enrollment in BB 2916 (Phage Hunters: The Quest)

Students may not receive credit for both BB 350X and BB 3526

Anticipated Instructor: JoAnn Whitefleet- Smith

Rationale:

Both of these courses were taught last year as experimental courses. WPI is a participating partner in the SEA PHAGES initiative which has been developed by and is being directed through the University of Pittsburg, with funding from the Howard Hughes Institute. The rationale for the course development is based on a national call to transform undergraduate science teaching. Among the recommendations included in the President’s Council of Advisors on Science and Technology (PCAST) report, *Engage to Excel*, and in the AAAS/NSF report, *Vision and Change in Undergraduate Biology Education*, is replacing standard laboratory courses with discovery-based research courses.

The student specific course objectives published by the SEA PAHGES program are:

- Instill in each student a sense of ownership of a scientific problem
- Discover new scientific information
- Encourage close student-faculty interactions and effective mentoring

Data from the 2015-16 experimental offering:

Outcomes from questions 1, 2, 9, and 26 of course evaluations

	Q1	Q2	Q9	Q26A	Q26B
291X	4.9	4.8	4.7	<3 hrs: 2 4 hrs: 7 5 hrs: 2 6 hrs: 2	1-5 hrs: 8 6-10 hrs: 4 11-15 hrs: 1 16-20 hrs: 1
350X	3.9	3.4	4.0	4 hrs: 7 5 hrs: 1 6 hrs. 1	1-5 hrs: 5 6-10 hrs: 3 11-15 hrs: 1

Enrollments: Banner indicates 16 enrolled in 291X and 15 in 350X. Evaluations for both courses were done electronically.

Instructor feedback and reflections:

Buckholt (BB 291X)

This course has an ambitious set of expected outcomes (listed below). All of them were covered in the course and assessed at some level. In particular 1, 3, 5, 8 and 12. Overall the course went well from my perspective. The students were actively engaged and enjoyed having some freedom to determine their own experiments. The ultimate goal of the course was to isolate bacteriophage which all of the students accomplished. This also afforded them the opportunity to name the phage they discovered which resulted in them having a real ownership of the work they were doing.

This course is part of a national initiative to increase the STEM pipeline and as such is also being accessed as part of the larger program. The students in the course participated in the “Persistence in the Sciences Survey (PITS)”. The survey measured Project Ownership Content, Project Ownership Emotion, Self-Efficacy, Science Identity, Scientific Community Values, and Networking.* You can see the survey results for definitions of these variables. The students in the course ranked slightly higher than the national average in all of them except networking, and this may be due to the fact that they did not get to publicly report their data until they took the follow on course.

Overall I feel the course addressed the outcomes and will be an important part of remaking our curriculum in to be more inquiry based and research oriented.

1. Students will be able to describe the nature of science as a discipline
2. Students will practice appropriate safety measures when with working with biological and chemical hazards
3. Students will be able to articulate the scientific process and provide examples from their experience
4. Students will be proficient in several basic lab techniques
5. Students will be able to broadly discuss microbial diversity, microbial ecology, focusing on soil as an ecosystem.
6. Students will demonstrate analytical skills: when given data they will be able to mathematically and statistically process, summarize, graphically present, and evaluate their hypothesis.
7. Students will display facility with a number of laboratory calculations
8. Students will be able to articulate what a bacteriophage is and its different life cycles
9. Students will develop an understanding of what restrictions enzymes are and how they work
10. Students will be able to use a variety of resources to find answers about science.
11. Students will understand the importance of ethics in science
12. Students will develop skill in working in teams and understand that modern science is a collaborative effort nature. (team building, group work)

*The files containing the results from the PIT survey can be made available to CAO if it would be helpful

Whitefleet-Smith (BB 350X)

Although several students initially were very uncomfortable with not having day-by-day lab instructions and specific daily lab protocols, by the middle of the course most had embraced the concept that authentic research based labs require the student and student groups to propose hypotheses, determine how they are going to approach testing a hypotheses, and setting goals and deadlines. By the end of the lab all students were reasonably comfortable with these concepts.

The course was structured in a way that allowed student groups to see what other groups were doing and finding, and to give feedback to other members in the class; they met and exceeded my expectations during these sessions. In this first offering students annotated three different genomes, which after review by the instructor and TA were submitted for expert quality control through the SEA PHAGES program. This was a major accomplishment in a first offering and a time frame that is half of most other schools in this program—again meeting course objectives and outcomes, and exceeding my expectations. We were commended by the reviewers when all three annotations required minimal corrections, and after review all three annotated sequences were submitted to GenBank (National Center for Biotechnology Information, the US based sequence repository); two of the three have been published on GenBank (accession numbers KX522943.1 and KX522649.1) and we are waiting for the third to appear. In addition one has been through a NCBI review and now is part of the reference sequence database (accession number NC_031111.1)—very exciting! Lastly the SEA PHAGES program runs a 3-day symposium and requires 1-2 students from each participating school to present a poster.

All three student groups participated in creating the draft symposium poster, and I was very pleased with the give and take during this class session. This gave the two presenting students a reasonable template for creating the final poster, whose authors were the entire class—again meeting the course objectives. Feedback from the two students who went to the symposium has been tremendous, from the venue (the Janelia research campus of HHMI) to access to the some of the research labs and scientists, to the poster session discussions, to the invited student and professional speakers. This can be, and in both cases appears to have been a life changing experience.

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

Resource Needs:

a) What currently available resources will be needed?

Professors Buckholt and Whitefleet-Smith will continue to teach the courses in B and D terms, respectively.

The BB laboratory GH 206 will be used for the wet lab course, BB 2916 and will be scheduled around the schedule of the other lab offering, BB 2902, that is also taught in that physical space in B term. Therefore no alternative or additional space will be required. The lab capacity is 20 students. Multiple sections can be added to accommodate demand. The lab currently is equipped with all of the supplies and instrumentation needed.

BB 3526 will be taught in the computer lab GH 012. This lab has the capacity to hold all 30 students at once, although if scheduling permits and demand increases, we may offer two smaller sections to provide students flexibility in their scheduling.

b) What new resources will be needed?

The University of Pittsburgh will provide the annotation platform, DNA Master.

Analysis of comparative genomic data will be done using a program called Phamerator. As part of the application process, we have included an assurance provided to us by Sia Najafi that computers in GH012 meet the systems requirements for running these programs and that we will be able to run both software programs.

Impact on Distribution Requirements and Other Courses: As proposed, this course would fulfill a laboratory distribution requirement for BBT, CBC and BCB majors. Any student wanting introductory level laboratory experience in biology would have access to this course.

The purpose of this course has been articulated in the rationale.

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to add BB 2915 (Searching for Solutions in Soil: Microbial and Molecular Investigations)

Motion: On behalf of the Department of Biology & Biotechnology, the Committee on Academic Operation recommends and I move that BB 2915 (*Searching for Solutions in Soil: Microbial and Molecular Investigations*), as described below, be added.

