WORCESTER POLYTECHNIC INSTITUTE

May 9, 2023

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

The ninth Faculty meeting of the 2022-2023 academic year will be held on **Tuesday**, **May 9, 2023 at 11:00am in OH 107 and by Zoom at:** https://wpi.zoom.us/j/98960213982 . Refreshments will be available in OH 107 at 10:45am.

1. Call to Order — M. Richman
   - Approval of the agenda
   - Approval of the consent agenda including minutes of the April 18, 2023 meeting
2. Opening Announcements
3. President's Report — G. Wang
4. Committee Business:

   Committee on Academic Operations (CAO)
   - **Motion to approve the May 2023 Undergraduate Student Graduation List** — J. Srinivasan

   Committee on Graduate Studies and Research (CGSR)
   - **Motion to approve the May 2023 Graduate Student Graduation List** — D. Medich

   Committee on Governance (COG)
   - **Motion to Adopt the Reorganized Faculty Handbook** — L. Albano, G. Heineman, M. Richman

   Committee on Academic Policy (CGSR)
   - **Motion to establish a Master of Architecture degree program in Civil, Environmental, and Architectural Engineering (CEAE)** — D. Medich, C. Eggleston, S. Van Dessel
   - **Motion to establish an M.S. degree program in Financial Technology (FinTech) in the Business School** — D. Medich, P. Shah
5. New Business
6. Provost's Report — W. Soboyejo
7. Closing Announcements
8. Adjournment

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WORCESTER POLYTECHNIC INSTITUTE
Faculty Meeting Minutes
April 18, 2023

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3. President's Report
4. Committee Business: COG, CAP, CAP
5. New Business
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Detail:

1. Call to Order

The eighth faculty meeting of the 2022-2023 academic year was called to order at 3:20pm in Olin Hall 107 by **Prof. Richman** (AE). Prof. Richman reminded all those in attendance that the meeting was being recorded for the purpose of accurate minutes only. The meeting agenda was approved as distributed. The consent agenda, consisting of the minutes from the March 30, 2023 meeting, 13 motions from CAO, and one motion from CGSR, were approved with minor typos corrected. Prof. Richman thanked all those responsible for the work required to bring the motions to the faculty for approval.

2. Opening Announcements

Prof. Richman urged everyone to attend the Faculty Convocation on April 28th (at 11am followed by a light lunch at noon). The Convocation is an opportunity for the community to celebrate the accomplishments of our colleagues as a reflection of what we all do. The awards presented include the TA of the year, the Moruzzi Young Faculty award for Innovation in Undergraduate Education, and trustees' awards for outstanding academic advising, outstanding research and creative scholarship, outstanding teaching, and the Chair's prize for exemplary all-around achievement.

Prof. Richman also encouraged all faculty members to participate in the upcoming commencement ceremonies. Graduate commencement will be held on May 11th at 5pm, undergraduate commencement will be held on May 13th at 10am, and the baccalaureate ceremony will be held on May 12th at 5pm. Graduation regalia can be ordered through the campus bookstore.

Prof. Gericke (UGS) explained that due to an oversight this year, Project Presentation Day (April 21) is scheduled to coincide with Eid al-Fitr. Prof. Gericke asked all faculty members to accommodate all students who, for religious reasons, will not participate on April 21. An extra event has been scheduled on April 24 to provide those students with an alternative opportunity to present their project projects with their whole project teams.

Prof. Richman introduced President Wang with an audio clip from Saturday's Worcester Woo Sox game at which President Wang was invited to throw out the first pitch.

3. President's Report

President Wang looked forward to productive future collaborations with students, faculty, and staff. She thanked all those who had help her adjust to the campus so far, and she expressed her appreciation particularly to Provost Soboyejo for his partnership, and to Prof. Richman, Prof. Albano, Prof. Heineman, Prof. Troy, the many committee Chairs, committee members, and the many faculty members who had already shared their understanding of WPI with her. Pres. Wang believes that WPI will continue to expand its research and innovation ecosystem to deliver external impact to our community and beyond. She will continue conducting her listening sessions throughout the summer and throughout the next academic year.

President Wang expressed her view that our strategic plan, which is two years old, does not need to be changed. Rather, over the past few months it has been translated into a draft list of strategic priorities on which the community has been and will continue to be welcome to provide its input. She encouraged everyone to remain involved as the priorities are translated into actions.

President Wang indicated that we had received around 12,000 admission applications this year, which slightly exceeded last year's total. We are in the process of hosting admitted student days on campus, and we are on track to reach our admission goal for fall 2023. Finally, Pres. Wang encouraged all faculty members to attend the upcoming Convocation and commencement events.

4. Committee Report

Committee on Governance (COG): Reorganization the Faculty Handbook: Focus of "Tenure," "Promotions," and the "Faculty Grievance Procedure."

Prof. Albano (CEAE; COG, Chair) and **Prof. Heineman** (CS; COG, Sec.) explained that at the upcoming May 9 faculty meeting, COG will bring a motion to adopt the reorganized Faculty Handbook in place of the current (July 1, 2022) version of the Faculty Handbook. Although the current version is accurate, it is extremely difficulty to navigate and interpret. **Prof. Heineman** explained that the emphasis of the project has been on reorganization while improving clarity and usability. The reorganized information has been placed in five coherent chapters: Governance; Academic Appointments; Tenure; Promotions; and a Faculty Grievance Procedure. (See **Addendum #1** on file with these minutes.)

