

WORCESTER POLYTECHNIC INSTITUTE

January 17, 2024

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

The fifth Faculty meeting of the 2023-2024 academic year will be held on **Wednesday, January 17, 2024 at 11:00am in OH 107 and by Zoom at: <https://wpi.zoom.us/j/92182594163>**. Refreshments will be available in OH 107 at 10:45am.

1. Call to Order M. Richman
 - Approval of the Agenda
 - Consideration of the Consent Agenda - including the minutes from Dec. 6, 2023

2. Opening Announcements M. Richman
 - **Deliberations to eliminate one of WPI's two current retirement fund vendors (TIAA or Fidelity) – Call for faculty input** H. Walker

3. President's Report G. Wang

4. Committee Business – for discussion only:
 - Committee on Graduate Studies and Research (CGSR) S. Olson
 - **Draft Motion to establish a template for Collaborative Accelerated Master's Programs Frameworks between Partner Institutions and WPI** C. Ruiz
 - **Draft Motion to establish a Collaborative Accelerated Master's Framework between Assumption University and WPI**
 - **Draft Motion to establish a Collaborative Accelerated Master's Program In Neuroscience between Assumption University and WPI**

5. Committee Report:
 - Committee on Academic Policy (CAP) B. Calli
 - **Finding the Balance Between Providing Academic Flexibility and Maintaining Academic Standards** P. Fitzpatrick
 - A. Gericke

6. New Business

- ~~7. Provost's Report A. Heinricher~~

7. Closing Announcements
 - **Faculty participation in the 2024 COACHE survey** C. Demetry
 - **Just-in-Time Advising Training Session (for C-term Academic Advising Day)** R. Kafle

8. Adjournment

TABLE OF CONTENTS

Faculty Meeting Materials, January 17, 2024

	<u>Page</u>
1. Faculty Meeting Minutes: December 6, 2023	5
2. Committee Business	
CGSR Draft Motions – for discussion only:	
- to establish a template for Collaborative Accelerated Master’s Programs Frameworks between Partner Institutions and WPI	11
- to establish a Collaborative Accelerated Master’s Framework between Assumption University and WPI	21
- to establish a Collaborative Accelerated Master’s Program in Neuroscience between Assumption University and WPI	31
3. Appendix: Consent Agenda Motions	45
CAO Motions:	
- to modify the title of BME 3813 Cellular Engineering Lab	46
- to add BME 4813 Cellular Engineering: Applications	47
- to change ES 3501 A Project-Based Intro to Systems Engineering from Cat. I to Cat. III	49
- to add AB 1600 Moroccan Colloquial Arabic	51
- to modify the course description of CN 1541 Elementary Chinese I	53
- to modify the course description of CN 1542 Elementary Chinese II	55
- to modify the course description of CN 1543 Elementary Chinese III	57
- to modify course titles for ISE 1800, ISE 1801, ISE 1803, ISE 2800, and ISE 2820	59
- to remove ISE 2810 Listening and Speaking for Non-native Speakers	62
- to remove TH 3220: Shakespeare in Performance	63
- to add PSY 1500 The Science of Creativity	65
- to add PSY 2411 Social Neuroscience	67
<u>Note:</u> the following 19 motions in green involve removing or adding a BBT course:	
- to remove BB 1035 Biotechnology	69
- to add BB 1101 Foundations of Cellular and Molecular Biotechnology	70
- to remove BB 1045 Biodiversity	72
- to add BB 1102 Foundations of Ecology and Environmental Biology	73
- to remove BB 1025 Human Biology	75
- to add BB1004 Human Biology	76
- to remove BB 2050 Animal Behavior	78
- to add BB 3060 Animal Behavior	79
- to remove BB 2950 Molecular Biology	81
- to add BB 3950 Molecular Biology	82
- to remove BB 3050 Cancer Biology	84
- to add BB 4050 Cancer Biology	85
- to remove BB 2917 Hunting for Phage and BB 3526 Phage Hunters: The Analysis	87
- to remove BB 3512 Molecular Genetics Lab	89

- to remove **BB 3517** Fermentation 90
- to remove **BB 4170** Experimental Genetic Engineering 91
- to add **BB 1801** Foundations of Biology and Biotechnology Laboratory 92
- to add **BB 2201** Foundations of Physiology 94
- to add **BB 3840** Design and Expression of Biomolecules Laboratory 96

Note: the following 18 motions in blue involve modifications to current BBT **lecture** courses:

- to modify **BB 1001** Introduction to Biology 98
- to modify **BB 2003** Fundamentals of Microbiology 99
- to modify **BB 2030** Plant Diversity 101
- to modify **BB 2040** Ecology 102
- to modify **BB 2550** Cell Biology 103
- to modify **BB 2920** Genetics 104
- to modify **BB 3003** Medical Microbiology: Plagues of the Modern World 106
- to modify **BB 3010 / BCB 3010** Simulation in Biology 108
- to modify **BB 3080** Neurobiology 110
- to modify **BB 3101** Human Anatomy and Physiology: Movement and Communication 112
- to modify **BB 3102** Human Anatomy and Physiology: Transport and Maintenance 113
- to modify **BB 3120** Plant Physiology 114
- to modify **BB 3140** Evolution: Pattern and Process 115
- to modify **BB 3620** Developmental Biology 117
- to modify **BB 4190 / CH 4190** Regulation of Gene Expression 119
- to modify **BB 4260** Synthetic Biology 120
- to change the course number of **BB 4801** Bioinformatics to **BB 4001** 121
- to modify the title and description of **BB 4900** Capstone Experience in Biology 122

Note: the following 11 motions in red involve modifications to current BBT **lab** courses:

- to modify the number, title and description of **BB2902** Enzymes, Proteins, and Purification 124
- to modify the number and title of **BB 2903** Anatomy and Physiology 126
- to modify the number, title, and descr. of **BB 2904** Ecology, Environ., and Animal Behavior 128
- to modify the no., title, and descr. of **BB 2915** Search for Solns. in Soil: Micro & Mol. Invest. 130
- to modify the no., title and descr. of **BB 3513** Cell Culture Techniques for Animal Cells 132
- to modify the number and description of **BB 3515** Physiologic Systems Laboratory 133
- to modify the number, title, and description of **BB 3521** Microscopy 135
- to modify the number, title, and description of **BB 3525** Plant Physiology 137
- to modify the no., title, and descr. of **BB 3527** Mol. Bio. and Gen. Eng: Approaches & Apps 138
- to modify the no., title, and descr. of **BB 3530** Immunotherapies: The Next Gen. of Pharm. 140
- to modify the no., title, and descr. of **BB 3570** Cell Culture Models for Tissue Regeneration 142

Note: the following 2 motions in orange incorporate the changes proposed included in the previous 48 BBT motions:

- to modify the **requirements for the Biology and Biotechnology major** 144
- to modify the **requirements for the Biology and Biotechnology minor** 154

CGSR Motions:

Note: The following 12 motions are related to the AE Ph.D. program.

- to remove AE 6093 Advanced Special Topics 156
- to add AE 601 Advanced Special Topics 157
- to add AE 602 Independent Study 158
- to remove AE 6098 Pre-Dissertation Research 159
- to add AE 690 Pre-Dissertation Research 160
- to remove AE 6999 Ph.D. Qualifying Exam 161
- to add AE 691 Ph.D. Qualifying Exam 162
- to remove AE 6099 Dissertation Research 163
- to add AE 692 Dissertation Research 164
- to add AE 693 PhD Dissertation Proposal 165
- to add AE 694 Ph.D. Dissertation Defense 166
- to modify the Ph.D. Degree requirements in Aerospace Engineering 167

Note: The following 4 motions are related to the RBE M.S. program.

- to add RBE 593 Directed Research for Capstone Experience 171
- to modify RBE 596 Robotics Engineering Practicum 172
- to modify the requirements for the non-thesis MS program in RBE 173
- to modify the Core Robotics Engineering Electives in the MS program in RBE 176

WORCESTER POLYTECHNIC INSTITUTE
Faculty Meeting Minutes
December 6, 2023

Summary:

1. Call to Order; Approval of the Consent Agenda and the Minutes of November 8, 2023
2. Secretary of the Faculty's Report and Opening Announcements
3. President's Report
4. Committee Business: CAO, CGSR
5. Special Report: WPI's Graduate Workers Union Agreement: An Overview for the Faculty
6. New Business
7. Provost's Report
8. Closing Announcements
9. Adjournment

Detail:

1. Call to Order; Approval of the Consent Agenda and the Minutes of November 8, 2023

The fourth faculty Meeting of the 2023-2024 academic year was called to order at 12:30pm both in person and via ZOOM by **Prof. Richman** (AE). Prof. Richman reminded all those in attendance that the meeting was being recorded for the purpose of taking accurate minutes, only. The agenda and the minutes from the Nov. 8 faculty meeting were approved as distributed. Prof. Richman pointed out that of the 20 motions from CAO in the consent agenda, 17 of them came from the Cognitive sSciences program in its effort to reorganize and renumber its course offerings. Of the 18 motions from CGSR, 13 courses will be used in the M.S. in A.I. program that will be presented for approval at this meeting, but would stand on their own even without the new program. By separating them in this manner, we were able to simplify their main motion to establish the new M.S. program. The consent agenda was approved as distributed.

2. Secretary of the Faculty's Report and Opening Announcements

Prof. Richman pointed out that, as part of our experiment in shifting the days and times of the faculty meetings to further reduce obstacles of attendance, the two faculty meetings in C-Term will be held on Wednesdays at 11am rather than on Wednesdays at 12:30pm.

Prof. Richman also reported that, with the three elected members of the Provost Search Committee identified, COG and the President are in the final stages of collaborating to identify the remaining six appointed members, and that an announcement about the full membership of the search committee will probably be made by early next week.

Prof. Richman encouraged all faculty and staff members to take advantage of the Quorum whenever possible for coffee, lunch, interviews, or meetings. **Dean Perlow** seconded those sentiments about the Quorum and spoke with pride about the Quorum's friendly atmosphere and excellent cappuccino.

3. President's Report

President Wang thanked everyone for their hard work during B-Term and urged everyone to use the break to refresh, recharge, and re-energize. President Wang reported that she plans to continue her listening sessions, which most recently have been with engineering department heads, and she will soon be meeting with the student affairs and enrollment team and with the finance and operations team. The purpose of these listening sessions is to identify common issues and to determine our strategic priorities. Now is the time to start thinking about the next fiscal year and how to align our resources, time, and effort with these priorities.

President Wang assured the community that the University is in robust financial health. She emphasized that we are not in the red, but that we need to be extremely prudent in our spending. At the same time, like most other Universities, we need more resources and we need to make sure that every penny we spend will serve our priorities.

President Wang thanked Prof. Heineman, Prof. Richman, and all of COG for their healthy partnership in filling out the membership of the Provost Search Committee according to the Faculty Handbook so that it will represent our diversity across the university. President Wang thanked V.P. Turner (T&I) and her team, who will be providing logistical support to the search committee. She thanked all those who provided input on the provost position profile and encouraged people to forward the names of qualified candidates to the search committee.

4. Committee Business

Committee on Academic Operations (CAO)

Prof. Van Dessel (CEAE, CAO Chair) presented on behalf of the Committee on Academic Operations as follows: The Office of the Registrar reports that the following candidates have either completed all the requirements for the degree designated in the department or program indicated, or are expected to complete their degree requirements before December 30, 2023. They therefore are or will be eligible to receive that degree, and on behalf of the Committee on Academic Operations, he moved that, pending final verification by the Registrar that all those on the list have in fact completed their degree requirements, they be approved for December 30, 2023 graduation.

Prof. Richman pointed out that the list has not changed since it was first circulated one week ago.

The motion passed.

Committee on Graduate Studies and Research (CGSR)

Prof. Olson (MA, CGSR Chair) presented on behalf of the Committee on Graduate Studies and Research as follows: The Office of the Registrar reports that the following candidates have either completed all the requirements for the degree designated in the department or program indicated, or are expected to complete their degree requirements before December 30, 2023. They therefore are or will be eligible to receive that degree, and on behalf of the Committee on Graduate Studies and Research, she moved that, pending final verification by the Registrar that all those on the list have in fact completed their degree requirements, they be approved for December 30, 2023 graduation.

Sarah Miles (Registrar) and **Prof. Richman** pointed out six new additions to the list that was first circulated one week ago.

Prof. Ryder (BBT) and **Prof. Demetriou** (AE) identified two students on the list who had not completed the degree requirements. They will work with Registrar Miles to make sure the final graduation list reflects the students' correct status.

The motion passed.

Prof. Richman thanked Registrar Miles and the rest of the Registrar's office for compiling the two lists with such care.

Committee on Graduate Studies and Research (CGSR):

Prof. Olson (MA; CGSR Chair), representing the Committee on Graduate Studies and Research and on behalf of the Computer Science Department, the Data Science Program, and the Robotics Engineering Department, moved that a M.S. degree program in Artificial Intelligence (MS-AI) be established (including one new course CS594/DS594 Graduate Qualifying Project) as described in the meeting materials. The program will include a B.S./M.S. path to the M.S. degree and a Graduate Certificate program in AI. (See **Addendum #1** on file with these minutes.)

Prof. Rundensteiner (CS) described the motivations for creating this degree program. She cited the broad use of AI, its transformational effect on academic disciplines and industries, and the many lucrative employment opportunities currently unfilled. The proposed degree will benefit companies and WPI students, and it will bring in increased tuition revenue for WPI. She also noted WPI's unique position to offer this program based on our many AI-related course offerings and our many strong faculty members with AI teaching interests and research programs across different departments, programs, and disciplines.

Prof. Rundensteiner described the program as a technical degree in which students learn to understand, develop, and deploy AI technologies and innovate new ones – all in a responsible fashion. Because the program originators want to implement this degree quickly, they are starting with a technical AI degree – with which they are most comfortable. Prof. Rundensteiner emphasized that other emphases could be developed – perhaps even sooner than

later - leveraging the AI courses included in the current proposal with collaborations among other existing disciplines and programs.

Prof. Rundensteiner explained that the program is a STEM degree with an existing Classification of Instructional Programs (CIP) definition under the title of Artificial Intelligence:

A program that focuses on the symbolic inference, representation, and simulation by computers and software of human learning and reasoning processes and capabilities, and the computer modeling of human motor control and motion. It includes instruction in computing theory, cybernetics, human factors, natural language processing, and applicable aspects of engineering, technology, and specific end-use applications.

Prof. Rundensteiner outlined the proposed 30-credit program. Students must take one course from each of the five core AI categories: Artificial Intelligence, Ethics & AI, Machine Learning, Knowledge & Reasoning, and Interaction & Action. A required project (either a 3-credit Graduate Qualifying Project or a 9-credit master's thesis) ensures they will have an authentic capstone experience. The remaining credits can be drawn from any of the five core categories, AI-related special topics, AI-related preparatory courses, or - to allow for flexibility - students may take up to 6 credits from thematically related non-AI courses in any discipline at WPI to apply AI to some other area of personal interest. She demonstrated the variety of courses available to students in each of the five core areas, provided examples of thematically related topics in disciplines outside of AI, and noted the depth of AI and related expertise among WPI faculty.

Prof. Rundensteiner explained the proposed BS/MS option and the graduate certificate. For the AI BS/MS, students can double count up to 12 graduate credits including all approved MS-AI core graduate courses and any 4000-level undergraduate course that the unit offering the course considers equivalent to an MS AI-approved graduate course. The AI Graduate Certificate can be earned by taking the Introduction to AI course, two courses from two distinct categories (not including the AI category), and a fourth MS-AI approved course.

Prof. Rundensteiner compared the proposed MS degree requirements in AI to other WPI MS degrees. Although there is some content overlap, the AI program provides a focus unavailable in existing WPI programs. Structurally it is similar to many other WPI MS degrees with a balance between structure, rigor, and flexibility. Prof. Rundensteiner also compared this proposed degree to those offered by other universities, finding similarities in MS programs offered by Northeastern University (MS - AI), Boston University (MS - AI), and Carnegie Mellon (MS AI & Innovation; MS AI-Engineering). The oldest such programs are CMU's, whose cost at over \$100,000 is almost twice the cost of WPI's proposed program.

While Computer Science, Data Science, and Robotics Engineering will direct this MS program, the following WPI departments, programs, and schools will participate in and have endorsed it: Electrical and Computer Engineering; Mathematical Sciences; Social Sciences & Policy Studies; Humanities & Arts; the School of Engineering; the School of Arts and Sciences; and the School of Business. These departments have been consulted and are offering courses for the degree.

Prof. Rundensteiner described the administration of the proposed program: Initially, one program head will oversee the launch and the operation of the program, aided by a graduate committee consisting of one faculty member from RBE, one from CS, and one from DS. This committee will help guide students with different focuses through admission and advising. A faculty advisory committee, modeled on the new MS in Global Health program, consists of the core faculty members who have agreed to serve when needed. Prof. Rundensteiner expressed her goal of using as few faculty member resources as possible to launch the program, noting that they can call on other faculty as needed.

Regarding resources, an adequate number of AI faculty positions are filled at WPI already or have been approved, a MS-AI advisor staff position has been approved, funding has been approved to market the initial program launch, and further funding will be secured once the cohort size and student demand is established. **Prof. Rundensteiner** thanked everyone who has been involved in advancing the proposal to this stage.

Prof. Ryder (BBT) asked if, as a new interdisciplinary program, it would it have its own program director. **Prof. Rundensteiner** indicated that there would be a program director rather than a department head.

Prof. Calli (RBE) asked if the graduate qualifying project can be carried out as an industrial internship - as is possible in CMU's degree program. **Prof. Rundensteiner** replied that currently this is not an option, although it is possible that the project could be done under the supervision of a WPI advisor in collaboration with an industrial sponsor. The current emphasis is on having the students acquire teamworking skills and produce a deliverable for a customer,

Prof. El-Korchi (CEAE) asked how many students are expected in the next five years and what the expenditures are expected to be during this time. With the caveat that it is impossible to predict, **Prof. Rundensteiner** offered a guess of 50 students per year. As for expenditures. **Prof. Rundensteiner** identified the cost of faculty teaching courses as the greatest expense. However, she also pointed out that none of the courses in the program are offered under a new AI label, so all the courses in the new program would be offered and/or would have been rolled out even without the MS AI program. **Prof. El-Korchi** also asked a more general question about the criteria used to terminate programs that cost more than they generate in revenues.

Prof. Manning (BBT) asked for a clearer distinction between the number of students who might enroll in the new MS-AI program and the number who, as a result, might be taken away from other overlapping degree programs. **Prof. Rundensteiner** could not predict that level of specificity, but thought that the proposed program would be very appealing given the general interest in AI and would attract students who might not otherwise have come to WPI.

Prof. Heffernan (CS) thanked everyone, including Prof. Rundensteiner, for all their hard work to organize the program. His own students will benefit from the course offerings, and he especially appreciated the inclusion of both ethical and technical considerations.

Prof. Xiao (RBE) was excited to have Robotics Engineering play a central role in offering the program, which will highlight the often-overlooked fact that robotics is as much about using AI as it is about developing mechanical devices.

Prof. Walcott (MA) was concerned that popular master's degree programs attract students who are very different from PhD students in the same courses, which in turn places a larger burden on the faculty members teaching these courses. He warned that if this program is successful, the administration will need to ensure that faculty who teach courses in the program aren't overburdened. **Prof. Rundensteiner** agreed and thanked Prof. Walcott for making this point. She also pointed out that increased course enrollments due to the presence of M.S. students allows us to offer courses that would not be feasible if only Ph.D. students were enrolled.

This motion passed.

5. Special Report:

WPI's Graduate Workers Union Agreement: An Overview for the Faculty

Dean Comesano (CHE, Dean of Graduate Studies) thanked Prof. Richman for inviting her to explain WPI's new Graduate Student Workers Union four-year collective bargaining agreement. She noted that graduate students at public universities in the U.S. began unionizing in 1970 and expanded to private universities in 2002. There are currently more than 150 graduate worker unions in the US, including recent unions at Harvard, Tufts, Brandeis, and Boston College. Dean Comesano observed that demands are similar across these unions: increased pay, healthcare benefits, paid time off, and better/safer working conditions. (**See Addendum #2** on file with these minutes.)

Dean Comesano indicated that WPI's graduate workers filed to unionize with UAW last November. The union represents approximately 600 graduate workers, including 153 hourly workers, 245 RAs, and 180 TAs. The collective bargaining process ran from January 2023 to August 2023 and moved more quickly than at many universities. WPI's administrative bargaining team consisted of Interim Provost Heinricher, Senior VP Turner, Dean Comesano, Assistant Dean Flinn; AVP Sullivan; T & I Director Draper; and T & I Director Keyes. The Graduate Worker Union team consisted of master's and Ph.D. students, whose careful preparation helped them understand graduate unions at other universities.

A four-year contract was ratified in August 2023. One of the administration's guiding principles was the separation between employment status and student status, meaning that the final contract must not affect graduate education in any way. Dean Comesano noted that while immediate implementation permitted all TAs and RAs to be paid and receive their tuition benefits in time for the 2023-24 academic year, continuing implementation includes integration

with Workday (with an anticipated completion in January 2024) and communication with and training of key stakeholders responsible for contract implementation.

Dean Camesano reviewed the salary agreements: \$39,000 for TAs or RAs on a 12-month appointment (prorated for any shorter appointment) with annual salary increases of 2.6 percent in year 2, and 3 percent each in years 3 and 4. The agreement for hourly workers includes annual wage increase and is as follows: a *minimum* of \$18/hour for administrative and instructional graduate workers, and \$20/hour for hourly research assistants. Dean Camesano indicated that the weekly workload of 20 hours would not change, but she explained that this is regarded as an average; graduate workers may exceed 20 hours in a single week if they average 20 hours per week. The agreement also specifies time off for sickness and personal needs, parental leave, bereavement leave, holidays, and vacations. Access to these benefits applies equally to all graduate workers. She also noted that WPI would pay for additional ESL courses for graduate students whose language exams indicate they need more ESL.

Whereas in prior years it was difficult to get all departments and programs to issue employment notices well in advance, the contract includes a required minimum appointment notice of 60-days under ordinary circumstances. **Dean Camesano** noted that exceptions will occur when, for instance, a student assigned to a paid appointment cannot fulfill their responsibilities and the appointment must be reassigned on short notice. WPI is also striving to issue 9- or 12-month appointments, with exceptions allowed provided they don't harm the student or violate the intent of the agreement. Noting that the graduate student union asked for early notice of summer opportunities, Dean Camesano explained her expectation that, to the extent possible, departments would start discussing available funding at the beginning of C-Term. Faculty members should tell their graduate students at that point if they think summer funding will be available or if the students should seek other summer opportunities.

Dean Camesano also underscored the importance of giving early notice to underperforming graduate students. All such cases should be documented with opportunities given to students to improve. She encouraged faculty members to ask for help from Graduate Studies to avoid dismissals if possible and to work instead to help students improve. Kelly Draper (kdraper@wpi.edu) is the primary contact for performance or disciplinary issues.

Finally, **Dean Camesano** invited faculty members to read the full collective bargaining agreement (which was distributed with this month's meeting materials) and the FAQs available at <https://www.wpi.edu/c/graduate-student-workers-union-frequently-asked-questions>), and to contact any member of the collective bargaining committee with questions or concerns.

Prof. Danielski (HUA) asked how ESL competency is being assessed and who would be providing the needed ESL training. **Dean Camesano** explained that those details are not specified in the contract. WPI would like to provide its own ESL training, but currently we are contracting with an outside company.

Prof. Manning (BBT) asked for some elaboration on the work information that will be tracked in Workday. **Dean Camesano** explained that students will, for example, have a mechanism through Workday to request time off. For RAs, the research advisor would have authority to approve the request; for TAs, each department could designate a single faculty member (i.e. the grad coordinator or the department head or the associate department head) with approval authority.

Prof. Rundensteiner (DS) suggested that students should be encouraged to talk to their advisors or the appropriate authority about requests for time off rather than limiting the communication through Workday. **Dean Camesano** agreed.

V.P. Turner (T & I) asked Dean Camesano to elaborate on the distinction between academic- and work-performance. **Dean Camesano** explained that evaluation of a student's academic performance is separate from their performance as a graduate worker. But she pointed out that the two are connected because maintaining satisfactory academic performance is required to maintain student status, which in turn is required to belong to the GWU in the first place.

6. New Business

Prof. El-Korchi (CEAE) commented on the mixed nature of the message we are receiving from the WPI administration. At one point recently we were told that we were having financial and budgetary problems; now we are told that WPI is strong budgetarily. However, Prof. El-Korchi has not seen this strength in his department, where a potential faculty hire was just cut and where travel and other discretionary budgets are being eliminated, including

no longer having spring water provided in the department kitchen. In his view, this mixed messaging has led to confusion about WPI's financial state. He suggested that a greater degree of transparency might clear up the confusion, and he respectfully asked that WPI faculty and staff throughout the community be provided greater opportunity to learn about the state of the budget, where the university stands, and why. If, on the other hand, we can only judge our current financial health based on what we see in our departments, then our budget problems appear to be significant. The President's comments earlier today that WPI is in a strong financial position should be reflected to us in a transparent manner and should be felt in our campus experiences.

Prof. Richman suggested that, because President Wang had to leave the meeting early, the comments made by Prof. El-Korchi could be conveyed to her with a request that she address them as part of her report at the Jan. 17 faculty meeting.

7. Provost's Report

Provost Heinricher thanked all those faculty members who worked on the proposal for an M.S. degree in A.I. He commented on the high demand for AI workforce training, and he was more concerned about the possibility of losing students if we did not offer such an A.I. degree than he was about addressing future needs arising from increased student enrollments. Provost Heinricher reminded all those in attendance about GPS Presentation Day on Dec. 11 from 1-3pm. He thanked the faculty members who have already agreed to serve on the provost search committee and encouraged those who not yet been contacted to serve if they are asked to do so. Finally, Provost Heinricher reflected positively on WPI's leadership in project-based and global education within the academic community and on the extent to which it indicates the importance of our work.

8. Closing Announcements

There were no closing announcements.

9. Adjournment

Meeting was adjourned at 2:00pm by **Prof. Richman**.

Respectfully submitted,

Mark Richman
Secretary of the Faculty

Addenda on file with these minutes:

Addendum #1 - CGSR Motion for MS in AI - Minutes - Dec 6 2023

Addendum #2 - Dean Camesano Presentation on GWU Agreement - Minutes - Dec 6 2023

DRAFT MOTION – for discussion only

Date: January 17, 2014

To: WPI Faculty

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

Re: Motion to establish a template for Collaborative Accelerated Master's Programs Frameworks between Partner Institutions and WPI

Motion: On behalf of the Collaborative Accelerated Master's Programs Frameworks Working Group, the Committee on Graduate Studies and Research recommends, and I move that the template for future Collaborative Accelerated Master's Programs Frameworks between partner institutions and WPI be established, as described below.

Summary:

This motion consists of two parts:

- **Part I:** Part I describes the notion of a Collaborative Accelerated Master's Programs Framework between WPI and a partner institution, in which undergraduate students at the partner institution, after graduating with their bachelor's degree, may pursue a master's degree at WPI in an accelerated manner. Part I also provides a template with general rules and guidelines to facilitate the creation of a Collaborative Accelerated Master's Programs Framework with a partner institution.
- **Part II:** Once a Collaborative Accelerated Master's Programs Framework between WPI and a given partner institution has been established, any department or program at WPI that confers a master's degree may opt-in to participate in said Collaborative Framework. Part II provides a template for the creation of a master's-specific Collaborative Accelerated Master's Program (e.g., an accelerated master's program in Computer Science) within a Collaborative Accelerated Master's Programs Framework with the partner institution, in which additional information and rules specified by the opting-in, accelerated master's program (e.g., M.S. in Computer Science) at WPI are provided.

Part I: Collaborative Accelerated Master's Programs Frameworks between Partner Institutions and WPI

Summary Description: A Collaborative Accelerated Master's Programs Framework between WPI and a partner institution is a cross-institutional collaboration in which undergraduate students at the partner institution can apply to and, after graduating with their bachelor's degree at the partner institution, pursue a master's degree at WPI in an accelerated manner. These collaborative frameworks may include B.A. and B.S. degrees at the partner institution and any opting-in master's degree programs at WPI (including but not limited to M.S. degrees).

Anyone at WPI may spearhead the creation of a Collaborative Accelerated Master's Programs Framework with a new partner institution. To establish such a Collaborative Accelerated Master's Programs Framework with a specific partner institution, WPI, in collaboration with the partner institution, shall develop an instantiation and/or adaptation of the template provided below,

specific to the partner institution, for consideration and approval by the WPI Committee on Graduate Studies and Research (CGSR) and subsequently by the WPI Faculty.

For simplicity, the partner institution is denoted by “X” in the remainder of this document.

Once a Collaborative Accelerated Master’s Programs Framework between WPI and partner institution X has been established, any department or program at WPI that confers a master’s degree may opt-in to participate in said Collaborative Framework. Part II describes a template for individual WPI master’s programs (e.g., M.S in Computer Science) to opt-in to participate by creating a Collaborative Accelerated Mater’s Program in its field (e.g., Computer Science) within a Collaborative Accelerated Master’s Programs Framework between X and WPI. The template for a collaborative accelerated master’s program provides structure for additional requirements from the specific WPI master’s degree program for students to be admitted to and fulfill said master’s degree requirements at WPI.

Template: Collaborative Accelerated Master’s Programs Framework between partner institution X and WPI.

1. Framework Description

This Collaborative Accelerated Master’s Programs Framework between X and WPI allows undergraduate students from X to apply to and, after graduating with their bachelor’s degree from X, pursue a master’s degree at WPI in an accelerated manner. This may include B.A. and B.S. degrees at X, and any opting-in master’s degree programs at WPI (including but not limited to M.S. degrees).

Students in this Collaborative Accelerated Master’s Programs Framework must satisfy all the requirements of their respective bachelor’s degree at X and all the requirements of their master’s degree at WPI. WPI allows these students to count toward their master’s degree up-to two of their advanced senior-level undergraduate courses, from a list of eligible courses from X that satisfy the rules specified in the following sections.

The administration of this Collaborative Accelerated Master’s Programs Framework will be led by two *Collaborative Framework Coordinators*, one at X and one at WPI, who will oversee the implementation and administration of this Collaborative Accelerated Master’s Programs Framework.

2. Participating Master’s Degree Programs at WPI

Any master’s degree program at WPI may opt-in to participate in this Collaborative Accelerated Master’s Programs Framework between X and WPI. For simplicity, this specific master’s degree program will be denoted by “Y” from now on.

In order to op-in, a WPI master’s program Y shall, in consultation with the *Collaborative Framework Coordinators* at X and at WPI, prepare a motion for consideration and approval by WPI’s Committee on Graduate Studies and Research (CGSR) and subsequently by the WPI Faculty. Said motion must comply with the general rules in the Collaborative Accelerated Master’s

Programs Framework between X and WPI; must provide any additional requirements from the specific WPI master's degree program for students to be admitted to and fulfill the master's degree in Y at WPI; and must identify a *WPI Y-Program Coordinator*, a faculty or staff member who will serve as the point-of-contact for the master's degree program in Y as it relates to this Collaborative Accelerated Master's Programs Framework . This motion shall come endorsed by the faculty in the department or program that confers said master's degree at WPI. A template for a master's program to opt-in is provided in Part II.