Proposed Course Description:

BB 2915 Searching for Solutions in Soil: Microbial and Molecular Investigations *Cat. I*
Students in this course will be part of a national student crowd sourcing initiative, developed in response to a decreasing supply of effective antibiotics and increased microbial resistance, to identify novel antibiotics produced by soil bacteria. Operating in an authentic research paradigm, students will gain skill in the process of scientific inquiry, including hypothesis generation and testing, and in common procedures of microbial culture and characterization. They will learn about and have the opportunity to use the techniques of recombinant DNA including the use of plasmids, restriction enzymes, and PCR. At the conclusion of the course students will report their findings in a poster style format and will be able to see the results of other groups around the country.

Recommended background: A familiarity with current topics in biotechnology or microbiology such as those introduced in BB 1035 and BB 2003, or equivalent. Students may not receive credit for this course and either BB2901 and BB2905.

Contact: Jill Rulfs

Preferred term: D

Expected enrollment: ≤ 20/section (anticipate 3 sections initially)

Course type: Laboratory

Intended audience: upper level students in the life sciences

Anticipated Instructor: Michael Buckholt, Louis Roberts

Rationale:

This course is part of the department's continued effort to replace standard laboratory courses with discovery-based research courses. Towards this end, this course represents an additional step in revamping our undergraduate laboratory curriculum. This laboratory course will provide the opportunity for students to utilize contemporary microbiology and molecular biology approaches to address an authentic and socially important research problem. By combining what is currently a skills based laboratory (BB 2901) with a course based research experience (BB 2905) we will overtly tie the need to master the practical laboratory skills of biology with the skills required of research scientists including hypothesis generation and testing, experimental design, data analysis and communication skills, both written and oral. As a combined course, this will now become a 1/3 unit offering (combining two 1/6 unit courses) with integrated procedural and conceptual learning outcomes.

Course Learning Outcomes: Students who complete this course will be able to:

1. demonstrate proficiency in the quantitative and procedural skills related to microbiology and basic molecular biology.

2. discuss the role of soil ecology and define the corresponding laboratory conditions that can be manipulated to promote differential microbial growth
3. design appropriate experiments using basic approaches and techniques of microbiology and molecular biology.
4. properly collect, record, and analyze experimental data to assess the validity of a scientific hypothesis;
5. present findings clearly in written and oral formats while adhering to the standards, style, and intellectual honesty expected of life scientists;
6. function effectively, safely, and collaboratively as part of a team of scientists.

Resource Needs: No new resources are required. The course will be taught in one of the Goddard Hall laboratories (GH 205 or 206) where the only other courses taught are Biology Biotechnology courses. We have reviewed the room use and are confident we can accommodate this course with no additional space resources.

Assessment: The course will be assessed by the distribution of student evaluations. Feedback to the department will also be provided in the form of instructor reflections and observations, and can be made available to CAO if the course becomes a permanent offering.

Anticipated impact: As proposed, this course would fulfill a laboratory distribution requirement for BBT or biochemistry majors. Other interested students with the recommended background (A familiarity with current topics in biotechnology or microbiology such as those introduced in BB 1035 and BB 2002, or equivalent) may find the social implications of the course compelling (doing good in addition to doing well!), especially as it may relate to their goals as articulated in Major with a Mission.

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to add BB 356X (Molecular Biology and Genetic Engineering: Approaches and Applications)

Motion: On behalf of the Department of Biology & Biotechnology, the Committee on Academic Operation recommends and I move that BB 356X (Molecular Biology and Genetic Engineering: Approaches and Applications) in academic years 2017 and 2018

Proposed Course Description:

BB 356X, Molecular Biology and Genetic Engineering: Approaches and Applications
Cat. I (1/3 unit)

In this laboratory based course, students will learn to use current techniques in molecular and genetic engineering to address authentic research questions. Students will design and execute experiments to assess hypotheses, and evaluate data relative to those hypotheses. Specific approaches may include the generation of novel plasmids, genes, and cells, designed to specifically address contemporary problems in biology and biomedical science. In each offering, the problem addressed will be selected from and the results contribute to current faculty research initiatives.

Recommended background: Working knowledge of the principles of molecular biology (BB 2950 or BB 2920 or equivalent) and cell biology (BB 2550 or equivalent), as well as relevant biology laboratory experience (BB 2901 or BB 2905).

Contact: Jill Rulfs

Preferred term: D

Expected enrollment: ≤ 20

Course type: Laboratory

Intended audience: upper level students in the life sciences

Anticipated Instructor: Louis Roberts

(Professor Roberts is a non tenure track teaching professor. We have three NTTs who together are responsible for our laboratory teaching. The schedules of all three have been adjusted to accommodate this course with no undue load on any one of the three.)

Rationale:

The rationale for this course offering lies in the national call to transform undergraduate science teaching. Among the recommendations included in the President's Council of Advisors on Science and Technology (PCAST) report, *Engage to Excel*, and in the AAAS/NSF report, *Vision and Change in Undergraduate Biology Education*, is replacing standard laboratory courses with discovery-based research courses. Towards this goal, this course represents an additional step in revamping our undergraduate laboratory curriculum (first steps involved CAO approval of BB2905 – Microbes to Molecules: Crowdsourcing antibiotic discovery, BB291X, Phage Hunters: The Quest, and BB350X, Phage Hunters: The Analysis). This laboratory course will provide the opportunity for students to utilize contemporary molecular biology and genetic engineering approaches to address authentic research problems posed by BBT faculty. This course will also serve as a pilot for a 1/3 unit laboratory (as opposed to all current BBT lab courses carrying a

1/6 unit load), which will allow a significantly more comprehensive exploration of the scientific research method by the students.

Course Learning Outcomes: Students who complete this course will be able to

1. demonstrate mastery of the quantitative and procedural skills related to molecular biology.
2. design appropriate experiments using contemporary approaches and techniques in molecular biology and genetic engineering.
3. properly collect, record, and analyze experimental data to assess the validity of a scientific hypothesis;
4. present findings clearly in written and verbal formats while adhering to the standards, style, and intellectual honesty expected of life scientists;
5. function effectively, safely, and collaboratively as part of a team of scientists.

Resource Needs:

No new resources are required. The course will be taught in one of the Goddard Hall courses where the only other courses taught are Biology & Biotechnology courses. We have reviewed the room use and devised a schedule to accommodate this course with no additional space resources required.

Assessment: The course will be assessed by the distribution of student evaluations. Feedback to the department will also be provided in the form of instructor reflections and observations, and can be made available to CAO if the course becomes a permanent offering.

Anticipated impact: As proposed, this course would fulfill a laboratory distribution requirement for BBT or biochemistry majors. Any student with a working knowledge of the principles of molecular and cell biology and/or genetics (notably CBC and BCB majors) would have access to this course.

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to remove BB 2901 (Molecular Biology, Microbiology and Genetics) and BB 2905 (Microbes to Molecules) from the undergraduate catalog.

Motion: On behalf of the Department of Biology & Biotechnology, the Committee on Academic Operation recommends and I move that BB 2901, *Molecular Biology, Microbiology and Genetics* and BB 2905, *Microbes to Molecules* be removed from the undergraduate catalog.