Prof. Heineman focused on the Tenure chapter in the draft of the reorganized Faculty Handbook. It is organized into seven sections: Eligibility for Tenure, Probationary Appointments, and Mandatory Reviews; the Tenure Clock; the Tenure Criteria; Department Tenure Committees (DTCs); Joint Tenure Committees (JTCs); Joint Tenure Committees for Interdisciplinary Candidates; and Tenure Procedures. Prof. Heineman also showed a mapping that gave the locations in the current faculty handbook from where this information originates. He summarized the wording that has been modified to conform to accepted current practice: professors at the assistant rank receive a combined review for tenure and promotion; the Provost's annual list of probationary faculty members includes only relevant information; the Department Head is given the responsibility for writing the JTC letter of recommendation in the case of a negative tenure recommendation; the requirement that the JTCs file minutes with the Secretary of the faculty is eliminated; and the replacement process for JTC members who resign is specified. The chapter also includes generalized wording to include Professors of Teaching as TTTs; it provides clear definitions of the probationary period, the tenure clock, and tenure review timing; it includes clarifications of the process for early tenure for special contributions by a faculty member and when the academic freedom of a faculty member is in jeopardy. It also includes more clarity in communicating the effect of tenure clock stoppages on individual faculty member's scheduled tenure review; and it provides for more timely formation of JTCs for interdisciplinary candidates.

Prof. Albano described the organization of the Promotions chapter. It is organized into five sections: Eligibility, Time in Rank, and Conditions for Promotion; Promotion Criteria; Promotion Procedures to (full) Professor; (full) Professor of Teaching, (full) Teaching Professor, and Associate Teaching Professor; Promotion Procedures to Senior Instructor, Assistant Teaching Professor, Associate Research Professor, and (full) Research Professor; and Mentoring and Professional Development of Professors at the Associate Level. Prof. Albano also provided a mapping that showed the locations in the current faculty handbook from where this information originates. He summarized wording that had been modified to conform to accepted current practice: Associate Professors and Associate Professors of Teaching should first achieve tenure before seeking promotion to the full rank; procedures and dossier format for promotion to Associate and (full) Teaching Professors follow those for promotion to (full) Professor and (full) Professor of Teaching; letters of promotion recommendations are signed by the voting members of the JTC, only; and the stated standards for evaluation apply to all reviewers. The chapter also includes generalized wording that is consistent with the expectations of the teaching faculty, and it simplifies how credit for time-in-rank is documented and considered in the timing of promotion eligibility.

Prof. Albano described the organization of the Faculty Grievance Procedure chapter. It is organized into five sections; Grounds; Submission of Relevant Documentation and Dates for Filing a Grievance; Formation of an FRC

Subcommittee and Recusals; Investigation and Access to Relevant Documentation; and Resolution, Required Actions, and Final Appeals. Prof. Albano also provided a mapping that gave the locations in the current faculty handbook from where this information originates. He summarized the wording that had been modified to conform to accepted current practice: that the grievance procedures apply to cases of non-renewal and termination of secured teaching faculty members on 3- and 5-year contracts.

Prof. Albano summarized the reorganization effort as one that unscrambles and unifies the faculty handbook. It eliminates much of the existing confusion and clarifies the broad and technical issues that we will need to address in the future. He suggested that we focus on the big improvements of the reorganized document rather than getting distracted by the issues that will require larger policy changes to fix. Finally, Prof. Albano welcomed all feedback directed to any member of COG through email and encouraged anyone who wanted to meet in person to take advantage of the six hours of drop-in sessions scheduled by COG over two days later this week.

Prof. Richman explained that the approach to hold six hours of drop-in sessions rather than a single open meeting was chosen by COG to maximize the chances that any person with questions or feedback could meet directly with members of COG.

Committee on Academic Policy (CAP): Motion to Establish a New Undergraduate BS degree Program in Financial Technology (FinTech)

Prof. Servatius (MA) and **Prof. Hall-Phillips** (BUS) presented on behalf of CAP. **Prof. Servatius** moved on behalf of the Business School and the Committee on Academic Policy that a new bachelor's degree in financial technology (FinTech) be added to WPI's undergraduate degree program. (See **Addendum #2** on file with these minutes.)

Prof. Hall-Phillips introduced the FinTech program, which sits at the intersection of business, finance, and information technology. Noting that students in the program will develop essential knowledge and skills in all three areas, Prof. Hall-Phillips shared the list of key learning objectives. She presented an overview of degree requirements.

This program will require the typical university requirements. For the core, Prof. Hall-Phillips noted that the courses in the four-course business foundation, three-course FinTech foundation, three technical and three analytics courses were either already offered in the School of Business or have been developed for this program. Prof. Hall-Phillips then described the three FinTech concentrations developed in collaboration with other departments. These are Financial Technologies, Financial Analytics, and Financial Mathematics. All three concentrations require students to take two courses that come from the school of business and the other four from the department aligned with their concentration. If students do not select a concentration, they will take two of the required courses from the Business School and their other four from at least two of the different concentration groupings. This will make up the general concentration.

Prof. Hall-Phillips thanked the other departments for their cooperation and help in figuring out the details behind these concentrations.

Prof. Wobbe (DIGS) asked about the coverage of sustainability issues within FinTech. **Prof. Hall-Phillips** explained that the MQP for this program will be matched with the FinTech Project Center that has been going on for a while and these projects often have sustainability pieces in them. Some of the business and behavioral courses they are taking will also touch on sustainability.