3. Student Admissions Requirements and Application Process

Eligibility:

Students from X in majors relevant to the WPI master's degree program in Y they wish to pursue or who otherwise have the necessary coursework are eligible to apply for the respective Collaborative Accelerated Master's Program in Y. A minimum overall GPA of 3.0 is required; however, students with a GPA lower than 3.0 may petition to the *Collaborative Framework Coordinators* at X and at WPI for special eligibility consideration. Interested students should seek academic advice from the *Collaborative Framework Coordinators* at X and at WPI, their academic advisor at X, and the *WPI Y-Program Coordinator*, no later than during their junior year so that they have sufficient time to plan their course selection. Additional information specific to the Y-Program and possibly additional eligibility criteria are provided in the specific Y-Program description (see Part II).

Admissions Process and Deadlines:

The application, application review and admissions processes into a participating Y-Program within this Collaborative Accelerated Master's Programs Framework are the same as those of the internal B.S./M.S. programs at WPI, which are described in what follows. The application consists of a statement of purpose, academic transcript(s) and two letters of recommendation. GRE, applicable ESL test, and application fees are waived. Applications must be submitted through the WPI Graduate Admissions Office's application system. Application review and admission decisions are handled by the participating WPI master's program in Y that the student wishes to pursue. Applications are received and reviewed on a rolling basis.

Eligible students are expected to apply officially for admission to a Y-Program within this Collaborative Accelerated Master's Programs Framework during their junior year at X. This allows students to best plan their senior year courses. However, applications will be accepted during the students' senior year or up to three years after graduating with their bachelor's degree from X. In addition, students accepted into a Y-Program are allowed to defer the beginning of their master's studies at WPI for up to one year after graduating with their bachelor's degree from X. In any case, students in are expected to start their master's degree in Y at WPI no later than three academic years after graduating with their bachelor's degree from X.

Becoming a Graduate Student at WPI:

Students accepted into a Y-Program within this Collaborative Accelerated Master's Programs Framework will become graduate students at WPI only after they have completed their undergraduate degree at X and register for graduate courses at WPI.

4. Course Registration for HECCMA Partner Institutions Only

Consistent with the Higher Education Consortium of Central Massachusetts (HECCMA) rules, full-time, matriculated, undergraduate students at X are eligible to cross-register for fall and spring courses at WPI. Only one cross-registration course per semester is permitted. Undergraduate courses taken through cross-registration require no additional tuition. For students admitted to a Collaborative Accelerated Master's Program in Y as part of this Collaborative Accelerated Master's Programs Framework between X and WPI, this tuition benefit is extended to include up to two graduate courses taken at WPI while they are still undergraduate students at X.

Undergraduate students from X planning to register for WPI courses should consult with their academic advisors and with the *WPI Y-Program Coordinator* to make sure that they have the necessary course prerequisites and/or recommended background before registering for a WPI course.

5. Requirements for the Collaborative Accelerated Master's Programs Framework

- Students enrolled in a Collaborative Accelerated Master's Program in Y as part of this Collaborative Framework must satisfy all the program requirements of their bachelor's degree at X and all the program requirements of their master's degree in Y at WPI.
- Detailed rules about course counting are provided in the next section.
- In consultation with the student's major academic advisor at X, the *WPI Y-Program Coordinator* of the specific master's program being pursued by the student, the *Collaborative Framework Coordinators* at X and at WPI, and both Institutions' catalogs, the student will fill out their "*Plan of Study Form for the Collaborative Accelerated Master's Program in Y*" outlining the selections made to satisfy the master's degree requirements, including the courses that will be double-counted. This Plan of Study must comply with all the regulations of the Collaborative Accelerated Master's Programs Framework described here. This Plan of Study must be approved by the *WPI Y-Program Coordinator*.

6. Course-Counting Rules

- Students enrolled in a Y-Program of this Collaborative Accelerated Master's Programs Framework will be allowed to count toward their master's degree in Y at WPI up-to two advanced, senior level courses from X that satisfy all of the following conditions:
 - The course is included on the list of eligible courses from X provided in the *Plan of Study Form for the Collaborative Accelerated Master's Program in Y*; this form also provides the equivalent number of graduate credits carried by each eligible course.
 - The student receives a grade of "B-" or higher on the course.
 - The student takes the course while still being an undergraduate at X.
- If applicable, eligible 4000-level or graduate level courses taken at WPI while the student is still an undergraduate at X may also count toward the student's master's degree in Y. Eligible 4000-level WPI courses are listed on the internal BS/MS in Y entry of the WPI Graduate Catalog, and eligible WPI graduate courses are listed on the master's degree in

Y entry of the WPI Graduate Catalog. These eligible courses also appear on the “*Plan of Study Form for the Collaborative Accelerated Master’s Program in Y*”.

- Courses not on the aforementioned lists of eligible courses may also count if approved by the *WPI Y-Program Coordinator*, the *Collaborative Framework Coordinator* at WPI, and, if applicable, the *Collaborative Framework Coordinator* at X.
- Other existing WPI graduate credit transfer and double-counting rules apply to students in this collaborative framework. In particular, no more than 40% of the credit hours required for the master’s degree in Y may come from the total aggregate of graduate-equivalent credit hours from the two X eligible courses, and when applicable from undergraduate and/or graduate WPI courses, taken while the student was still an undergraduate at X. A typical master’s degree at WPI requires 30-33 graduate credits, so up to 12 graduate credits or equivalent undergraduate credits that meet the requirements for the master’s degree in Y can be counted. Some master’s degree programs at WPI may have a more restrictive limit (e.g., 30%); in that case the limit is specified in the “*Plan of Study Form for the Collaborative Accelerated Master’s Program in Y*.”

7. Program Administration

This Collaborative Accelerated Master’s Programs Framework between X and WPI will be jointly administered by a *Collaborative Framework Coordinator* at X and a *Collaborative Framework Coordinator* at WPI who will oversee all administrative aspects of this Collaborative Accelerated Master’s Programs Framework. They will coordinate academic advising aspects of the specific bachelor’s and master’s degrees being pursued by a student in a Y-Program with the student’s undergraduate academic advisor and the *WPI Y-Program Coordinator*.

Part II: Collaborative Accelerated Master’s Programs between partner institution X and WPI

Summary Description: Any WPI department or program that confers a master’s degree may opt-in to participate in the Collaborative Accelerated Master’s Programs Framework between X and WPI. To opt-in, the department or program shall, in consultation with the *Collaborative Framework Coordinators* at X and at WPI, prepare a motion for consideration and approval by CGSR and subsequently by the WPI Faculty, which must comply with the general rules in this Collaborative Accelerated Master’s Programs Framework between X and WPI, and must provide the information listed in the template below.

Template: Collaborative Accelerated Master’s Program in Y between partner institution X and WPI

This document must include:

1. Additional eligibility criteria, if any, for students from X to apply to the Collaborative Accelerated Master's Program in Y. Typically, the disciplines of the bachelor's degree and of the master's degree may be thematically-related but are not required to be so.
2. Recommended background, prerequisites, and/or additional guidelines for students who wish to pursue the Y-Program.
3. A "*Plan of Study Form for the Collaborative Accelerated Master's Program in Y between X and WPI*", listing:
 - a. The degree requirements that a student in this Y-Program needs to satisfy to graduate with a master's degree in Y from WPI.
 - b. The list of advanced, senior-level courses from X that may count toward the master's degree in Y at WPI, the number of equivalent graduate credits carried by each of these course, and the specific master's degree requirement(s) that each of these courses may satisfy. Note that the maximum number of undergraduate courses from X that may be counted toward the master's degree at WPI is two.
 - c. If applicable, the list of WPI 4000-level courses that a student in the Y-Program may take to fulfill master's degree requirements, whether there is a minimum grade requirement, and whether these courses count toward the master's degree only when they are taken while the student is still an undergraduate at X.
 - d. The list of WPI graduate courses that that a student in the Y-Program may take to fulfill master's degree requirements.
 - e. The list of pairs of courses at X and at WPI with significant overlap, if any, such that credit toward the master's degree at WPI will be awarded for at most one of the two courses.
 - f. If lower than the typical WPI 40% upper limit, the maximum total percentage of the graduate credit hours required for the master's degree in Y that the Y-Program allows students to double-count between their undergraduate and graduate degrees. This upper limit applied to the total aggregate of graduate-equivalent credit hours from the two X eligible courses, and when applicable from undergraduate and/or graduate WPI courses, taken while the student was still an undergraduate at X
4. The name of a WPI faculty or staff member, hereby called "*WPI Y-Program Coordinator*" who will serve as the point of contact for the master's program in Y within this Collaborative Framework with X. This master's-specific coordinator will work in collaboration with the *WPI Collaborative Framework Coordinator* on the academic aspects of the Collaborative Accelerated Master's Program in Y, and on providing academic advice to students on this Y-Program.
5. Endorsement from the faculty in the department or program that offers the master's degree in Y.

It is the responsibility of the *Collaborative Framework Coordinators* at WPI and at X, in communication with the *WPI Y-Program Coordinator*, to keep all the information about the Collaborative Accelerated Master's Program in Y up-to-date, and to inform the counterparts at X or at WPI promptly when a change occurs (e.g., a change in a course description or a change in degree requirements).

Rationale for the Collaborative Accelerated Master's Programs Framework

Benefits to Partner Institution X and to WPI of this Collaborative Accelerated Master's Programs Framework :

Partnerships like this one strengthen collaborations between WPI and our partner institutions, and are beneficial for students, WPI, and our partner institutions.

This Collaborative Accelerated Master's Programs Framework helps highlight graduate options for undergraduate students from our partner institutions. Students from X can benefit from this Collaborative Accelerated Master's Programs Framework as it allows them to pursue their master's degrees at WPI in an accelerated manner. A master's degree will poise these students well for future employment and/or for entry into Ph.D. programs. In the case of partner institutions in the greater Worcester area, having a local option for a graduate degree can be attractive to students.

This Collaborative Accelerated Master's Programs Framework benefits X by allowing it to attract and nurture students who are interested in pursuing their bachelor's and master's programs in a synergistic manner, and in disciplines that may not be available at X at the graduate level.

This Collaborative Accelerated Master's Programs Framework benefits WPI by attracting external students with strong undergraduate training (and who are familiar with Worcester, in the case of local partner institutions) to pursue their master's degree at WPI.

WPI has a long tradition of offering the B.S./M.S. option to its students, where the master's degree is in the same department/program or in a different department/program of their bachelor's degree. This Collaborative Accelerated Master's Programs Framework between X and WPI is inspired by WPI's internal B.S./M.S. option and will create a new type of collaboration between these two institutions and a pathway for students to obtain a bachelor's and a master's degrees in an accelerated and synergistic manner.

Design choices of the Collaborative Accelerated Master's Programs Framework :

The Collaborative Accelerated Master's Programs Framework described here follows all the internal WPI B.S./M.S. rules; it has been informed by the B.S./M.S. program descriptions in the WPI Graduate Catalog.

There are numerous examples of B.S./M.S. students at WPI who have completed their B.S. degree in a department or program (e.g., Physics) and their M.S. degree in a different department or program (e.g., Computer Science). WPI departments and programs that offer the B.S./M.S. option do regulate the M.S. portion of the degree (e.g., what undergraduate courses can be double-counted toward the M.S. degree. Same applies to this Collaborative Accelerated Master's Programs Framework. With a few exceptions (e.g., the B.S./M.S. options in Fire Protection Engineering and in Systems Engineering, which are only available to engineering undergraduate

majors), departments/programs' B.S./M.S. options at WPI are available to any WPI undergraduate major (see for example the B.S./M.S. option in Data Science in the Graduate Catalog). In that spirit, the proposed Collaborative Accelerated Master's Programs Framework allows students to pursue a master's degree at WPI in a discipline related to, but not necessarily the same as, the discipline of their undergraduate major at X.

In the case of partner institutions that are part of the Higher Education Consortium of Central Massachusetts (HECCMA), the rules described here for students to register for courses at WPI while they are still undergraduate students at X are consistent with the cross-registration policies established by HECCMA. Furthermore, this Collaborative Accelerated Master's Programs Framework extends these policies by allowing students admitted to a Y-Program within this Collaborative Accelerated Master's Programs Framework to take up to two WPI graduate courses while they are still undergraduate students at X without paying additional tuition. This extended tuition-benefit was approved by the WPI Provost and agreed upon with the WPI Registrar.

The limit of at most two undergraduate courses from X to count for the master's degree at WPI has been adopted to satisfy requirements from the New England Commission of Higher Education (NECHE), as per conversations with NECHE's Senior Vice-President in the spring of 2023.

No special considerations are needed for this Collaborative Accelerated Master's Programs Framework regarding ABET accreditation as engineering master's degrees at WPI are not constrained by ABET accreditation rules.

Allowing students to take three "gap" years between completing their bachelor's degree at X and starting their master's degree at WPI is consistent with WPI's own internal B.S./M.S. rules (which allows a 5-year gap). It accommodates potential changes of circumstances in students' lives and incentivizes students to come back for a graduate degree after spending time in industry or other endeavors, making the program more flexible and attractive.

Impact on Degree Requirements:

None.

Resources Needed:

At WPI, resources are needed to appoint and reward a WPI *Collaborative Framework Coordinator* to administer and oversee this Collaborative Accelerated Master's Programs Framework between X and WPI, and to serve as the general WPI advisor for students in any of the Collaborative Accelerated Master's Program in Y s within this Framework.

Implementation Date for the Collaborative Accelerated Master's Programs Framework between X and WPI:

Implementation date for the establishment at WPI of this Collaborative Accelerated Master's Programs Framework between X and WPI is AY20ZZ-20(ZZ+1).

Contacts for the Collaborative Accelerated Master's Programs Framework between X and WPI:

Contacts at WPI:

Collaborative Accelerated Master's Programs Framework Coordinator at WPI: <include name>

Other WPI Faculty, Staff, and Administrators:

- *<include names>*

Contacts at X:

Collaborative Accelerated Master's Programs Framework Coordinator at X: <include name>

Other Faculty, Staff and Administrators at X:

- *<include names>*

Implementation Date for the General Template for Collaborative Accelerated Master's Programs Frameworks between WPI and Partner Institutions:

Implementation date for the adoption of this general template for Collaborative Accelerated Master's Programs Framework between WPI and partner institutions is upon this motion's approval by the WPI Faculty.

Contacts for the General Template for Collaborative Accelerated Master's Programs Frameworks between WPI and Partner Institutions:

General Collaborative Accelerated Master's Programs Framework Architecture at WPI:

• Carolina Ruiz, Associate Dean of Arts and Science and Professor, Computer Science Faculty, Staff, and Administrators who have provided input for this General Collaborative Accelerated Master's Programs Framework:

- WPI Faculty from several Schools, Department and Programs
- WPI Committee on Graduate Studies and Research (CGSR)
- WPI Secretary of the Faculty, Mark Richman
- WPI Provost, Art Heinricher
- WPI Dean of Graduate Studies, Terri Comesano
- WPI Dean of Arts and Sciences, Jean A. King
- WPI Dean of Engineering, John McNeill
- WPI Dean of The Business School, Debora Jackson

- WPI Dean of The Global School, Mimi Sheller
- WPI Registrar, Sarah Miles
- WPI Executive Director of Graduate Recruitment and Admissions, Melissa Terrio
- WPI Associate General Counsel, Amy Fabiano
- Counterparts at partner institutions, including Assumption University and Holy Cross
- The Senior Vice President of the New England Commission of Higher Education (NECHE), Patricia O'Brien.

DRAFT MOTION – for discussion only

Date: January 17, 2014

To: WPI Faculty

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

Re: Motion to establish a Collaborative Accelerated Master's Framework between Assumption University and WPI

Motion: On behalf of the Collaborative Accelerated Master's Programs Framework between Assumption University and WPI Working Group, the Committee on Graduate Studies and Research recommends, and I move, that the Collaborative Accelerated Master's Framework between Assumption University and WPI be established, as described below.

Summary:

This motion consists of two parts:

- **Part I:** Part I establishes a Collaborative Accelerated Master's Programs Framework between Assumption University and WPI, in which undergraduate students at Assumption University, after graduating with their bachelor's degree, may pursue a master's degree at WPI in an accelerated manner.
- **Part II:** Any department or program at WPI that confers a master's degree may opt-in to participate in this Collaborative Framework. Part II provides a template for the creation of a Master's-specific (e.g., M.S. degree in Neuroscience) Program within this Collaborative Accelerated Master's Programs Framework between Assumption University and WPI, in which additional information and rules specified by the opting-in, accelerated master's program (e.g., M.S. in Neuroscience) at WPI are provided.

Part I: Collaborative Accelerated Master's Programs Framework between Assumption University and WPI

Summary Description: This part establishes a Collaborative Accelerated Master's Programs Framework between Assumption University and WPI, in which undergraduate students at Assumption University can apply to and, after graduating with their bachelor's degree at the Assumption, pursue a master's degree at WPI in an accelerated manner.

This motion specifies general rules for this cross-institution collaboration. This collaboration may to include B.A. and B.S. degrees at Assumption and any opting-in master's degree programs at WPI (including but not limited to M.S. degrees).

Part II describes a template for WPI master's programs (e.g., M.S in Computer Science) to opt-in to participate in this Collaborative Accelerated Master's Programs Framework between Assumption University and WPI. The template for a collaborative accelerated master's program provides structure for additional requirements from the specific WPI master's degree program for students to be admitted to and fulfill said master's degree requirements at WPI.

Template: Collaborative Accelerated Master's Programs Framework between Assumption University and WPI.

1. Framework Description

This Collaborative Accelerated Master's Programs Framework between Assumption University and WPI allows undergraduate students from Assumption University to apply to and, after graduating with their bachelor's degree from Assumption, pursue a master's degree at WPI in an accelerated manner. This may include B.A. and B.S. degrees at Assumption, and any opting-in master's degree programs at WPI (including but not limited to M.S. degrees).

Students in this Collaborative Accelerated Master's Programs Framework must satisfy all the requirements of their respective bachelor's degree at Assumption University and all the requirements of their master's degree at WPI. WPI allows these students to count toward their master's degree up-to two of their advanced senior-level undergraduate courses, from a list of eligible Assumption University courses that satisfy the rules specified in the following sections.

The administration of this Collaborative Accelerated Master's Programs Framework will be led by two *Collaborative Framework Coordinators*, one at Assumption University and one at WPI, who will oversee the implementation and administration of this Collaborative Accelerated Master's Programs Framework.

2. Participating Master's Degree Programs at WPI

Any master's degree program at WPI may opt-in to participate in this Collaborative Accelerated Master's Programs Framework between Assumption University and WPI. For simplicity, this specific master's degree program will be denoted by "Y" from now on.

In order to opt-in, a WPI master's program Y shall, in consultation with the *Collaborative Framework Coordinators* at Assumption University and at WPI, prepare a motion for consideration and approval by WPI's Committee on Graduate Studies and Research (CGSR) and subsequently by the WPI Faculty. Said motion must comply with the general rules in the Collaborative Accelerated Master's Programs Framework between Assumption University and WPI; must provide any additional requirements from the specific WPI master's degree program for students to be admitted to and fulfill the master's degree in Y at WPI; and must identify a *WPI Y-Program Coordinator*, a faculty or staff member who will serve as the point-of-contact for the master's degree program in Y as it relates to this Collaborative Accelerated Master's Programs Framework. This motion shall come endorsed by the faculty in the department or program that offers the master's degree at WPI. A template for a master's program to opt-in is provided in Part II.

3. Student Admissions Requirements and Application Process

Eligibility:

Students from Assumption University in majors relevant to the WPI master's degree program in Y they wish to pursue or who otherwise have the necessary coursework are eligible to apply for the respective Collaborative Accelerated Master's Program in Y. A minimum overall GPA of 3.0

is required; however, students with a GPA lower than 3.0 may petition to the *Collaborative Framework Coordinators* at Assumption University and at WPI for special eligibility consideration. Interested students should seek academic advice from the *Collaborative Framework Coordinators* at Assumption University and at WPI, their academic advisor at Assumption University, and the *WPI Y-Program Coordinator*, no later than during their junior year so that they have sufficient time to plan their course selection. Additional information specific to the Y-Program and possibly additional eligibility criteria are provided in the specific Y-Program description (see Part II).

Admissions Process and Deadlines:

The application, application review and admissions processes into a participating Y-Program within this Collaborative Accelerated Master's Programs Framework are the same as those of the internal B.S./M.S. programs at WPI, which are described in what follows. The application consists of a statement of purpose, academic transcript(s) and two letters of recommendation. GRE, applicable ESL test, and application fees are waived. Applications must be submitted through the WPI Graduate Admissions Office's application system. Application review and admission decisions are handled by the participating WPI master's program in Y that the student wishes to pursue. Applications are received and reviewed on a rolling basis.

Eligible students are expected to apply officially for admission to a Y-Program within this Collaborative Accelerated Master's Programs Framework during their junior year at Assumption University. This allows students to best plan their senior year courses. However, applications will be accepted during the students' senior year or up to three years after graduating with their bachelor's degree from Assumption University. In addition, students accepted into a Y-Program are allowed to defer the beginning of their master's studies at WPI for up to one year after graduating with their bachelor's degree from Assumption University. In any case, students are expected to start their master's degree in Y at WPI no later than three academic years after graduating with their bachelor's degree from Assumption University.

Becoming a Graduate Student at WPI:

Students accepted into a Y-Program within this Collaborative Accelerated Master's Programs Framework will become graduate students at WPI only after they have completed their undergraduate degree at Assumption University and register for graduate courses at WPI.

4. Course Registration

Consistent with the Higher Education Consortium of Central Massachusetts (HECCMA) rules, full-time, matriculated, undergraduate students at Assumption University are eligible to cross-register for fall and spring courses at WPI. Only one cross-registration course per semester is permitted. Undergraduate courses taken through cross-registration require no additional tuition. For students admitted to a Collaborative Accelerated Master's Program in Y as part of this Collaborative Accelerated Master's Programs Framework between Assumption University and WPI, this tuition benefit is extended to include up to two graduate courses taken at WPI while they are still undergraduate students at Assumption University.

Undergraduate students from Assumption University planning to register for WPI courses should consult with their academic advisors and with the *WPI Y-Program Coordinator* to make sure that they have the necessary course prerequisites and/or recommended background before registering for a WPI course.

5. Requirements for the Collaborative Accelerated Master's Programs Framework

- Students enrolled in a Collaborative Accelerated Master's Program in Y as part of this Collaborative Framework must satisfy all the program requirements of their bachelor's degree at Assumption University and all the program requirements of their master's degree in Y at WPI.
- Detailed rules about course counting are provided in the next section.
- In consultation with the student's major academic advisor at Assumption University, the *WPI Y-Program Coordinator* of the specific master's program being pursued by the student, the *Collaborative Framework Coordinators* at Assumption University and at WPI, and both Institutions' catalogs, the student will fill out their "*Plan of Study Form for the Collaborative Accelerated Master's Program in Y*" outlining the selections made to satisfy the master's degree requirements, including the courses that will be double-counted. This Plan of Study must comply with all the regulations of the Collaborative Accelerated Master's Programs Framework described here. This Plan of Study must be approved by the *WPI Y-Program Coordinator*.

6. Course-Counting Rules

- Students enrolled in a Y-Program of this Collaborative Accelerated Master's Programs Framework will be allowed to count toward their master's degree in Y at WPI up-to two advanced, senior level courses from Assumption University that satisfy all of the following conditions:
 - The course is included on the list of eligible courses from Assumption University provided in the *Plan of Study Form for the Collaborative Accelerated Master's Program in Y*; this form also provides the equivalent number of graduate credits carried by each eligible course.
 - The student receives a grade of "B-" or higher on the course.
 - The student takes the course while still being an undergraduate at Assumption University.
- If applicable, eligible 4000-level or graduate level courses taken at WPI while the student is still an undergraduate at Assumption University may also count toward the student's master's degree in Y. Eligible 4000-level WPI courses are listed on the internal BS/MS in Y entry of the WPI Graduate Catalog, and eligible WPI graduate courses are listed on the master's degree in Y entry of the WPI Graduate Catalog. These eligible courses may also appear on the "*Plan of Study Form for the Collaborative Accelerated Master's Program in Y*".
- Courses not on the aforementioned lists of eligible courses may also count if approved by the *WPI Y-Program Coordinator*, the *Collaborative Framework Coordinator* at WPI, and, if applicable, the *Collaborative Framework Coordinator* at Assumption University.

- Other existing WPI graduate credit transfer and double-counting rules apply to students in this collaborative framework. In particular, no more than 40% of the credit hours required for the master's degree in Y may come from the total aggregate of graduate-equivalent credit hours from the two Assumption University eligible courses, and when applicable from undergraduate and/or graduate WPI courses, taken while the student was still an undergraduate at Assumption University. A typical master's degree at WPI requires 30-33 graduate credits, so up to 12 graduate credits or equivalent undergraduate credits that meet the requirements for the master's degree in Y can be counted. Some master's degree programs at WPI may have a more restrictive limit (e.g., 30%); in that case the limit is specified in the "*Plan of Study Form for the Collaborative Accelerated Master's Program in Y.*"

7. Program Administration

This Collaborative Accelerated Master's Programs Framework between Assumption University and WPI will be jointly administered by a *Collaborative Framework Coordinator* at Assumption University and a *Collaborative Framework Coordinator* at WPI who will oversee all administrative aspects of this Collaborative Accelerated Master's Programs Framework. They will coordinate academic advising aspects of the specific bachelor's and master's degrees being pursued by a student in a Y-Program with the student's undergraduate academic advisor and the *WPI Y-Program Coordinator*.

Part II: Collaborative Accelerated Master's Programs between Assumption University and WPI

Summary Description: Any WPI department or program that confers a master's degree may opt-in to participate in the Collaborative Accelerated Master's Programs Framework between Assumption University and WPI. To opt-in, the department or program shall, in consultation with the *Collaborative Framework Coordinators* at Assumption University and at WPI, prepare a motion for consideration and approval by CGSR and subsequently by the WPI Faculty, which must comply with the general rules in this Collaborative Accelerated Master's Programs Framework between Assumption University and WPI, and must provide the information listed in the template below.

Template: Collaborative Accelerated Master's Program in Y between Assumption University and WPI

This document must include:

6. Additional eligibility criteria, if any, for students from Assumption University to apply to the Collaborative Accelerated Master's Program in Y. Typically, the disciplines of the bachelor's degree and of the master's degree may be thematically-related but are not required to be so.

7. Recommended background, prerequisites, and/or additional guidelines for students who wish to pursue the Y-Program.
8. A “*Plan of Study Form for the Collaborative Accelerated Master’s Program in Y between Assumption University and WPI*”, listing:
 - a. The degree requirements that a student in this Y-Program needs to satisfy to graduate with a master’s degree in Y from WPI.
 - b. The list of advanced, senior-level courses from Assumption University that may count toward the master’s degree in Y at WPI, the number of equivalent graduate credits carried by each of these course, and the specific master’s degree requirement(s) that each of these courses may satisfy. Note that the maximum number of undergraduate courses from Assumption University that may be counted toward the master’s degree at WPI is two.
 - c. If applicable, the list of WPI 4000-level courses that a student in the Y-Program may take to fulfill master’s degree requirements, whether there is a minimum grade requirement, and whether these courses count toward the master’s degree only when they are taken while the student is still an undergraduate at Assumption University.
 - d. The list of WPI graduate courses that that a student in the Y-Program may take to fulfill master’s degree requirements.
 - e. The list of pairs of courses at Assumption University and at WPI with significant overlap, if any, such that credit toward the master’s degree at WPI will be awarded for at most one of the two courses.
 - f. If lower than the typical WPI 40% upper limit, the maximum total percentage of the graduate credit hours required for the master’s degree in Y that the Y-Program allows students to double-count between their undergraduate and graduate degrees. This upper limit applied to the total aggregate of graduate-equivalent credit hours from the two Assumption University eligible courses, and when applicable from undergraduate and/or graduate WPI courses, taken while the student was still an undergraduate at Assumption.
9. The name of a WPI faculty or staff member, hereby called “*WPI Y-Program Coordinator*” who will serve as the point of contact for the master’s program in Y within this Collaborative Framework with Assumption University. This master’s-specific coordinator will work in collaboration with the *WPI Collaborative Framework Coordinator* on the academic aspects of the Collaborative Accelerated Master’s Program in Y, and on providing academic advice to students on this Y-Program.
10. Endorsement from the faculty in the department or program that offers the master’s degree in Y.

It is the responsibility of the *Collaborative Framework Coordinators* at WPI and at X, in communication with the *WPI Y-Program Coordinator*, to keep all the information about the Collaborative Accelerated Master’s Program in Y up-to-date, and to inform the counterparts at Assumption University or at WPI promptly when a change occurs (e.g., a change in a course description or a change in degree requirements).

Rationale for this Collaborative Accelerated Master's Programs Framework

Benefits to Assumption University and to WPI of this Collaborative Accelerated Master's Programs Framework:

This Collaborative Accelerated Master's Programs Framework strengthens collaborations between Assumption University and WPI, and is beneficial for students, WPI, and Assumption University.

This Collaborative Accelerated Master's Programs Framework helps highlight graduate options for Assumption University undergraduate students. Students from Assumption can benefit from this Collaborative Accelerated Master's Programs Framework as it allows them to pursue their master's degrees at WPI in an accelerated manner. A master's degree will poise these students well for future employment and/or for entry into Ph.D. programs. Having a local option for a graduate degree can be attractive to students.

This Collaborative Accelerated Master's Programs Framework benefits Assumption University by allowing it to attract and nurture students who are interested in pursuing their bachelor's and master's programs in a synergistic manner, and in disciplines that may not be available at Assumption University at the graduate level.

This Collaborative Accelerated Master's Programs Framework benefits WPI by attracting external students with strong undergraduate training (and who are familiar with Worcester) to pursue their master's degree at WPI.

WPI has a long tradition of offering the B.S./M.S. option to its students, either in the same department/program or in different departments/programs. This Collaborative Accelerated Master's Programs Framework between Assumption University and WPI is inspired by WPI's internal B.S./M.S. option and will create a new type of collaboration between these two institutions and a pathway for students to obtain a bachelor's and a master's degrees in an accelerated and synergistic manner.

Design choices of the Collaborative Accelerated Master's Programs Framework:

The Collaborative Accelerated Master's Programs Framework described here follows all the internal WPI B.S./M.S. rules; it has been informed by the B.S./M.S. program descriptions in the WPI Graduate Catalog.

There are numerous examples of B.S./M.S. students at WPI who have completed their B.S. degree in a department or program (e.g., Physics) and their M.S. degree in a different department or program (e.g., Computer Science). WPI departments and programs that offer the B.S./M.S. option do regulate the M.S. portion of the degree (e.g., what undergraduate courses can be double-counted toward the M.S. degree. Same applies to this Collaborative Accelerated Master's Programs Framework. With a few exceptions (e.g., the B.S./M.S. options in Fire Protection

Engineering and in Systems Engineering, which are only available to engineering undergraduate majors), departments/programs' B.S./M.S. options at WPI are available to any WPI undergraduate major (see for example the B.S./M.S. option in Data Science in the Graduate Catalog). In that spirit, the proposed Collaborative Accelerated Master's Programs Framework allows students to pursue a master's degree at WPI in a discipline related to, but not necessarily the same as, the discipline of their undergraduate major at Assumption University.