Current Course Descriptions to be Removed:

BB 2901: *Molecular Biology, Microbiology and Genetics* *Cat 1 (1/6 unit)*

This course covers the basic laboratory techniques and knowledge needed for a career in biotechnology. It will also cover topics that are useful to those planning to go into a health profession. Examples of the types of techniques and experiences included in this course are:

- The use, handling of bacteria in the laboratory
- Identification of bacteria through staining and metabolic testing
- Aseptic technique
- Microscopy
- Handling, restriction digestion, and visualization of DNA
- Plasmid purification and cloning

Recommended background: a working knowledge of concepts in biotechnology (BB 1035 or equivalent).

BB 2905: *Microbes to Molecules* *Cat 1 (1/6 unit)*

Using an authentic research project, students will gain skill in the process of scientific inquiry, including hypothesis generation, and testing, and in common procedures of microbial culture and characterization. Students enrolled in the course will be part of a national student crowd sourcing initiative to identify novel antibiotics produced by soil bacteria in response to a decreasing supply of effective antibiotics and increased microbial resistance. Students will report their findings in a poster format and will be able to see the results of other groups around the country as the course continues.

Recommended background: A familiarity with current topics in biotechnology or microbiology, such as those introduced in BB 1035 and BB 2002 or equivalent.

Rationale:

These two 1/6 unit courses will be replaced by a new 1/3 course BB 2915 (Searching for Solutions in Soil: Microbial and Molecular Investigations)

Impact on Distribution Requirements and Other Courses:

None are anticipated as these courses are being effectively replaced.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to remove BB 3524 (Bioinformatics Lab) from the undergraduate catalog

Motion: On behalf of the Biology & Biotechnology Department, the Committee on Academic Operation recommends and I move that BB 3524 (Bioinformatics Lab) be removed from the undergraduate catalog.

Current Course Description to be Removed:

BB 3524. BIOINFORMATICS LAB *Cat 1 (1/6 unit)*

Laboratory course giving students practice with some of the basic tools currently available for on-line literature searching, sequence data mining, comparison of nucleotide and/or protein sequences and analysis of nucleotide and protein sequences. Course is entirely computer based.

Rationale:

This course, which has an enrollment capacity of 24 students, has shown low enrollments over the past few years, and declining enrollments in the last three.

Academic year	AY 13/14	AY 14/15	AY 15/16	AY 16/17
Enrolled students	13	8	7	6

With CAO's approval, last year the Biology and Biotechnology Department introduced a new laboratory course, BB 350X (PHAGE HUNTERS: THE ANALYSIS). This lab includes genome analysis and annotation using modern biotechnology tools, and is part two of the course sequence where students, operating in a crowd sourcing format, search for novel bacteriophage as part of a national initiative. In the first course, students isolate a bacteriophage from soil and then characterize it. In the second they orient the sequence, map the existing genes and annotate the genome. This course sequence is part of the BBT initiative to convert our laboratory courses to authentic research initiatives.

Impact on Distribution Requirements and Other Courses:

None anticipated as there is another course which effectively covers this material and which we plan to submit as a permanent course after the second offering this year.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to change the course descriptions and titles of CH1010, CH1020, CH1030, and CH 1040.

Motion: On behalf of the Department of Chemistry and Biochemistry, the Committee on Academic Operations recommends and I move that the titles and descriptions for CH1010, CH1020, CH1030, and CH 1040 be changed as described below.

Current course titles and descriptions:

CH1010 – Molecularity

Cat I

Catalog description: The theme of CH 1010 is that all matter in the universe is composed of atoms bonded together in a limited number of ways. Molecularity is one of a small number of fundamental themes of chemistry (and of all science); it is important for us to address it immediately because it permeates all of chemistry.

Specific concepts that we will discuss are: Introduction to the Molecular View; Types of Compounds: The Periodic Table; Chemical Calculations; Types of Reactions; and The Quantum Structure of the Atom

CH1020 – Forces and Bonding

Cat I

Catalog description: We will examine the origin and strength of electrical forces within molecules (covalent bonds), between positive and negative ions in a lattice (ionic bonds), and between atoms or molecules of a pure substance (intermolecular forces). Energy changes accompanying the rupture or formation of such bonds will be discussed.

Specific concepts that we will discuss are: Molecular Structure and Shape; Gases; Solids; Intra- and Intermolecular Forces; Liquids; and Energy (First Law of Thermodynamics)

CH1030 – Equilibrium

Cat I

Catalog description: We will examine the nature of dynamic equilibrium at the molecular level, and will develop an understanding of the mathematical aspects of equilibrium. Phase equilibrium, further aspects of thermodynamics (entropy, free energy), equilibrium of chemical reactions in the gas phase, and equilibrium of chemical reactions in solution will be discussed.

Specific concepts that we will discuss are: Phase Equilibrium; Chemical Equilibrium of Gas; Phase Reactions; Solutions; Chemical Equilibrium of Reactions in Solution; and Entropy and Free Energy

CH1040 – Chemical Dynamics

Cat I

Catalog description: We will examine the nature of molecular motions and their interaction with light, which provides us with all of our structural information about molecules. Various types of molecular spectroscopy will be discussed. Then we will turn to the dynamics of interactions between molecules, examining the rates of chemical reactions, and discussing the detailed molecular pathways by which they occur.

Specific concepts that we will discuss are: NMR Spectroscopy; Vibrational Spectroscopy; Electronic Spectroscopy ; Dynamics of Physical Processes (Diffusion, phase changes, phase distribution); Dynamics of Chemical Processes

Proposed course titles and descriptions:

CH1010 – Chemical Properties, Bonding, and Forces

Cat I

Catalog description: The CH1010 course is an introduction to chemistry using the fundamental structures of atoms as a starting point. Emphasis is placed on discussing how all properties of matter as well as bonding mechanisms arise from atomic structure. Lewis structures and molecular orbitals are used to understand bonding, and the intermolecular forces present in chemicals systems are used as a prelude to reactivity patterns covered in future courses.

CH1020 –Chemical Reactions

Cat I

Catalog description: Bonding theories introduced earlier in the sequence are applied to chemical reactions, including reduction/oxidation reactions, to demonstrate patterns in reactivity. Solution thermodynamics, concentration scales, and colligative properties are discussed in the context of balanced chemical reactions both in aqueous solution and in the gas phase.

Recommended background: Properties of matter, basic bonding theory, Lewis structures and molecular orbitals, intermolecular forces. See CH1010.

CH1030 –Kinetics, Equilibrium, and Thermodynamics

Cat I

Catalog description: This course will examine the dynamic nature of solutions at the molecular level, and will develop an understanding of the mathematical aspects of molecular dynamics and equilibrium. Reaction kinetics will be outlined in detail leading into exploration of various fundamentals and examples of equilibrium processes in the gas phase as well as in solution, including acid-base chemistry and precipitation. Principles of thermodynamics will be introduced (entropy, free energy), and relationships with equilibrium will be explored. Case studies in current topics will be emphasized throughout the course.

Recommended background: Properties of matter, basic bonding theory, Lewis structures and molecular orbitals, intermolecular forces. Redox reactions, solution thermodynamics, colligative properties, balancing of chemical reactions. See CH1010 and CH1020.