Prof. Richman pointed out that two of the new courses mentioned were part of the consent agenda and have just been approved.

This motion passed.

Committee on Academic Policy (CAP): Motion to Allow Changes to Submitted Student Projects for Protecting Privacy and Confidentiality

Prof. Servatius (MA) and **Prof. Calli** (RBE) represented the Committee on Academic Policy (CAP). **Prof. Servatius** moved that the WPI Electronic Project Submission Policy be modified (by adding an exception governed by a proposed "WPI Personal Privacy and Confidentiality Change Policy") to allow for changes to archived projects based

on concerns for privacy and confidentiality without any time constraint, and that WPI's Undergraduate Catalog be updated to reflect these changes. (See **Addendum #3** on file with these minutes.)

Prof. Calli (RBE) summarized the changes and explained the reasoning behind them. He noted that the motion makes two changes: 1) it replaces "Digital WPI" with "WPI's digital repository;" and 2) it makes an exception to the current policy's prohibition against any changes to a project once it is electronically submitted. The exception concerns published undergraduate student work in the digital repository when changes are necessary to protect personal privacy and confidentiality, "per the WPI Personal Privacy and Confidentiality Change Policy with Respect to Electronic Project Submissions."

In the remainder of the presentation, **Prof. Calli** explained this "Personal Privacy and Confidentiality Change Policy with Respect to Electronic Project Submissions" (PP&CCP). The PP&CCP affirms WPI's goal of protecting the personal privacy and confidentiality of its student authors and members of the extended WPI community (project sponsors, interviewees, and collaborators). Prof. Calli noted that this policy covers only undergraduate student projects and indicated that there will be an official approval process based on the need to protect the confidentiality and privacy of individuals in the above categories. If approved, these changes would be made to the publicly available electronic records, while the original submissions would be maintained in non-public administrative archives. Prof. Calli explained that the reason for this motion is that the library occasionally hears from former students who have changed their names, or whose personal information (addresses, phone numbers) were inadvertently published in a project report, requesting that this information be changed or removed. He shared examples of universities and publishing houses that allow changes in the interests of fostering diversity (for example, to accommodate gender-affirming name changes for transgender people). The motion allows for changes to be requested at any point during or after project submission. He explained that the Gordon Library staff have already drafted an implementation process (included in the meeting materials).

Prof. Ryder (BBT) wondered why this policy is restricted to undergraduate projects. **Prof. Calli** explained that the Committee on Academic Policy (CAP) considers policy for undergraduate students; the Committee on Graduate Studies and Research (CGSR) will consider the policy next year.

Prof. Samson (HUA) asked whether issues of intellectual property are included in the proposed policy. He noted that a former MQP student wanted to protect his MQP work as intellectual property. **Prof. Calli** explained that changes based on intellectual property (allowed within 180 days) are covered by a different policy, but that the policy under discussion does not involve intellectual property concerns.

Prof. Brown (ECE) noted that the policy does not identify the person or committee responsible for reviewing and approving these requests. **Prof. Calli** explained that CAP considers this an implementation detail. The main goal of this policy is privacy and confidentiality. Prof. Calli indicated that the implementation plan included in the meeting materials designates the Dean of Undergraduate Studies as the reviewer of requests.

Prof. Brattin (HUA) expressed his desire to see the policy indicate the individual responsible for reviewing requests. He also observed that the motion is quite vague in allowing revisions in the interest of "privacy and confidentiality," a phrase that covers much more than name changes or a mistaken phone number. He wondered if the exception includes project sponsors who don't want information (for instance, survey responses) to be made available. He suggested that the language should more specifically indicate the purpose of privacy in name changes. **University Librarian Gold** acknowledged the value of specificity but noted that the authors of this proposal wanted to leave open the possibility of privacy-related requests they can't at this time anticipate but that would be persuasive to the person responsible for reviewing requests. However, the open-endedness of the policy language is not intended as a way to renegotiate project contents with a sponsor.

Prof. Shue (CS) asked whether the policy would allow for name changes that are public rather than private (a married name, for example). **University Librarian Gold** explained that the intention of the policy was to handle the more difficult situations where there is not a desire to share a name change with the public. She noted that the WPI Library does have a related policy of accepting a public name change in the metadata, but she thought it unlikely that the authors of the proposal would be in favor of changing projects based on public name changes. **Prof. Shue** suggested a change in wording to allow for public name changes. **University Librarian Gold** reminded people that this word change is not in the spirit of the policy.

Prof. Boudreau (HUA) spoke against the proposed wording to allow changes for married names. She drew a contrast between name changes based on marriage (a public event) and those based on gender transitions. When we look at married people, we can assume they were once single. Prior names are called dead names because people typically do not want it known that they once used a differently gendered name. Because of that difference, only the second kind of name change is a privacy and confidentiality issue. In her opinion, the proposed policy should not be expanded to include married name changes.

Prof. Shue clarified that he will not propose this change as an amendment to the motion, but he expressed concern that the goal of this motion is not being achieved.

Prof. Dominko (BBT) asked how this is reconciled with other WPI documents, since the project is not the only document associated with names. **Prof. Calli** explained that this proposed policy change covers only electronic project submission.

Prof. Mortensen (CS) asked if this policy is student or alumni facing, and will people know that it is about removing someone's dead name from a document. **Prof. Calli** explained that the idea was to put publicly facing information on the library website and other places to make the purpose of the policy clear to the students.