The rules described here for students to register for courses at WPI while they are still undergraduate students at Assumption University are consistent with the cross-registration policies established by the Higher Education Consortium of Central Massachusetts (HECCMA). Furthermore, this Collaborative Accelerated Master's Programs Framework extends these policies by allowing students admitted to a Y-Program within this Collaborative Accelerated Master's Programs Framework to take up to two WPI graduate courses while they are still undergraduate students at Assumption University without paying additional tuition. This extended tuition-benefit was approved by the WPI Provost and agreed upon with the WPI Registrar.

The limit of at most two undergraduate courses from Assumption University to count for the master's degree at WPI has been adopted to satisfy requirements from the New England Commission of Higher Education (NECHE), as per conversations with NECHE's Senior Vice-President in the spring of 2023.

No special considerations are needed for this Collaborative Accelerated Master's Programs Framework regarding ABET accreditation as engineering master's degrees at WPI are not constrained by ABET accreditation rules.

Allowing students to take three "gap" years between completing their bachelor's degree at Assumption University and starting their master's degree at WPI is consistent with WPI's own internal B.S./M.S. rules (which allows a 5-year gap). It accommodates potential changes of circumstances in students' lives and incentivizes students to come back for a graduate degree after spending time in industry or other endeavors, making the program more flexible and attractive.

Impact on Degree Requirements:

None.

Resources Needed:

At WPI, resources are needed to appoint and reward a WPI *Collaborative Framework Coordinator* to administer and oversee this Collaborative Accelerated Master's Programs Framework between Assumption University and WPI, and to serve as the general WPI advisor for students in any of the Collaborative Accelerated Master's Program in Ys within this Framework.

!

Implementation Date:

Implementation date for this action is AY2024-2025.

Contacts for this Collaborative Accelerated Master's Programs Framework between Assumption University and WPI:

Contacts at WPI:

Collaborative Accelerated Master's Programs Framework Coordinator at WPI:

- Carolina Ruiz, Associate Dean of Arts and Science and Professor of Computer Science

Faculty, Staff, and Administrators who have provided input for this Collaborative Accelerated Master's Programs Framework:

- Faculty from several Department and Programs
- Committee on Graduate Studies and Research (CGSR)
- Mark Richman, Secretary of the Faculty
- Art Heinricher, Provost
- Terri Camesano, Dean of Graduate Studies
- Jean A. King, Dean of Arts and Sciences
- John McNeill, Dean of Engineering
- Debora Jackson, Dean of The Business School
- Mimi Sheller, Dean of The Global School
- Sarah Miles, Registrar
- Melissa Terrio, Executive Director of Graduate Recruitment and Admissions
- Amy Fabiano, Associate General Counsel

Contacts at Assumption University:

Collaborative Accelerated Master's Programs Framework Coordinator at :

- Michele Lemons, Professor of Biology and Director of Center for Neuroscience

Other Faculty, Staff, and Administrators at Assumption University:

- Brian Niece, Chairperson of Biological and Physical Sciences
- Stuart Cromarty, Professor of Biology
- Nikos Lessios, Assistant Professor of Biology
- Anthony Saccino, Assistant Professor of Practice, Biology
- Lea Gordon, Chairperson of Psychology
- Jessica McCreedy, Chairperson of Mathematics and Computer Science
- Marc Guerra, Provost
- Michelle Graveline, Interim Dean of the D'Amour College of Liberal Arts and Sciences
- Heather Pecoraro, Registrar

- Christina Graziano, General Counsel and VP for Strategy

Contacts at NECHE:

- The Senior Vice President of the New England Commission of Higher Education (NECHE), Patricia O'Brien.

DRAFT MOTION – for discussion only

Date: January 17, 2014

To: WPI Faculty

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

Re: Motion to establish a Collaborative Accelerated Master's Program in Neuroscience between Assumption University and WPI

Motion: On behalf of the WPI Neuroscience Program, the Committee on Graduate Studies and Research recommends, and I move, that the Collaborative Accelerated Master's Program in Neuroscience between Assumption University and WPI be established, as described below.

Summary:

This motion establishes a Collaborative Accelerated Master's Program in Neuroscience between Assumption University and WPI, in which undergraduate students at Assumption University, after graduating with their bachelor's degree, may pursue an M.S. degree in Neuroscience at WPI in an accelerated manner. This accelerated master's program is part of the Collaborative Accelerated Master's Programs Framework between Assumption University and WPI. This accelerated master's program complies with all the rules described in the Collaborative Accelerated Master's Programs Framework between Assumption University and WPI and with all the rules of the WPI M.S Program in Neuroscience. This motion describes additional rules and information specific for undergraduate students from Assumption University who wish to apply to and pursue an M.S. in Neuroscience at WPI in an accelerated manner.

Collaborative Accelerated Master's Program in Neuroscience between Assumption University and WPI

In addition to the rules and regulations provided in the general Collaborative Accelerated Master's Programs Framework between Assumption University and WPI, the following sections provide additional information and rules specific to students who wish to obtain their M.S. degree in Neuroscience at WPI as part of this Collaborative Accelerated Master's Programs Framework between Assumption University and WPI.

1. Additional Eligibility Criteria

Assumption University students in majors relevant to Neuroscience (including, Neuroscience, Biology, Biotechnology and Molecular Biology, Chemistry, Computer Science, Data Analytics, Health Professions, Health Sciences, Mathematics, and Psychology) or who otherwise have the necessary coursework are eligible for this Collaborative Accelerated Master's Program in Neuroscience. Other eligibility criteria described in the general Collaborative Accelerated Master's Programs Framework between Assumption University and WPI applies.

2. Recommended Background, Prerequisites, and/or Additional Guidelines for this Collaborative Accelerated M.S. Program in Neuroscience

Eligible Assumption University students wishing to pursue an accelerated M.S. in Neuroscience at WPI are encouraged to consult with their own undergraduate academic advisor, the Director of Neuroscience at Assumption University, and the WPI Neuroscience Coordinator at WPI (names provided later in this document) about course selection that would best prepare them for the M.S. degree in Neuroscience at WPI. The Plan of Study provided in this document provides detailed information about courses at Assumption University and at WPI that may count toward the M.S. degree in Neuroscience at WPI. General rules for course-counting and other important information are included in the description of the Collaborative Accelerated Master's Programs Framework between Assumption University and WPI.

Assumption University courses eligible toward the M.S. degree in Neuroscience at WPI:

See the Plan of Study Form included in this document for further details. Unless otherwise noted, Assumption University 4-credit undergraduate courses carry 3 WPI graduate credits; and Assumption University 3-credit undergraduate courses carry 2 WPI graduate credits.

- Courses that count toward the M.S. degree's core or elective coursework requirement in Neuroscience:
 - BIO415 Principles of Neuroscience (4 undergraduate credits)
 - Students in the program can receive credit towards their M.S. degree for BIO415 or for NEU501, but not for both.
 - BIO490 Independent Study with Neuroscience Focus (3 undergraduate credits)
 - This ISC may be conducted with Assumption University and/or WPI faculty.
- Courses that count toward the M.S. degree's core or elective coursework requirement in Biology:
 - Course BIO420 Developmental Biology (4 undergraduate credits)
 - BIO430 Comparative Physiology (4 undergraduate credits)
- Courses that count toward the M.S. degree's elective coursework requirement in Chemistry:
 - CHE414 Biochemistry (4 undergraduate credits)
- Courses that count toward the M.S. degree's elective coursework requirement in Psychology:
 - PSY402 Social and Affective Neuroscience (3 undergraduate credits)
 - PSY403 Cognitive Neuroscience (3 undergraduate credits)
- *Note:* The Assumption University PHI 262 Biomedical Ethics course may be used to satisfy the Ethics requirement of the M.S. degree in Neuroscience, but it will carry zero credits toward the MS degree.

WPI graduate courses eligible for double-counting toward a Bachelor's degree at Assumption University:

- Unless otherwise noted, WPI graduate courses carry 3 WPI graduate credits and 3 Assumption undergraduate credits.

- Assumption University will accept up to two of the WPI graduate courses listed below towards credit for an undergraduate degree at Assumption. A grade of "C" or higher in these two courses is required.
- WPI neuroscience graduate courses:
 - NEU 501 Neuroscience:
 - NEU 501 will satisfy the BIO415 requirement for the Neuroscience Major with a Cellular Path, Neuroscience Major with a Psychology Path, and the Biology Major with a concentration in neuroscience and behavior.
 - NEU 501 will count as a Quantitative elective or Biology elective in the Biology major.
 - However, NEU 501 will not satisfy the 400-level elective requirement at Assumption. For example, the Biology Major with a Concentration in Neuroscience and Behavior and the Neuroscience Major with a Cellular Path must take at least one 400 level biology course with a lab, or CHE414 with a lab, at Assumption University.
- WPI elective graduate courses for the M.S. in Neuroscience:
 - BCB501 Bioinformatics
 - BCB504 Statistical Methods in Genetics and Bioinformatics
 - DS501 Introduction to Data Science

One of the WPI elective graduate courses listed above will count as a "Biology elective" or "Quantitative Elective" in the following programs at Assumption: Neuroscience Major with a Cellular Path, Biology Major with a Concentration in Neuroscience and Behavior, and Biology Major. For Assumption students pursuing a Neuroscience Major with a Psychology Path, elective graduate courses listed above will count as an "elective". A second WPI graduate course from this list will count as a general biology elective course at Assumption.

WPI undergraduate courses eligible for double-counting toward a Bachelor's degree at Assumption University:

Unless otherwise noted, WPI undergraduate courses carry 3 Assumption undergraduate credits. (Please note that undergraduate courses from WPI are subject to credit conversion when being counted for a WPI graduate degree, with 3 WPI undergraduate credits being equivalent to 2 WPI graduate credits.)

The undergraduate WPI courses listed below will count towards an undergraduate major (listed below) at Assumption, provided a student earns a letter grade of "C" or higher. WPI undergraduate courses listed below will count as a "Biology Elective" or "Quantitative Elective" in the following programs at Assumption: Neuroscience Major with a Cellular Path, Biology Major with a Concentration in Neuroscience and Behavior, and Biology Major. For Assumption students pursuing a Neuroscience Major with a Psychology Path, elective undergraduate courses listed below will count as an "elective".

- Bioinformatics and Computational Biology courses:
 - BCB 4001/BB4801. Bioinformatics
 - BCB 4002/CS 4802. Biovisualization
 - BCB 4003/CS 4803. Biological and Biomedical Database Mining

- BCB 4004/MA 4603. Statistical Methods in Genetics and Bioinformatics
- Biology and Biotechnology courses:
 - BB/CH 4190. Regulation of Gene Expression
 - BB 4260. Synthetic Biology
- Biomedical Engineering courses:
 - BME/ECE 4011. Biomedical Signal Analysis
 - BME 4201. Biomedical Imaging
- Chemistry and Biochemistry courses:
 - CH 4110. Protein Structure and Function
 - CH 4120. Lipids and Biomembrane Functions
 - CH4160. Membrane Biophysics
 - CH4170. Experimental Genetic Engineering
- Computer Science courses:
 - CS 4341. Introduction to Artificial Intelligence
 - CS 4342. Machine Learning
 - CS 4432. Database Systems II
 - CS 4445. Data Mining and Knowledge Discovery in Databases
 - CS 4518. Mobile and Ubiquitous Computing
 - CS 4802/BCB 4002. Biovisualization
 - CS 4803/BCB 4003. Biological and Biomedical Database Mining
- Data Science courses:
 - DS 4635/MA 4635. Data Analytics and Statistical Learning
- Mathematics courses:
 - MA 4631. Probability and Mathematical Statistics I
 - MA 4632. Probability and Mathematical Statistics II
 - MA 4635/DS 4635. Data Analytics and Statistical Learning
- Psychology courses:
 - PSY 4800. Special Topics in Psychological Science
 - PSY 4900. Advanced Research in Psychological Science

3. Plan of Study Form for the Collaborative Accelerated Master's Program in Neuroscience between Assumption University and WPI

The Plan of Study Form is attached at the end of this document.

4. Program Administration

The *WPI Neuroscience-Program Coordinator* for this collaborative accelerated master's program will be Prof. Carolina Ruiz, who will serve as the point of contact for the M.S. degree program in Neuroscience. She will work in collaboration with the *WPI Collaborative Accelerated Master's Programs Framework Coordinator* and with the Assumption University Director of Neuroscience, Prof. Michele Lemons on the academic aspects of this Collaborative Accelerated Master's Program in Neuroscience and on providing academic advice to students on this program.

5. Endorsements

This motion is endorsed by the faculty in the Neuroscience Program at WPI, and by the Neuroscience Program, and the Departments of Biological and Physical Sciences, Psychology, and Mathematics and Computer Sciences at Assumption University.

Rationale for this Collaborative Accelerated Master's Program in Neuroscience between Assumption University and WPI

About Neuroscience:

It is an exciting time to study neuroscience! The brain is the most complex organ in our body and arguably the least understood. Understanding the human brain and peripheral nervous system is one of the most significant scientific challenges of our time. With recent advances in technology, we are poised to better understand the mechanisms of brain development and function. Deciphering interactions between different neural structures links the diverse fields of neuroscience, psychological and cognitive science, cell and molecular biology, computer science, biomedical engineering, mathematics, and physics.

Neuroscience Degree Programs at Assumption University and at WPI:

Assumption University offers B.S. and B.A. degrees and two different concentrations in Neuroscience. Assumption undergraduate students have four possible pathways to study neuroscience: two Neuroscience Majors: one with a Cellular focus (B.S.) and one with a Psychological focus (B.A.); and two Neuroscience Concentrations: one coupled with a Biology major (B.S.) and one coupled with a Psychology major (B.A.).

WPI offers B.S./M.S. and M.S. degrees in Neuroscience. The mission of the Neuroscience Program at WPI is to provide an outstanding education to its students and to advance scholarship in the biological, behavioral, and computational aspects of the study of the nervous system and its interaction with the world.

Benefits to Assumption University and to WPI of this Collaborative Accelerated Master's Program in Neuroscience:

Assumption students who pursue neuroscience courses at Assumption can choose to further their understanding of neuroscience by pursuing a Master's in Neuroscience at WPI. Assumption students can employ their undergraduate neuroscience education as a springboard to earn a Master's in Neuroscience at WPI in an accelerated manner. A master's degree will poise these students well for future employment and for entry into Ph.D. programs, M.D. programs, PT programs, PA programs, and other health professions.

This Collaborative Accelerated Master's Program in Neuroscience benefits WPI by encouraging undergraduate students with undergraduate neuroscience training (and who are familiar with Worcester) to enter into WPI's Master's in Neuroscience program. Assumption students' interests

in neuroscience are strong, and their understanding of neuroscience fundamentals (from both biological and psychological perspectives) will serve as an asset to WPI's graduate program. In addition, many students at Assumption are interested in remaining in the Worcester area and having a local option for a graduate degree can be attractive for these students.

Our partnership between WPI and Assumption has developed productive collaborations. WPI faculty and students have been invited (and have attended) guest research seminars supported by Assumption's Center for Neuroscience program. Assumption's Center for Neuroscience offers several guest lectures each year, these seminars are offered in-person and via zoom, allowing easy access for colleagues and students at WPI. Similarly, WPI has invited Assumption faculty and students to neuroscience seminars.

Partnerships like this one help highlight graduate options for undergraduate students. As we emerge from the pandemic, students are becoming more open to thinking more broadly about their post-graduate careers and many students are pursuing graduate options. This partnership offers a local Worcester option for neuroscience students to earn a master's degree in Neuroscience at WPI in an accelerated manner.

Design choices of this Collaborative Accelerated Master's Program in Neuroscience:

General design choices are provided in the rationale of the motion that introduces the general Collaborative Accelerated Master's Programs Framework between Assumption University and WPI. Here we provide design choices specific to the Collaborative Accelerated M.S. Program in Neuroscience.

Four credit science courses at Assumption University require students to meet in a classroom 150 minutes per week in addition to meeting in a laboratory for 180 minutes per week, for a full semester. These courses (lecture plus lab) demand considerable work outside of scheduled classroom and laboratory time. In addition, the Assumption University 400-level courses listed in this Collaborative Accelerated M.S. Program in Neuroscience include a semi-independent research project component that lasts several weeks and requires students to conduct more time-demanding and technically-challenging experiments beyond scheduled lab time. Hence, these 4-credit courses will carry 3 graduate credits toward the M.S. degree in Neuroscience at WPI.

This Collaborative Accelerated M.S. program in Neuroscience adds to existing collaborations between Assumption and WPI. In particular, there is an existing articulation agreement that reserves spaces and facilitates the admission of qualified WPI Psychology students into Assumption's competitive and prestigious Clinical Counseling Psychology Master of Arts degree program and Applied Behavior Analysis Master of Arts degree program. Additionally, Assumption Psychology majors present their projects at WPI's Project Presentation Day and vice versa; this creates a natural opportunity for Psychology students to forge and grow connections, and for those among these students who are interested in Neuroscience to be attracted to this new collaborative program.

Impact on Degree Requirements:

None.

Resources Needed:

None.

Implementation Date:

Implementation date for this action is AY2024-2025.

Contacts for this Collaborative Accelerated Master's Program in Neuroscience:

Contacts at WPI:

Collaborative Accelerated Master's Programs Framework Coordinator at WPI:

- Carolina Ruiz, Computer Science and Associate Dean of Arts & Sciences

Neuroscience Program Director:

- Jagan Srinivasan, Biology and Biotechnology

Neuroscience Faculty Steering Committee:

- Robert Dempski, Chemistry and Biochemistry
- Jean King, Biology and Biotechnology and Dean of Arts & Sciences
- Dmitry Korkin, Computer Science
- Adam Lammert, Biomedical Engineering
- Richard Lopez, Social Sciences and Policy Studies (Psychological and Cognitive Science Program)
- Inna Nechipurenko, Biology and Biotechnology
- Benjamin Nephew, Biology and Biotechnology
- Angela Rodriguez, Social Sciences and Policy Studies (Psychological and Cognitive Science Program)
- Carolina Ruiz, Computer Science
- Suzanne Scarlata, Chemistry and Biochemistry
- Jeanine Skorinko, Social Sciences and Policy Studies (Psychological and Cognitive Science Program)
- Erin Solovey, Computer Science
- Jagan Srinivasan, Biology and Biotechnology

- Ali Yousefi, Computer Science

Contacts at Assumption University:

Collaborative Accelerated Master's Programs Framework Coordinator at :

- Michele Lemons, Biology and Director of Center for Neuroscience

Other Faculty, Staff, and Administrators at Assumption University:

- Michelle Graveline, Interim Dean of the D'Amour College of Liberal Arts and Sciences
- Brian Niece, Chairperson of Biological and Physical Sciences
- Stuart Cromarty, Biology
- Nikos Lessios, Biology
- Anthony Saccino, Biology
- Lea Gordon, Chairperson of Psychology
- Jessica McCready, Chairperson of Mathematics and Computer Science



**Collaborative
Accelerated Master's
Program in Neuroscience
Plan of Study**



See the WPI Graduate Catalog and the Neuroscience webpages for additional information about the Neuroscience MS degree requirements.

Student: _____
 Assumption ID#: _____
 WPI ID#: _____
 Email Address: _____
 Bachelor's Degree: _____
 Entry Date: _____
 Expect. MS Completion Date: _____
 WPI Academic Advisor: _____

Collaborative Accelerated Master's Programs Framework General Requirements:

- The equivalent of at most 12 graduate credits can be double-counted toward the Bachelors and M.S. degrees.
- Within this 12 graduate credit maximum, eligible senior-level Assumption and 4000-level WPI undergraduate courses (listed below) count toward the M.S. degree only if:
 - They are taken before students graduate with their bachelor's degree.
 - The course grade is a "B-" or higher.
 - At most 2 eligible Assumption undergraduate courses can be counted.
- Restricted course combinations are provided in a table at the end of this document.

Core Neuroscience Coursework Requirement: at least 19 graduate credits.

Neuroscience courses: at least 9 graduate credits from the list of Eligible Neuroscience Courses

School	Course #	Course Title	Semester	Grad credits	Grade	Double-counted?

Biology course(s): at least 3 graduate credits from the list of Eligible Biology & Biotechnology Courses

School	Course #	Course Title	Semester	Grad credits	Grade	Double-counted?

Computer Science course(s): at least 3 graduate credits from the list of Eligible Computer Sci. Courses

School	Course #	Course Title	Semester	Grad credits	Grade	Double-counted?

Bioethics course: at least 1 graduate credit. *For example, BB 551 Research Integrity in the Sciences or ID 500 Responsible Conduct of Research. Assumption's PHI 262 Biomedical Ethics course may be used to satisfy the Ethics requirement of the M.S. degree in Neuroscience, but it will carry 0 credits toward the MS degree.*

School	Course #	Course Title	Semester	Grad credits	Grade	Double-counted?

- Scientific Writing or Experimental Design course:** at least 3 graduate credits. *For example, BB 553 Experimental Design and Statistics in the Life Sciences, MA 546 Design and Analysis of Experiments or ID 527 Fundamentals of Scientific Teaching and Pedagogy.*

School	Course #	Course Title	Semester	Grad credits	Grade	Double-counted?

- MS Thesis (optional):** 9 graduate credits. Conducted at WPI.
The thesis must be advised or co-advised by a faculty member affiliated with the WPI Neuroscience Program.
 - MS thesis proposal.
*Must be submitted to and approved by the Neuroscience Faculty Steering Committee **before the student receives grades for more than 3 MS thesis credits.** Normally students submit thesis proposals during their 2nd or 3rd semester.*
 - MS thesis reader assigned.
*MS thesis reader will be assigned by the Neuroscience Program Director when the MS thesis proposal is approved. The reader must be a Neuroscience-affiliated faculty in a department different from that(those) of the thesis advisor(s).
Reader's Name: _____*
- 9 MS thesis credits NEU599. *Only 9 MS thesis credits may be applied towards the MS degree.*

Course #	Course Title	Semester	Credits	Grade
NEU 599	Master's Thesis			
NEU 599	Master's Thesis			
NEU 599	Master's Thesis			
NEU 599	Master's Thesis			

- Public Thesis presentation to the WPI Neuroscience Faculty.
- Final thesis approval. *Title page signed by advisor(s), reader, and Neuroscience program director.*

- Research or practice-oriented internship (optional):** 3-6 graduate credits. Conducted at WPI.
The internship is to be carried out in cooperation with a sponsoring organization or affiliated research lab and must be approved and overseen by a faculty member affiliated with the Neuroscience program.

Course #	Sponsoring organization / research lab	Semester	Credits	Grade

- Program electives to satisfy the remainder of the 31-credit requirement** from any of the lists of Eligible Courses
If the research or practice-oriented internship option is used, this list of electives must include a Neuroscience course (3 grad credits) in addition to the 3 Neuroscience courses (9 graduate credits) in the Core Neuroscience Coursework Requirement.

School	Course #	Course Title	Semester	Grad credits	Grade	Double-counted?

Student's Signature and Date: _____

WPI Advisor Signature and Date: _____

Assumption Advisor Signature and Date: _____

WPI Neuroscience Program Director Signature and Date: _____

LISTS OF ELIGIBLE COURSES

Eligible Neuroscience courses:

WPI Graduate Courses (3 graduate credits each):

NEU 501 Neuroscience
NEU 502 Neural Plasticity
NEU 503 Computational Neuroscience
NEU 504 Advanced Psychophysiology
NEU 505 Brain-Computer Interaction

Assumption Undergraduate Courses:

BIO415 Principles of Neuroscience (3 graduate credits)

- Students can receive credit towards their M.S. degree for BIO415 or for NEU501, but not for both.

BIO490 Independent Study with Neuroscience Focus (2 graduate credits)

- This ISC may be conducted with Assumption University and/or WPI faculty.

Eligible Bioinformatics and Computational Biology courses:

WPI Graduate Courses (3 graduate credits each):

BCB 501/BBT 581 Bioinformatics
BCB 502/CS 582 Bio visualization
BCB 503/CS 583 Biological and Biomedical Database Mining
BCB 504/MA 584 Statistical Methods in Genetics and Bioinformatics
BCB 510 Bioinformatics and Computational Biology Seminar

WPI Undergraduate Courses (2 graduate credits each):

BCB 4001/BB4801. Bioinformatics
BCB 4002/CS 4802. Biovisualization
BCB 4003/CS 4803. Biological and Biomedical Database Mining
BCB 4004/MA 4603. Statistical Methods in Genetics and Bioinformatics

Eligible Biology and Biotechnology courses:

WPI Graduate Courses (3 graduate credits each):

BBT 561 Model Systems: Experimental Approaches and Applications
BBT 581/ BCB 501 Bioinformatics

WPI Undergraduate Courses (2 graduate credits each):

BB/CH 4190. Regulation of Gene Expression
BB 4260. Synthetic Biology

Assumption Undergraduate Courses (2 graduate credits each):

BIO420 Developmental Biology (3 graduate credits)
BIO430 Comparative Physiology (3 graduate credits)

Eligible Biomedical Engineering courses:

WPI Graduate Courses (3 graduate credits each):

- BME 550 Tissue Engineering
- BME 555 BioMEMS and Tissue Micro engineering
- BME 560 Physiology for Engineers
- BME 583 Biomedical Microscopy and Quantitative Imaging

WPI Undergraduate Courses (2 graduate credits each):

- BME/ECE 4011. Biomedical Signal Analysis
- BME 4201. Biomedical Imaging

Eligible Chemistry and Biochemistry courses:

WPI Graduate Courses (3 graduate credits each):

- CH 520 Cell Signaling
- CH 538 Medicinal Chemistry
- CH 541 Membrane Biophysics
- CH 555D Drug and Regulations
- CH 555R Drug Safety and Regulatory Compliance
- CH 555/PH597 Cell Mechanics

WPI Undergraduate Courses (2 graduate credits each):

- CH 4110. Protein Structure and Function
- CH 4120. Lipids and Biomembrane Functions
- CH 4160. Membrane Biophysics
- CH 4170. Experimental Genetic Engineering

Assumption Undergraduate Courses:

- CHE414 Biochemistry (3 graduate credits)

Eligible Computer Science courses:

WPI Graduate Courses (3 graduate credits each):

- CS 5007 Introduction to Applications of Computer Science with Data Structures and Algorithms
- CS 5084 Introduction to Algorithms: Design and Analysis
- CS 528 Mobile and Ubiquitous Computing
- CS 534 Artificial Intelligence
- CS 539 Machine Learning
- CS 541/DS 541 Deep Learning
- CS 542 Database Management Systems
- CS 546 Human-Computer Interaction
- CS 548 Knowledge Discovery and Data Mining
- CS/RBE 549 Computer Vision
- CS/SEME 565 User Modeling
- CS/SEME 566 Graphical Models for Reasoning under Uncertainty
- CS/SEME 567 Empirical Methods for Human-Centered Computing
- CS 573 Data Visualization
- CS 584 Algorithms: Design and Analysis
- CS 585/DS 503 Big Data Management
- CS 586/DS 504 Big data Analytics

WPI Undergraduate Courses (2 graduate credits each):

- CS 4341. Introduction to Artificial Intelligence
- CS 4342. Machine Learning
- CS 4432. Database Systems II
- CS 4445. Data Mining and Knowledge Discovery in Databases
- CS 4518. Mobile and Ubiquitous Computing
- CS 4802/BCB 4002. Biovisualization
- CS 4803/BCB 4003. Biological and Biomedical Database Mining

Eligible Data Science courses:

WPI Graduate Courses (3 graduate credits each):

- DS 501 Introduction to Data Science
- DS 502/MA 543 Statistical Methods for Data Science

WPI Undergraduate Courses (2 graduate credits each):

- DS 4635/MA 4635. Data Analytics and Statistical Learning

Eligible Mathematical Sciences courses:

WPI Graduate Courses (3 graduate credits each):

- MA 508 Mathematical Modeling
- MA 543/DS 502 Statistical Methods for Data Science
- MA 510/CS 522 Numerical Methods
- MA 511 Applied Statistics for Engineering and Scientists
- MA 542 Regression Analysis
- MA 546 Design and Analysis of Experiments
- MA 550 Time Series Analysis
- MA 556 Applied Bayesian Statistics

WPI Undergraduate Courses (2 graduate credits each):

- MA 4631. Probability and Mathematical Statistics I
- MA 4632. Probability and Mathematical Statistics II
- MA 4635/DS 4635. Data Analytics and Statistical Learning

Eligible Psychology courses:

WPI Undergraduate Courses (2 graduate credits each):

- PSY 4800. Special Topics in Psychological Science
- PSY 4900. Advanced Research in Psychological Science

Assumption Undergraduate Courses:

- PSY402 Social and Affective Neuroscience (2 graduate credits each)
- PSY403 Cognitive Neuroscience (2 graduate credits)

NOTES:

- Other graduate courses, graduate research credits, or Independent Study Grad Courses (ISGs) may be used to satisfy Neuroscience MS degree requirements with prior approval of the WPI Neuroscience Director.

Restricted Course Combinations:

The following table lists courses that have significant overlap in their content; a student may receive credit towards their M.S. degree in Neuroscience at WPI for at most one of the courses in each row below:

Courses from Assumption University and WPI	
Assumption Course	WPI Course
BIO 415 Principles of Neuroscience	NEU 501 Neuroscience
WPI Courses in Bioinformatics and Computational Biology	
Undergraduate Course	Graduate Course
BCB 4001/BB4801. Bioinformatics	BCB 501/BBT 581 Bioinformatics
BCB 4002/CS 4802. Biovisualization	BCB 502/CS 582 Biovisualization
BCB 4004/MA 4603. Statistical Methods in Genetics and Bioinformatics	BCB 504/MA 584 Statistical Methods in Genetics and Bioinformatics
WPI Courses in Computer Science	
Undergraduate Course	Graduate Course
CS 4341 Introduction to Artificial Intelligence	CS 534 Artificial Intelligence
CS 4342 Machine Learning	CS 539 Machine Learning
CS 4432 Database Systems II	CS 542 Database Management Systems
CS 4518 Mobile and Ubiquitous Computing	CS 528 Mobile and Ubiquitous Computing
WPI Courses in Mathematics and Data Science	
Undergraduate Course	Graduate Course
MA 4631 Probability and Mathematical Statistics I	MA 540 Probability and Mathematical Statistics I
MA 4632 Probability and Mathematical Statistics II	MA 541 Probability and Mathematical Statistics II
DS 4635/MA 4635 Data Analytics and Statistical Learning	MA 543/DS 502 Statistical Methods for Data Science

Appendix
Consent Agenda Motions

(see next page)

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the title of BME 3813 Cellular Engineering Lab

Motion: On behalf of the Biomedical Engineering Department, the Committee on Academic Operations recommends, and I move that the title for BME 3813 Cellular Engineering be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BME 3813 Cellular Engineering Lab (*Cat. I; 1/units*)

This laboratory-driven course provides hands-on experience in the application of bioengineering to control cellular processes. Students will be challenged to design an intervention to manipulate a specific cellular process (adhesion, proliferation, migration, differentiation) and use modern cellular and molecular biology tools to assess and refine their approach. Laboratory exercises will provide an overview of cell culture technique, microscopy and molecular probes, quantification of cell proliferation and migration, and assessment of cellular differentiation in the context of the assigned projects. Students will complete the project at their own pace in a team setting and communicate their findings effectively.