CH1040 – Spectroscopy in Organic and Polymer Chemistry

Cat I

Catalog description: We will examine the nature of molecular motions and their interaction with electromagnetic radiation, which provides us with all of our structural information about molecules. In addition, students will be introduced to the fundamentals of mass spectrometry and electrochemistry. The concepts of these techniques will be discussed in the context of structural organic chemistry and polymer characterization.

Recommended background: Properties of matter, basic bonding theory, Lewis structures and molecular orbitals, intermolecular forces. Redox reactions, solution thermodynamics, colligative properties, balancing of chemical reactions. Reaction kinetics, equilibrium processes, acid-base chemistry and principles of thermodynamics (entropy, free energy). See CH1010, CH1020 and CH1030.

Rationale:

The Chemistry and Biochemistry Department has identified the need for a fundamental shift in how we offer our general chemistry courses. In order to meet the desired learning outcomes for students, the content of the CH1010 – 1040 sequence needs to be re-arranged, some parts need to be modernized and polymer chemistry needs to be added.

The core content of the CH1010 – CH1040 sequence of courses is not changing, it is merely being rearranged and optimized. *The content of CH1010, CH 1020, and Ch 1030 course is changing by less than 15% relative to the previous course content.*

The content of the General Chemistry CH1010 – 1040 is being rearranged and the “Kinetics” teaching module is being moved to CH1030. The spectroscopy part of the course is being modernized and adjusted to current needs. Polymer chemistry is added to the course and is being used along with organic chemistry to discuss the various spectroscopic methods.

The changes in the CH1010 – CH1040 series have been made to increase the *rigor* of our general chemistry sequence, as well as to bring the departmental offerings more in line with ACS accreditation requirements. New material is being added to the end of the sequence, and the material presented in the earlier courses in the sequence has been rearranged to follow an “atoms first” approach. We feel this is a pedagogically sound decision that will increase student understanding overall and we have accordingly chosen a new textbook to support this approach.

The American Chemical Society now requires for accreditation that we expand our offering in polymer chemistry. CH 1040 is the most appropriate course to add synthesis, properties and characterization of industrial and biopolymers to the curriculum. In addition to CBC majors, non-majors will greatly benefit from this addition since polymers are one of the most important industrial product classes and they are omnipresent in nature.

Understanding polymer chemistry requires a basic knowledge of organic chemistry. A foundation in organic chemistry is also required for the spectroscopy of this course. Therefore, we will add an introduction of organic chemistry to this course. Organic chemistry was also in the past used to introduce the various spectroscopic methods, however, this was not mentioned in the catalog. The explicit mentioning of organic chemistry in the course description fixes this shortcoming.

The field of spectroscopy is rapidly expanding. In particular mass spectrometry has become an important tool in the chemical profession and more broadly in the life sciences. Early and repeated exposure of students to this technique is therefore desirable. In support of the lab course, the department has a gas chromatography mass spectrometer available exclusively for teaching. X-ray diffraction is being moved from CH1020 to CH1040 because it fits better to the characterization focus of this course.

Electrochemistry is being moved from CH1020 to CH1040 since it requires a knowledge of thermodynamics, which is covered in CH1030.

Kinetics (chemical dynamics) is being moved to CH1030 to ensure that non-majors that stop taking the General Chemistry sequence with CH1030 (e.g., BBT majors) are being exposed to this important concept.

Overall, the course content of CH 1040 changes by about 25%.

Impacts on students: There will be no necessary alterations to the distribution requirements for other majors as a result of these changes. The main impacts will be an increased rigor in these courses and improving the quality and quantity of material presented.

There should be minimal impact on students as a result of these changes. There will be no necessary alterations to the distribution requirements for other majors as a result of these changes. The main impacts will be an increased rigor in the CH1010 – CH1040 courses and improving the quality and quantity of material presented.

Resource Needs:

All resources needed to deliver the redesigned sequence are currently available, including the assigned classrooms, laboratory space, instructors, and any support via the ATC, Registrar, and library staff.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to change the course description for CH 2360 Organic Laboratory

Motion: On behalf of the Department of Chemistry and Biochemistry, the Committee on Academic Operations recommends and I move that the description for CH2360 Organic Laboratory be changed as described below.

Current course description:

CH 2360. ORGANIC LABORATORY.

Cat. I

Laboratory experience in the preparation, purification, and characterization of organic substances. The course will also contain sufficient training in laboratory technique and data handling so that no previous laboratory experience beyond that of general chemistry will be assumed. (To be taken concurrently or following studies in organic chemistry.) Recommended for chemical engineers, pre-medical students, BB majors, and other nonchemists desiring chemical laboratory experience. One lecture and three three-hour labs.

Proposed course description:

CH2360 – Organic Laboratory

Cat I

Catalog description: Laboratory experience in standard methods for the preparation and purification of organic compounds. The course will provide sufficient training in laboratory technique so that no previous laboratory experience beyond that of general chemistry is required. This course may be taken concurrently or following lecture courses in organic chemistry. Recommended for pre-medical students and students majoring in disciplines outside of chemistry and biochemistry that desire laboratory experience in basic methods of organic synthesis.

Recommended background: Fundamentals of chemistry, basic chemistry laboratory techniques (e.g., basic synthesis, spectral analysis and chemical separation skills).

Rationale:

The Chemistry and Biochemistry Department has identified a need to update the organic laboratory sequence and to clarify differences between the laboratory courses being offered.

There seems to be considerable confusion, particularly by faculty outside of CBC, regarding the difference between CH 2360 and CH 2660. The proposed changes should clarify those differences.

The core content of this course is not changing, it is merely being clarified and optimized.

Impacts on students: There should be minimal impact on students as a result of these changes. There will be no necessary alterations to the distribution requirements for other majors as a result of these changes. There will be no change to the schedule for the labs and conferences.

Resource Needs:

All resources needed to deliver the redesigned sequence are currently available, including the assigned classrooms, laboratory space, instructors, and any support via the ATC, Registrar, and library staff.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to change the title and course description of CH 2650 Experimental Chemistry II

Motion: On behalf of the Department of Chemistry and Biochemistry, the Committee on Academic Operations recommends and I move that the description and course title for CH2650 Experimental Chemistry II be changed as described below.

Current course title and description:

CH2650 – Experimental Chemistry II

Catalog description: The experiments to be performed this term have been chosen to illustrate important principles and experimental techniques of physical chemistry. Students will gain experience with many of the instruments that they are likely to use in any chemical laboratory setting. These include optical spectrometers, vacuum lines, molecular modeling workstations and calorimeters.

Recommended background: CH 2640 and CH 3510.

Proposed course title and description:

CH2650 – Modern Physical Chemistry Methods

Catalog description: This laboratory course emphasizes principles, techniques, and instrumentation employed in modern physical chemistry with a view towards applications throughout the molecular sciences. Investigations include chemical thermodynamics and phase equilibria; gas-phase, solution-phase, and interfacial reaction kinetics and dynamics; and molecular modeling of small molecules. Emphasis includes data collection, interpretation, error analysis, and write-up.

Recommended background: Fundamentals in chemistry (see CH1010 – CH1040), knowledge in thermodynamics (see CH3510).

Rationale:

The Chemistry and Biochemistry Department has identified the need for a more precise wording regarding course names and content instead of a general description. This will enable students who consider taking the class to better gauge if the class aligns with their interests and learning objectives.