Prof. Brown (ECE) stated that the examples shown from other universities are more explicit about the intent of their policies (regarding name changes) and expressed his concern that the intent here was obscure. **Prof. Calli** stated that the university public archives usually do not explicitly refer to name changes, while digital archives typically do.

Prof. Servatius (MA) asked whether this published archive will include an indication that the contents of the documents may have been changed. **University Librarian Gold** responded that she'd want to reflect on the suggestion and how to word it in a way that affirms the library's commitment to the archive. She thought a statement might be written that is truthful to the limits of the changes that are made or the reasons for the changes.
The motion passed.

5. New Business

There was no new business.

6. Provost's Report

Provost Soboyejo reflected on his transition back to the Provost's office and the importance and power of collaboration. He cited, as a first example, the handbook project started by Prof. Richman that has since become a team effort involving faculty members, members of the administration, and the Board. Provost Sobojeyo added that he is assured that President Wang is fully in support of the effort and that she is committed to it. Provost Soboyejo also indicated that he has kept Board Chair, Bill Fitzgerald informed of the progress we have made, and that as Chair, Mr. Fitzgerald understands the great value the revised handbook will have in unifying our institution. Provost Soboyejo further encouraged everyone to provide their feedback over the next two weeks so we will have a Faculty Handbook that captures what we believe in at our core, while remaining open to making future improvements.

Provost Soboyejo spoke about the support we could give to our Black students, and how we should put into practice all the techniques that we know will work. Provost Soboyejo suggested providing orientation pathways for incoming students in ways that would help them to be more successful. These pathways include offering summer and first-year courses that students can take to better learn the foundations of math, physics, computer science and chemistry irrespective of their high school preparation. These subjects can take longer for some students to learn, but what matters most is how deeply the subject matter sinks in. It is up to the faculty to assure our students that there is no shame in taking longer to learn in a meaningful way. Provost Soboyejo encouraged everyone to participate in faculty development opportunities that will be offered to share the best practices in this regard, and he shared his view that doing so is a part of building a culture of campus well-being.

Provost Soboyejo encouraged everyone to continue over the next four weeks to interact positively with each other, with our community, and to enjoy the moments we have together.

7. Closing Announcements

Prof. Richman pointed out that the next faculty meeting is only three weeks away on May 9th after the end of D-term.

8. Adjournment

The meeting was adjourned at 4:45pm.
Respectfully submitted,

Mark Richman
Secretary of the Faculty

Addenda on file with these minutes:
Addendum #1 - COG Faculty Handbook Revisions – Minutes April 18 2023
Addendum #2 - CAP motion to establish a BS degree program FinTech - Minutes April 18 2023
Addendum #3 - CAP motion to allow changes to student projects for privacy - Minutes April 18 2023

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to approve the May 2023 undergraduate student graduation list

Motion: 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 May 13, 2023. They therefore are or will be eligible to receive that degree, and on behalf of the Committee on Academic Operations, I move that – pending final verification by the Registrar that all those on the list have in fact completed their degree requirements – they be approved for May 13, 2023 graduation.

Bachelor of Arts

Environmental and Sustainability Studies:
Colby Frechette
Double Major
Abraham Koffman
Iris Morin
Julia Naras
Sydney Smith
Double Major
Thanh Trac
Double Major

Interactive Media and Game Development:
Diego Arce
Braden Arnold
Audio and Music Concentration
Justin Gaborit
Sydney Gardner
Technical Art Concentration
Minor: Computer Science
Brendan Horack
Alex Jozitis
Audio and Music Concentration
Minor: Drama/Theatre
Vladimir Karashchuk
Kurtis Kiai
Design Concentration
Yongcheng Liu
Design Concentration
Double Major
Erin Marczewski
Yaseen Nagib
Design Concentration
Daniel Pacheco-Cruz
Victoria Rindeiko
Kirsten Roethel
Alan Roush
Audio and Music Concentration
Percy Rynkowski
Jaden Smith-Borne
Writing Concentration
Mitchel Tanguay
Writing Concentration
Aaron Waldman
Hanwen Xu

Bachelor of Science

Actuarial Mathematics:
Zachary Ahearn
Demetre Doherty
Anshika Jain
Olivia Pineiro
Minor: Business
Brinda Venkataraman
Double Major
Shiyu Wu
Double Major

Aerospace Engineering:
Emily Abbe
David Acuna
Double Major
Zachary Angell

Aerospace Engineering cont.:

Michael Beskid
Double Major
Jacob Borowsky
Minor: Business
Aaron Boyer
Bryce Bragdon
Minor: Music
Ryan Brunelle
Calista Carrignan
Minor: Robotics Engineering
Jack Charbonneau
Paul Coccomo
Noah Cook
Garrett Devlin
Minor: History
Robert Devlin
John Dougherty
William Fisher
Minor: Mechanical Engineering
Logan Frandsen
Minor: Economics
Tyler Guertin
Dev Gujarathi
Drake Hamblin
Sarah Hildreth
Anwar Hughes-Crawford
Lily Kinne
Minor: International and Global Studies
Alexander Lagle
Newton Le
Matthew Liliedahl
Megan Malito
Amaya Massari
Minor: Business
Nicholas Masse
Marcela Mayor
Travis McGregor
Sean McMahon
Noah Mester
Jacob Mitchell
Connor Moriarty
Minor: Computer Science
Nicholas Paszczuk
Minor: German
Deep Patel
Toshak Patel
Minor: Astrophysics
Nickolas Pellegrini
Caleb Powell
Minor: Mechanical Engineering
Alexander Psenicka
Emily Raynowska
Minor: Astrophysics
David Reynolds
Christopher Ritter
Julian Robles
Minor: Electrical and Computer Engineering
Jacob Roller
Minor: Electrical and Computer Engineering
Kofi Sarfo
Kevin Schultz
Trevor Shrady
Katie Smith
Mason Thyng
Gabrielle Tims
Rory Veguilla
Hunter Wagner
Ryan Weeks
Benjamin Workinger
Minor: Astrophysics