Recommended Background: Basic chemistry (CH 1010 and CH 1020) and a solid knowledge of cell biology (BB 2550) or equivalent.

Proposed course number, title, and description:

BME 3813 – Cellular Engineering: Techniques

(Course description including recommended background are unchanged.)

Rationale:

This course remains identical to BME3813 - Cellular Engineering but will have a new name so that to be consistent with the companion new course proposed, “BME 4813 – Cellular Engineering: Applications”. This will provide for clarity for our students in identifying the best BME labs to take for their experience level and interest areas.

Implementation Date: 2024-2025 academic year

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add BME 4813 Cellular Engineering: Applications

Motion: On behalf of the Biomedical Engineering Department, the Committee on Academic Operations recommends and I move that BME 4813 Cellular Engineering: Applications, as described below, be added.

Proposed Course Description:

Cellular Engineering: Applications (1/6 unit; Cat. I)

This course provides experience in advanced cellular engineering techniques for students who are already proficient in basic mammalian cell culture methods. Students, in consultation with the course instructor, will formulate and conduct independent project(s) to answer specific questions/hypothesis from selected research topics. Students will develop their own experimental plans, taking into consideration the experimental set up, timelines, number of replicates, experimental controls and strategies to test their hypothesis. Students must use proper statistical method(s) to test their hypothesis and present their findings.

Recommended Background: Proficiency in basic mammalian cell culture techniques such as media preparation, cell subculture, cell counting, cell freezing & thawing (BME 3813, BB 3513, or equivalent)

Expected yearly enrollment: 36 (18 students per offering)

Anticipated Instructor: Prof. Sakthikumar Ambady

Alternative Instructor: Prof. Raymond Page

Terms: A and D terms

Rationale:

The purpose of this course is to provide Biomedical Engineering students with advanced experience to apply their knowledge to cellular therapy, tissue engineering and organ engineering.

Learning outcomes:

Develop a deeper understanding of the dynamics of cell growth, formulating reagents for cell culture, troubleshoot cell culture issues, experimental design, statistical analysis, and hypothesis testing. By the end of the course the student should have developed a high level of proficiency in:

- Mammalian cell culture techniques
- Microscopy techniques
- Ability to differentiate between primary cells and cell lines and their utility in research and clinical settings

Ability to develop and conduct appropriate experimentation, analyze and interpret data from living systems, and use statistical methods to analyze results.

Implementation Date: 2024-25 academic year

Resource Needs:

- Instructor: Part of the regular teaching load for Prof. Sakthikumar Ambady
- Classroom: A classroom for 20-24 students per offering
- Laboratory: The course will be taught in GH007
- Library resources: no additional resources required
- Information Technology: no special support needed
- Other: TA and PLA support for grading and student consultation

Assessment: Assessments include STUDENT FEEDBACK (student course evaluations) and INSTRUCTOR FEEDBACK AND REFLECTIONS as to whether the learning objectives and outcomes were met through student performance on homework assignments and quizzes. The results of student course evaluations will be considered with special emphasis on responses to questions 1, 2, 7, 8, and 19

Impact on Distribution Requirements and Other Courses: None; this course can be taken to fulfill the existing BME 3000 level lab requirements.

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to change ES 3501 A Project-Based Introduction to Systems Engineering from Cat. I to Cat. III

Motion: On behalf of the Electrical and Computer Engineering Department and the Systems Engineering Program, the Committee on Academic Operation recommends and I move that ES 3501 A Project-Based Introduction to Systems Engineering be changed from Cat. I to Cat. III.

Description of Proposed Change:

(with deleted text ~~struckthrough~~ and added text in red)

ES 3501 A Project-Based Introduction to Systems Engineering (1/3 unit; Cat. I III)

Systems Engineering is a multifaceted discipline, involving human, organizational, and various technical variables that work together to create complex systems. This course is an introduction and overview of the methods and disciplines that systems engineers use to define and develop systems, with a particular focus on capstone projects. The course will include specific integrated examples, projects, and team building exercises to aid in understanding and appreciating fundamental principles. Topics covered will include: Introduction to Systems Engineering; Requirements Development; Functional Analysis; System Design; Integration, Verification and Validation; Trade Studies and Metrics; Modeling and Simulation; Risk Management; and Technical Planning and Management.

Recommended background: Third or fourth year standing as an undergraduate student, preferably in engineering or science, or permission of the instructor.

Rationale:

This course was taught in A-term of 2019 and 2020. The course was not taught in A-term 2021 and 2022, due to a combination of limited enrollment and availability of an instructor. The Systems Engineering Program remains committed to delivering this course, thus would like it to remain in the undergraduate catalog. But, the Registrar's Office has requested a change in the "Category," to remain consistent with the frequency at which the course will be offered. The change in "Category" reflects that the course is expected to be offered "at the discretion of the department/program," at least in the near future.

Systems Engineering has grown into a fully sustained program at the graduate level at WPI. At the undergraduate level, larger engineering companies (e.g., Raytheon) have specifically visited WPI ECE/Systems Eng. encouraging systems engineering training at the undergraduate level. These companies expressed a growing need for entry-level engineers trained in systems engineering basics for employment in systems engineering positions. Thus, we see this area as a growth opportunity. For these reasons, we want to continue offering the course, albeit at a lower frequency so as to retain sufficient enrollment in each offering.

Impacts on students: The change in course “Category” preserves opportunities for students to enroll in this course, once an available instructor is identified.

The Undergraduate Committee from the Mechanical and Materials Engineering Department reviewed this change request, since ECE and MME share many ES courses. They had no objections to this change.

ES 3501 is listed within the requirement notes for the Environmental Engineering major as one of three recommended courses to satisfy a “Fundamental Engineering Design” requirement. This requirement is listed as: “Must include 2/3 unit in mass transfer, heat transfer, and/or system engineering (selected from ES 3002, ES 3003, ES 3501).” Thus, the Department Head for Environmental Engineering (EVE) was asked to review this proposed change. In brief, his reply noted that moving the course to Category III “... will reduce the options for EVE students. But that said, if the course hasn’t been able to be offered due to lack of enrollment, it doesn’t make sense for EVE to still have it as an option anyway. EVE majors have been taking the other two courses to fulfill that specific degree requirement EVE has no issue with moving ES 3501 to Cat III.”

Resource Needs: There will be no additional resource needs for this course.

Implementation Date: Academic Year 2024-25

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add AB 1600 Moroccan Colloquial Arabic

Motion: On behalf of the Humanities and Arts Department, the Committee on Academic Operation recommends and I move that AB 1600 Moroccan Colloquial Arabic, as described below, be added.

Proposed Course Description:

AB 1600 Moroccan Colloquial Arabic (1/3 Unit; Cat. III)

This course presents the rudiments of the spoken Moroccan Colloquial Arabic (MCA) with an emphasis on speaking and listening skills and functional aspects of the language. The course will be taught using phonetic transliteration and Modern Standard Arabic (MSA) script. By the end of the course, students are expected to master a set of social and communicative functions, including introductions, asking for and receiving information, describing persons, objects, and places, requests, describing events with respect to tense, and more. To help students grasp the various functions of MCA, class materials such as songs, film clips, and Moroccan TV series will be used in class and assignments.

This course is open to students with no Arabic language background; *this course is closed to native speakers of Arabic and heritage speakers except with written permission from the instructor.*

Anticipated Instructor: Prof. Mohammed El Hamzaoui

Rationale:

WPI students participate annually in the Morocco HUA Project Center and the Morocco Project Center in the Global Projects Program. This project center is the only WPI site present in a majority Arabic-speaking country. To prepare students for successful project and research work, language learning is important. Moroccan Arabic, also known as Darija, is the dialectal, vernacular form of Arabic spoken in Morocco. This course prepares students with linguistic and cultural knowledge in this vernacular form of spoken Arabic.

The AB 1600 course is Cat III ("as needed") because it will primarily serve the HUA Morocco Project Center. This HUA program used to be offered in D-term, but the director is moving it to the summer terms to recruit more students. The instructor of the course will teach the class in D or E term if/when there is a sufficient number of students recruited for the Morocco HUA program.

This course adds to the Arabic curriculum offered at WPI. Students taking the language track to fulfill the HUA requirement complete 6 language courses. The current courses for Arabic are AB1531, AB1532, AB1533, AB2531, AB2532, and AB2533. By adding this course, students have the option of focusing on oral communication in the vernacular Arabic. Students can take the class on campus (D term) or at the HUA project center in Morocco (anticipated in E1). This course will be offered as a 1/3 credit course in the Morocco HUA program. Enrollment projections are 15-18 students.

The proposed course number has not been used previously.

Resource Requirement: New and existing student tutors will be recruited to provide language practice. The Arabic program hires intermediate-level students to support elementary-level students.

Implementation Date: Implementation date for this action is the 2024-2025 academic year.

Impact on Distribution Requirements and Other Courses: The new course will have no impact on current distribution requirements.

Contact: Prof. Esther Boucher-Yip, Associate Head of HUA Department

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the course description of CN 1541 Elementary Chinese I

Motion: On behalf of the Humanities and Arts Department, the Committee on Academic Operations recommends and I move that the course description for CN 1541 Elementary Chinese I be modified as described below.

Description of the Proposed Modifications:

Current Course Description:

CN 1541 Elementary Chinese I (1/3 unit; Cat. I)

An intensive language course designed to introduce Mandarin Chinese to students with no or little background in Chinese. Pronunciation, basic grammar rules, and character recognition will be the emphasis of the course. Handwriting of Chinese characters is not emphasized at this stage, and students are encouraged to typewrite the characters. Major aspects of Chinese culture will be introduced throughout the course. Students who taken Chinese in high school are urged to take a placement test before enrolling in Elementary Chinese I. *This course is closed to native speakers of Chinese and heritage speakers, except with written permission from the coordinator of the Chinese track.*

Proposed Course Description:

CN 1541 Elementary Chinese I (1/3 unit; Cat. I)

An intensive course to introduce Mandarin Chinese to students with no or little background in Chinese. Pronunciation, basic grammar rules, and character recognition will be the emphasis of the course. Major aspects of Chinese culture will be introduced throughout the course. Students who have previous Chinese language background should have a placement evaluation with the coordinator of the Chinese track before enrolling in Elementary Chinese I. This course is closed to native speakers of Chinese and heritage speakers, except with written permission from the coordinator of the Chinese track.

Rationale:

The new description focusses on describing the content and objectives of the course and avoids the addition of individual instructors' preferences on course design by removing the sentence "Handwriting of Chinese characters is not emphasized at this stage, and students are encouraged to typewrite the characters" in Elementary Chinese I (CN1541), Elementary Chinese II (CN1542), and Elementary Chinese III (CN1543). The proposed description also replaces the sentence "Students who have taken Chinese in high school are urged to take a placement test before enrolling in Elementary Chinese I" with "Students who have previous Chinese language background should have a placement evaluation with the coordinator of the Chinese track before enrolling in Elementary Chinese I" in Elementary Chinese I to avoid ambiguity in the interpretation of the placement requirement.

Impacts on Distribution Requirements: None.

Implementation Date: 2024-25 Academic year.

Contact: Esther Boucher-Yip, Assoc Department Head (Languages, Literature, Writing)

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the course description of CN 1542 Elementary Chinese II

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the course description of CN 1542 Elementary Chinese II be modified as described below.

Description of the Proposed Modifications:

Current Course Description:

CN 1542 Elementary Chinese II (1/3 unit; Cat. I)

A continuation of Elementary Chinese I, with progressive expansion of vocabulary and grammar. Pronunciation, basic grammar rules, and character recognition will continue to be the emphasis of the course. Handwriting of Chinese characters is not emphasized at this stage, and students are encouraged to typewrite the characters. Major aspects of Chinese culture will be introduced throughout the course. This course is closed to native speakers of Chinese and heritage speakers, except with written permission from the coordinator of the Chinese track.

Recommended Background: CN1541

Proposed Course Description:

CN 1542 Elementary Chinese II (1/3 unit; Cat. I)

A continuation of Elementary Chinese I, with progressive expansion of vocabulary and grammar. Pronunciation, basic grammar rules, and character recognition will continue to be the emphasis of the course. Major aspects of Chinese culture will be introduced throughout the course. This course is closed to native speakers of Chinese and heritage speakers, except with written permission from the coordinator of the Chinese track.

Recommendation Background: CN 1541

Rationale:

The new description focusses on describing the content and objectives of the course and avoids the addition of individual instructors' preferences on course design by removing the sentence "Handwriting of Chinese characters is not emphasized at this stage, and students are encouraged to typewrite the characters" in Elementary Chinese I (CN1541), Elementary Chinese II (CN1542), and Elementary Chinese III (CN1543). The proposed description also replaces the sentence "Students who have taken Chinese in high school are urged to take a placement test before enrolling in Elementary Chinese I" with "Students who have previous Chinese language background should have a placement evaluation with the coordinator of the Chinese track before enrolling in Elementary Chinese I" in Elementary Chinese I to avoid ambiguity in the interpretation of the placement requirement.

Impacts on Distribution Requirements: None.

Implementation Date: 2024-25 Academic year.

Contact: Esther Boucher-Yip, Assoc Department Head (Languages, Literature, Writing)

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the course description of CN 1543 Elementary Chinese III

Motion: On behalf of the Humanities & Arts Department, the Committee on Academic Operations recommends and I move that the course description of CN 1543 Elementary Chinese III be modified as described below.

Description of the Proposed Modifications:

Current Course Description:

CN 1543 Elementary Chinese III (1/3 unit; Cat. I)

A continuation of Elementary Chinese II, with progressive expansion of vocabulary and grammar. Pronunciation, basic grammar rules, and character recognition will continue to be the emphasis of the course. Handwriting of Chinese characters is not emphasized at this stage, and students are encouraged to typewrite the characters. Major aspects of Chinese culture will be introduced throughout the course. This course is closed to native speakers of Chinese and heritage speakers, except with written permission from the coordinator of the Chinese track.

Recommended Background: CN 1542

Proposed Course Description:

CN 1543 Elementary Chinese III (1/3 unit; Cat. I)

A continuation of Elementary Chinese II, with progressive expansion of vocabulary and grammar. Pronunciation, basic grammar rules, and character recognition will continue to be the emphasis of the course. Major aspects of Chinese culture will be introduced throughout the course. This course is closed to native speakers of Chinese and heritage speakers, except with written permission from the coordinator of the Chinese track.

Recommended Background: CN 1542

Rationale:

The new description focusses on describing the content and objectives of the course and avoids the addition of individual instructors' preferences on course design by removing the sentence "Handwriting of Chinese characters is not emphasized at this stage, and students are encouraged to typewrite the characters" in Elementary Chinese I (CN1541), Elementary Chinese II (CN1542), and Elementary Chinese III (CN1543). The proposed description also replaces the sentence "Students who have taken Chinese in high school are urged to take a placement test before enrolling in Elementary Chinese I" with "Students who have previous Chinese language background should have a placement evaluation with the coordinator of the Chinese track before enrolling in Elementary Chinese I" in Elementary Chinese I to avoid ambiguity in the interpretation of the placement requirement.

Impacts on Distribution Requirements: None.

Implementation Date:
2024-25 Academic year.

Contact: Esther Boucher-Yip, Assoc Department Head (Languages, Literature, Writing)

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify course titles for ISE 1800, ISE 1801, ISE 1803, ISE 2800, and ISE 2820

Motion: On behalf of the Department of Humanities and Arts, the Committee on Academic Operations recommends and I move, that the course titles for ISE 1800, ISE 1801, ISE 1803, ISE 2800, and ISE 2820 be modified as described below.

Description of the Proposed Modifications:

Current Course Title (and Course Description):

ISE 1800 Introduction to Academic Reading and Writing for Non-native Speakers of English (1/3 Unit; Cat. I)

The goal of this course is to provide international students for whom English is not their native language the necessary skills for academic success through reading, writing, oral communication, and US academic culture assignments. Students will focus on developing vocabulary, critical reading, paragraph, and essay writing skills. Emphasis is also given to a review of English grammar through intensive written and oral practice to promote accurate and appropriate language use. Strongly recommended for first-year international non-native English speakers. Admission determined by Writing Placement or consent of instructor.

Recommended Background: None

Proposed Course Title (with Course Description Unchanged):

ISE 1800 Academic Skills for English Language Learners (1/3 Unit; Cat I)

Current Course Title (and Course Description):

ISE 1801 Composition for Non-native Speakers of English (1/3 Unit; Cat. I)

This course is for international students who want to develop their academic writing skills through a sequence of essay assignments, with emphasis on rhetorical and grammatical issues particular to second language learners (ESL). Students will concentrate on producing coherent paragraphs, developing short essays in a variety of rhetorical modes, and improving mechanics (grammar and punctuation) and vocabulary usage. Both personal and academic writing assignments provide practice in the process of writing and revising work for content and form.

Recommended Background: ISE 1800 or equivalent skills (determined by Writing Placement or consent of the instructor).

Proposed Course Title (with Course Description Unchanged):

ISE 1801 College Writing for English Language Learners (1/3 Unit; Cat I)

Current Course Title (and Course Description):

ISE 1803 Oral Communication for Non-native Speakers of English (1/3 Unit; Cat. I)

This course focuses on the speaking and listening skills that are necessary in an academic setting. Students practice formal and informal communication skills, including listening comprehension, pronunciation, and conversational and presentation skills. Students are encouraged to practice oral/aural exercises with the class as a whole and in small groups. Class work will build language skills and personal confidence levels.

Recommended Background: None

Proposed Course Title (with Course Description Unchanged):

ISE 1803 Oral Communication for English Language Learners (1/3 Unit; Cat. I)

Current Course Title (and Course Description):

ISE 2800 College Writing for Non-native Speakers of English (1/3 Unit; Cat. I)

In this course students will practice analytical reading, writing, and thinking intensively, through a variety of exercises and assignments. Emphasis is placed on using various methods of organization appropriate to the writer's purpose and audience. Students will read and discuss a selection of non-fiction texts; these readings will form the basis for writing assignments in summary, critique, synthesis, and persuasion. The course also stresses the ability to understand, use, and document college-level non-fiction readings as evidence for effectively formulating and accurately supporting a thesis. This course is for international students who have already studied grammar extensively and need to refine the ability to produce acceptable academic English.

Recommended Background: ISE 1801 or equivalent skills (determined by Writing Placement or consent of the instructor).

Proposed Course Title (with Course Description Unchanged):

ISE 2800 Research Writing for English Language Learners (1/3 Unit; Cat. I)

Current Course Title (and Course Description):

ISE 2820 Critical Reading of our World (1/3 Unit; Cat. II)

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 academic journal articles, research reports, current news reports and autobiographical literature. Students will create annotated bibliographies, summaries, literature reviews, and critical reaction papers. Students will 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. This course will be offered in 2021-22, and in alternate years thereafter.

Recommended Background: ~~Composition for Non-native Speakers of English (as covered in ISE 1801)~~ or equivalent skills.

Proposed Course Title (with Course Description Unchanged):

(with ~~striketrough~~ text above deleted from the Recommended Background):

ISE 2820 Critical Reading of Our World for English Language Learners (1/3 Unit; Cat. II)

Recommended Background: ISE 1801 or equivalent skills.

Rationale:

We are removing the term 'non-native' from our course titles as they are unhelpful and perpetuate assumptions about language competence that have an exclusionary effect. We wish to provide more descriptive course titles, especially for international students who might be unsure what to expect in each course. The explicit course titles also will help academic advisors during the advising and course selection process.

Impact on Distribution Requirements: None

Implementation Date: 2024-2025 academic year

Contact: Esther Boucher-Yip, Associate Department Head (Languages, Literature, Writing)

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to remove ISE 2810 Listening and Speaking for Non-native Speakers

Motion: On behalf of the Humanities and Arts Department, the Committee on Academic Operations recommends and I move that ISE 2810 be removed.

Description of Course to be Removed:

ISE 2810 Listening and Speaking for Non-native Speakers (1/3 Unit; Cat. II)

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. Note: Students who have taken ISE 281X may not receive credit for this course. This course will be offered in 2021-22, and in alternate years thereafter.

Recommended Background: Oral communication skills (ISE 1803) or equivalent skills.

Rationale:

This course was designed to meet the needs of international students who wanted to improve their listening and speaking skills. We recently made revisions in other English language courses where listening and speaking are also taught. Students interested in developing these skills have the option to take other courses such as ISE 1803 Oral Communication for Non-native Speakers of English. Thus, the impact on students will be minimal.

Impact on Distribution Requirements and Other Courses: None

Changes to resource requirements:

We will be hiring one less adjunct instructor to teach this course.

Implementation Date:

AY 2024-2025.

Contact: Esther Boucher-Yip, Assoc Department Head (Languages, Literature, Writing)

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to remove TH 3220: Shakespeare in Performance

Motion: On behalf of the Humanities and Arts Department, the Committee on Academic Operation recommends and I move that TH 3220 Shakespeare in Performance be removed.

Description of Course to be Removed:

TH 3220 Shakespeare in Performance (1/3 Unit; Cat. II)

This course examines a selection of Shakespeare's plays, specifically addressing issues of performance. We will approach the plays through close reading; in relationship to the historical, cultural, and theatrical context in which they were written and originally produced; through viewing and analysis (film and live performance); and as they have been and can be interpreted for performance. We will explore the relationship between text and performance in a practical way with performance exercises and staging scenes from the plays. We will also consider how production elements (design elements including setting and costumes, casting, direction and performance choices, etc.) create and convey meaning and shape audience response.

Students may not receive credit for EN 3225 and TH 3220.

This course will be offered in 2022-23, and in alternating years thereafter.

Recommended Background: Some familiarity with Shakespeare and or/theatre but the course is suitable for anyone with interest in the subject.

Rationale:

HUA Theatre is redesigning its dramatic literature curriculum to better reflect the increasingly global & intersectional nature of theatre studies, and to allow for greater flexibility in future course offerings. This course is being folded into TH3300: Special Topics in Performance Studies, for which "Shakespeare in Performance" will be a recurring offering.

A course to replace this course: This course is being folded into TH3300: Special Topics in Performance Studies, for which "Shakespeare in Performance" will be a recurring offering.

Impact on Distribution Requirements and Other Courses: The deletion of this course will have minimal or no impact on most students— including HUA Theatre majors & minors. The HUA Theatre discipline will continue offering approximately the same number of courses per year, including in dramatic literature & performance studies.

Term and Cat.: This course has only been offered once since it was added to the curriculum in AY20

Changes to resource requirements: None

Implementation Date: AY 2023-24

Date: January 17, 2023

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add PSY 1500 The Science of Creativity

Motion: On behalf of the Social Sciences and Policy Studies Department and the Psychological and Cognitive Sciences Program, the Committee on Academic Operations recommends and I move that PSY1500 The Science of Creativity, as described below, be added.

Description of the Proposed Course:

PSY 1500 The Science of Creativity (1/3 Unit; Cat. II)

Are you fascinated by the ways in which artists and scientists reach creative breakthroughs? Ever wonder why you have *aha!* eureka moments in the shower? Do you wonder how you can improve your own creativity? This course is intended for anyone interested in understanding the science behind creativity. Creativity is considered one of the most sophisticated forms of human cognition and is used by both artists and scientists to push the frontier of knowledge and expression. This course will introduce students to the predominant theories and research findings from cognitive science on creativity, including theories of divergent and convergent thinking, flow experiences, and eureka moments of insight. This course mixes lectures with in-class activities to teach students the latest findings from creativity research and elaborate on these concepts through creative experiences inside and outside the classroom. Students who complete this course will gain a solid understanding of the theoretical frameworks of creativity and activities that promote creativity, apply class concepts to improve their creative problem-solving skills and leverage creative processes to their advantage to work on reaching their full creative potential. This course will be taught in 2025-26, and in alternating years thereafter.

Recommended Background: None

Rationale:

In the era of open AI, there is great value in helping students develop their ability to think creatively, but many students do not believe they are creative or know how to reach their own creative potential. Paired with widespread misconceptions about what creativity is and how to improve creativity, there is an opportunity to offer an introductory course that teaches students important findings from the science of creativity early on in their academic journey at WPI. This course serves an additional function by focusing on activities that promote creativity AND wellbeing, including going for walks, taking breaks, sleeping, and engaging in diverse and rich hobbies. As one of the recommendations of the Mental Health and Wellbeing Task Force was to find new ways to help students take breaks, recharge, and destress, this course follows through on this goal by teaching students the value of such activities through the science of creativity. The course may be taken by any undergraduate student in partial fulfillment of their social science requirement. It may also serve as an elective psychology course for students completing a minor or major in psychological science.

There was no experimental version of this course.

Impacts on students: Upon completing this course, students will 1) have a solid understanding of the main theoretical frameworks of creativity, 2) apply research findings to improve their creativity in work and life, and 3) better appreciate the multifaceted nature of creativity and its significance in art, science, and everyday life. Hopefully the course will also encourage students to engage more regularly in activities that benefit both wellbeing and creative thinking throughout their time at WPI.

Resource Needs: An Active Learning Classroom is preferred. The course will be taught by Prof. Stacy Shaw. No additional resources are required.

Implementation Date: 2025-26 Academic Year.

Date: January 17, 2023

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add PSY 2411 Social Neuroscience

Motion: On behalf of the Social Science and Policy Studies Department and the Psychological and Cognitive Sciences Program, the Committee on Academic Operations recommends and I move that PSY2411 Social Neuroscience, as described below, be added.

Description of Proposed Course:

PSY 2411 Social Neuroscience (1/3 Unit; Cat. II)

This course is intended for students interested in exploring the links between the mind, brain, and social behaviors. In this class, we will focus on recent theorizing and methodologies from neuroscience that have identified psychological processes at play as we go about our dynamic and complex social lives. Specifically, we will examine the brain bases of social judgments, the experience and regulation of emotions, empathy, attachment, theory of mind, sexual attraction, romantic love, and neuroeconomics, among other topics. Along the way we will learn about a variety of methodological approaches used by social neuroscientists, including social psychology paradigms, lesion studies, patient research, and functional neuroimaging. Coursework will include group projects and presentations that summarize various social phenomena that may be of interest (e.g., social rejection) and their neural underpinnings, as well as opportunities to work with real brain data collected at WPI and other neuroimaging sites. This course will be offered in 2024-25 and in alternate years thereafter. Students may not receive credit for both this course and PSY2800: Social Neuroscience.

Recommended Background: PSY1400: Introduction to Psychological Science and/or PSY2402: Social Psychology

Anticipated Instructor: Prof. Richard Lopez (currently teaches PSY 2800 Special Topics in Psychological Science - Social Neuroscience)

Rationale:

To date, social neuroscience has been taught once during B Term, 2022 (enrollment: 28) as a special topic in psychological science (under course PSY2800). However, given Prof. Lopez's intentions to expand and enrich curricular offerings across the psychology and neuroscience programs, as well as his expertise in social neuroscience, this course will be best taught going forward as a permanent course.

This will not only better serve the needs of psychology majors and minors, many of whom have a strong interest in the neurobiological bases of behavior (e.g., it is not uncommon for a student to double major in BBT and Psychology). It will also be especially useful as an introduction to the field of neuroscience and neuroscience methods for students considering BS/MS or MS degrees in neuroscience at WPI. Indeed, two students who took social neuroscience in B Term 2022 went on to work in Prof. Lopez's Social

Neuroscience of Affective Processes lab, and both are in the process of applying to the neuroscience BS/MS program. Another student who is a BBT major and psychology minor got so much out of the course that she went on to do an interdisciplinary social neuroscience based MQP, which will involve collecting and analyzing fMRI data at PracticePoint, with Prof. Lopez and Prof. Benjamin Nephew (BBT) serving as co-advisors.

Course evaluations from B Term 2022 were very favorable (e.g., students gave an overall average rating of 4.9 for the course, and 4.8 for the instructor's teaching). Qualitative feedback confirmed this regarding the course/instructor overall ("For the course itself I found it to be very engaging and informative with a lot of thought provoking [sic], and as for the professor I found him to be very good at explaining course material and overall a very positive aspect of my term with his passionate energy for the class"), as well as the intended learning goals and skills for students to build ("I liked that the course had homework and other assignments that were very particular in building the skills this class seeks to provide").

Impacts on Students: This course has several overarching learning goals for undergraduate students. Specifically, it will help students: 1) Develop a nuanced and integrated understanding of links between neural, cognitive, and behavioral levels of analysis, as well as some discernment regarding what brain science can and cannot tell us about the human mind; 2) Sharpen their critical thinking and communication skills, especially when reading, interpreting, and presenting findings from the fields of social and cognitive neuroscience; 3) Build a core foundation of knowledge to promote further study of social and cognitive neuroscience (e.g., for independent research and MQPs) and/or other related disciplines and majors at WPI (e.g., biology & biotechnology). The course serves as an advanced elective for psychology majors and minors as well as an appropriate second course for students fulfilling their social science requirement.

Impact on Distribution Requirements and Other Courses: No changes to major or minor distribution requirements are required. Psychology majors and minors can take this course to fulfill major/minor requirements. Psychology majors pursuing a Psychobiology concentration can take PSY2411 as one of their required courses.

Implementation Date: Academic year 2024-25.

Resource Needs: No additional resources are required. Prof. Lopez currently teaches PSY 2800 Special Topics in Psychological Science (Social Neuroscience) and will now teach PSY2411 instead.

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to remove BB 1035 Biotechnology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that that BB 1035 Biotechnology be removed.

Course to be removed:

BB 1035: Biotechnology

Through lectures, discussion and project work, students will gain an understanding of the function of biological systems at the molecular and cellular level. This course will explore topics such as genes-to-proteins, cell cycle regulation, genomics, and cell signaling as foundational concepts in genetic and cellular engineering, synthetic biology, stem cell generation, regenerative and personalized medicine and the production of therapeutic biologics. Projects will be designed to facilitate students' understanding of the links between biological systems and biotechnology applications, including their impact on society. This course is intended for BBT and other life science majors.

Units: 1/3

Category: Category I

Recommended Background: a solid working knowledge of biological principles such as would be learned in a rigorous high school biology course.

Rationale:

We are replacing this course with BB 1101.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: BB 1101 will fulfill the distribution requirement previously fulfilled by BB 1035.

Impact on students in other majors: We intend to offer sufficient sections of our introductory classes to accommodate both students who intend further study in the life sciences and those who do not. We are creating advising documents to inform other departments of course substitutions that we recommend for their students. Thus, we do not anticipate any major impacts of dropping BB 1035 for students in other majors.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add BB 1101 Foundations of Cellular and Molecular Biotechnology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that that BB 1101 Foundations of Cellular and Molecular Biotechnology, as described below, be added.

Proposed course description:

BB 1101: Foundations of Cellular and Molecular Biotechnology

In this foundational course, students will explore the cellular and molecular basis of life through lectures, discussion, and project work. Students will gain an understanding of how genetic information is stored and used, as well as how the structures of cells underlie their functions. There will be a focus on the application of these topics to genetic engineering and biotechnology. This course is designed for BBT majors and minors, as well as others who plan further study in topics such as cell biology, molecular biology, and genetics. Credit cannot be received for both BB 1101 and BB 1035.

Units: 1/3

Category: Category I

Recommended Background: a solid working knowledge of biological principles such as would be learned in a rigorous high school biology course.