The core content of the course is not changing, but its name and description are updated.

The change to the course content is less than 10%.

Impacts on students: There will be no necessary alterations to the distribution requirements for other majors as a result of these changes. The main impacts will be a clearer communication of course goals and content.

Resource Needs: All resources needed to deliver the redesigned sequence are currently available, including the assigned classrooms, instructors, and any support via the ATC, Registrar, and library staff.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to change course title and description for CH 2660 Experimental Chemistry III

Motion: On behalf of the Department of Chemistry and Biochemistry, the Committee on Academic Operations recommends and I move that the title and description for CH2660 Experimental Chemistry III be changed as described below.

Current course title and description:

CH 2660. EXPERIMENTAL CHEMISTRY III.

Cat. I

The emphasis in CH 2660 is on basic techniques essential for the synthesis, isolation, and characterization of organic compounds. These include isolation and purification by solvent extraction, crystallization, distillation, and chromatographic techniques, followed by the determination of physical properties and characterization by infrared and nuclear magnetic resonance spectroscopy. Micro-synthetic procedures are introduced. Mastery of the techniques and manipulations emphasized in CH 2640 and CH 2650 would be advantageous.

Proposed course title and description:

CH2660 – Organic Synthesis and Analysis Laboratory

Cat I

Catalog description: The emphasis in CH 2660 is on fundamental techniques essential for the synthesis, purification, and characterization of organic compounds. These techniques include setting up, running and monitoring reactions, isolation and purification by solvent extraction, crystallization, distillation, and chromatographic techniques, followed by determination of physical properties and characterization by infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy. Micro-synthetic methods and multi-step synthesis are introduced. This course differs from CH 2360 by providing in-depth experience with spectroscopic characterization of molecular structure and hands-on training operating core instruments in addition to methods of organic synthesis. This course is required for students majoring in chemistry, and is recommended for students majoring in biochemistry and disciplines outside of chemistry that desire a strong background in methods of organic synthesis and characterization. Recommended background: Fundamentals of chemistry (see CH1010, CH1020, CH1030) and chemical characterization techniques (see CH1040), basic chemistry laboratory techniques (e.g., basic chemical synthesis, spectral analysis and chemical separation skills).

Rationale:

The Chemistry and Biochemistry Department has identified a need to update the organic laboratory sequence and to clarify differences between the laboratory courses being offered.

First, there seems to be considerable confusion, particularly by faculty outside of CBC, regarding the difference between CH 2360 and CH 2660. The proposed changes should clarify those differences.

Second, it's important that pre-med students have a course on their transcripts that says "organic lab" in the title. In several cases, students who'd already taken CH2660 enrolled in CH2360 for that reason. Changing the title of CH 2660 to "Organic Synthesis and Analysis Laboratory" in the catalog will address that issue.

The core content of this course is not changing, it is merely being clarified and optimized.

Impacts on students: There should be minimal impact on students as a result of these changes. There will be no necessary alterations to the distribution requirements for other majors as a result of these changes. There will be no change to the schedule for the labs and conferences.

Resource Needs: All resources needed to deliver the redesigned sequence are currently available, including the assigned classrooms, laboratory space, instructors, and any support via the ATC, Registrar, and library staff.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to change the name and recommended background for CH 2670

Motion: On behalf of the Department of Chemistry and Biochemistry, the Committee on Academic Operations recommends and I move that the course name be changed from Experimental Chemistry IV to Investigation of Coordination Complexes Through Inquiry, and the recommended background be modified, as described below.

Current course description:

CH2670 – Experimental Chemistry IV

Catalog description: The synthesis, isolation, and characterization of inorganic compounds are emphasized. Syntheses of main group compounds, classical transition metal complexes, and organotransition metal compounds are included. In addition to reinforcing and building on standard techniques of synthesis and characterization, several new techniques are introduced: synthesis under inert atmosphere, measurement of magnetic susceptibility by NMR, and cyclic voltammetry. Some exposure to ¹³C NMR is also provided. The final experiment of the course requires the student to design a synthesis for a compound selected from a list provided, based on strategies learned in the course.

Proposed course description:

CH2670 – Investigation of Coordination Complexes Through Inquiry

Catalog description: No change

Add:

Recommended background: Principles of inorganic chemistry, chemical bonding and reactions, thermodynamic stability of inorganic species, solubility and precipitation of inorganic compounds. Advanced chemistry laboratory skills (see CH 2660)

Rationale:

The Chemistry and Biochemistry Department has identified the need for a more precise wording regarding course names instead of a generalized description (Experimental Chemistry IV). This will enable students who consider taking the class to better gauge if the class aligns with their interests and learning objectives.

The content of the course is not changing, but its name and description are updated.

Impacts on students: There will be no necessary alterations to the distribution requirements for other majors as a result of these changes. The main impacts will be clearer communication of course goals and content.

Resource Needs: All resources needed to deliver the redesigned sequence are currently available, including the assigned classrooms, instructors, and any support via the ATC, Registrar, and library staff.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to change the course name and recommended background for CH 3410 – Principles of Inorganic Chemistry

Motion: On behalf of the Department of Chemistry and Biochemistry, the Committee on Academic Operations recommends and I move that the course name for CH 3410 Principles of Inorganic Chemistry be changed to Structure, Bonding, and Reactivity in Inorganic Chemistry, and the recommended background be modified as described below.

Current course title and description:

CH3410 – Principles of Inorganic Chemistry

Catalog description: This course provides the fundamental understanding of atomic, molecular and solid state structures and properties. Orbital structures of atoms, symmetry of molecules and point groups are used to understand chemical bonding and reactions. Various acid-base concepts are explored to analyze the acidity of cations and basicity of anions, solubility and precipitations of inorganic compounds, and metal-ligand binding affinities. Redox properties are discussed using Pourbaix diagrams. Thermodynamic stabilities of inorganic species are discussed using acid-base and redox concepts and thermochemical analyses are used to analyze chemical reactivity at atomic, molecular, and solid state level.

Proposed course title and description and schedule of offering:

CH3410 – Structure, Bonding, and Reactivity in Inorganic Chemistry

Catalog description: unchanged

Add:

Recommended background: Firm understanding of general chemistry topics (CH1010 – CH1030)

Schedule: We recommend moving the course in the proposed course sequence for chemistry majors into the sophomore year.

Rationale:

The Chemistry and Biochemistry Department has identified the need for a more precise wording regarding course names instead of a generalized description (Principles of Inorganic Chemistry). This will enable students who consider taking the class to better gauge if the class aligns with their interests and learning objectives.

Currently, many chemistry majors enter the inorganic chemistry laboratory (CH2670) without knowledge of inorganic chemistry. Moving CH3410 into the sophomore year of the proposed course sequence will familiarize students with concepts that are required for understanding the experimental work in CH2670.

The content of the course is not changing, but its name and recommended background is updated.

Impacts on students: The main impacts will be clearer communication of course goals and content through change of the course title. Additionally, we expect that more chemistry majors

decide to attend CH3410 in their sophomore year, thus eliminating IQP-related course conflicts and their lack of preparation for the inorganic chemistry laboratory CH2670.