Applied Physics:

Nathaniel Gamboa
Camille McDonnell
Minor: Chemistry

Architectural Engineering:

Stefanie Beaudry
Minor: Sustainability Engineering
Vanessa Bussiere
Derek Childs
Keira Coulard-Smith
Phebe Cunningham
Makayla Delo
Emily Deptula
Minor: Sustainability Engineering
Hannah Frieden
Holly Hazelton
Minor: Sustainability Engineering
Sarah Johnson
Minor: Mechanical Engineering

Architectural Engineering cont.:

Lucas Kamal
Danforth Kenerson
Talia Mamayek
Minor: Environmental and Sustainability Studies
Kyle Mann
Minor: Sustainability Engineering
Anne McNamara
Hannah Rodenbush
Margot Schassler
Minor: Sustainability Engineering
Adam Shi
Joseph Sorrenti
Athina Theofilou
Gianna Viele
Sebastian Villacorta
Minor: Mechanical Engineering
Georgy Zhukov

Biochemistry:

Safiya Ali
Jon Aronoff
Double Major
Ishani Bedre
Minor: Psychology
Eleni Bellas
Minor: Bioinformatics and Computational Biology
Lali Berelashvili
Double Major
Chloe Byrne
Minor: Business
Shane Dancer
Marissa Desir
Hannah Duncan
Minor: Chinese Studies
Minor: Bioinformatics and Computational Biology
Jillian Earley
Minor: Psychological Science
John Gabelmann
Grace Hadley
Anna Hickman
Amanda Holbrook
Minor: Bioinformatics and Computational Biology
Kimberly Huaman
Minor: Global Public Health
Tovah Lockwood
Minor: Drama/Theatre
Jeffrey Marsh
Eliza Mastergeorge
Minor: Global Public Health
Adam McKnight
Sofi Murray
Minor: History
Misha Rashkovskii
Brandon Rein
Minor: Psychology
Catherine Reynolds
Jessica Takami
Sophia Togneri
Double Major
Christina Tsillas
Psychobiology Concentration
Double Major
Minor: Global Public Health
Olivia Wallace
Aaron Wheeler
Natalia Wierzbicki
Leo Zhu

Bioinformatics and Computational Biology:

Chloe Byrne
Minor: Psychological Science
David Datta
Adam LaBombard
Wesley Lo
Double Major
Minor: Music
Sophia Strano
Double Major

Biology and Biotechnology:

Hannah Allen
Olivia Atkins
Alexia Barcus
Minor: Biochemistry

Biology and Biotechnology cont.:

Claire Behning
Double Major
Alexander Boucher
Ally Breen
Alexander Breiling
Double Major
Kaylee Gladu
Alexander Guerra
Hope Hutchinson
Double Major
Hannah Kachadoorian
Minor: Biochemistry
Natalie Kay
Minor: Bioinformatics and Computational Biology
Lia Kelly
Susanna Oppong
Michelle Pan
Minor: Bioinformatics and Computational Biology
Gabrielle Paquette
Amelia Sadlon
Minor: Environmental and Sustainability Studies
Minor: Global Public Health
Hannah Shell
Hannah Smith
Katherine Stratton
Minor: Drama/Theatre
Vinh Tran
Tammie Zhu

Biomedical Engineering:

Zara Alkaff
Minor: Spanish
Priscilla Anand
Minor: Biology
Christina Avakian
Carter Bach
Araceli Baeza Gonzalez
Riley Baranowski
Minor: Electrical and Computer Engineering
Mary Barsoum
Minor: Mechanical Engineering
Tatyana Barthold
Abigail Bartynski
Marino Bertone
Caitlin Bonavita
Sarah Boynton
Minor: Psychology
Anthony Bozza
Brian Brooks
Olivia Brown
Cleo Caldwell
Minor: Biology
Myah Caplan
Minor: Law and Technology
Minor: Chemistry
Emma Carleton
Navelyn Carrillo
Rachel Chan
Double Major
Akhil Chilamkurthi
John Clewley
Jonathan Coco
Alexis Compton
Brendan Corcoran
Steven Defreitas
Minor: Interactive Media and Game Development
Sofia Demonico
Minor: Mechanical Engineering
Minor: Spanish
Kyle Deroma
Minor: Chemistry
Binh Diec
Minor: Materials
Alison Drapeau
Rachel Drasser
Nicole Dressler
Minor: Mechanical Engineering
Gillian Ebeling
Minor: Psychological Science
Sarah Francis
Emily Frick
Madison Gass
Minor: Mechanical Engineering
Erin Gowaski
Ana Grandgeorge
Max Halloran

Biomedical Engineering cont.:

Samantha Havel
Minor: Mechanical Engineering
Tara Haymon
Double Major
Gabrielle Healey
Giulia Herszage Rocha
Double Major
Elizabeth Hicks
Sydney Hobson
Minor: Electrical and Computer Engineering
Emily Howard
Minor: English
Khaled Jarad
Double Major
Kyle Johns
Eric Johnson
Grace Jolin
Double Major
Priyanka Joshi
Minor: Bioinformatics and Computational Biology
Cayla Jumpp
Minor: Mechanical Engineering
Richard Kern
Double Major
Charlotte Kokernak
Regan Krizan
Double Major
Ian Lafountain
Marissa Langille
Carmellitta Le
Kelsey Leach
Minor: Physics
Julie Lee
Double Major
Samantha Katerina Lopez
Minor: Biology
Alena Lukovnikova
Kaylie Lunderville
Minor: Materials
Elisabeth Lynn
Malika Maksudiy
John Martel
Samuel Mather
Ashleigh Matsis
Minor: Mechanical Engineering
Minor: Spanish
Michaela Mattson
Minor: Computer Science
Abigail Maynard
Molly McGinn
Jacob Mills
Anastasia Mina
Double Major
Dylan Moroney
Minor: Mechanical Engineering
Ciara Murphy
Minor: Electrical and Computer Engineering
Crystal Murray
Double Major
Chloe Naasz
Minor: English
Isabel Nearing
Srikar Nekkanti
Amy Ngan
Adam Olson
Megan Ouellette
Emily Pacheco
Abhinav Palisetti
Minor: Robotics Engineering
Gianluca Panza
Minor: Biology
Marcel Paolillo
Casey Peris
Gabriel Rivera
Minor: Mechanical Engineering
Santiago Rivero
Gabrielle Rosales
Marc Rosenthal
Minor: Electrical and Computer Engineering
Madison Sanborn
Luis Sandoval
Minor: Mechanical Engineering
Tiffany Saunders
Minor: Chemistry
Liudmila Serebrennikova
Biomechanical Concentration
Double Major
Julia Sherwin
Emma Shulenburg

Biomedical Engineering cont.:

Andrew Sifferlen
Minor: Business
Emma Smith
Minor: Biology
Khushi Soni
Isadora Sorpol
Minor: Spanish
Hope Soucy
Kyle Staubi
Minor: Electrical and Computer Engineering
Catherine Stevenson
Alexandra Taylor
Madelyn Thrasher
Double Major
Shelby Tweedie
Luese Ufuah
Double Major
Sudish Vengat
Bella Vignola
Minor: Statistics
Andrew Voronin
Minor: Biology
Micah Wilde
Ethan Wilke
Kathryn Woodland
Double Major
Maya Yaakov Jakubovitz

Business:

Franco Bazzini
Business Analytics Concentration
Livia Thomollari
General Business Concentration
Austin Zhou
Financial Technology Concentration
Minor: Data Science

Chemical Engineering:

Julia Afthim
Alexander Alonzo
Energy Concentration
Minor: Chemistry
Minor: Materials
Derek Baker
Michelle Barboza
Michela Benazzi
Minor: Chemistry
Katelyn Bergeron
Abigail Calistra
Environmental Concentration
Double Major
Griffin Carloni
Zachary Carney
Eduardo Carrillo Diaz
Alexis Clark
Nathan Crock
Cameron Cronin
Abigail Cummings
Lazi Danga
Robert Dec
Patrick Devine
Brent Ditzler
Emily Donovan
Emma Driscoll
Grace Fitzpatrick-Schmidt
Albert Foun
William Garvey
Jessica Goode
Paul Jasmin
Noah Kantor
Materials Concentration
Katherine Lacroix
Adam Lee
Kurt Lindenthal
Minor: Materials
Alana Miska
Jacob Morin
Double Major
Shayla Nguyen
Brandon Nieto
Sam Qu
Minor: Mechanical Engineering
Minor: Materials
Maheer Quasem
Minor: Mechanical Engineering
Dylan Rapoport
Biological Concentration
Wasef Raza
Matthew Shea
Reya Singh
Minor: Global Public Health

Chemical Engineering cont.:
Kristen Soden
Elitumaini Swai
Rachel Swanson
Double Major
Naomasa Tanaka
Rainier Vaughn
Antonietta Vigliotti
Morgan Watson
Lucas Wilson-Wuestefeld
Minor: Mechanical Engineering

Chemistry:
Abigail Berube
Isaac Frederique
Katherine Jones
Emma Pellerin
Minor: Astrophysics
Rebecca Ramthun
Rachel Swanson
Double Major
Kyra Tripp
Jason White

Civil Engineering:
Justin Aguilar
Adam Bartlett
Aradhana Bissoondial
Sophia Calandrello
Melanie Castillo
Christopher Cavallaro
Catie Coumounduros
Minor: Spanish
Mark Delia
Rachel Flanagan
Hannah Frank
Minor: Fire Protection Engineering
Madison Garrity
Minor: Mechanical Engineering
Jacob Gassenheimer
Theron Howe
Minor: International and Global Studies
Morgan Hughes
Emily Jorden
Minor: Business
~~John Lowther~~
Azat Mukhametkulov
Emily Mullin
Minor: Business
Aidan Murphy
Patrick Nieman
Minor: Computer Science
David Omura
Eda Raycraft
Minor: Architectural Engineering
Minor: Spanish
Jane Richardson
Thijs Seppenwolde
Double Major
Kristen Stilin
Minor: Chinese Studies
Ryan Trongone
Elizabeth Valentine
Fatimah Wattar
Colette Webster
Environmental Concentration
Double Major
Nicholas Willey
Paul Williamson
Desmond Woodson