Rationale:

BB1101, together with its companion course BB 1102, will introduce the foundational concepts advocated nationally by [‘Vision and Change in Undergraduate Biology’](#) (evolution, information flow, structure and function, transformations of energy, and biological systems), which will be reinforced throughout the BBT curriculum. The title and course description clearly and concisely convey the central goals and focus areas of the course, as well as the student population for which it is intended. The choice of BB 1101 for the course number helps to distinguish this course, which is intended for BBT majors and other students who plan further study in biology, from the BB 1001, 1002, 1003, 1004 numbering for non-majors courses.

Resource Needs: No new resources are required, as BB 1101 is a replacement for BB 1035 and we anticipate offering the same number of sections of BB 1101 as had been offered for BB 1035.

Impact on Distribution Requirements: This course will be required for all BBT majors in the proposed new distribution requirements.

Impact on students in other majors: We intend to offer sufficient sections of our introductory classes to accommodate both students who intend further study in the life sciences and those who do not. We are creating advising documents to inform other

departments of course substitutions that we recommend for their students. Thus, we do not anticipate any major impacts of adding BB 1101 for students in other majors.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to remove BB 1045 Biodiversity

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 1045 Biodiversity be removed.

Course to be removed:

BB 1045: Biodiversity

Through lectures, readings, and discussions this course will examine the breadth, patterns, mechanisms, and conservation of biodiversity. Case studies and peer-to-peer learning will be used to examine threats to regional and global biodiversity and assess management and engineering strategies for solutions to the biodiversity crisis. Students will investigate and interpret past and contemporary research to quantify, document, and track trends in biodiversity. This course will use problem sets and assignments to explore the natural, social, and economic tradeoffs associated with threats to and conservation of biodiversity. Students will develop an area of expertise and synthesize their comprehension of topics through project work (e.g., management plan, report, presentation, citizen science). Finally, this course will provide a synthesis of the interdisciplinary nature of biodiversity conservation and how principles of conservation biology, landscape ecology, metapopulation biology, and biogeography can be applied to strategies aimed towards sustaining Earth's biota. This course is intended for BBT and other life science majors.

Units: 1/3

Category: Category I

Recommended Background: a solid working knowledge of biological principles such as would be learned in a rigorous high school biology course.

Rationale:

We are replacing this course with BB 1102.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: BB 1102 will fulfill the distribution requirement previously fulfilled by BB 1045.

Impact on students in other majors: We intend to offer sufficient sections of our introductory classes to accommodate both students who intend further study in the life sciences and those who do not. We are creating advising documents to inform other departments of course substitutions that we recommend for their students. Thus, we do not anticipate any major impacts of dropping BB 1045 for students in other majors.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add BB 1102 Foundations of Ecology and Environmental Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 1102 Foundations of Ecology and Environmental Biology, as described below, be added.

Proposed Course Description:

BB 1102: Foundations of Ecology and Environmental Biology

In this foundational course, students will explore our planet's diversity of organisms and environments and the interactions among them. Lectures, discussion, and project work will address topics such as biodiversity, ecology, evolution, and animal behavior. Students will develop their communication skills and gain experience using primary literature to understand the process of biological research. This course is designed for BBT majors and minors, as well as others who plan further study in topics such as environmental biology, conservation, ecology, and evolution. Credit cannot be received for both BB 1102 and BB 1045.

Units: 1/3

Category: Category I

Recommended Background: a solid working knowledge of biological principles such as would be learned in a rigorous high school biology course.

Rationale:

BB1102, together with its companion course BB 1101, will introduce the foundational concepts advocated nationally by '[Vision and Change in Undergraduate Biology](#)' (evolution, information flow, structure and function, transformations of energy, and biological systems), which will be reinforced throughout the BBT curriculum. The course description reflects a broader focus than BB 1045, the course BB1102 will replace, to include ecology and evolutionary biology. In addition, the description more clearly conveys the intended role of the course within the biology curriculum, and the student population for which it is intended. The choice of BB 1102 for the course number helps to distinguish this course, which is intended for BBT majors and other students who plan further study in biology, from the BB 1001, 1002, 1003, 1004 numbering for non-majors courses.

Resource Needs: No new resources are required, as BB 1102 is a replacement for BB 1045 and we anticipate offering the same number of sections of BB 1102 as had been offered for BB 1045.

Impact on Distribution Requirements: This course will be required for all BBT majors in the proposed new distribution requirements.

Impact on students in other majors: We intend to offer sufficient sections of our introductory classes to accommodate both students who intend further study in the life sciences and those who do not. We are creating advising documents to inform other departments of course substitutions that we recommend for their students. Thus, we do not anticipate any major impacts of adding BB 1101 for students in other majors.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to remove BB 1025 Human Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 1025 Human Biology be removed.

Course to be removed:

BB 1025 Human Biology

This course presents students with an introduction to general concepts of human biology with particular focus on human structure and function. Concepts such as homeostasis, structure/function, and regulatory systems will be introduced. Discussion of current topics related to human health, such as personalized medicine and recent advances in cancer research and auto immune disease will be integrated throughout the course. This course is intended for BBT and other life science majors.

Units: 1/3

Category: Category I

Recommended Background: a solid working knowledge of biological principles such as would be learned in a rigorous high school biology course

Rationale:

We are replacing this course with BB 1004 Human Biology. This course will have similar content, but is intended for non-majors. We are also proposing a new course, BB 2101 Foundations of Physiology, for majors and others desiring broader physiology content. Please see the rationales of these courses for a more detailed explanation.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: BB 1025 will no longer be a choice BBT majors will have for 1000 level courses. Instead of choosing 2 of 3 1000 level courses, they will be required to take our two new foundational courses, BB 1101 and BB 1102.

Impact on students in other majors: We intend to offer sufficient sections of our introductory classes to accommodate both students who intend further study in the life sciences and those who do not. We are creating advising documents to inform other departments of course substitutions that we recommend for their students. Thus, we do not anticipate any major impacts of dropping BB 1025 for students in other majors.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add BB1004 Human Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 1004, as described below, be added.

Proposed Course Description:

BB 1004 Human Biology

This course is designed for students seeking an introduction to general concepts of human biology, with particular focus on human structure and function. Concepts such as homeostasis, structure/function, and regulatory systems will be introduced. Discussion of current topics related to human health, such as personalized medicine and recent advances in cancer research and autoimmune disease will be integrated throughout the course. This course is intended for non-BBT majors. Students may not receive credit for both BB 1004 and BB 1025.

Units: 1/3

Category: Category I

Recommended Background: high school biology

Rationale:

In the current curriculum, both majors and non-majors were taking BB 1025 Human Biology. The course was popular with non-majors, but the mixed population made it difficult to teach rigorously enough to prepare majors with a strong enough background for higher level organismal courses. Converting this course to a non-majors course will provide these students with the level of biology they need, and focusing on human biology is an approach non-majors find particularly engaging. Renumbering the course will make it clear that we intend it for non-majors, as our other non-majors courses are numbered BB1001, BB1002, and BB1003. Our proposed BB 2101 Foundations of Physiology course will provide our majors, and other students interested in taking upper-level BB courses, with a more rigorous and broader base of knowledge to advance to 3000 level courses.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: BBT majors will not be able to take BB 1004 to complete major distribution requirements. At the 1000 level, they will be required to take our two new foundational courses, BB 1101 and BB 1102.

Impact on students in other majors: BB 1004 will expand our offerings of introductory courses intended for non-majors at the 1000 level. We intend to offer sufficient sections of our introductory classes to accommodate both students who intend further study in the

life sciences and those who do not. We are creating advising documents to inform other departments of course substitutions that we recommend for their students.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to remove BB 2050 Animal Behavior

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 2050 Animal Behavior be removed.

Course to be removed:

BB2050: Animal Behavior

This course will provide an introduction to the scientific study of animal behavior. A combination of lecture, reading, and videos will be used to illustrate how proximate and ultimate forces interact to shape animal behavior in complex and fascinating ways. Behavioral phenomena in all members of the animal kingdom will be discussed and analyzed from ecological, evolutionary, cognitive, and neurobiological perspectives to highlight how the use of an integrative approach has greatly accelerated our ability to solve complex behavioral problems. Primary scientific literature will be used to outline experimental tools and techniques used to investigate behavior in different contexts, including communication, foraging, navigation, mate choice, predation, and social behavior.

Units: 1/3

Category: Category I

Rationale:

We are replacing this course with BB 3060 Animal Behavior.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: If the proposed motions pass, we will have one fewer course at the 2000 level, and one more course at the 3000 level, than we have currently. Students will need to choose 4 of the 6 courses at the 2000 level. If needed, we will create extra sections of remaining courses to accommodate student needs.

Impact on students in other majors: Students desiring to take Animal Behavior will be advised to take recommended background courses first, as the new course will be taught assuming more content knowledge in Ecology than previously.

Recommended implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add BB 3060 Animal Behavior

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3060 Animal Behavior, as described below, be added.

Proposed course description:

BB 3060 Animal Behavior

This course will provide an introduction to the scientific study of animal behavior. A combination of lecture, reading, and videos will be used to illustrate how proximate and ultimate forces interact to shape animal behavior in complex and fascinating ways. Behavioral phenomena in all members of the animal kingdom will be discussed and analyzed from ecological, evolutionary, cognitive, and neurobiological perspectives to highlight how the use of an integrative approach has greatly accelerated our ability to solve complex behavioral problems. Primary scientific literature will be used to outline experimental tools and techniques used to investigate behavior in different contexts, including communication, foraging, navigation, mate choice, predation, and social behavior. Students may not earn credit for both BB2050 and BB3060.

Units: 1/3

Category: Category I

Recommended Background: A thorough understanding of ecology (BB 2040 Ecology or equivalent).

Rationale:

Given the curriculum restructure, Animal Behavior is more appropriate at the 3000 level. Currently, BB 2040 Ecology and BB 2050 Animal Behavior are both at the 2000 level. Moving Animal Behavior to the 3000 level and recommending BB 2040 as background for the class will allow instructors to reinforce and build on students' knowledge of ecology to address topics of greater complexity as students progress. The proposed BB 3060 number reflects the appropriate level and sequencing of this course.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: If the proposed motions pass, we will have one more course at the 3000 level than we have currently, giving students more choices at the 3000 level. Having more courses in the ecology / environment area of biology at the 3000 level is especially helpful for students wishing to take upper level courses in this area, since most of our 3000 level courses are more oriented towards the molecular/cell area.

Impact on students in other majors: Students desiring to take Animal Behavior will be advised to take recommended background courses first, as the new course will be taught assuming more content knowledge in Ecology than was previously required.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to remove BB 2950 Molecular Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 2950 Molecular Biology be removed.

Course to be removed:

BB2950 Molecular Biology

Through a combination of lectures and in class discussion, students will learn and understand the essential concept of molecular biology, including the mechanisms by which information stored in nucleic acids is maintained and processed in living systems. An evolutionary framework will help illustrate how genomes are structured and how they change. Basic regulatory mechanisms of gene expression will be addressed, with emphasis in eukaryotic gene regulatory proteins. The concepts learned in this course will provide the foundation to continue exploring this rapidly expanding field.

Units: 1/3

Category: Category I

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

Rationale:

We are replacing this course with BB 3950 Molecular Biology.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: If the proposed motions pass, we will have one fewer course at the 2000 level, and one more course at the 3000 level, than we have currently. Students will need to choose 4 of the 6 courses at the 2000 level. If needed, we will create extra sections of remaining courses to accommodate student needs.

Impact on students in other majors: Students desiring to take Molecular Biology will be advised to take recommended background courses first, as the new course will be taught assuming more content knowledge in Genetics and Cell Biology than previously.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add BB 3950 Molecular Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3950 Molecular Biology, as described below, be added.

Proposed Course Description:

BB 3950 Molecular Biology

Through lectures, discussion, and other activities, students will learn the essential concepts of molecular biology, including the mechanisms by which genetic information is stored, replicated, and used to produce RNA and proteins. The theory behind major molecular biology laboratory techniques such as recombinant DNA technology, nucleic acid sequencing, and genetic engineering will also be covered. Basic mechanisms by which gene expression is regulated will be addressed. The themes of structure/function relationships, evolution, and intersections of molecular biology and human disease will run throughout the course. The concepts learned in this course will provide a foundation for further study and work in this rapidly expanding field. Students may not earn credit for both BB 2950 and BB 3950.

Units: 1/3

Category: Category I

Recommended Background: A thorough understanding of genetics (BB 2920 or equivalent) and cell biology (BB 2550 or equivalent) and an understanding of organic chemistry (CH 2310 or equivalent).

Rationale:

Given the curriculum restructure, Molecular Biology is more appropriate at the 3000 level. We currently have three courses at the 2000-level with significantly overlapping content: BB2550 Cell Biology, BB2920 Genetics, and BB2950 Molecular Biology. As the field of biotechnology is rapidly evolving, we desire to provide a course that rather than simply repeating content, will reinforce and build upon content from BB2550 and BB2920, and enable more advanced topics to be covered to prepare our students for our 4000-level curriculum as well as for the many professional opportunities in the biotechnology industry. The proposed BB 3950 number reflects the appropriate level and sequencing of this course.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: If the proposed motions pass, we will have one more course at the 3000 level than we have currently, giving students more choices of courses that count as upper level.

Impact on students in other majors: Students desiring to take Molecular Biology will be advised to take recommended background courses first, as the new course will be taught assuming more content knowledge in Genetics and Cell Biology than previously.

Implementation date: Academic year 2024-2025

Contacts: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to remove BB 3050 Cancer Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3050 Cancer Biology be removed.

Course to be removed:

BB3050 Cancer Biology

In this course, students will learn and apply advanced cellular and molecular biology concepts to understand causes and consequences of cancer cell transformation. Through an integration of primary literature and lecture material students will explore how research into basic mechanisms of cancer biology is used to identify therapeutic targets and inform drug design. This course will cover discussion of the hallmarks of cancer including the deregulation of cell growth, cell death, and metabolism; corruption of genome stability; evasion of immune response; and metastatic potential.

Units: 1/3

Category: Category I

Recommended Background: A thorough understanding of genetics (BB 2920 or equivalent), cell biology (BB 2550 or equivalent), and molecular biology (BB 2950 or equivalent).

Rationale:

We propose replacing this course with BB 4050 Cancer Biology.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: If the proposed package of motions passes, we will have one more course at the 4000 level than we have currently, giving students more choices of 4000 level classes. Since we are adding two courses at the 3000 level and moving this one to the 4000 level, students will end up with more choices at the 3000 level as well.

Impact on students in other majors: None. Cancer Biology will still be available to other students, but will now be more appropriately numbered and sequenced with other BB courses, as explained in the rationale for adding BB 4050 Cancer Biology.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add BB 4050 Cancer Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 4050 Cancer Biology, as described below, be added.

Proposed Course Description:

BB4050: Cancer Biology

In this course, students will learn and apply advanced cellular and molecular biology concepts to understand causes and consequences of cancer cell transformation. Through an integration of primary literature and lecture material students will explore how research into basic mechanisms of cancer biology is used to identify therapeutic targets and inform drug design. This course will cover discussion of the hallmarks of cancer including the deregulation of cell growth, cell death, and metabolism; corruption of genome stability; evasion of immune response; and metastatic potential. Students may not earn credit for both BB3050 and BB4050.

Units: 1/3

Category: Category I

Recommended Background: A thorough understanding of genetics (BB 2920 or equivalent), cell biology (BB 2550 or equivalent), and molecular biology (BB 3950 or equivalent).

Rationale:

Given the curriculum restructure, and the mastery of concepts expected of students in this course, Cancer Biology is more appropriate at the 4000 level. It builds on our proposed move of Molecular Biology to the 3000 level and prepares students for advanced study of this topic. The instructor's experience is that students gain more from the class if they take it at an advanced stage of their undergraduate career; the course integrates many concepts in biology and is most appropriate at the 'mastery' (4000) level of the Department's proposed curricular spiral. The proposed BB 4050 number reflects the appropriate level and sequencing of this course.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: If the proposed motions pass, we will have one more course at the 4000 level than we have currently, giving students more choices of courses that count as upper level.

Impact on students in other majors: Students desiring to take Cancer Biology will be advised to take recommended background courses first, as the new course will be taught assuming more content knowledge than previously.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to remove BB 2917 Hunting for Phage and BB 3526 Phage Hunters: The Analysis

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 2917 Hunting for Phage, and BB 3526 Phage Hunters: The Analysis be removed.

Courses to be removed:

BB 2517 Hunting for Phage (*Cat. I; 1/3 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 3526 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 that have already received course credit for BB 291X or BB 2916 may not also receive credit for BB 2917.

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 BB 2910, 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, BB 2950, 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

Rationale:

These two courses originate from the Howard Hughes Medical Institute SEA-PHAGES (Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary

Science) Program, a national crowd-sourcing initiative to discover and annotate novel bacteriophage. Curriculum is established for all participating programs, and instructors are required to attend training programs periodically in order to teach these courses.

While the BB 2917 Hunting for Phage course has seen steady enrollment of ~25-30 students each offering, most students have chosen to not enroll in the companion course BB 3526 Phage Hunters: The Analysis (4-8 students/offering), and the instructor of this course has retired. The SEA-PHAGES Program envisions these courses (along with a third SEA-GENES course our department does not offer) as a sequential progression of discovery.

The continued low student demand for BB 2917 Hunting for Phage, coupled with the instructor-intensive requirements for BB 3526, motivate BBT to remove this course.

Reflecting on the purpose, pedagogy, and utility of the SEA-PHAGES curriculum, BBT has decided our majors, minors, and students from related disciplines can be exposed to and trained in a similar authentic research paradigm via our BB 2915 Searching for Solutions in Soil: Microbial and Molecular Investigations lab course. BB 2915 is a well-established national crowd-sourcing initiative to discover, identify, and characterize soil microbes that may be producing (or resistant to) antibiotics. Linked with the Tiny Earth Initiative, the BB 2915 course offers a very similar student experience to the BB 2917 Hunting for Phage lab. Additionally, most students taking BB 2917 at WPI do not experience the sequential progress of discovery intended by its developers as they do not take the next course in the series (BB 3526). Therefore, BBT believes BB 2917 should be removed from the course catalog.

Resource Needs: No changes to resource requirements are anticipated.

Impact on Distribution Requirements and Other Courses:

Over the last few years the Department of Biology and Biotechnology has added several new laboratory courses that carry 1/3 credit (i.e., BB 3527, BB 3530, BB 3570), increased the units from 1/6 to 1/3 for BB 2915, and will be adding a new BB 1801 Foundations of Biology Laboratory that will carry 1/3 units. BBT will be adding an additional 1/3 unit lab course within 1-2 years. These additions will more than offset any capacity reductions due to removal of BB 2917 and BB 3526.

We are also altering our laboratory distribution requirements for majors, where the new BB 1801 Foundations of Biology Laboratory will be required. This is expected to reduce demand at the 2000 level specifically. However, should we perceive an increased demand for the BB 2915 lab course, we are amenable to offering additional sections. The 3526 laboratory had low enrollment which will easily be absorbed into other lab courses. Thus, removing these courses should have no impact on the ability of students to fulfill lab distribution requirements for BBT or BCB majors, or those minoring or with interest in enrolling in biology laboratory courses.

Implementation Date: AY24-25

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to remove BB 3512 Molecular Genetics Lab

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3512 Molecular Genetics Lab be removed.

Course to be removed:

BB 3512 Molecular Genetics Lab (*Cat. I; 1/6 unit*)

The topic of gene therapy will be used to give students experience with several fundamental skills in biotechnological research and practice: on-line information search and retrieval, computer cloning, and biological sequence analysis and manipulation. Course is entirely computer based.

Recommended background: a working knowledge of laboratory skills and concepts in molecular biology, microbiology and genetics (BB 2901, BB 2950, BB 2002, and BB 2920 or equivalent).

Rationale:

This course no longer fits the needs of the BBT curriculum, as its content has already been integrated into BB 3827 Molecular Biology and Genetic Engineering Laboratory.

Resource Needs: No changes to resource requirements are anticipated.

Impact on Distribution Requirements and Other Courses:

Over the last few years, the Department of Biology and Biotechnology has added several new laboratory courses that carry 1/3 credit (i.e., BB 3527, BB 3530, BB 3570), increased the units from 1/6 to 1/3 for BB 2915, and will be adding a new BB 1801 Foundations of Biology Laboratory that will carry 1/3 units. These additions will more than offset any capacity reductions due to the removal of this course. Thus, removing this course should have no impact on the ability of students to fulfill lab distribution requirements for BBT or BCB majors, or those minoring or with interest in enrolling in biology laboratory courses.

Implementation Date: AY24-25

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to remove BB 3517 Fermentation

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3517 Fermentation be removed.

Course to be removed:

BB 3517 Fermentation (*Cat. I; 1/6 unit*)

The experiments in this course focus on basic fermentation theory and practice, common to any bio-product production facility. Students will gain significant experience in hypothesis generation and testing as they work toward the goal of optimizing their proposed culture media.

Recommended background: a working knowledge of laboratory techniques in molecular biology, and microbiology (BB 2901 or equivalent), and concepts in cell biology (BB 2550 or equivalent).

Rationale:

This course no longer fits the needs of the BBT curriculum, as its content has already been integrated into BB 3530 Immunotherapies: The Next Generation of Pharmaceuticals.

Resource Needs: No changes to resource requirements are anticipated.

Impact on Distribution Requirements and Other Courses:

Over the last few years, the Department of Biology and Biotechnology has added several new laboratory courses that carry 1/3 credit (i.e., BB 3527, BB 3530, BB 3570), increased the units from 1/6 to 1/3 for BB 2915, and will be adding a new BB 1801 Foundations of Biology Laboratory that will carry 1/3 units. These additions will more than offset any capacity reductions due to the removal of this course. Thus, removing this course should have no impact on the ability of students to fulfill lab distribution requirements for BBT or BCB majors, or those minoring or with interest in enrolling in biology laboratory courses.

Implementation Date: AY24-25

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to remove BB 4170 Experimental Genetic Engineering

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 4170 Experimental Genetic Engineering be removed.

Course to be removed:

BB 4170 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 CH 2310, BB 2550, BB 4010 and CH 4110 or equivalent.

Rationale:

BB 4170 is a crosslisting of a laboratory course CH 4170 Experimental Genetic Engineering. Given that BBT does not contribute to the design, content, nor instruction of BB 4170, we wish to remove BB 4170 from the undergraduate course catalog.

This in no way changes the offering of CH 4170, which is under the control of the Department of Chemistry and Biochemistry. This motion removes the BB 4170 course from the undergraduate catalog, effectively removing the crosslisting in the process. The Department of Chemistry and Biochemistry does not oppose removing the BB 4170 course.

Resource Needs: No changes to resource requirements are anticipated.

Impact on Distribution Requirements and Other Courses: We anticipate no impact on distribution requirements or other courses, as over the last few years the Department of Biology and Biotechnology has added several new laboratory courses, including a course of similar content (BB 3527 Molecular Biology and Genetic Engineering). Thus, removing this course should have no impact on the ability of students to fulfill lab distribution requirements for BBT or BCB majors, or with interest in enrolling in biology laboratory courses.

Implementation Date: AY24-25

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add BB 1801 Foundations of Biology and Biotechnology Laboratory

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 1801 Foundations of Biology and Biotechnology Laboratory, as described below, be added.

Proposed Course Description:

BB 1801 Foundations of Biology and Biotechnology Laboratory (*Cat. I; 1/3 unit*)

This course will provide a foundational experience by exposing students to how research questions are identified and addressed via biological experimentation. Importantly, the lab will also serve as a unifying experience for biology majors, providing a framework that will allow them to identify as contributing members of a scientific community. This lab will convey the breadth of biological systems from organismal to molecular scales, and the overarching principles of evolution and effects of environment on behavior. Focus areas may include how resistance to antibiotics arises, how ecosystems and organisms are adversely affected by pollution, and how experiments can be designed to identify strategies to overcome global problems. This introductory biology lab experience is intended for first-year Biology & Biotechnology majors, and anyone intending to take 3800 level biology laboratories.

Recommended background: High school biology. No previous laboratory experience is assumed.

Course type: Laboratory

Intended audience: All first-year students majoring in biology, and anyone taking multiple 3000 level biology labs

Expected enrollment: ≤ 20 per offering

Preferred terms: Once in fall, once in spring

Anticipated Instructor(s): Lou Roberts and Mike Buckholt

Professor Roberts is an associate professor of teaching. Professor Buckholt is a (full) teaching professor. We have three teaching-focused faculty who together are responsible for our laboratory teaching. The schedules of all three will be adjusted to accommodate this course with no undue load on any one of the three.

Rationale:

Our motivations for offering this course are to provide an opportunity for students, especially those majoring in Biology & Biotechnology, to acquire a foundational and unifying lab experience that prepares them for lab and project work, and allows them to identify as both scientists-in-training and part of a community. The course will also allow for a “spiral” design to our overall lab curriculum, in which students continuing in biology labs in particular at the 3000 level will revisit and build upon concepts and skills as they progress through the curriculum. We have identified core principles and practices that

are aligned with our program learning outcomes. These include identifying the key factors in designing, executing, and analyzing experiments and results; understanding the roles of controls, standards, and different types of replicates in experiments; awareness of considerations for experimental design such as limitations of space, equipment, time, money, resources, people, and capacity; and methods of data collection and analyses such as data transformations, normalizations, and statistics. This new course will allow students, especially majors, to be introduced to these concepts earlier in their undergraduate careers, and identify as part of a community. BB1801 will introduce the foundational concepts advocated nationally by [‘Vision and Change in Undergraduate Biology’](#) (i.e., evolution, information flow, structure and function, transformations of energy, and biological systems), which will be reinforced throughout the BBT curriculum. Given the spiral nature of our lab curriculum, students from any major taking other biology lab courses will not be disadvantaged as these principles and practices will recur in our 2800 (and above) level lab courses.

Anticipated Learning Outcomes: By completing this course, students will:

1. begin to identify as a member of a community of biological scientists within and beyond WPI, capable of addressing global problems;
2. experience the steps of scientific inquiry and biological experimentation (e.g., hypothesis formation, design, setup, execution, data analysis);
3. build a technical skillset they will need to undertake life science research;
4. choose appropriate and effective ways to present data reflective of the results that address the research question/hypothesis and justify conclusions;
5. become aware of how research questions emerge upon exploring the primary literature and making thoughtful observations, and which can be answered via experimentation and data collection;
6. work safely and collaboratively in a laboratory setting.

Resource Needs: No new resources are required. The course will be taught in one of the Goddard Hall laboratory rooms 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 with additional course-specific questions, as well as reflections by the students and instructor(s). The impact of this course as it relates to our revised lab and lecture curricula, including integration with the ‘Vision and Change in Undergraduate Biology’ concepts, will also be assessed programmatically.

Anticipated impact: This course would fulfill a laboratory distribution requirement for BBT majors. This course will also serve to build a sense of community amongst students majoring in biology and biotechnology.

Implementation date: Academic year 2024-2025

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add BB 2201 Foundations of Physiology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that that BB 2201 Foundations of Physiology, as described below, be added..

Proposed Course Description:

BB 2101: Foundations of Physiology

Physiology combines some basic principles of physics, chemistry, molecular genetics, anatomy and evolution to explore the relationships among cells, tissues, organs and organ systems in the context of the whole organism. With homeostasis and regulation as unifying principles, we will examine the essential interactions between body systems that maintain proper function. This course differs from our Anatomy and Physiology sequence in its focus on the concepts that unify organismal function, using selected physiologic systems and both comparative and integrative approaches.

Units: 1/3

Category: Category I

Recommended Background: A strong foundation in molecular and cellular biology (BB 1101 or equivalent)

Course type: Lecture

Intended audience: First- and second-year students majoring in biology or other life sciences, pre-health students, and anyone planning to take upper level (3000 and 4000) courses in such topics as immunology, neurobiology, developmental biology, and human anatomy and physiology.

Expected enrollment: 50 students per offering

Preferred terms: Once per academic year. Specific term to be arranged with consideration for balancing the number and frequency of all 2000-level offerings

Anticipated Instructor(s): Chris Collins

Professor Collins is an associate teaching professor, and currently teaches an anatomy laboratory course (BB2903). We have several other faculty members that have taught upper-level Human Anatomy and Physiology (Farny, Dominko) or Human Biology (Rulfs, Oates) who could also teach this course as needed.

Rationale:

In the current curriculum, many of our majors were taking BB 1025 Human Biology as their first introduction to physiology. However, a deeper understanding of physiology

requires a strong foundation in cell biology. By providing a physiology course at the 2000 level, we can reinforce and build on concepts in cell biology provided to students by our proposed BB 1101 course, Foundations in Cellular and Molecular Biotechnology. In addition, by focusing on concepts that unify organismal function rather than more narrowly on human biology, students will be better prepared for the variety of organismal courses available at the 3000 level. This course is appropriate both for our majors, and for other students interested in taking upper-level BB courses.

Anticipated Learning Outcomes:

- Students will gain an understanding through lectures, discussions, and in-class activities, of the concept of homeostasis and will be able to give examples of homeostatic mechanisms across various kingdoms of life.
- Students will be able to identify and give examples of regulatory mechanisms that adjust physiological functions to enable and maintain homeostasis.
- Students will be able to identify, compare, and contrast physiological systems that span various kingdoms of life, and in so doing gain an understanding of the evolution and diversification of physiological systems.
- Students will gain an understanding of how the laws of chemistry and physics define and enable physiological functions.

Assessment: The course will be assessed by the distribution of student evaluations with additional course-specific questions, as well as reflections by the students and instructor(s). The impact of this course as it relates to our revised lab and lecture curricula, including integration with the 'Vision and Change in Undergraduate Biology' concepts, will also be assessed programmatically.

Impact on Distribution Requirements: The addition of BB 2101 will expand our offerings at the 2000 level and will create an offering that is focused on the organismal / subfield of biology, which was previously lacking at this level in the BBT curriculum. If all our motions pass, students will choose 4 of 6 courses offered at the 2000 level. This will help to ensure breadth in the curriculum, as there are at most 3 courses at the 2000 level in any one sub-field of biology (molecular/cell; organismal; ecology/environment).

Impact on students in other majors: Students in other majors will be able to choose BB 1004 or BB 2101 depending on their needs. BB 2101 is likely to be most appropriate for students continuing on to higher level BB courses. We are creating advising documents to inform other departments of course selections that we recommend for their students.

Resource Needs: No new resources are required.

Implementation date: Academic year 2024-2025

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to add BB 3840 Design and Expression of Biomolecules Laboratory

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3840 Design and Expression of Biomolecules Laboratory, as described below, be added.

Proposed Course Description:

BB 3840 Design and Expression of Biomolecules Laboratory

Students will gain experience in several fundamental skills applicable to academic and industrial research and development. Producing a biologic product is of paramount interest in both basic and applied research and requires the ability to both design and produce a functional product. There are numerous potential variables that influence the amount, quality, and cost of producing these molecules. This course will explore some of those variables which allow students to design, test, and evaluate strategies for product and process optimizations. Students will learn how DNA sequences are designed, constructed, and analyzed. A model organism will be grown and induced to express a protein product using common fermentation principles and techniques. Students will evaluate efficiency of the fermentation and output of the gene product through an original research project of their design. Students may not receive credit for BB 3840 and either BB 3512 or BB 3517.