Resource Needs: All resources needed to deliver the redesigned sequence are currently available, including the assigned classrooms, instructors, and any support via the ATC, Registrar, and library staff.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to change the course title and category of CH 4420

Motion: On behalf of the Department of Chemistry and Biochemistry, the Committee on Academic Operations recommends and I move that the course title for CH 4420 be changed from "Inorganic Chemistry II" to "Application of Molecular Orbital Theory to Metal Complexes" and that the course be changed from Cat II to Cat I.

Current course title, description and category:

CH4420 – Inorganic Chemistry II

Cat II

Catalog description: Complexes of the transition metals are discussed. Covered are the electronic structures of transition metal atoms and ions, and the topological and electronic structures of their complexes. Symmetry concepts are developed early in the course and used throughout to simplify treatments of electronic structure. The molecular orbital approach to bonding is emphasized. The pivotal area of organotransition metal chemistry is introduced, with focus on complexes of carbon monoxide, metal-metal interactions in clusters, and catalysis by metal complexes. Recommended background: CH 1010 - CH 1040, CH 2640 - CH 2670, CH 3410, CH 3530, and CH 3550. This course will be offered in 2017-18, and in alternating years thereafter.

Proposed course title, description, and category:

CH4420– Application of Molecular Orbital Theory to Metal Complexes

Cat I

Catalog description: Complexes of the transition metals are discussed. Covered are the electronic structures of transition metal atoms and ions, and the topological and electronic structures of their complexes. Symmetry concepts are developed early in the course and used throughout to simplify treatments of electronic structure. The molecular orbital approach to bonding is emphasized. The pivotal area of organotransition metal chemistry is introduced, with focus on complexes of carbon monoxide, metal-metal interactions in clusters, and catalysis by metal complexes. Recommended background: CH 1010 - CH 1040, CH 2640 - CH 2670, CH 3410, CH 3530, and CH 3550.

Recommended background: Fundamental understanding of atomic, molecular and solid state structures and properties. Thermodynamic stabilities of inorganic species. Acidity, solubility and precipitation of inorganic compounds (see CH3410)

Rationale:

The Chemistry and Biochemistry Department has identified the need for a more precise wording regarding course names instead of a generalized description (Inorganic II). This will enable students who consider taking the class to better gauge if the class aligns with their interests and learning objectives.

A major drawback of the current bi-yearly scheduling is that every second class of students is not exposed to the content of CH4420 until D term of their senior year. In many cases, this affects the work of these students, as content taught in CH4420 is important for understanding many MQP projects. In addition, IQP and other scheduling related conflicts often require

students to complete the course as an independent study (historically about 3 - 4 students per year take this course as an ISP).

The content of the course is not changing, but its name and scheduling is updated.

Impacts on students: The main impacts will be clearer communication of course goals and content through change of the course title. Additionally, we expect that more chemistry majors will decide to attend CH4420 in their sophomore or junior year, thus eliminating IQP-related course conflicts and their lack of preparation for MQP projects.

Resource Needs: All resources needed to deliver the redesigned sequence are currently available, including the assigned classrooms, instructors, and any support via the ATC, Registrar, and library staff.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to change the course titles and course descriptions of CH 4110, CH 4120, and CH 4130

Motion: On behalf of the Department of Chemistry and Biochemistry, the Committee on Academic Operations recommends and I move, that the description and title for CH4110 Biochemistry I be changed as described below.

Current course titles and descriptions:

CH4110 – Biochemistry I

Catalog description: The principles of protein structure are presented. Mechanisms of enzymatic catalysis, including those requiring coenzymes, are outlined in detail. The structures and biochemical properties of carbohydrates are reviewed. Bioenergetics, the role of ATP, and its production through glycolysis and the TCA cycle are fully considered.

Recommended background: CH 2310, CH 2320. Suggested background: CH 2330.

CH 4120. Biochemistry II

Catalog description: Oriented around biological membranes, this course begins with a discussion of electron transport and the aerobic production of ATP followed by a study of photosynthesis. The study of the biosynthesis of lipids and steroids leads to a discussion of the structure and function of biological membranes. Finally the membrane processes in neurotransmission are discussed.

Recommended background: CH 4110.

CH4130 – Biochemistry III

Catalog description: This course presents a thorough analysis of the biosynthesis of DNA (replication), RNA (transcription) and proteins (translation), and of their biochemical precursors. Proteins and RNAs have distinct lifetimes within the living cell; thus the destruction of these molecules is an important biochemical process that is also discussed. In addition to mechanistic studies, regulation of these processes is covered. Students who have received credit for CH 4130 or BB 4910 prior to Term A 2000 may not receive credit for the other course.

Specific concepts that we will discuss are: DNA: Components and Structure; DNA Replication; prokaryotic and eukaryotic; DNA Damage and Repair; Transcription and Regulation; RNA Processing; and Translation Post-translational Processing

Proposed title, description, and course offering:

CH4110 - Protein Structure and Function

Catalog description: The fundamental concepts of protein architecture and dynamics are presented with an emphasis on the functional outcomes of chemistry coordinated in three dimensional space. Catalytic mechanics and enzyme function are outlined in detail. Current methods in the determination of enzyme structure and function will be discussed, and students will use common tools in macromolecular analysis and structural modeling. Case studies in enzyme dysfunction, disease, and current research will be used throughout the course.

Recommended background: Familiarity with organic chemistry topics including functional groups, nucleophilic addition and substitution reactions, stereochemistry, and carbonyl

chemistry. General knowledge of cellular architecture is also recommended. See CH 2310, CH 2320, CH 2330, and BB2550 or equivalent.

CH 4120. Lipids and Biomembrane Functions

Catalog description: Oriented around biological membranes, this course begins with a description of lipids and proteins forming biomembranes. Permeability and the mechanism of transmembrane mass transport are presented. Transport of electrons and redox equivalents is explained within the context of aerobic production of ATP and plant photosynthesis. Finally the transport of information across biomembranes in signal transduction and neurotransmission are discussed.

Recommended background: Knowledge of organic chemistry fundamentals as well as concepts including protein structure and folding, catalytic mechanics, enzyme kinetics, and ATP synthesis and hydrolysis mechanisms. See CH2310, BB2550, and CH4110 or equivalent.

CH4130 – Nucleic Acids and Bioinformation

Catalog description: This course presents the structure and function of DNA. Precursors and biomolecules that give rise to DNA, the mechanism of DNA replication, RNA synthesis, and protein synthesis are described in detail. In addition to mechanistic studies, regulation of these processes is covered as well as those of genetic mutation, DNA repair, and epigenetics.

Recommended background: Knowledge of organic chemistry fundamentals as well as concepts including protein structure and folding, catalytic mechanics, enzyme kinetics, and ATP synthesis and hydrolysis mechanisms. See CH2310, CH2320, CH2330, BB2550, and CH4110 or equivalent.

Rationale:

The Chemistry and Biochemistry Department has identified the need for a fundamental shift in how we offer our biochemistry courses. In order to meet the desired learning outcomes for students, we have redesigned the biochemistry curriculum.