Computer Science:
Gabrielle Acquista
Joan Albert
Minor: Data Science
Rohan Anand
Double Major
Yasmine Aoua
Double Major
Jon Aronoff
Double Major
Keval Ashara
Sean Barbour
William Bazakas-Chamberlain
Olivia Bell
Double Major
Mary Braen
Samantha Braun
Double Major
Minor: Bioinformatics and Computational Biology
Robert Brodin

Computer Science cont.:

Reagan Brunelle
Sirut Buasai
Minor: Electrical and Computer Engineering
Gabriel Buonomano
Ashley Burke
William Burke
Gabriel Camacho
Vanessa Cardaropoli
Double Major
Zane Carey
Erin Carter
Minor: Data Science
Hao Chen
Double Major
Anna Cherkinsky
Jack Ciroli
Edward Clifford
Gregory Conrad
Ian Coolidge
Daniel Correa
Double Major
Danilo Augusto Correia Da Silva
Minor: Data Science
Yanbo Dai
David Danielian
Minor: Robotics Engineering
Ryan Darcey
Double Major
Joshua Debare
Gabriel Deml
Minor: Electrical and Computer Engineering
Vishnu Priya Dendukuri
Luke Deratzou
Minor: Data Science
Keith Desantis
Cyber Security Concentration
Lena Dias
Double Major
Loren Diloreto
Shane Donahue
Evelyn Dube
Jason Dykstra
Margaret Earnest
Minor: Robotics Engineering
Patrick Eaton
Ashley Espeland
Double Major
Shen Fang
Double Major
Jacob Feiss
Carlie Flanagan
Lauren Flanagan
Double Major
Colby Frechette
Double Major
Alex Friedman
Double Major
Chandler Garcia
Double Major
Michael Geary
Roopsa Ghosh
Double Major
Sidney Goldinger
Minor: Bioinformatics and Computational Biology
Smera Gora
Double Major
Emily Gorelik
Minor: Data Science
Kendall Goto
Mayank Govilla
Double Major
Peyton Grant
Double Major
Zijian Guan
Patrick Hagearty
Double Major
Botao Han
Alexander Hayden
Minor: Electrical and Computer Engineering
Eric Heinemann
Cyber Security Concentration
Matthew Hendrickson
Double Major
Matthew Hlushko
Bao Huynh
Minor: Data Science
Abigail Hyde
Minor: Robotics Engineering
Cameron Jacobson
Xianhan Jia

Computer Science cont.:

Amanda Jones
Ian Khung
Minor: Data Science
Eri Kim
Jin Ryoul Kim
Ivan Klevanski
Gregory Klimov
Minor: Financial Technology
Minor: Data Science
Zack Koval
Double Major
Nathan Kumar
Double Major
Alexander Kwan
Minor: Data Science
Timothy Kwan
Double Major
Samuel Kwok
Harrison Kyriacou
Prudence Lam
Double Major
Harmoni Larrabee
Jacob Leavitt
Minor: Business
Michael Lepore
Megan Letendre
Nicholas Li
Sizhe Li
Minor: Interactive Media and Game Development
Emily Lin
Shannen Lin
Double Major
Yongcheng Liu
Design Concentration
Double Major
Nestor Lopez
Minor: Robotics Engineering
Liang Lu
Double Major
Ryan Luu
Alyssa Magaha
Double Major
David Mahany
Double Major
Sierra Mangini
Double Major
Cole Manning
Gregory Marshall
Double Major
Ivan Martinovic
Cyber Security Concentration
Jacob Matthews
Double Major
Dillon McCarthy
Minor: Electrical and Computer Engineering
Natalie McClain
Conor McDonough
Kyle McFatter
Sean McMillan
Tia Mehta
Patrick Mejia
Jonathan Metcalf
Jakob Misbach
Alexander Mitchell
Aidan Mulcahey
Kiara Munz
Minor: Interactive Media and Game Development
Declan Murphy
Cyber Security Concentration
Elise Nerden
Michael O'Connor
Jason Odell
Emmanuel Ola
Sean O'Connor
Minor: Interactive Media and Game Development
Rahil Parikh
Double Major
Samuel Parks
Cyber Security Concentration
Vansh Patel
Niko Pelletier
Vrandol Perez
Owen Pfannenstiehl
Double Major
Manh Nhu Pham
Sebastian Pineda
Mason Powell

Computer Science cont.:

Siddhartha Pradhan
Double Major
Stephen Price
John Prominski
Aadhya Puttur
Daniel Quackenbush
Ishan Rathi
Double Major
Liam Rathke
Bridget Redgate
Minor: Data Science
Matthew Reynolds
Brianna Roskind
Double Major
Sam Rowe
Angelo Ruggeri
Double Major
Arman Saduakas
Minor: Data Science
Jacob Salerno
Zachary Sarrett
Brandon Scanlon
Benjamin Schmitt
Kush Shah
Cyber Security Concentration
Minor: Economics
Mago Sheehy
Double Major
Nupur Shukla
Minor: Robotics Engineering
Minor: Data Science
Reily Siegel
Hayden Smith
Double Major
Casey Snow
Charles Snow
Minor: Drama/Theatre
Shane Stevens
Sophia Strano
Double Major
Alexander Strickland
Double Major
Molly Sunray
Double Major
Darian Tavana
Marie Tessier
Travis Thompson
Double Major
Cindy Trac
Double Major
Evelyn Tran
Minor: Management Information Systems
Minor: Data Science
Steven Tran
Double Major
Joshua Unger
Sai Varun Vadlamudi
Jacob Van Steyn
Double Major
Brinda Venkataraman
Double Major
Marko Vila
Double Major
Anthony Vuolo
Double Major
Finn Wander
Shiyue Wang
Double Major
Tiffany Wee Sit
Minor: Business
Vivek Wong
Yihong Xu
Double Major
Adam Yang
Minor: Electrical and Computer Engineering
Oliver Yasuna
Henry Yoder
Minor: Writing and Rhetoric
Sitsanok Young
Minor: Chinese Studies
Minor: Data Science
Michael Zeolla
Double Major
Wenjie Zhang
Yifei Zhao
Double Major
Yueting Zhu
Double Major