Units: 1/3

Category I

Recommended background: Working knowledge of the principles of molecular biology (BB 1101, BB 2920, or 3950 or equivalent) and cell biology (BB 2550 or equivalent), as well as relevant biology laboratory experience (BB 1801, 3827, or equivalent).

Rationale:

This motion proposes the addition of a new course, BB 3840 Design and Expression of Biomolecules Laboratory. The purpose of this motion is to outline the rationale for adding this course and address relevant issues, as follows:

This course integrates the content and learning outcomes of two previously offered courses, BB 3512 Molecular Genetics and BB 3517, Fermentation. This new course is the latest offering in the BBT Department's initiative to move our laboratory teaching to an authentic research paradigm. The rationale for this change 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. This laboratory course will provide the opportunity for students to utilize

contemporary molecular and cell biology approaches to address relevant considerations when designing and expressing a gene product in a cell system. A project-based approach will be utilized to maximize student investment and learning.

Impacts on students: This course will impact current and future students by integrating elements of design that comprise a workflow to express a biologic. This course would fulfill a laboratory distribution requirement for BBT majors. This course will be of particular interest to students majoring in the life sciences who will enter the workforce in biotechnology or pursue graduate study.

By completing this course, students will:

1. become competent in identifying and using resources to answer questions and solve problems;
2. use software platforms to analyze and manipulate both DNA and protein sequences;
3. be introduced to basic concepts used to optimize growth media and conditions to produce a protein via a living cell system;
4. demonstrate competence in assay methods, sterile technique, data analyses, as well as applications to scale-up;
5. strengthen problem solving and critical thinking skills;
6. become proficient in organizing and writing in a digital notebook, as well as in evaluating observations and data;
7. 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 laboratory rooms 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. The department currently has faculty well-suited to teach this course.

Implementation Date: The new course is expected to be implemented beginning in the 2024-25 academic year.

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 1001 Introduction to Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 1001 Introduction to Biology be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 1001. Introduction to Biology (Cat. I; 1/3 unit)

This course is designed for students seeking a broad overview of biologic concepts, especially at the cell and organism level. It is conducted in an active style including the use of case studies, class discussion/participation, and classroom polling systems. The major goal of this course is to help students become more informed citizens, skeptical when presented with data in the media, and knowledgeable enough to question and make informed decisions about scientific advances and science policy. It will primarily focus on current topics which may include stem cells, ethical uses of DNA, development of personalized medicine, genetic engineering, antibiotic resistance. This course is intended for non-life science majors.

Recommended background: High School Biology

Proposed course description:

BB 1001. Introduction to Biology (Cat. I; 1/3 unit)

This course is designed for students seeking a broad overview of biologic concepts, especially at the cell and organism level. It is conducted in an active style including the use of case studies, class discussion/participation, and classroom polling systems. The major goal of this course is to help students become more informed citizens, skeptical when presented with data in the media, and knowledgeable enough to question and make informed decisions about scientific advances and science policy. It will primarily focus on current topics which may include ~~stem cells, ethical uses of DNA, development of personalized medicine~~, genetic engineering, ~~viruses and vaccines~~, antibiotic resistance ~~and bacteria~~, ~~the evolution of infectious diseases~~. This course is intended for non-life science majors.

Recommended background: High School Biology.

Rationale:

Faculty used this opportunity to update course description to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 2003 Fundamentals of Microbiology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 2003 Fundamentals of Microbiology be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 2003 Fundamentals of Microbiology (*Cat. I; 1/3 unit*)

This course will introduce the basic principles of microbiology through lectures, discussion, readings, and projects. The course will explore both the fundamental biology of microbes and the ways in which microbes influence society and the world. Topics will include the morphology, physiology, and genetics of unicellular organisms with a primary focus on bacteria. Special attention will be given to organisms known to have important roles in health, research, industry, and the environment. This course is designed for all biology majors and other students who seek a good general education in modern biology. Students may not receive credit for both BB 2002 and BB 2003.

Recommended background: A basic understanding of cell biology and elementary biochemical processes (BB 1035, BB 2550 or equivalent).

Proposed course description:

BB 2003 Fundamentals of Microbiology (*Cat. I; 1/3 unit*)

This course will introduce the basic principles of microbiology through lectures, discussion, readings, and projects. The course will explore both the fundamental biology of microbes and the ways in which microbes influence society and the world. Topics will include the morphology, physiology, and genetics of unicellular organisms with a primary focus on bacteria. Special attention will be given to organisms known to have important roles in health, research, industry, and the environment. This course is designed for ~~all biology majors and other students who seek a good general education in modern biology~~ life sciences majors. Students may not receive credit for both BB 2002 and BB 2003.

Recommended background: ~~A basic understanding of cell biology and elementary biochemical processes (BB 1035, BB 2550 or equivalent).~~ A working knowledge of concepts of cellular and molecular biology (BB 1101 or equivalent), and knowledge of chemical properties and reactions (CH 1010 and CH 1020 or equivalent).

Suggested background: a working knowledge of chemical kinetics, equilibrium, and thermodynamics (CH 1030 or equivalent)

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some

faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 2030 Plant Diversity

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 2030 Plant Diversity be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 2030 Plant Diversity (Cat. I; 1/3 unit)

This course focuses on general concepts as they relate to the vast array of plant species and their taxonomic links. Current uses of major plant phyla in both society and the biotechnology industry will be explored. Some emphasis will be given to economically important species chosen from agronomic and non-agronomic situations.

Recommended background: a working knowledge of concepts in biodiversity (BB1045 or equivalent).

Students may not receive credit for both BB 2030 and BB 1040 (no longer offered).

Proposed course information

BB 2030 Plant Diversity (Cat. I; 1/3 unit)

This course focuses on general concepts as they relate to the vast array of plant species and their taxonomic links. Current uses of major plant phyla in both society and the biotechnology industry will be explored. Some emphasis will be given to economically important species chosen from agronomic and non-agronomic situations **with examples related to society and climate change.**

Recommended background: a working knowledge of concepts in biodiversity (~~BB1045~~ **BB1102, BB1002, or equivalent**).

Students may not receive credit for both BB 2030 and BB 1040 (no longer offered).

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 2040 Ecology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 2040 Ecology be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 2040 Ecology (*Cat. I; 1/3 unit*)

This course is intended to help students understand ecological concepts at different levels of integration, from individuals to ecosystems, and the linkages among them. Students will also practice the application of qualitative and quantitative models to ecological systems and processes, as well as hypothesis generation, experimental design, and analysis and interpretation of data. In a format that includes team-based case studies, discussion and presentations, and ecological simulations, students will explore topics in both basic and applied ecology, which may include population ecology, host-parasite ecology and epidemiology, climate change, and sustainable agriculture, among others.

Recommended background: A working knowledge of concepts in biodiversity (BB1045 or equivalent) and integral and differential calculus.

Proposed course description:

BB 2040 Ecology (*Cat. I; 1/3 unit*)

This course is intended to help students understand ecological concepts at different levels of integration, from individuals to ecosystems, and the linkages among them. Students will also practice the application of qualitative and quantitative models to ecological systems and processes, as well as hypothesis generation, experimental design, and analysis and interpretation of data. In a format that includes team-based case studies, discussion and presentations, and ecological simulations, students will explore topics in both basic and applied ecology, which may include population ecology, host-parasite ecology and epidemiology, climate change, and sustainable agriculture, among others.

Recommended background: ~~A working~~Foundational knowledge of concepts in ~~ecology and biodiversity (BB1045/1102 or equivalent) and integral and differential calculus.~~ Suggested background: integral and differential calculus

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 2550 Cell Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 2550 Cell Biology be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 2550 Cell Biology (*Cat. I; 1/3 unit*)

The goal of this course is to help students to develop a working understanding of the unifying concepts that define cell structure and function including replication, metabolism, regulation, communication and death. Applications in therapeutics, molecular medicine, and genetic engineering will be introduced. Classic and current research examples will provide practice in hypothesis generation and testing as well as making clear the importance of a working knowledge of cell biology to support advances in biotechnology and medicine. The course serves as the foundation of all fields of modern biology, and is recommended for all BBT and other life science majors.

Recommended background: BB 1035 (Biotechnology) or equivalent

Proposed course description:

BB 2550 Cell Biology (*Cat. I; 1/3 unit*)

The goal of this course is to help students to develop a working understanding of the unifying concepts that define cell structure and function including replication, metabolism, regulation, communication, and **transport**. ~~death~~. Applications in therapeutics, molecular medicine, and genetic engineering will be introduced. Classic and current research examples will provide practice in hypothesis generation and testing as well as making clear the importance of a working knowledge of cell biology to support advances in biotechnology and medicine. The course serves as the foundation of all fields of modern biology and is recommended for all BBT and other life science majors.

Recommended background: **Foundational knowledge of cell and molecular biotechnology (BB 1035 (Biotechnology)-BB 1101** or equivalent).

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 2920 Genetics

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 2920 Genetics be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 2920 Genetics (*Cat. I; 1/3 unit*)

Through interactive lectures, group problem solving, and analysis of primary scientific literature, this course will help students understand the gene concept and its application in modern biological analysis. This course will cover patterns of inheritance, the relationship between genotype and phenotype, and the transmission, coding, and expression of genetic information contained in DNA, in several model systems. Students will gain an understanding of the modern tools of genetic analysis, including gene cloning, creation of transgenic organisms, high-throughput sequencing and RNA interference. Applications of genetic analysis to current advancements in agriculture through crop improvements, and in human health, including gene therapy and personalized medicine, will be explored.

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

Proposed course description:

BB 2920 Genetics (*Cat. I; 1/3 unit*)

Through interactive lectures, group problem solving, and analysis of primary scientific literature, this course will help students understand the gene concept and its application in modern biological analysis. This course will cover patterns of inheritance, the relationship between genotype and phenotype, and the transmission, coding, and expression of genetic information contained in DNA, in **both several model systems and humans**. Students will gain an understanding of the modern tools of genetic analysis, including **genomics, gene cloning, creation of transgenic organisms, high-throughput sequencing, CRISPR editing,** and RNA interference. Applications of genetic analysis to current advancements **in agriculture through crop improvements, and in human health, including such as** gene therapy and personalized medicine, will be explored.

Recommended background: ~~a working knowledge of concepts in biotechnology (BB 1035 or equivalent)~~ Foundational knowledge of concepts in biology and biotechnology (BB 1101 and BB 1102 or equivalent.)

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify BB 3003 Medical Microbiology: Plagues of the Modern World

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3003 Medical Microbiology: Plagues of the Modern World be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 3003 Medical Microbiology: Plagues of the Modern World (*Cat. I; 1/3 unit*)

Using a case study approach, this course will focus on molecular mechanisms of pathogenesis of a wide range of infectious diseases and host-pathogen interactions including a survey of human immunobiology. Students will gain an understanding of microbes that are of medical relevance including bacteria, viruses, fungi, and protozoans, enabling them to make informed decisions about appropriate medical interventions. Students will be able to evaluate how their day-to-day choices impact public health as well as alter microbial communities. This interactive course is designed for all biology and biochemistry majors as well as other students with the recommended background who have an interest in the pathogenesis of disease.

Recommended background: a working knowledge of concepts in biotechnology, molecular biology and microbiology (BB 1035, BB 2950, and BB 2003 or equivalent) Students may not receive credit for both BB 2002 Microbiology: Plagues of the Modern World and BB 3003

Proposed course description:

BB 3003 Medical Microbiology: Plagues of the Modern World (*Cat. I; 1/3 unit*)

~~Using a case study approach, this course~~ This course will introduce the basic principles of Medical Microbiology. It will focus on molecular mechanisms of pathogenesis of a wide range of infectious diseases and host-pathogen interactions including a survey of human immunobiology. ~~Students~~We will ~~gain an understanding of microbes~~ explore microorganisms that are of medical relevance including bacteria, viruses, fungi, and protozoans, enabling ~~them~~one to make informed decisions about appropriate medical interventions. ~~Students~~We will ~~be able to~~ evaluate how ~~their~~our day-to-day choices impact public health as well as alter microbial communities. This interactive course is designed for all ~~biology and biochemistry~~ majors ~~as well as other students with the recommended background~~ who have an interest in ~~the pathogenesis~~pre-health professions or students who seek a deep understanding of disease-infectious diseases.

Recommended background: a working knowledge of concepts in biotechnology, microbiology, and molecular biology, (BB 1101, BB 2003, and **BB 3950**, or equivalent). Students may not receive credit for both BB 2002 Microbiology: Plagues of the Modern World and BB 3003.

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 3010 / BCB 3010 Simulation in Biology

Motion: On behalf of the Biology and Biotechnology Department and the Bioinformatics and Computational Biology Program, the Committee on Academic Operations recommends and I move that BB3010 Simulation in Biology be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 3010 / BCB 3010 Simulation in Biology (Cat. II; 1/3 unit)

Computer simulations are becoming increasingly important in understanding and predicting the behavior of a wide variety of biological systems, ranging from metastasis of cancer cells, to spread of disease in an epidemic, to management of natural resources such as fisheries and forests. In this course, students will learn to use a graphical programming language to simulate biological systems. Most of the classroom time will be spent working individually or in groups, first learning the language, and then programming simulation projects. We will also discuss several papers on biological simulations from the primary scientific literature. In constructing and comparing their simulations, students will demonstrate for themselves how relatively simple behavioral rules followed by individual molecules, cells, or organisms can result in complex system behaviors.

Recommended background: Students taking this course must have a solid background in a biological area they would like to simulate, at about the depth provided by a BB 3000 level class. No programming experience is assumed.

This course will be offered in 2020-21, and in alternating years thereafter.

Proposed course description:

BB 3010 / BCB 3010 Simulation in Biology (Cat. II; 1/3 unit)

Computer simulations are becoming increasingly important in understanding and predicting the behavior of a wide variety of biological systems, ranging from metastasis of cancer cells, to spread of disease in an epidemic, to management of natural resources such as fisheries and forests. In this course, students will learn to use a ~~graphical programming language~~ technique called 'agent-based modeling (ABM)' to simulate biological systems. Most of the classroom time will be spent working individually or in groups, first learning ~~the~~ language (either the block-based language Starlogo Nova, or the text-based language Netlogo), and then ~~programming~~ creating simulation projects. We will also discuss several papers on biological simulations from the primary scientific literature. In constructing and comparing their simulations, students will demonstrate for themselves how relatively simple behavioral rules followed by individual molecules, cells, or organisms can result in complex system behaviors.

Recommended background: Students taking this course ~~must have a solid~~ should have background in a biological area they would like to simulate, at about the depth provided by a BB 2000 or 3000 level class. No programming experience is assumed.

This course will ~~be~~ offered in 2020-21, and in alternating years thereafter.

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 3080 Neurobiology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3080 Neurobiology be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 3080 Neurobiology (*Cat. I; 1/3 unit*)

The nervous system underlies every aspect of our behavior, including sensation, movement, emotion, and cognition. In this course, students will develop an understanding of neurobiology at several levels, from the physiology of individual neurons, through the functioning of neural circuits, and finally to the behavior of neural systems such as vision, motion, and memory. The class will be based on lectures accompanied by in-class activities, and will include weekly discussion of a paper from the scientific literature. The class will focus each year on a guiding theme, such as a particular neurotransmitter system, and will emphasize research on human neurological problems, such as schizophrenia, addiction, Alzheimer's disease, and autism.

Recommended background: a working knowledge of concepts in cell biology (BB 2550 or equivalent), and either genetics or molecular biology (BB2920 or BB2950 or equivalent)

Suggested background: a working knowledge of concepts related to the anatomy and physiology of movement and communication (BB 3101 or equivalent).

Students may not receive credit for both BB 4080 and BB 3080 .

Proposed course description:

BB 3080 Neurobiology (*Cat. I; 1/3 unit*)

The nervous system underlies every aspect of our behavior, including sensation, movement, emotion, and cognition. In this course, students will develop an understanding of neurobiology at several levels, from the physiology of individual neurons, through the functioning of neural circuits, and finally to the behavior of neural systems such as vision, motion, and memory. The class will be based on lectures accompanied by in-class activities and will include weekly discussion of a paper from the scientific literature. ~~Each year, the class papers will focus each year on a guiding theme, (e.g. such as a particular neurotransmitter systems) with emphasis on research that is relevant for human health such as, and will emphasize research on human neurological problems, such as neurodevelopmental conditions (e.g. autism), psychiatric disorders (e.g. schizophrenia), addiction, or neurodegenerative diseases (e.g. Parkinson's, ALS, addiction, Alzheimer's, etc.). disease, and autism.~~

Recommended background: A working knowledge of concepts in cell biology (BB 2550 or equivalent), ~~and either~~ genetics or molecular biology (BB2920 ~~BB2950~~BB3950 or equivalent), ~~and~~ physiology (BB 2101 or equivalent). ~~Suggested background: A working knowledge of concepts related to the anatomy and physiology of movement and communication (BB 3101 or equivalent).~~

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 3101 Human Anatomy and Physiology: Movement and Communication

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB3101 Human Anatomy and Physiology: Movement and Communication be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 3101 Human Anatomy and Physiology: Movement and Communication (*Cat. I; 1/3 unit*)

The form and function of the systems that are responsible for the support, movement, internal communication, and interaction of the human body with its environment will be presented and discussed: Integumentary, Skeletal, Muscular, Nervous (including the senses), and Endocrine.

Recommended background: BB 1025 and BB 2550.

Suggested background: Concurrent Laboratory Module: BB 3511. Students who have received credit for BB 2130 may not take BB 3101 for credit.

Proposed course description:

BB 3101 Human Anatomy and Physiology: Movement and Communication (*Cat. I; 1/3 unit*)

The form and function of the systems that are responsible for the support, movement, internal communication, and interaction of the human body with its environment will be presented and discussed: Integumentary, Skeletal, Muscular, Nervous (including the senses), and Endocrine.

Recommended background: A working knowledge of concepts in physiology and cell biology (~~BB 1025~~BB 2101 and BB 2550 or equivalent), and a working knowledge of chemical properties and reactions (CH 1010 and CH 1020 or equivalent).

Suggested background: Concurrent Laboratory ~~Module:~~ BB ~~3511~~3815. Students who have received credit for BB 2130 may not take BB 3101 for credit.

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 3102 Human Anatomy and Physiology: Transport and Maintenance

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB3102 Human Anatomy and Physiology: Transport and Maintenance be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 3102 Human Anatomy and Physiology: Transport and Maintenance (*Cat. I; 1/3 unit*)

The form and function of the systems of the human body that provide for the intake, distribution, and processing of nutrients, water, and oxygen, and the systems that safeguard health by elimination of wastes, regulation of metabolism, and surveillance against disease will be presented and discussed. Digestive, Respiratory, Circulatory, Lymphatic, Endocrine, Urinary, and Reproductive.

Recommended Background: BB 1025 and BB 2550; CH 1010 and CH 1020.

Suggested background: Concurrent Laboratory Module: BB 3514. Students who have received credit for BB 3110 may not take BB 3102 for credit.

Proposed course description:

BB 3102 Human Anatomy and Physiology: Transport and Maintenance (*Cat. I; 1/3 unit*)

The form and function of the systems of the human body that provide for the intake, distribution, and processing of nutrients, water, and oxygen, and the systems that safeguard health by elimination of wastes, regulation of metabolism, and surveillance against disease will be presented and discussed. Digestive, Respiratory, Circulatory, Lymphatic, ~~Endocrine~~, Urinary, and Reproductive.

Recommended Background: A working knowledge of concepts in physiology and cell biology (~~BB 1025~~BB 2101 and BB 2550 or equivalent), and a working knowledge of chemical properties and reactions (CH 1010 and CH 1020 or equivalent).

Suggested background: Concurrent Laboratory ~~Module~~: BB ~~3514~~3815. Students who have received credit for BB 3110 may not take BB 3102 for credit .

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 3120 Plant Physiology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3120 Plant Physiology be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 3120 Plant Physiology (*Cat. II; 1/3 unit*)

This course explores the remarkable physiology of plants and emphasizes their importance in past and future life on earth. Conserved and unique aspects of plant cellular physiology will provide the foundation to understand the challenges of life on land and multicellularity. Topics such as water relations, mineral nutrition, intra- and inter-cellular transport, photosynthesis, and light responses will be discussed. Examples from the recent literature will be used to illustrate some of the key existing problems in plant physiology.

Recommended background: a working knowledge of concepts in biodiversity and cell biology (BB 1045 and BB 2550 or equivalent) and in chemical reactions (CH 1020 or equivalent)

This course will be offered in 2019-20, and in alternating years thereafter. Some sections of this course may be offered as Writing Intensive (WI).

Proposed course description:

BB 3120 Plant Physiology (*Cat. II; 1/3 unit*)

This course explores the remarkable physiology of plants and emphasizes their importance in past and future life on earth. Conserved and unique aspects of plant cellular physiology will provide the foundation to understand the challenges of life on land and multicellularity. Topics such as water relations, mineral nutrition, intra- and inter-cellular transport, photosynthesis, and light responses will be discussed. Examples from the recent literature will be used to illustrate some of the key existing problems in plant physiology. This course will be offered in 2019-20, and in alternating years thereafter. Some sections of this course may be offered as Writing Intensive (WI).

Recommended background: A working knowledge of concepts in ~~biodiversity~~ **ecology and environmental biotechnology, physiology**, and cell biology (BB ~~1045~~ **1102**, BB 2030, BB 2101, and BB 2550 or equivalent) and in chemical reactions (CH 1020 or equivalent).

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 3140 Evolution: Pattern and Process

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3140 Evolution: Pattern and Process be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 3140 Evolution: Pattern and Process (*Cat. II; 1/3 unit*)

In this course, students will explore the foundations of micro- and macro-evolutionary theory and will learn to apply these fundamental evolutionary principles through critical analysis of the primary scientific literature. In a course format that emphasizes team-based case studies, discussion of recent and classic papers, and computer simulation of evolutionary processes, students will explore the evolutionary foundations of a wide range of biological disciplines, and will gain experience in critical evaluation of approaches, arguments, and points of view in the field. Topics may include the history of life on Earth; biogeography and the origins of biodiversity; host-pathogen coevolution; and genomic and molecular evolution, among others.

Recommended background: a working knowledge of the principles of ecology and genetics (BB2040 and BB2920 or equivalent) and integral and differential calculus

This course will be offered in 2019-20, and in alternating years thereafter.

Proposed course description:

BB 3140 Evolution: Pattern and Process (*Cat. II; 1/3 unit*)

In this course, students will explore the foundations of micro- and macro-evolutionary theory and will learn to apply these fundamental evolutionary principles through critical analysis of the primary scientific literature. In a course format that emphasizes ~~team-based case studies and, discussion~~ **critical analysis** of ~~recent and classic paper~~ **the primary scientific literature, and computer simulation of evolutionary processes**, students will explore the evolutionary foundations of a wide range of biological disciplines, and will gain experience in critical evaluation of approaches, arguments, and points of view in the field. Topics may include the history of life on Earth; biogeography and the origins of biodiversity; host-pathogen coevolution; and genomic and molecular evolution, among others. This course will be offered in **2023-24**, and in alternating years thereafter.

Recommended background: A working knowledge of the principles of ecology (**BB2040 or equivalent**) and **molecular biology & genetics** (**either or both BB2920 and BB3950 or equivalent**) ~~and integral and differential calculus.~~

Suggested background: **integral and differential calculus** (MA 1020 or 1021, and MA 1022, or equivalent)

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 3620 Developmental Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 3620 Developmental Biology course be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 3620 Developmental Biology (*Cat. II; 1/3 unit*)

Through lecture, reading, and discussion, this course will help students understand how developmental biologists study the development of a fertilized egg into a multi-cellular animal. Beginning with the description of developmental events, the major problems of developmental biology such as determination of cell fate, differentiation, and pattern formation will be explored. Emphasis will be placed on techniques such as analysis of mutations, molecular genetics, gene transfer, and the use of model organisms. Societal implications of the ability to control the outcome of development will be discussed.

Recommended background: A working knowledge of concepts in microbiology, cell biology and genetics (BB 2002, BB 2550, and BB 2920 or equivalent) This course will be offered in 2019-20, and in alternating years thereafter.

Proposed course description:

BB 3620 Developmental Biology (*Cat. II; 1/3 unit*)

Through interactive lectures, individual and group activities, and readings, ~~Through lecture, reading, and discussion,~~ this course will help students understand how ~~developmental biologists study the development of~~ a fertilized egg ~~develops~~ into a multi-cellular animal and how diversity in form develops during evolution. The course will focus on the following topics: Embryogenesis; Morphogenesis and Body Patterning; Limb Development and Regeneration; and Evolution and Development. Consequences of genetic and environmental perturbations on development in human disorders and model systems will also be covered. ~~Beginning with the description of developmental events, the major problems of developmental biology such as determination of cell fate, differentiation, and pattern formation will be explored. Emphasis will be placed on techniques such as analysis of mutations, molecular genetics, gene transfer, and the use of model organisms. Societal implications of the ability to control the outcome of development will be discussed.~~

Recommended background: A ~~strong~~ working knowledge of concepts in ~~microbiology,~~ both cell biology and genetics ~~is required~~ (~~BB 20023,~~ BB 2550 and BB 2920, or equivalent). This course will be offered in ~~2019-20,~~ 2023-24, and in alternating years thereafter.

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 4190 / CH 4190 Regulation of Gene Expression

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 4190 / CH 4190 Regulation of Gene Expression be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 4190 / CH 4190 Regulation of Gene Expression 7 (*Cat. I; 1/3 unit*)

Through lectures, problem sets, reading and discussion, and presentations this course will help elucidate for students the processes that allow regulated gene expression, mechanisms used in each type of regulation, and methods and techniques used for investigation of regulatory mechanisms. Readings from the current original research literature will explore the growing use of model systems and “omics” level approaches to enhance our ever expanding understanding of the gene regulatory mechanisms. The development of cell-based therapeutics and genetic engineering as they relate to gene regulation will be introduced.

Recommended background: a working knowledge of concepts in biochemistry and molecular genetics (CH 4110, 4120, 4130 and BB 4010 or equivalent)

Proposed course description:

BB 4190 / CH 4190 Regulation of Gene Expression (*Cat. I; 1/3 unit*)

Through lectures, problem sets, reading and discussion, and presentations this course will help elucidate for students the processes that allow regulated gene expression, mechanisms used in each type of regulation, and methods and techniques used for investigation of regulatory mechanisms. Readings from the current original research literature will explore the growing use of model systems and “omics” level approaches to enhance our ever-expanding understanding of the gene regulatory mechanisms. The development of cell-based therapeutics and genetic engineering as they relate to gene regulation will be introduced.

Recommended background: A working knowledge of concepts in biochemistry and molecular genetics (CH 4110 and CH 4120, or equivalent, and CH 4130 or ~~BB 4010~~ BB 3950, or equivalent).

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify BB 4260 Synthetic Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 4260 Synthetic Biology be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 4190 / CH 4190 Regulation of Gene Expression (*Cat. II; 1/3 unit*)

Do we yet have the technology to engineer life? Can we control gene expression to create organisms that function in useful ways? Do we understand the tenets of genetic regulation as well as we think we do? These important questions and more are investigated by the emerging field of Synthetic Biology. In this course, students will explore this exciting new realm of biology through in-depth analysis and discussion of primary literature. Topics to be covered include the design and construction of synthetic gene circuits, synthesis of new genes and genomes, logic gate regulation of gene expression, and the latest applications of synthetic biology to advances in medicine, information processing, and the environment.

Recommended background: Students should have a strong foundational knowledge of cell biology, molecular biology, and genetics, as would be obtained from BB2550, BB2920, and BB2950. This course will be offered in 2020-21, and in alternating years thereafter.

Proposed course description:

BB 4190 / CH 4190 Regulation of Gene Expression (*Cat. II; 1/3 unit*)

Do we yet have the technology to engineer life? Can we control gene expression to create organisms that function in useful ways? Do we understand the tenets of genetic regulation as well as we think we do? These important questions and more are investigated by the emerging field of Synthetic Biology. In this course, students will explore this exciting new realm of biology through in-depth analysis and discussion of primary literature. Topics to be covered include the design and construction of synthetic gene circuits, synthesis of new genes and genomes, logic gate regulation of gene expression, and the latest applications of synthetic biology to advances in medicine, information processing, and the environment.

Recommended background: Students should have a strong foundational knowledge of cell biology, molecular biology, and genetics, as would be obtained from BB2550, BB2920, and BB~~239~~50. This course will be offered in 2024-25, and in alternating years thereafter.

Rationale:

Because we are proposing changes to a number of courses in the curriculum, other courses that rely on these have corresponding changes in their recommended background. In addition, some faculty used this opportunity to update course descriptions to be more consistent with their current offering.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to change the course number of BB 4801 Bioinformatics to BB 4001

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that BB 4801 Bioinformatics be changed to BB 4001.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Proposed course description:

(unchanged except for course number and an updated number for one recommended background course)

BB ~~4801~~ 4001 Bioinformatics (*Cat. II; 1/3 unit*)

In an age when the amount of new biological data generated each year is exploding, it has become essential to use bioinformatics tools to explore biological questions. This class will provide an understanding of how we organize, catalog, analyze, and compare biological data across whole genomes, covering a broad selection of important databases and techniques. Students will acquire a working knowledge of bioinformatics applications through hands-on use of software to ask and answer biological questions in such areas as genetic sequence and protein structure comparisons, phylogenetic tree analysis, and gene expression and biological pathway analysis. In addition, the course will provide students with an introduction to some of the theory underlying the software (for example, how alignments are made and scored).

Recommended background: a working knowledge of concepts in genetics and molecular biology (BB2920 and BB~~23~~950 or equivalent), and statistics (MA2610 or MA2611 or equivalent) This course will be offered in 2020-21, and in alternating years thereafter.

Students may not receive credit for this course and BB 4801.

Rationale:

The Department of Biology and Biotechnology is renumbering all of its laboratory courses to have an "8" in the second digit place (i.e., 18xx, 28xx, and 38xx) to cue which courses are laboratories for advising and degree audit purposes. The only BB non-laboratory course with an "8" in the second position is BB 4801 Bioinformatics. Changing the course number (not the course name, description, or crosslisting as BCB 4001) will ensure that all BB courses with an "8" as the second digit are laboratories.

Resource Needs: No changes to resource requirements are anticipated.

Impact on Distribution Requirements and Other Courses: We anticipate no impact on distribution requirements or other courses, as only the course number will be changed. The course name, description, and courses that serve as recommended background will remain unchanged, except for the level change to the recommended background course BB 2950 (to BB 3950; see accompanying motion 8). The course is cross listed with BCB 4001; the Bioinformatics and Computational Biology Program finds this change to the BB course number acceptable.

Implementation Date: AY24-25

Contact: Liz Ryder

Date: January 17, 2024
To: WPI Faculty
From: Committee on Academic Operations (Prof. Van Dessel, Chair)
Re: Motion to modify the title and description of BB 4900 Capstone Experience in Biology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the title of BB 4900 Capstone Experience In Biology And Biotechnology be modified to Advanced Topics in Biology and Biotechnology, and the course description be modified as described below.

Description of Proposed Modifications:

(Modifications to course description are indicated in red text.)