Impacts on students: Students will benefit from a more contemporary view of biochemistry in tune with novel nomenclature emerging from the scientific advances in the last 20 years. The course will offer restructured and advanced material to students majoring in Biochemistry, Biology and Biotechnology, Bioinformatics, Chemistry, Chemical Engineering and Biomedical Engineering.

Resource Needs: All resources needed to deliver CH 4110, CH4120, and CH 4130 are currently available, including the assigned classrooms, instructors, and any support via the ATC, Registrar, and library staff.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to add CH 4140 Metabolism and Disease

Motion: On behalf of the Department of Chemistry and Biochemistry, the Committee on Academic Operations recommends and I move that the course CH 4140 Metabolism and Disease CH 4140, as described below, be added.

Proposed Course Description (and other details):

CH 4140. Metabolism and Disease

Cat I

Catalog description: This course presents a thorough analysis of the most relevant metabolic processes in cells. The catabolism of sugars and lipids will be presented in the context of energy generation and storage. Nucleotide and amino acid metabolism will be discussed as building blocks for large biomolecules. Throughout the course the links between metabolism, hereditary pathologies, as well as risk of metabolic imbalances such as diabetes and obesity will be presented.

Recommended background: Familiarity with organic chemistry topics including functional groups, nucleophilic addition and substitution reactions, stereochemistry, and carbonyl chemistry. General knowledge of cellular architecture is also recommended. See CH 2310, CH 2320, CH 2330, and BB2550 or equivalent.

Specific concepts that we will discuss are:

Glucose and glycogen metabolism;

Gluconeogenesis;

Citric Acid Cycle;

Lipid, amino acid and nucleotide metabolisms;

Mammalian Fuel Metabolism: Integration and Regulation.

Anticipated Instructor: Carissa P. Olsen or Suzanne Scarlata

The class will be offered M/T/W/R/F for 50 minutes each day.

Book: This course will utilize the same book as CH4110 – 4130 (currently “Fundamentals of Biochemistry” by Voet, Voet and Pratt)

Rationale:

The Chemistry and Biochemistry Department has identified the need for a fundamental shift in how we offer our biochemistry courses. In order to meet the desired learning outcomes for students and to prepare them better for their project work, we have redesigned the biochemistry curriculum.

This is a motion for a new course. The course covers material not offered anywhere else in the Biochemistry curriculum nor in other courses at WPI. The material is essential to prepare our students in a topical area of biochemistry that is central to medicine and biotechnology.

Revision of the Biochemistry series (CH4110, CH4120, CH 4130) indicates that several areas of biochemistry of contemporary importance are not covered by the existing courses. These topics cannot be incorporated in existing courses. The areas missing can be integrated in a single course covering the conceptual analysis of the fate of biomolecules in living organisms.

Metabolic studies are at the forefront of biochemical research as metabolic pathologies become more preponderant among the human population worldwide.

The creation of a new course CH4140 covering the area of molecular metabolism, is integrated with coordinated changes in CH4110, 4120 and CH4130.

Rationale for requesting approval as new permanent course rather than an experimental course: This course fills an important gap in our curriculum as well as neighboring departments (BBT). CBC is currently applying for accreditation with the American Society of Biochemistry and Molecular Biology (ASBMB). In the course of developing our accreditation material, it became clear that the addition of a metabolism class is crucially required. Therefore, we omit the step of offering this course first as an experimental course.

Impacts on students: Students will benefit from a more contemporary view of biochemistry in tune with novel nomenclature emerging from the scientific advances in the last 20 years. The course will offer novel and advanced topics to students majoring in Biochemistry, Biology and Biotechnology, Bioinformatics, Chemistry, Chemical Engineering and Biomedical Engineering.

Resource Needs:

- Due to recent additions to the department, CBC has now the expertise and number of faculty available to offer this course.
- We anticipate that a room for 30 – 40 students will be required to offer this course. GH 227 has availability and the required technology available. We expect an enrollment of 30 +/- 5 students.
- Laboratory (Computer): We anticipate using CBC's 3D visualization modalities (zSpace, Microsoft HoloLens) for project work.
- Library resources: no specific needs
- IT support: Nothing beyond what IT is already providing to CBC.

Impact on distribution requirements and other courses: The content in this course does not overlap with course content taught in any other course at WPI. This course fills a void in an area important to biochemistry and BBT majors. The CBC DH has met with the BBT DH and Associate DH and they welcome the addition of this course. This course will be an elective that can be used to fulfill the biochemistry course requirements.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to change the course title of CH 4150

Motion: On behalf of the Department of Chemistry and Biochemistry, the Committee on Academic Operations recommends and I move that the title for CH4150 be changed from “Experimental Biochemistry” to “Enzymology and Protein Characterization Laboratory.”

Current course title and description”

CH 4150. Experimental Biochemistry.
Cat. I

The experiments in this laboratory course have been designed to acquaint the students with the basic skills necessary to perform biochemical studies. The course will cover, for instance, protein purification, subcellular fractionation, enzyme kinetics (K_m , V_{max} , specific activity, effector-protein interaction, etc.), exclusion and ion exchange chromatography, and electrophoresis.

Recommended background: CH 4120.

Proposed course title and description:

CH 4150. Enzymology and Protein Characterization Laboratory
Cat. I

The experiments in this laboratory course have been designed to acquaint the students with the basic skills necessary to perform biochemical studies. The course will cover, for instance, protein purification, subcellular fractionation, enzyme kinetics (K_m , V_{max} , specific activity, effector-protein interaction, etc.), exclusion and ion exchange chromatography, and electrophoresis.

Recommended background: Knowledge of organic chemistry fundamentals as well as concepts including protein structure and folding, catalytic mechanics, enzyme kinetics, and ATP synthesis and hydrolysis mechanisms. See CH2310, BB2550, and CH4110 or equivalent.

Rationale:

The current title lacks specificity. This is a problem as we are trying to attract undergraduate Biochemistry students to WPI and as we are offering this laboratory course during E-term to external students.

Impacts on students: Aside from having a better idea about the course content based upon the new title, there will be no impact on the students.

Resource Needs: All resources needed to deliver CH 4150 are currently available, including the assigned classrooms, instructors, and any support via the ATC, Registrar, and library staff.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Academic Operations (Prof. Iannacchione, Chair)
Re: Motion to change the title and description of CH 4170 and to cross list the course with BBT

Motion: On behalf of the Department of Chemistry and Biochemistry and the Department of Biology and Biotechnology, the Committee on Academic Operations recommends and I move that the title and description for CH4170 be changed and cross-listed with BBT as described below.

Current course title and description

CH 4170. Experimental Biochemistry II
Cat. I

This laboratory course focuses on modern DNA technologies and general applications of gene manipulation. Topics include gene amplification and recombination, promoter and plasmid engineering, gene expression and analysis, model systems, genomics and transgenics. Experiments in this course are integrated into an overall genetic engineering project throughout the term that will involve techniques such as electrophoresis, quantitative spectrofluorimetry, and real-time quantitative PCR. Methods of data analysis, common statistical approaches and technical writing will be emphasized throughout the course.
Recommended background: CH 4110, CH 4120, CH 4130.