Current course description:

BB 4900 Capstone Experience In Biology And Biotechnology (*Cat. I; 1/3 unit*)

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

Proposed course description:

BB 4900 ~~Capstone Experience In Biology And Biotechnology~~ **Advanced Topics in Biology and Biotechnology** (*Cat. I; 1/3 unit*)

These classes will serve as integrative experiences for students majoring in Biology & Biotechnology. The course will help students integrate concepts from other courses in the curriculum, practice skills of critical analysis, and evaluate and communicate scientific information effectively. The specific theme of each offering will center around a current topic of biological interest, and may include such areas as genomics, cancer, environmental problems, and synthetic biology.

Recommended Background: Prior to enrolling in the **course**, a student should have completed all of the BB course distribution requirements for BBT majors at the 1000 and 2000 level, or should seek advice from the course instructor. Topics will be announced prior to registration in the year preceding the course offering.

Only one offering of BB 4900 can count toward BBT major distribution requirements, although additional offerings may be taken as free electives.

Rationale:

The term 'Capstone Experience' was confusing to students, because the word 'Capstone' is used with a different meaning for engineering major requirements. The Department decided that 'Advanced Topics' was a more appropriate term. While these courses are integrative and are meant to provide mastery of concepts and competencies described in the BBT Department's Educational Program, they need not be taken at the end of a student's academic program. However, most of these courses are taught using the primary literature, so a statement about this was added to the recommended background. Because these courses are limited in size to ensure student participation in class, the BBT Department decided that only one offering can count toward the major distribution requirements.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: None.

Recommended implementation date: Academic year 2024-2025

Contacts: Liz Ryder

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the number, title, and description of BB 2902 Enzymes, Proteins, and Purification

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the course number, title and description of BB 2902 Enzymes, Proteins, and Purification be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB 2902 Enzymes, Proteins, and Purification (*Cat. I; 1/6 unit*)

This course gives basic practical experimental experience in enzymology, how enzymes work and how to purify them for later use. These techniques are the foundation the design and production of many therapeutic products. Examples of the types of techniques and experiences included in this course are: • The action and optima of enzyme catalysis • Induction of enzyme production • Quantification and detection techniques for proteins • Extraction and purification of protein from biological material using column chromatography • Identification of compounds using Thin Layer Chromatography

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

Proposed course number, title, and description:

BB 2802 Enzymes, Proteins, and Purification Laboratory (*Cat. I; 1/6 unit*)

This course gives basic practical experimental experience in how enzymes work and how to purify proteins for later use. These techniques are foundational for the design and production of many therapeutic products. Examples of the types of techniques and experiences included in this course are: The action and optima of enzyme catalysis, induction of protein production, quantification and detection techniques for proteins, extraction and purification of proteins from biological material using column chromatography, and assessing the efficacy of a purification process.

Recommended background: at least one college-level biology course.

Students may not receive credit for this course and BB 2902.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However, our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying which courses are laboratory and thus which can be used to fulfill that distribution requirement. Additionally, it will facilitate academic planning and advising for students and faculty across all majors/departments. Finally, it will simplify academic audits for all

classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the course number and title of BB2903 Anatomy and Physiology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the course number and title of BB2903 Anatomy and Physiology be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB2903 Anatomy and Physiology (*Cat. I; 1/6 unit*)

This course is an active exploration of a number of topics in anatomy and physiology through the use of simulations, measurement and hands on discovery. It will be particularly relevant to any student considering a health related career, doing work where body structure is relevant or has interest in how body systems connect. A significant portion of this discovery will be accomplished by a hands-on dissection. Examples of the specific types of techniques and experiences included in this course are:

- Comparative and general anatomy of several organisms
- Physiology and function of body systems, processes and organs
- Enzyme Linked Immunosorbent Assay (ELISA)
- Microscopy

Recommended background: a working knowledge of concepts in human biology (BB 1025 or equivalent).

Proposed course number, title, and description:

BB2803 Anatomy and Physiology Laboratory (*Cat. I; 1/6 unit*)

This course is an active exploration of topics in anatomy and physiology through the use of simulations, measurements, and hands-on discovery. It will be particularly relevant to any student considering a health-related career, doing work where body structure is central, or has interest in how body systems connect. A significant portion of this discovery will be accomplished by a hands-on dissection. Examples of the specific types of experiences and techniques included in this course are comparative and general anatomy of several organisms; physiology and function of body systems, processes, and organs; Enzyme Linked Immunosorbent Assay (ELISA); and microscopy. Students may not receive credit for this course and BB 2903.

Recommended background: at least one college-level biology course.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However, our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying which courses are laboratory and thus which can be used to fulfill that distribution

requirement. Additionally, it will facilitate academic planning and advising for students and faculty across all majors/departments. Finally, it will simplify academic audits for all classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the number, title, and description of BB 2904 Ecology, Environment, and Animal Behavior

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the number, title, and description of BB 2904 Ecology, Environment, and Animal Behavior be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB 2904 Ecology, Environment, and Animal Behavior (*Cat. I; 1/6 unit*)

This course examines topics in ecology and animal behavior through hands on experimentation and simulation. Activities in this course include interactions and observation of live animals as well as some outdoor activities and environmental sampling. This course will be relevant to students who have an interest in biology at more than the individual organism level as well as those with majors involving environmental and ecological concerns. Examples of the specific types of techniques and experience included in this course are: • Observing, recording, understanding, and analyzing animal behaviors • Handling of organisms • Environmental and ecological assessment and sampling • Observations of population dynamics.

Recommended background: a working knowledge of concepts in biodiversity (BB 1045 or equivalent).

Proposed course number, title, and description:

BB 2804 Ecology, Environment, and Animal Behavior Laboratory (*Cat. I; 1/6 unit*)

This course examines topics in ecology and animal behavior through hands on experimentation and simulation. Activities in this course include interactions and observation of live animals as well as some outdoor activities and environmental sampling. This course will be relevant to students who have an interest in biology at more than the individual organism level as well as those majors studying environmental and ecological concerns. Examples of the specific types of techniques and experience included in this course are observing, recording, understanding, and analyzing animal behaviors; handling of organisms; environmental and ecological assessment and sampling; and observations of population dynamics.

Recommended background: at least one college-level biology course.

Students may not receive credit for this course and BB 2904, BB 294X, or BB 292X.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However, our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying

which courses are laboratory and thus which can be used to fulfill that distribution requirement. Additionally, it will facilitate academic planning and advising for students and faculty across all majors/departments. Finally, it will simplify academic audits for all classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the number, title, and description of BB2915 Searching for Solutions in Soil: Microbial and Molecular Investigations

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the number, title, and description of BB2915 Searching for Solutions in Soil: Microbial and Molecular Investigations be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB 2915 Searching for Solutions in Soil: Microbial and Molecular Investigations

(Cat. 1; 1/3 unit)

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.

Proposed course number, title, and description:

BB 2815. Microbial and Molecular Investigations Laboratory *(Cat. 1; 1/3 unit)*

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 plasmids, restriction enzymes, and PCR. At the conclusion of the course students will report their findings in poster format and will be able to see the results of other groups around the country.

Recommended background: at least one college-level biology course.

Students may not receive credit for this course and BB 2915.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However, our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying which courses are laboratory and thus which can be used to fulfill that distribution requirement. Additionally, it will facilitate academic planning and advising for students and faculty across all majors/departments. Finally, it will simplify academic audits for all classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the number, title and description of BB 3513 Cell Culture Techniques for Animal Cells

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the number, title and description of BB3513 Cell Culture Techniques for Animal Cells be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB 3513 Cell Culture Techniques for Animal Cells (Cat. I; 1/6 unit)

Basic laboratory skills in mammalian cell culture to include cell counting, freezing and thawing cell lines, culture of suspension and attached cells.

Recommended background: BB 2901, BB 2550 and knowledge of aseptic techniques.

Proposed course number, title, and description:

BB 3813 Animal Cell Culture Techniques Laboratory (Cat. I; 1/6 unit)

Basic laboratory skills in mammalian cell culture including cell counting, freezing and thawing cell lines, and culture of suspension and attached cells.

Recommended background: knowledge of aseptic technique (BB 1801 or 2815 or equivalent) and cell biology (BB 2550 or equivalent).

Students may not receive credit for this course and BB 3513.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However, our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying which courses are laboratory and thus which can be used to fulfill that distribution requirement. Additionally, it will facilitate academic planning and advising for students and faculty across all majors/departments. Finally, it will simplify academic audits for all classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the number and description of BB 3515 Physiologic Systems Laboratory

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the course number and description of BB 3515 Physiologic Systems Laboratory be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB 3515: Physiologic Systems Laboratory (*Cat. I; 1/3 unit*)

Exercises in this course focus on computer and wet laboratory studies of nervous, musculoskeletal, circulatory and respiratory system structure, function, and physiology. Students will gain experience in hypothesis generation and testing and will be introduced to an interactive biomedical/physiological data acquisition and analysis system.

Recommended Background: a working knowledge of laboratory skills and concepts in anatomy and physiology (BB 2903, BB 3101 and BB 3102 or equivalent).

Students may not receive credit for both BB 3515 and BB 3511 or BB 3515 and BB 3514.

Proposed course number, title, and description:

BB 3815: Physiologic Systems Laboratory (*Cat. I; 1/3 unit*)

Exercises in this course focus on computer and wet laboratory studies of nervous, musculoskeletal, circulatory, and respiratory systems structures, functions, and physiology. Students will gain experience in hypothesis generation and testing and will be introduced to an interactive biomedical/physiological data acquisition and analysis system.

Recommended Background: a working knowledge of laboratory skills and concepts in anatomy and physiology (BB 2803, BB 3101, or BB 3102 or equivalent) and general biology lab practices (BB 1801 or equivalent).

Students may not receive credit for this course and BB 3515, BB 3511, or BB 3514.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However, our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying which courses are laboratory and thus which can be used to fulfill that distribution requirement. Additionally, it will facilitate academic planning and advising for students and faculty across all majors/departments. Finally, it will simplify academic audits for all classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the number, title, and description of BB 3521 Microscopy

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the number, title, and description of BB3521 Microscopy be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB 3521: Microscopy (*Cat. II; 1/6 unit*)

Through a research-based laboratory and short lectures, students will learn the basic principles of image formation, resolution, and digital imaging. Students will develop confidence in the use of the light microscope and be able to apply different modes of microscopy to solve biological problems. This course emphasizes a quantitative approach to microscopy and digital imaging applied toward simple phenotypic analysis. Students will develop scientific writing skills and learn how to prepare professional quality images. Some sections of this course may be offered as Writing Intensive (WI).

Recommended background: a working knowledge of laboratory techniques in molecular biology, and microbiology (BB 2901 or equivalent), and concepts in cell biology (BB 2550 or equivalent)

Proposed course number, title, and description:

BB 3821 Microscopy Laboratory (*Cat. II; 1/6 unit*)

Through a research-based laboratory and short lectures, students will learn the basic principles of image formation, resolution, and digital imaging. Students will develop confidence in the use of the light microscope and be able to apply different modes of microscopy to solve biological problems. This course emphasizes a quantitative approach to microscopy and digital imaging applied toward simple phenotypic analysis. Students will develop scientific writing skills and learn how to prepare professional quality images. Some sections of this course may be offered as Writing Intensive (WI).

Recommended background: a working knowledge of laboratory techniques in molecular biology and microbiology (BB 1801 or BB 2815 or equivalent), and concepts in cell biology (BB 2550 or equivalent).

Students may not receive credit for this course and BB 3521.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However, our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying which courses are laboratory and thus which can be used to fulfill that distribution requirement. Additionally, it will facilitate academic planning and advising for students

and faculty across all majors/departments. Finally, it will simplify academic audits for all classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the number, title, and description of BB 3525 Plant Physiology

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the number, title, and description of BB 3525 Plant Physiology be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB 3525 Plant Physiology (*Cat. I; 1/6 unit*)

Basic studies in the biochemical and physical systems plants use to sustain life; includes an introduction to plant cell culture techniques.

Recommended background: BB 1045 and BB 2903. Concurrent or prior registration in BB 3120 is recommended.

Students who have received credit for BB 325X may not receive credit for BB 3525.

Some sections of this course may be offered as Writing Intensive (WI).

Proposed course number, title, and description:

BB 3825 Plant Physiology Laboratory (*Cat. I; 1/6 unit*)

Basic studies in the biochemical and physical systems plants use to sustain life; includes an introduction to plant cell culture techniques. Some sections of this course may be offered as Writing Intensive (WI).

Recommended background: BB 1102, BB 2803, or equivalent. Concurrent or prior registration in BB 3120 is recommended.

Students may not receive credit for this course and BB 3525.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However, our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying which courses are laboratory and thus which can be used to fulfill that distribution requirement. Additionally, it will facilitate academic planning and advising for students and faculty across all majors/departments. Finally, it will simplify academic audits for all classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the number, title, and description of BB 3527 Molecular Biology and Genetic Engineering: Approaches and Applications

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that number, title, and description of BB 3527 Molecular Biology and Genetic Engineering: Approaches and Applications be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB 3527 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 2905, BB 2915, or BB 2916).

Students may not receive credit for both BB 356X and BB 3527.

Proposed course number, title, and description:

BB 3827 Molecular Biology and Genetic Engineering Laboratory (*Cat. I; 1/3 unit*)

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 1101, BB 2920, or BB 3950 or equivalent) and cell biology (BB 2550 or equivalent), as well as relevant biology laboratory experience (BB 1801, BB 2815, or equivalent).

Students may not receive credit for this course and BB 3527.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However,

our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying which courses are laboratory and thus which can be used to fulfill that distribution requirement. Additionally, it will facilitate academic planning and advising for students and faculty across all majors/departments. Finally, it will simplify academic audits for all classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the number, title, and description of BB 3530 Immunotherapies:
The Next Generation of Pharmaceuticals

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that number, title, and description of BB 3530 Immunotherapies: The Next Generation of Pharmaceuticals be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB 3530 Immunotherapies: The Next Generation of Pharmaceuticals (*Cat. I; 1/3 unit*)

While the production of monoclonal antibodies has been around since the 1970s, their clinical use as human therapeutics represents an increasingly popular and promising application. Beginning with a hybridoma cell line and using a discovery based approach, students in this course will explore the processes involved in the production and purification of monoclonal antibodies. Using cells in culture to produce the antibody, students will explore the efficacy and cost of a purification scheme involving separation techniques such as ion exchange and affinity chromatography to produce a purified product. Purification will be assessed using typical analytical techniques such as spectroscopy, electrophoresis and immunological based methods.

Recommended background: a working knowledge of laboratory skills in enzyme and protein purification (BB 2902 or equivalent) and concepts in cell biology and biochemistry (BB2550 and CH4110 or equivalent). Some knowledge of immunology may be beneficial.

Proposed course number, title, and description:

BB 3830 Immunotherapies Laboratory (*Cat. I; 1/3 unit*)

The clinical use of monoclonal antibodies as human therapeutics represents an increasingly popular and promising application. Beginning with a hybridoma cell line and using a discovery-based approach, students in this course will explore the processes involved in the production and purification of monoclonal antibodies. Using cells in culture to produce the antibody, students will explore the efficacy and cost of a purification scheme involving separation techniques such as ion exchange and affinity chromatography to produce a purified product. Purification will be assessed using typical analytical techniques such as spectroscopy, electrophoresis, and immunological methods.

Recommended background: a working knowledge of laboratory skills in protein purification (BB 2802 and BB 1801, or equivalent) and concepts in cell biology (BB 2550 or equivalent) and biochemistry (CH 4110 or equivalent). Some knowledge of immunology may be beneficial.

Students may not receive credit for this course and BB 3530.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However, our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying which courses are laboratory and thus which can be used to fulfill that distribution requirement. Additionally, it will facilitate academic planning and advising for students and faculty across all majors/departments. Finally, it will simplify academic audits for all classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the number, title, and description of BB 3570 Cell Culture Models for Tissue Regeneration

Motion: On behalf of the Biology and Biotechnology Department, the Committee on Academic Operations recommends and I move that the number, title, and description of BB 3570 Cell Culture Models for Tissue Regeneration be modified as described below.

Description of Proposed Modifications:

Current course number, title, and description:

BB 3570 Cell Culture Models for Tissue Regeneration (*Cat. I: 1/3 unit*)

This course is an intensive hands-on laboratory that explores mammalian cells as building blocks of complex tissues in vitro. In addition to learning standard cell culture skills, students will have the opportunity to examine cell survival, proliferation, differentiation, and function under different culture conditions. The course culminates with design and development of a cell-based system for an application in regenerative medicine (e.g., wound healing and fibrosis). Students will synthesize and present their work in the form of a research manuscript.

Recommended background: a working knowledge of the principles of cell biology (BB 2550 or equivalent) and molecular biology and/or genetics (BB 2920 or 2950 or equivalent) as well as foundational lab experience such as that offered in the BB 2900 lab sequence.

Proposed course number, title, and description:

BB 3870 Cell Culture Models Laboratory (*Cat. I: 1/3 unit*)

This course is an intensive hands-on laboratory that explores mammalian cells as building blocks of complex tissues in vitro. In addition to learning standard cell culture skills, students will have the opportunity to examine cell survival, proliferation, differentiation, and function under different culture conditions. The course culminates with design and development of a cell-based system for an application in regenerative medicine (e.g., wound healing and fibrosis). Students will synthesize and present their work in the form of a research manuscript. This course carries the writing-intensive designation.

Recommended background: a working knowledge of the principles of cell biology (BB 2550 or equivalent) as well as a foundational lab experience such as that offered in BB 1801 and BB 3813.

Students may not receive credit for this course and BB 3570.

Rationale:

Currently the laboratory and classroom/lecture courses in the Biology & Biotechnology curriculum cannot be easily distinguished from one another by title or number. However, our distribution requirements do specify a quantity and distribution of courses under a category called Laboratory Experience. The change proposed here will result in clarifying

which courses are laboratory and thus which can be used to fulfill that distribution requirement. Additionally, it will facilitate academic planning and advising for students and faculty across all majors/departments. Finally, it will simplify academic audits for all classes that matriculate after all the changes have been made. The credits associated with all laboratories are unchanged.

Resource needs: No new resources are required.

Impact on distribution requirements: No impact.

Implementation date: AY 24/25.

Contact: Lou Roberts

Date: January 17, 2024

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the requirements for the Biology and Biotechnology major

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

Description of Proposed Modifications:

(See next page)

Proposed Requirements for the Biology and Biotechnology Major:

(Edited version with deleted text in ~~red strikethrough~~ and added text in red.)

Biology and Biotechnology Major

Requirements

Minimum Units

Mathematical Sciences, Physics, Computer Science, Data Science, Engineering	
Quantitative Reasoning (Note 1)	5/3
Chemistry	5/3
Biology & Biotechnology (Note 2)	10/3
Laboratory Experience (Note 3)	4/3
Related Courses (Note 4)	3/3
MQP	± 3/3

Notes:

1. This requirement is fulfilled by courses in Mathematical Sciences, Physics, Computer Science, Bioinformatics and Computational Biology, Data Science, or Engineering. Must include 1/3 unit of statistics, or a course with the prefix BCB, CS, or DS.

2. Biology and Biotechnology coursework must include 2/3 units of Foundational Biology (BB 1101 and BB 1102) at the 1000 level, 4/3 units at the 2000 level, and 4/3 units at the 3000/4000 level, of which ~~at least~~ 1/3 unit must be a BB 4900 course. Laboratory courses (BB x8xx) cannot be used to meet the requirements in this category. ~~At least 2/3 unit of Biology and Biotechnology coursework must be taken from each of three major divisions of Biology (see below). The 2/3 unit for each division may include courses from any level (1000-4000).~~ Only one offering of BB 4900 may be counted towards degree requirements.

3. ~~Chosen from among the BB 2000 and 3000 level labs and the Experimental Biochemistry labs, CH 4150. Must include at least ½ unit of work at the 2000 level. Labs are worth either 1/6 or 1/3 unit.~~ Chosen from among laboratories with a “BB” designation. Must include 1/3 unit at the 1800 level, 1/3 unit at the 2800 level, and 1/3 unit at the 3800 level. The remaining 1/3 unit may be taken at the 2800 or 3800 level.

4. Chosen from the Related Courses List, which includes additional BB 3000/4000 level courses ~~and excludes BB 4900.~~

The Three Major Divisions of Biology:

Type: Bachelor

1. Cellular and Molecular		
Item #	Title	Units
BB-1035	Biotechnology	1/3
BB-2003	Fundamentals of Microbiology	1/3
BB-2550	Cell Biology	1/3
BB-2920	Genetics	1/3
BB-3003	Medical Microbiology: Plagues of the Modern World, a Case Study Approach	1/3
BB-2950- BB-3950	Molecular Biology	1/3
BB-3050- BB-4050	Cancer Biology	1/3
BB/CH-4190	Regulation of Gene Expression	1/3
BB-4260	Synthetic Biology	1/3

2. Biology of the Organism		
Item #	Title	Units
BB-1025	Human Biology	1/3
BB-3101	Human Anatomy & Physiology: Movement and Communication	1/3
BB-3102	Human Anatomy & Physiology: Transport and Maintenance	1/3
BB-3080	Neurobiology	1/3
BB-3120	Plant Physiology	1/3
BB-3620	Developmental Biology	1/3
BB-3920	Immunology	1/3

3. Organisms in their Environment		
Item #	Title	Units
BB-1045	Biodiversity	1/3
BB-2030	Plant Diversity	1/3
BB-2040	Principles of Ecology	1/3
BB-3140	Evolution: Pattern and Process	1/3
BB-2050- BB-3550	Animal Behavior	1/3

Related Courses

Item #	Title	Units
CS 4802/BCB 4002	Biovisualization	1/3
CS 4803/BCB 4003	Biological and Biomedical Database Mining	1/3
MA 4603/BCB 4004	Statistical Methods in Genetics and Bioinformatics	1/3
CE 3059	Environmental Engineering	1/3
CH 2330	Organic Chemistry III	1/3
CH 3510	Chemical Thermodynamics	1/3
CH 4110	Protein Structure and Function	1/3
CH 4120	Lipids and Biomembrane Functions	1/3
CH 4130	Nucleic Acids and Bioinformation	1/3
CH 4140	Metabolism and Disease	1/3
CH 4160	Membrane Biophysics	1/3
CHE 3301	Introduction to Biological Engineering	1/3

Any BB 3000 or 4000 level course **except for BB 4900**.

These may include BB laboratory courses (BB 38xx).

Proposed Requirements for the Biology and Biotechnology Major:

(Clean version with proposed changes incorporated.)

Biology and Biotechnology Major

Requirements	Minimum Units
Quantitative Reasoning (Note 1)	5/3
Chemistry	5/3
Biology & Biotechnology (Note 2)	10/3
Laboratory Experience (Note 3)	4/3
Related Courses (Note 4)	3/3
MQP	3/3

Notes:

1. This requirement is fulfilled by courses in Mathematical Sciences, Physics, Computer Science, Bioinformatics and Computational Biology, Data Science, or Engineering. Must include 1/3 unit of statistics, or a course with the prefix BCB, CS, or DS.

2. Biology and Biotechnology coursework must include 2/3 units of Foundational Biology at the 1000 level (BB 1101 and BB 1102), 4/3 units at the 2000 level, and 4/3 units at the 3000/4000 level, of which 1/3 unit must be a BB 4900 course. Laboratory courses (BB x8xx) cannot be used to meet the requirements in this category. Only one offering of BB 4900 may be counted towards degree requirements.

3. Chosen from among laboratories with a "BB" designation. Must include 1/3 unit at the 1800 level, 1/3 unit at the 2800 level, and 1/3 unit at the 3800 level. The remaining 1/3 unit may be taken at the 2800 or 3800 level.

4. Chosen from the Related Courses List, which includes additional BB 3000/4000 level courses and laboratories, and excludes BB 4900.

Related Courses

Item #	Title	Units
MA 4603/BCB 4004	Statistical Methods in Genetics and Bioinformatics	1/3
CE 3059	Environmental Engineering	1/3
CH 2330	Organic Chemistry III	1/3
CH 3510	Chemical Thermodynamics	1/3
CH 4110	Protein Structure and Function	1/3
CH 4120	Lipids and Biomembrane Functions	1/3
CH 4130	Nucleic Acids and Bioinformation	1/3
CH 4140	Metabolism and Disease	1/3
CH 4160	Membrane Biophysics	1/3
CHE 3301	Introduction to Biological Engineering	1/3

Any BB 3000 or 4000 level course except for BB 4900.

These may include BB laboratory courses (BB 38xx).

Rationale:

The BBT Department wishes to create a spiral curriculum that will maximize the ability of each individual student to achieve their full potential while at WPI, better preparing them for employment and/or further education upon graduation. As described more fully in companion motions, we propose requiring three foundational courses (BB1101, BB1102, and BB1801) that will ensure students will have a strong grounding in cellular and molecular biotechnology, ecology, and environmental biology, as well as core laboratory practices and skills, upon which our upper-level courses can build. These courses will introduce the core concepts advocated nationally by [‘Vision and Change in Undergraduate Biology’](#) (evolution, information flow, structure and function, transformations of energy, and biological systems), which will be reinforced in our 2000 and 3000 level courses and mastered at the 3000 and 4000 level. Having a common first year sequence taken by most of our majors will also serve to create a strong cohort of majors, who will already feel they are beginning to think like biologists. We expect that these curriculum changes will be particularly welcoming for students from underrepresented populations or from under-resourced communities, who may enter our programs with weaker high school preparation and/or lower confidence in their self-identification as scientists.

In response to students’ requests for more freedom and flexibility in choosing their courses, the Department decided to eliminate the formal breadth requirement of two courses in each of the major sub-divisions of biology (molecular, organismal, and ecology / environmental). We feel that our foundational courses will provide the minimum amount of breadth necessary for an informed biologist in the 21st century. In addition, students will acquire more breadth as they complete four 2000 level courses, since there are no more than three 2000 level courses available in any of the major sub-divisions of biology. Removing the formal breadth requirement allows us to avoid the sometimes artificial classification of courses into sub-divisions. Instead, we will emphasize the themes that are found throughout biology. Most BBT majors will naturally acquire additional breadth in their more advanced classes, without being forced to take courses in a particular area of biology.

In recognition of the increasing need for quantitative skills in biology, we propose to require students to take at least one statistics, data science, bioinformatics, or computer science course. We have removed courses from our related courses list that require large amounts of background in other areas, are not closely related to biology, or have too much overlap with BB courses. For similar reasons, we now specify that all laboratories must have a BB prefix. Because we feel it is vital to keep our BB 4900 Advanced Topics courses small to allow for discussion and writing, we will allow only one BB 4900 offering to count toward the major distribution requirements.

To facilitate the spiral nature of the proposed BBT curriculum, this motion has companion motions that include changes to the names or numbers of several existing courses. We propose to renumber and rename many of our laboratory courses to provide consistency and clarity for students and faculty. Finally, we propose to update our course descriptions to reflect needed changes in recommended background or content to support the spiral curriculum. The rationales for these changes are described in the respective companion motions.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: This motion does not change the overall balance and number of courses and laboratories required for the major. It does change the distribution of laboratory courses to include the new foundational laboratory, BB 1801. Its major impact is to require two foundational courses and one foundational laboratory at the 1000 level, as described above, and to remove the formal breadth requirement.

Impact on students in other majors: We have created an [advising aid](#) (see attached **APPENDIX** to this motion) that will help other departments and programs understand the changes in the BBT curriculum, as well as our intended audience for introductory courses. We intend to offer sufficient sections of our introductory classes in particular to accommodate both students who intend further study in the life sciences and those who do not. We have consulted with the departments and programs whose students take the most BBT courses at both introductory and more advanced levels: BME, CHE, CBC, BCB, and pre-health advising. All of these departments and programs have told us they do not foresee any problems with the changes we propose.

Implementation date: Academic year 2024-2025

Contacts: Liz Ryder, Lou Roberts

APPENDIX:

BBT Course Advising Information Updates for Other Departments

Summary:

BBT is revising our undergraduate curriculum using a spiral concept in order to improve course sequencing and ensure that upper-level courses build appropriately upon concepts and content from lower-level courses. This results in new names and numbers for several of our 1000-level courses and changes in level and recommended background for some of our 2000+ level courses. We anticipate these changes going into effect for AY 24/25. This document includes suggested substitutions for courses BBT will no longer be offering, as well as the intended audience for our introductory and laboratory courses. We do not anticipate these changes will adversely affect other majors.

General implications for other departments:

- Advisors will need to be aware of changes in BBT course numbers, names, and intended audiences in order to advise their students accordingly.
- Advisors and students need to be aware that the recommended background for each BBT course has been reviewed and in many cases revised, and moving forward BBT instructors intend to uniformly teach to the indicated level. Students should therefore pay close attention to the recommended background when deciding which courses to take.

Substantial changes affecting non-BBT majors:

New courses

- BB 1101 Foundations of Cellular and Molecular Biotechnology (replacing BB 1035 Introduction to Biotechnology)
- BB 1102 Foundations of Ecology and Environmental Biology (replacing BB 1045 Biodiversity)
- BB 1004 Human Biology (replacing BB 1025 Human Biology)
- BB 1801 Foundations of Biology and Biotechnology Laboratory
- BB 2101 Foundations of Physiology

Courses with level changes

- BB 3060 Animal Behavior (was BB 2050)
- BB 3950 Molecular Biology (was BB 2950)
- BB 4050 Cancer Biology (was BB 3050)

General advice on BBT courses (see table for specific details for each course):

- 1) Introductory courses intended for non-majors are numbered BB 100x (e.g. BB 1001, BB 1002, BB 1003, BB 1004).
- 2) Foundational courses intended for life science-related majors* are numbered BB 1101 and BB 1102.
- 3) All BB laboratory courses have '8' as the second digit (e.g. BB 1801, BB 28xx, BB 38xx) and 'Laboratory' in the course title.
- 4) BB 1801 Laboratory is primarily intended for BBT majors, as well as other students who intend to take multiple BB laboratories, particularly at the 3800 level.
- 5) BB 28xx Laboratories may be taken by non-BBT majors without first taking BB 1801.

* Life science-related majors include BBT, CBC, BCB, ENV, PSY, BME, as well as students in other majors such as CHE and ME who are taking life science-related tracks or concentrations and plan to take additional BB courses at higher levels. These courses are also appropriate for Biology minors and pre-health students.

Table of course-specific details:

Introductory course changes and suggested substitutions		
Previous course	Suggested substitution	Intended audience
None	BB 1801 Foundations of Biology Laboratory	New laboratory course intended primarily for BBT majors and minors.
BB 1035 Biotechnology	BB 1101 Foundations of Cellular and Molecular Biotechnology	Life science-related majors *
BB 1045 Biodiversity	BB 1102 Foundations of Ecology and Environmental Biology	Life science-related majors *
BB 1025 Human Biology	BB 1004 Human Biology	BME majors and other non-BBT majors interested in human biology who do not need the breadth of physiology covered in BB 2101 Foundations of Physiology or the depth covered in BB 3101 and BB 3102 Anatomy & Physiology I & II
BB 1025 Human Biology	BB 2101 Foundations of Physiology	BBT majors and other majors (such as pre-health students) needing more rigorous and broad physiology background. Students planning to take upper level BB courses with BB 2101 as recommended background (such as BB 3080 Neurobiology, BB 3101 and BB 3102 A&P I & II)
Course level changes		
Previous course number	New course number	Explanation
BB 2950 Molecular Biology	BB 3950 Molecular Biology	Molecular Biology will be taught with more rigor and will assume that students have mastered content knowledge equivalent to BB 2920 Genetics and BB 2550 Cell Biology.
BB 2050 Animal Behavior	BB 3060 Animal Behavior	Animal Behavior will be taught with more rigor and will assume that students have mastered content knowledge equivalent to BB 2040 Ecology.
BB 3050 Cancer Biology	BB 4050 Cancer Biology	Cancer Biology will be taught with more rigor and will assume that students have mastered content knowledge equivalent to BB 3950 Molecular Biology.

Minor name changes		
Previous number/name	New number/name	Explanation
BB 4900 Capstone	BB 4900 Advanced Topics	These courses are offered several times per year, and change topics with each offering, as previously. The name was changed from 'Capstone' to 'Advanced Topics' to avoid confusion with engineering capstone courses.
BB 29xx and BB 35xx	BB x8xx	All BB laboratories now have an '8' as the second digit and include 'Laboratory' in the course name.
BB 4801 Bioinformatics	BB 4001 Bioinformatics	This course number was changed because all numbers with an '8' as the second digit are now laboratory courses.

* Life science-related majors include BBT, CBC, BCB, ENV, PSY, BME, as well as students in other majors such as CHE and ME who are taking life science-related tracks or concentrations and plan to take additional BB courses at higher levels. These courses are also appropriate for Biology minors and pre-health students.

Date: January 17, 2023

To: WPI Faculty

From: Committee on Academic Operations (Prof. Van Dessel, Chair)

Re: Motion to modify the requirements for the Biology and Biotechnology minor

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

Description of Proposed Modifications:

Current Requirements for the Biology and Biotechnology Minor:

Biology Minor

Rather than trying to cover the entire field of biology, the minor in biology has been designed to allow the student to survey a few areas of biology (e.g. ecology and genetics) or to select a specific area of focus (e.g. cell biology) for the minor. In either case, students will complete three courses at the 1000 and 2000 level to provide broad foundational knowledge, two laboratory modules, and two 3000/4000 level courses for advanced study, including a 4000 level course of the student's choosing. Students should choose their foundational courses carefully so that they provide recommended background for upper level courses they plan to take. As with all minors, 1 unit of this work may be double counted toward meeting another degree requirement, while a minimum of 1 unit of the work must be unique to the minor. The specific requirements for the minor are as follows:

Biology and Biotechnology

1000-level BB course (Note 1) 1/3

2000-level BB courses 2/3

BB laboratory courses (Note 2) 1/3

3000/4000-level BB course 1/3

4000-level BB course 1/3

NOTE:

1. BB 1000, BB 1001, BB 1002, BB/BCB 1003 cannot be used to fulfill this requirement.

2. At least one of the BB laboratory courses must be at the 2000-level.

Proposed Requirements for the Biology and Biotechnology Minor:

(Edited version with deleted text in ~~red strikethrough~~ and added text in red.)

Biology Minor

Rather than trying to cover the entire field of biology, the minor in biology has been designed to allow the student to survey a few areas of biology (e.g. ecology and genetics) or to select a specific area of focus (e.g. cell biology) for the minor. In either case, students will complete three courses at the 1000 and 2000 level to provide broad foundational knowledge, ~~two laboratory modules~~

1/3 unit of laboratory courses, and two 3000/4000 level courses for advanced study, including a 4000 level course of the student's choosing. Students should choose their foundational courses carefully so that they provide recommended background for upper level courses they plan to take. As with all minors, 1 unit of this work may be double counted toward meeting another degree requirement, while a minimum of 1 unit of the work must be unique to the minor. The specific requirements for the minor are as follows:

Biology and Biotechnology Minor

Requirements	Minimum Units
1000-level BB course (Note 1)	1/3
2000-level BB courses	2/3
BB laboratory courses (note 2)	1/3
3000/4000-level BB course	1/3
4000-level BB course (Note 2)	1/3

NOTE:

1. BB 1000, BB 1001, BB 1002, BB/BCB 1003, and BB 1004 cannot be used to fulfill this requirement.

~~2. At least one of the BB laboratory courses must be at the 2000 level.~~

2. A BB4900 offering is not required for the minor. Only one BB4900 offering can count for the minor.

Rationale:

The proposed minor description is updated to mirror the proposed BBT curriculum changes. The Department does not allow non-major courses to count for the minor, and we propose to add BB 1004 as a new non-majors course, so we modified Note 1. We decided to allow BBT minors to complete their BB laboratory requirement at any level, so we deleted note 2 from the laboratory courses. We added a note to clarify that as for the major, only one BB4900 offering can count for the minor. To clarify the minor description overall, we added some formatting changes to match the major. In addition, we modified the language describing laboratory courses to refer to 'units' rather than 'courses', since some of the laboratory courses are worth 1/3 unit, and some are worth 1/6 unit.

Resource Needs: No new resources are required.

Impact on Distribution Requirements: This motion does not change the overall balance and number of courses and laboratories required for the minor.

Recommended implementation date: Academic year 2024-2025

Contacts: Liz Ryder, Lou Roberts

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to remove AE 6093 Advanced Special Topics

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that AE 6093 Advanced Special Topics be removed from page 287.

Description of Course to be Removed:

(to be removed from page 287 of the 2023-24 WPI Graduate Catalog)

AE 6093: Advanced Special Topics (2 Credits)

Arranged by individual faculty with special expertise, these courses cover advanced topics that are not covered by the regular aerospace engineering course offerings. Exact course descriptions are disseminated by the Aerospace Engineering Department in advance of the offering.

Recommended Background

Consent of instructor

Rationale:

This course is not needed due to the introduction of AE 601.

Implementation: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to add AE 601 Advanced Special Topics

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that AE 601 Advanced Special Topics, as described below, be added.

Description of Proposed Course:

AE 601 Advanced Special Topics (3 Credits)

Arranged by individual faculty with special expertise, these courses cover advanced topics that are not covered by the regular aerospace engineering course offerings. Exact course descriptions are disseminated by the Aerospace Engineering Department in advance of the offering.

Recommended Background: Consent of instructor

Anticipated Instructors: Any faculty member from the AE Department.

Rationale:

The AE 601 Advanced Special Topics as a 3 Credit semester-long course replaces the AE 6093.

Resources Needed: None.

Implementation Date: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to add AE 602 Independent Study

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that the semester long course AE 602 Independent Study, as described below, be added.

Description of Proposed Course:

AE 602: Independent Study (1-3 Credits)

A semester-long independent study may be used as a substitute for an existing AE course or as an opportunity to study an aerospace engineering topic not currently offered as a course at WPI. The course can be offered to a student or a group of students. The requirements and deliverables are specific to the topic and are determined by the instructor.

Recommended Background: Determined by the instructor.

Anticipated Instructors: Any faculty from the AE Department.

Rationale:

This semester-long course is suitable for students in the Ph.D. program in AE.

Resources Needed: None.

Implementation Date: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to remove AE 6098 Pre-Dissertation Research

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that AE 6098 Pre-Dissertation Research be removed.

Description of Course to be Removed:

(to be removed from page 287 of the 2023-24 WPI Graduate Catalog)

AE 6098 Pre-Dissertation Research Credits (0 Credits)

For doctoral students wishing to obtain dissertation-research credit prior to admission to candidacy.

Recommended Background: Consent of dissertation advisor

Rationale:

This course is not needed due to the introduction of AE 690.

Implementation Date: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to add AE 690 Pre-Dissertation Research

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that the semester long course AE 690 Pre-Dissertation Research, as described below, be added.

Description of Proposed Course:

AE 690 Pre-Dissertation Research (*1-9 Credits*)

For doctoral students wishing to obtain dissertation-research credit prior to admission to candidacy. (Students who previously completed AE 6098 will receive credit for AE 690.)

Recommended Background: Consent of dissertation advisor

Anticipated Instructors: Any faculty member from the AE Department.

Rationale:

The AE 690 Pre-Dissertation Research as a 1-9 credit semester-long course replaces the AE 6098.

Resources Needed: None.

Implementation Date: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to remove AE 6999 Ph.D. Qualifying Exam

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that the AE 6999 Ph.D. Qualifying Exam be removed.

Description of Course to be Removed:

(to be removed from page 288 of the 2023-24 WPI Graduate Catalog)

AE 6999: Ph.D. Qualifying Examination (0 Credits)

Admission to Candidacy will be granted when the student has satisfactorily passed the Ph.D. Qualifying Examination (AE 6999). The Qualifying Examination is intended to measure each student's fundamental knowledge in two Curricular Areas to be chosen by the student from the following: Fluid Dynamics; Propulsion and Energy; Flight Dynamics and Controls; and Materials and Structures. The AE 6999 Ph.D. Qualifying Examination is graded using a Pass/Fail system as determined by a) the results from the written Candidacy Test in the two Curricular Areas chosen by the student and b) the student's performance in graduate courses taken at WPI in the same two Curricular Areas. The written Candidacy Test is typically offered during the first week of B and/or D term. A student will be tested on material from two (2) graduate courses of their choice in one AE Curricular Area and on material from one (1) graduate course of their choice in a second AE Curricular Area. In the term preceding the written Candidacy Test, a student must inform the Graduate Coordinator about their selection of the two Curricular Areas and the three courses. The written Candidacy Test is graded using the Satisfactory/Not Satisfactory Performance (SP/NP) grading system and has no retake. If a student fails to register or fails to earn a Pass in the AE 6999 Ph.D. Qualifying Examination prior to completion of 18 credits after admission to the Ph.D. program, the student must withdraw from the Ph.D. program by end of the B term or D term of the year registered for the Qualifying Examination.

Rationale:

This course is not needed due to the introduction of AE 691.

Resources Needed: None.

Implementation Date: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to add AE 691 Ph.D. Qualifying Exam

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that AE 691 Ph.D. Qualifying Exam, as described below, be added.

Description of Proposed Course:

AE 691: Ph.D. Qualifying Examination (1 Credit)

This exam is graded using the Pass/Fail (P/Fail) grading system and has no retake. If a student fails to register or fails to earn a Pass (P) in AE 691 prior to completion of 18 credits after admission to the Ph.D. program, the student must withdraw from the Ph.D. program by the end of the semester registered for AE 691. (Students who previously completed AE 6999 will receive credit for AE 691.)

Rationale:

This course is replacing the AE 6999 which is removed with a different motion and adds 1 credit to reflect the effort.

Anticipated Instructors: Administered by the AE Department.

Resources Needed: None.

Implementation Date: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to remove AE 6099 Dissertation Research

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that AE 6099 Dissertation Research be removed.

Description of Course to be Removed:

(to be removed from page 287 of the 2023-24 WPI Graduate Catalog)

AE 6099: Dissertation Research (*Credits: Variable*)

For doctoral students admitted to candidacy wishing to obtain research credit toward their dissertations.

Recommended Background: Consent of dissertation advisor

Rationale:

This course is not needed due to the introduction of AE 692.

Resources Needed: None

Implementation Date: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to add AE 692 Dissertation Research

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that the semester long course AE 692 Dissertation Research, as described below, be added.

Description of Proposed Course:

AE 692: Dissertation Research (1-9 Credits)

For doctoral students wishing to obtain dissertation-research after admission to candidacy. Students who registered for the AE 6099 will receive credit for AE 692.

Recommended Background: Consent of dissertation advisor

Anticipated Instructors: Any faculty member from the AE Department.

Rationale:

The AE 692 Dissertation Research as a 1-9 Credit semester-long course replaces the AE 6099.

Resources Needed: None.

Implementation Date: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to add AE 693 PhD Dissertation Proposal

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that the semester long course AE 693 Ph.D. Dissertation Proposal, as described below, be added.

Description of Proposed Course:

AE 693: Ph.D. Dissertation Proposal (*1 Credit*) - *Grading P/F*

For doctoral students within a year after the Qualifying Exam and admission to candidacy.

Prerequisites: Students must have successfully passed AE 691 Ph.D. Qualifying Examination.

Anticipated Instructors: Any faculty member from the AE Department serving as the Dissertation Advisor will be the instructor of record for the AE 693.

Rationale:

The motion adds 1 credit to reflect this semester-long effort. The numbering allows the Registrar to formally record this milestone which becomes part of a student's record.

Resources Needed: None.

Implementation Date: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to add AE 694 Ph.D. Dissertation Defense

Motion: On behalf of the Aerospace Engineering Department, the Committee on Graduate Studies and Research recommends and I move that the semester graduate course AE 694 Ph.D. Dissertation Defense, as described below, be added.

Description of Proposed Course:

AE 694: Ph.D. Dissertation Defense (*1 Credit*) - *Grading P/F*

For students in the Ph.D. Program within 5 years after admission to candidacy

Prerequisites: Students must have successfully passed AE 693 Ph.D. Dissertation Proposal.

Anticipated Instructors: Any faculty member from the AE Department serving as the Dissertation Advisor will be the instructor of record for the AE 694.

Rationale:

The motion adds 1 credit to reflect this semester-long effort. This allows the Registrar to formally record this important milestone and becomes part of a student's record.

Resources Needed: None.

Implementation Date: AY 2024-2025.

Date: January 17, 2024

To: WPI Faculty

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

Re: Motion to modify the Ph.D. Degree requirements in Aerospace Engineering

Motion: On behalf of the Aerospace Engineering Program, the Committee on Graduate Studies and Research recommends and I move that the Ph.D. degree requirements in Aerospace Engineering be modified as described below.

Description of the Proposed Modifications:

(From pages 79-81 of the 2023-24 WPI Graduate Catalog - with added text underlined, and deleted text ~~struckthrough~~)

Ph.D. in Aerospace Engineering

Degree Type: Ph.D.

Students admitted to the Ph.D. program in Aerospace Engineering must retain a full-time status by registering for a minimum of 8 credits per semester or a part-time status by registering for a minimum of 4 credits per semester, until they reach the maximum number of credits required by the program. Failure by a student to maintain full-time status or part-time status for one semester will be considered insufficient progress and may result in the removal of the student from the Ph.D. program. Any student pursuing the Ph.D. must establish residency by being in full-time status for at least one continuous academic year.

~~Prior to admission to Candidacy, a student may receive up to 18 credits of pre-dissertation research under AE 6098. Only after admission to Candidacy with the successful passing of AE 6999 may a student receive credit toward Dissertation Research under AE 6099. The result of the dissertation research must be a completed doctoral dissertation.~~

Ph.D. in Aerospace Engineering directly from B.S. (90 credits)

- 34 ~~30~~ graduate credits in courses distributed as follows:
 - A minimum of 2 graduate credits in each of the five AE Curricular Areas: Fluid Dynamics; Propulsion and Energy; Flight Dynamics and Controls; Materials and Structures; General Aerospace Engineering Topics (including Special Topics and Independent Study)
 - A maximum of 10 graduate credits in AE courses (including Special Topics, Independent Study and Graduate Internship Experience)
 - A maximum of 8 graduate credits in courses in or outside of AE (including Special Topics and Independent Study)
 - A minimum of 3 ~~2~~ graduate credits in applied mathematics (MA 501, MA 511 or any other course with the approval of AE graduate committee)
 - ~~0~~ 1 graduate credits for 1 semester term in AE 691 ~~6999~~ Ph.D. Qualifying Examination
 - 1 graduate credit for 1 semester in AE 693 Ph.D. Dissertation Proposal
 - 1 graduate credit for 1 semester in AE 694 Ph.D. Dissertation Defense
 - 0 graduate credits for all terms during residency in AE 5032 Aerospace Engineering Colloquium

- 30 graduate credits in Dissertation Research (AE 692 ~~6099~~)
- ~~26~~ 30 graduate credits in electives*:
 - Courses in or outside of AE (including Special Topics and Independent Study)
 - Dissertation Research (AE 692 ~~099~~)
 - Supplemental Research (AE 5098 Directed Research, AE 690 pre-Dissertation Research ~~6098~~)

Minimum Credits

90

*The graduate credits taken as part of the electives must be approved by the AE Graduate Coordinator.

Ph.D. in Aerospace Engineering directly from M.S. (60 credits)

- 15 graduate credits in courses distributed as follows:
 - 12 graduate credits in AE courses (including Special Topics, Independent Study and Graduate Internship Experience)
 - ~~0~~ 1 graduate credits for 1 semester term during residency in AE 691 ~~6999~~ Ph.D. Qualifying Examination
 - 1 graduate credit for 1 semester in AE 693 Ph.D. Dissertation Proposal
 - 1 graduate credit for 1 semester in AE 694 Ph.D. Dissertation Defense
 - 0 graduate credits for all terms during residency in AE 5032 Aerospace Engineering Colloquium
- 30 graduate credits in Dissertation Research (AE 692 ~~6099~~)
- 15 ~~18~~ graduate credits in electives*:
 - Courses in or outside of AE (including Special Topics and Independent Study)
 - Dissertation Research (AE 693 ~~6099~~)
 - Supplemental Research (AE 5098 Directed Research, AE 690 ~~6098~~ Pre-Dissertation Research)

Minimum Credits

60

*The graduate credits taken as part of the electives outside of AE must be approved by the AE Graduate Coordinator.

Academic Advising and Schedule

Temporary Advisor

Upon admission to the Doctoral Program, each student is assigned or may select an AE faculty as the Temporary Advisor to arrange an academic plan covering the first 8-10 credits of study. This plan should be arranged before the first day of registration.

Dissertation Advisor and Plan of Study

A student selects an AE faculty member as the Dissertation Advisor who agrees upon prior to registering for more than 8-10 credits. The Dissertation Advisor will approve the Plan of Study which includes the Dissertation Topic.

Ph.D. Qualifying Exam and Admission to Candidacy

Admission to Candidacy will be granted when the student has satisfactorily passed the 1-credit Ph.D. Qualifying Examination (AE 691 999). The Qualifying Examination is intended to measure each student's fundamental knowledge in two Curricular Areas to be chosen by the student from

the following: Fluid Dynamics; Propulsion and Energy; Flight Dynamics and Controls; and Materials and Structures. The AE 661 999 Ph.D. Qualifying Examination is graded using a Pass/ ~~Fail~~ Attended system as determined by a) the results from the written Candidacy Test in the two Curricular Areas chosen by the student and b) the student's performance in graduate courses taken at WPI in the same two Curricular Areas.

The written ~~Candidacy Test~~ Ph.D. Qualifying Exam is typically offered during the first week of B and/or D term. A student will be tested on material from two (2) graduate courses of their choice in one AE Curricular Area and on material from one (1) graduate course of their choice in a second AE Curricular Area. In the term preceding the written ~~Candidacy Test~~ Ph.D. Qualifying Exam, a student must inform the Graduate Coordinator about their selection of the two Curricular Areas and the three courses. The written ~~Candidacy Test~~ Ph.D. Qualifying Exam is graded using the Pass/Fail Satisfactory/Not Satisfactory Performance (SP/NP) grading system and has no retake.

If a student fails to register or fails to earn a Pass (P) in the AE 691 999 Ph.D. Qualifying Examination prior to completion of 18 credits after admission to the Ph.D. program, the student must withdraw from the Ph.D. program by end of the semester ~~of the B term or D term of the year~~ registered for the Qualifying Examination.

Dissertation Committee and Dissertation Proposal

Formed prior to registering for more than 18 credits and after Admission to Candidacy. The Dissertation Committee consists of the Dissertation Advisor, at least one core faculty of the Aerospace Engineering Program, and at least one outside member.

Dissertation Proposal

The 1-credit AE 693 PhD Dissertation Proposal is given on a Pass or Fail mode and must be attempted by a Candidate within a year after successfully passing the AE 691 Ph.D. Qualifying Examination.

Each Doctoral Candidate must prepare a brief written proposal and make an oral presentation that demonstrates a sound understanding of the dissertation topic, the relevant literature, the techniques to be employed, the issues to be addressed, and the work done on the topic by the student to date. The Dissertation Proposal must be made within a year after the Qualifying Exam and admission to candidacy. Both the written and oral parts of the Proposals are presented to members of the Dissertation Committee and a representative from the AE Graduate Committee. The prepared portion of the oral presentation should not exceed 40 minutes, and up to 60 minutes should be allowed for discussion. If the members of the Dissertation Committee and the Graduate Committee representative have concerns about either the substance of the proposal or the student's understanding of the topic, then the student will have one month to prepare a second presentation that focuses on the areas of concern. This presentation will last 15 minutes with an additional 35 minutes allowed for discussion. Students can continue their research only if they Pass the Dissertation Proposal. ~~is approved. If the Dissertation Proposal is not approved, the Doctoral Candidate may find a new Dissertation Advisor and proceed with a new Dissertation Proposal. If a Doctoral Candidate does not Pass AE 693 Ph.D. Dissertation Proposal, they may find a new Dissertation Advisor and proceed with a new Dissertation Proposal.~~

Dissertation Defense

Each Doctoral Candidate is required to defend the originality, independence and quality of research by successfully passing the 1-credit AE 694 PhD Dissertation Defense. ~~during an~~ The oral dissertation defense ~~that~~ is administered by an examining committee that consists of the Dissertation Committee and a representative of the AE Graduate Committee who is not on the Dissertation Committee. The defense is open to public participation and consists of a one-hour presentation followed by a one-hour open discussion. At least one week prior to the defense, each member of the examining committee must receive a copy of the dissertation. At the same time, an additional copy must be made available for members of the WPI community wishing to read the dissertation prior to the defense, and public notification of the defense must be given by the aerospace engineering department. The examining committee will determine the acceptability of the student's dissertation and oral performance. The dissertation advisor will determine the student's grade.

Rationale:

The changes reflect the introduction of new courses and the removal of older courses.

Resources Needed: None.

Implementation Date: AY 2023-2024.

Date: January 17, 2024
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Olson, Chair)
Re: Motion to add RBE 593 Directed Research for Capstone Experience

Motion: On behalf of the Robotics Engineering Department, the Committee on Graduate Studies and Research recommends and I move that RBE 593 Directed Research for Capstone Experience, as described below, be added.

Description of Proposed Course:

RBE 593 Directed Research for Capstone Experience (3 Credits; Cat I)

This course is for M.S. students who plan to use Directed Research to satisfy their Capstone Experience requirement. To count for the Capstone Experience requirement, the project must be approved by the project advisor at the start of the semester. The project advisor must be affiliated with Robotics Engineering. The project must include substantial analysis and/or design and conclude with a written report and a public presentation.

Prerequisites: Consent of an RBE affiliated research advisor. Before Students can enroll in RBE 593, they must have completed the 9-credit RBE Foundations and additional 6 credits including any combination of RBE core, electives, and Engineering Context.

Anticipated Instructors: All RBE and affiliated faculty are eligible to advise Directed Research.

Rationale:

RBE has long allowed DR to satisfy the Capstone Experience, but there is no easy way to track if the DR meets the higher bar for the Capstone Experience. Some students have "slipped through the cracks" by taking DR in their first term and having it check the Capstone requirement in Workday. Adding this course will streamline tracking.

Resource Needs: No additional needs beyond what is already dedicated to DR.

Anticipated enrollment: 5 - 10 students per year

Impact on Distribution Requirements and Other Courses: This motion includes an update for the MS requirements in RBE (see parallel motion), which will require students to complete 15.0 credits of the RBE Core before engaging in the Capstone Experience.

Implementation Date: AY 2024-2025.

Date: January 17, 2024
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Olson, Chair)
Re: Motion to modify RBE 596 Robotics Engineering Practicum

Motion: On behalf of the Robotics Engineering Department, the Committee on Graduate Studies and Research recommends and I move that the description of RBE 596 Robotics Engineering Practicum be modified as described below.

Description of the Proposed Modifications:

Current Course Description:

RBE 596 Robotics Engineering Practicum (3 Credits)

This practicum provides an opportunity to put into practice the principles studied in previous courses. It will generally be conducted off campus and will involve real-world robotics engineering. Overall conduct of the practicum will be supervised by a WPI RBE faculty member; an on-site liaison will direct day-to-day activity. For a student from industry, a practicum may be sponsored by his or her employer. The project must include substantial analysis and/or design related to Robotics Engineering and will conclude with a substantial written report. There can be no confidential or proprietary company information in the project. A public oral presentation must also be made, to both the host organization and a committee consisting of the supervising faculty member, the on-site liaison and one additional WPI faculty member. This committee will verify successful completion of the practicum.

Prerequisites: Consent of practicum faculty advisor

Proposed Course Description:

(with added text highlighted in green)

RBE 596 Robotics Engineering Practicum (3 Credits)

This practicum provides an opportunity to put into practice the principles studied in previous courses. It will generally be conducted off campus and will involve real-world robotics engineering. Overall conduct of the practicum will be supervised by a WPI RBE faculty member; an on-site liaison will direct day-to-day activity. For a student from industry, a practicum may be sponsored by his or her employer. The project must include substantial analysis and/or design related to Robotics Engineering and will conclude with a substantial written report. There can be no confidential or proprietary company information in the project. A public oral presentation must also be made to both the host organization and a committee consisting of the supervising faculty member, the on-site liaison and one additional WPI faculty member. This committee will verify successful completion of the practicum.

Prerequisites: Consent of practicum faculty advisor. The student must have completed the 9-credit RBE Foundations and additional 6 credits including any combination of RBE core, electives, and Engineering Context before enrolling in RBE 596.

Rationale:

The changes reflect proposed changes in a parallel motion to ensure that the capstone experience builds on material in the program.

Resources and Anticipated Instructors: No additional resources beyond what is already dedicated.

Impact on Degree Requirements: Some students may be delayed in pursuing a Practicum.

Implementation Date: AY 2024-2025

Date: January 17, 2024
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Olson, Chair)
Re: Motion to modify the requirements for the non-thesis MS program in RBE

Motion: On behalf of the Robotics Engineering Department, the Committee on Graduate Studies and Research recommends and I move that the requirements for the non-thesis MS Program in RBE related to the Capstone Experience be modified, as described below.

Description of the Proposed Modifications:

Overview of modifications: Add a requirement that students must complete the 9-credit RBE Foundations and additional 6 credits including any combination of RBE core, electives, and Engineering Context before enrolling in one of the options for completing the Capstone Experience. The changes below incorporate a parallel motion for a new course, RBE 593 Directed Research for Capstone Experience.

Current Catalog Description:

(taken from page 71 of the 2023-24 WPI Graduate Catalog)

Non-Thesis Option

As an alternative to a 9-credit research-based thesis, students may elect a 3-credit capstone from the following options:

- Capstone Project Experience in Robotics Engineering (RBE 594),

 - Robotics Engineering Practicum (RBE 596),
- or
- Directed Research (RBE 598).

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

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

The Robotics Engineering Practicum (RBE 596) provides students an opportunity to put into practice the principles that have been studied in previous courses. It will generally be conducted off campus and will involve a real-world robotics-engineering situation. Overall conduct of the practicum will be supervised by a WPI RBE faculty member; an on-site liaison will direct day-to-day activity. For a student from industry, the practicum may be sponsored by his or her employer. The project must include substantial analysis and/or design related to Robotics Engineering and will conclude with a public presentation and substantial written report. There can be no confidential or proprietary company information in the project.

The Directed Research (RBE 598) option provides a research-oriented means to satisfy the capstone requirement. The student and research advisor will agree on the specific topics and deliverables on a per-

project basis. The project must include substantial research, analysis and/or design related to robotics engineering and will conclude with a substantial written report and public presentation. The research advisor of the RBE 598 course must be affiliated with the RBE Department.

Proposed Catalog Description:

(taken from page 71 of the 2023-24 WPI Graduate Catalog, with added text highlighted in green, and text to be deleted ~~struckthrough~~)

Non-Thesis Option

As an alternative to a 9-credit research-based thesis, students may elect a 3-credit capstone from the following options:

- Capstone Project Experience in Robotics Engineering (RBE 594),
- Robotics Engineering Practicum (RBE 596),

or

- Directed Research (~~RBE 598~~) **for Capstone Experience (RBE 593)**.

All non-thesis options must demonstrate significant graduate-level work involving Robotics Engineering, include substantial analysis and/or design, and conclude with a written report and public presentation. **Students must complete the 9-credit RBE Foundations and additional 6 credits including any combination of RBE core, electives, and Engineering Context before they can enroll in a course that satisfies the capstone requirement.**

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

The Robotics Engineering Practicum (RBE 596) provides students an opportunity to put into practice the principles that have been studied in previous courses. It will generally be conducted off campus and will involve a real-world robotics-engineering situation. Overall conduct of the practicum will be supervised by a WPI RBE faculty member; an on-site liaison will direct day-to-day activity. For a student from industry, the practicum may be sponsored by his or her employer. The project must include substantial analysis and/or design related to Robotics Engineering and will conclude with a public presentation and substantial written report. There can be no confidential or proprietary company information in the project.

The Directed Research (~~RBE 598~~) **for Capstone Experience (RBE 593)** option provides a research-oriented means to satisfy the capstone requirement. The student and research advisor will agree on the specific topics and deliverables on a per-project basis. The project must include substantial research, analysis and/or design related to robotics engineering and will conclude with a substantial written report and public presentation. The research advisor of the RBE 598 **593** course must be affiliated with the RBE Department.

Rationale:

A capstone experience draws from skills and knowledge developed in the program; requiring students to

complete the core codifies the intention of the capstone.

Resources and Anticipated Instructors: No additional resources beyond what is already dedicated to capstone.

Impact on Degree Requirements: Some students may be delayed in taking a capstone course.

Implementation: AY 2024-2025.

Date: January 17, 2024
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Olson, Chair)
Re: Motion to modify the Core Robotics Engineering Electives in the MS program in RBE

Motion: On behalf of the Robotics Engineering Department, the Committee on Graduate Studies and Research recommends and I move that the requirements for the Core RBE Electives in the Robotics Engineering MS program be updated in the catalog, as described below.

Description of the Proposed Modifications:

Overview of modifications: Remove Directed Research, Independent Study, and capstone courses from list of allowable courses in the RBE Core.

2021-2022 Graduate Catalog Description:

(taken from page 168 of the 2021-22 WPI Graduate Catalog)

Core Robotics Engineering Electives (6 credits)

Any RBE 500+ other than the above. [Note: "above" refers to RBE 500, 501, and 502]

2023-2024 Graduate Catalog Description:

(taken from page 69 of the 2023-24 WPI Graduate Catalog)

[Note: Due to a communication error, the current 2023-24 edition of the catalog contains wording more similar to the proposed wording, though it was never approved by CGSR.]

Core Robotics Engineering Electives (6 credits)

Any RBE 500+ other than RBE 594, RBE 596, RBE 598, RBE 599, and RBE 699.

Proposed Catalog Description:

(taken from page 69 of the 2023-24 WPI Graduate Catalog, with added text highlighted in green, and text to be deleted ~~struck through~~)

Core Robotics Engineering Electives (6 credits)

Any RBE 500 510+ other than RBE 593, RBE 594, RBE 596, RBE 597, RBE 598, RBE 599, and RBE 699. RBE 595 (Special Topics courses) count towards the CREE.

Rationale:

The current wording, which mentions "any RBE 500+," implies that students may consider enrolling in any RBE 590+ courses to fulfill the core requirements. However, this is not our intention. We aim to exclude RBE 59X credits (except for RBE 595) from the core electives because these courses do not adhere to the typical schedule and activities expected in a regular course.

Resources and Anticipated Instructors: None.

Impact on Degree Requirements: Students who might have used DR for the Core in the past will now have to take an additional core (lecture) course.

Implementation: AY 2024-2025.