Proposed title and description

CH 4170/BB4170 Experimental Genetic Engineering
Cat I

This laboratory course focuses on modern DNA technologies and general applications of gene manipulation. Topics include gene amplification and recombination, promoter and plasmid engineering, gene expression and analysis, model systems, CRISPR, genomics and transgenics. Experiments in this course are integrated into an overall genetic engineering project throughout the term that will involve techniques such as electrophoresis, quantitative spectrofluorimetry, and real-time quantitative PCR. Methods of data analysis, common statistical approaches and technical writing will be emphasized throughout the course.
Recommended background: Knowledge of organic chemistry fundamentals as well as biochemical concepts including DNA replication and recombination, RNA synthesis and protein synthesis. Familiarity with cellular architecture is also recommended. See CH2310, BB2550, BB4010 and CH4110 or equivalent.

Rationale:

The current title lacks specificity, which is a problem as we are trying to attract undergraduate Biochemistry students to WPI by offering them a state-of-the-art modern biochemistry education. The title describes accurately what is covered in this course. Cross-listing this course with BBT is timely since Genetic Engineering is an area of science routinely employed by biochemists and molecular biologists. About 1/3 – 1/2 of the student population in this course is from BBT. This is a very relevant course for biology students seeking an MQP project in molecular biology.

Impacts on students: Aside from having a better idea about the course content based upon the new title, there will be no impact on the CBC students. BBT students will be able to use this elective course as part of their BBT requirements.

Resource Needs: All resources needed to deliver CH 4170 are currently available, including the assigned classrooms, instructors, and any support via the ATC, Registrar, and library staff.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to change degree requirements for M.S. in Biology and Biotechnology

Motion: On behalf of the Department of Biology and Biotechnology, the Committee on Graduate Studies and Research recommends and I move that the “Degree Requirements” section describing the M.S. in Biology and Biotechnology (pp. 39 of the 2016-17 Graduate Catalog) be modified as listed below.

Description of Revisions to be included in Graduate Catalog: (Additions in *italics*, deletions struck through.)

~~Degree Requirements: M.S. in Biology and Biotechnology~~

~~Students pursuing the M.S. degree in biology and biotechnology must complete a minimum of 30 credit hours of course and thesis work, six of which must be thesis research credits. In addition, M.S. students must successfully complete (grade of B or higher) a minimum of three graduate courses appropriate to their area of study (subject to pre-approval by their thesis committee) and the graduate seminar (BB 501, 1 credit in every semester registered for full-time study). Students must assemble an Advisory Committee of three or more faculty members of which a majority must be Biology and Biotechnology program faculty members. The Advisory Committee must review and approve each M.S. student’s program of study and thesis research.~~

Degree Requirements: M.S. in Biology and Biotechnology (thesis-based)

Students pursuing the M.S. degree in Biology and Biotechnology must successfully complete a minimum of 30 credit hours of course and thesis work per the distribution requirement below. All courses must be at the 500 or 4000 level and no more than 9 credits may be at the 4000 level. An approved list is provided in the department’s graduate handbook.

Credit requirement:

<i>Course work at the 500 or 4000 level</i>	<i>15 CR</i>
<i>Thesis Research</i>	<i>15 CR (recommended)</i>

Course requirement:

<i>BB554</i>	<i>Journal Club</i>	<i>1 CR</i>
<i>BB551</i>	<i>Research Integrity in the Sciences</i>	<i>1 CR</i>
<i>BB501</i>	<i>Seminar</i>	<i>1 CR (minimum of 4)</i>
<i>BB course(s)</i>		<i>3 CR</i>
<i>Electives</i>	<i>(approved by Advisory Committee)</i>	<i>6 CR</i>
<i>BB599</i>	<i>Thesis Research</i>	<i>15 CR (recommended)</i>

Students must assemble an Advisory Committee of three or more faculty members of which a majority must be Biology and Biotechnology program faculty members. The Advisory Committee must review and approve each M.S. student’s program of study and thesis research. Students must successfully complete a thesis including a written thesis and oral defense.

Rationale: Currently, the graduate catalog entry for Master of Science in Biology and Biotechnology is ambiguous. For example, the sentence “*a minimum of three graduate courses appropriate to their area of study (subject to pre-approval by their thesis committee)*” does not specify how many credit hours each course should be. The changes are outlined above.

Impact on Degree Requirements: Provides clarification, does not impact current credit distribution requirements.

Resources and Anticipated Instructors: No new resources required.

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

Date: November 17, 2016
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Demetriou, Chair)
Re: Motion to establish a Graduate Certificate in Mech. Eng. for Technical Leaders (METL)

Motion: On behalf of the Mechanical Engineering Department, the Committee on Graduate Studies recommends and I move that a Graduate Certificate Program be established in Mechanical Engineering for Technical Leaders (METL), as described below.

(Note: This proposal was approved by the Mechanical Engineering Department on October 12, 2016)

Description of the Proposed Program:

Requirements:

9 credits in graduate level Mechanical Engineering courses*

9 credits in graduate level Business courses**

* Note: Students may petition the Mechanical Engineering Graduate Committee to count up to 4 credits in AE and/or MTE graduate courses. Petitions must be approved before students register for these AE and or MTE credits.

** Note: Students may use CE 580 (Advanced Project Management) toward this requirement.

Admission to the Certificate Program:

Students wishing to enroll in the METL Certificate program must submit a full M.S. graduate application.

Successful Completion of the METL Certificate Program:

Successful completion of the METL certificate program requires:

- completion of the 18 credits distributed as described above; and
- an overall GPA of at least 3.0.

Subsequent Admission into the M.S. program in Mechanical Engineering:

Students wishing to continue their studies in the M.S. program in Mechanical Engineering will be admitted upon request provided that they have:

- completed the METL certificate program; and
- earned a GPA of at least 3.0 within the 9 credits of M.E. courses (including any AE and MTE credits permitted by petition).

For students who continue on to the M.S. program in Mechanical Engineering, any AE or MTE credits that have been used to satisfy the METL certificate requirements will be counted as M.E. credits toward the M.S. degree.

Rationale:

Companies recognize that employees who pursue graduate education oftentimes become the future technical leaders within their organization. As leaders, it is important that they possess not only the engineering skills to understand technical problems that require novel and innovative solutions, but also the business and managerial skills to harness the resources (human and capital) to implement these solutions. In a modest way, this certificate combines graduate mechanical engineering coursework to

enhance their technical expertise along with leadership and management coursework to empower them to lead technical teams, make sound business decisions and bring their projects to successful conclusion.

Short-term enrollment projections: While this program can have broad appeal to many industries and individual students, National Grid has agreed to sponsor a first cohort of seven students beginning in January 2017. Based on discussions between National Grid representatives and WPI's CPE staff members, we anticipate that another National Grid cohort of about the same size will begin in January 2018. Additional National Grid cohorts beyond January 2018 are quite possible. Finally, students that complete this certificate are likely to continue their education. For this reason, the program is designed to allow a smooth transition into the M.S. program in Mechanical Engineering in which all credits earned in the METL Certificate Program could be applied towards an M.S.degree in Mechanical Engineering.

Implementation Date: January 2017

Additional Required Resources: No additional resources will be required for as long as the increase in graduate course-enrollments from the METL Certificate Program remain modest as described above.