Data Science:
Julie Andrade
Double Major
Mark Buono
Grace Casey
Ryan Dieselman
Minor: Mathematics
Minor: Computer Science
Matthew Dzwil
Lauren Flanagan
Double Major
Jack Fredo
Jack Gomes
Smera Gora
Double Major
Katy Hartmann
Aidan Horn
Katie Houskeeper
Daniel Johnson
Florkenthia Jolibois
Nathan Kumar
Double Major
Timothy Kwan
Double Major
Jasmine Laber
Anne Lapsley
Double Major
Jackson Lombardi
Sierra Mangini
Double Major
Garrett McMerriman
Minor: Management Information Systems
Frederick Miller
Double Major
Kelsey Moody
Troy Mullenberg
Double Major
Rebecca Noris
Minor: Mathematics
Ravi Palmieri
Siddhartha Pradhan
Double Major
Daniel Rabinovitz
Calvin Rambacher
Amos Roche
Luke Savoie
Minor: Spanish
Mago Sheehy
Double Major
Hayden Smith
Double Major
Molly Sunray
Double Major
Taenler Tavares
Cameron Tomko
Cindy Trac
Double Major
Steven Tran
Double Major
Jacob Van Steyn
Double Major
Marko Vila
Double Major
Shiyu Wu
Double Major
Michael Zeolla
Double Major
Yueting Zhu
Double Major

Economic Science:
Lora Dufresne
Double Major
Cole Peterson
Double Major

Electrical and Computer Engineering:
Andrew Adiletta
Dilan Altiparmak
Connor Borsari
Minor: Robotics Engineering
Vasil Bozdo
Slater Campbell
Minor: Computer Science
Nicholas Chantre
Minor: Computer Science
Brandon Chong
Rachel Dancy
Alexander Demirs
Maya Ellis
Javier Espinal

Electrical and Computer Engineering cont.:

Rachel Feldman
Minor: Computer Science
Mason Figler
Double Major
Matthew Fredo
Daniel Fu
Cristian Gallardo
Peyton Grant
Double Major
Yichen Guo
Double Major
Minor: Computer Science
Megan Hanlon
Bruce Huynh
Patrick Hyland
Yveder Joseph
Double Major
Ori Katz
Minor: Computer Science
Frank Kennedy
Peter Lam
Prudence Lam
Double Major
Abigail Leonardi
Minor: Computer Science
Minor: Chinese Studies
Zhuolin Liu
Henry Livingston
Jonathan Lopez
Minor: Computer Science
Kyle Lopez
Double Major
Kyle MacPherson
John Marcotte
Double Major
John Matthews
Alexandria Miera
Jared Minnich
Troy Mullenberg
Double Major
Thuyen Nguyen
Sage Ortega-Shue
Minor: History
Victor Paiz
Double Major
Cameron Pelletier
Thananart Piyajarawong
Double Major
Minor: Computer Science
Emma Pruitt
John Puksta
Michael Rideout
Zachary Rivernider
Double Major
Alan Robertson
Olivia Rockrohr
Vanshika Rohera
Minor: Computer Science
Brianna Roskind
Double Major
Michael Rothstein
Alicia Salvalzo
Benjamin Schwantes
Rachel Smith
Drew Solomon
Minor: Computer Science
Christopher Thomas
Travis Thompson
Double Major
Max To
Antonio Torres
Minor: Media Arts
Minor: Computer Science
Isaac Tufts
James Vo
Brandon Voci
Double Major
Tianshu Wang
Weizhe Wang
Minor: Computer Science
Alexander Wessel
Minor: Computer Science
Minor: International and Global Studies
John Winship
Noah Wolf
Minor: Computer Science
Minor: Mechanical Engineering
Evan Wu
Yiyang Wu
Mingxiao Zhao
Minor: Business

Electrical and Computer Engineering cont.:
Matthew Zoner

Environmental Engineering:
Adele Brochu
Nadiya Chalak
Minor: Individually-Designed
Danielle Gonzalez
Shannon Henderson
Minor: Creative Writing
Steven Phan
Evan Rios
Lucas Rodgers
Kali Sander
Caitlin Strzegowski
Dayna Tang
Richard Widman

Industrial Engineering:
Brianna Ankstitus
Kayla Brown
Double Major
Martin Carrau
Gabriel Comenzo
Malyssa Deranian
Elise Deshusses
Minor: Computer Science
Adam Ferrarotti
Minor: Data Science
Lindsey Fletcher
Double Major
Reagan Hajjar
Holly Mason
Heather McGlauflin
Minor: Gender, Sexuality and Women's Studies
Kara O'Neil
Gabrielle Puchovsky
Minor: Data Science
Aaliyah Royer
Cherylle Eliza Sabilla
Minor: Management Information Systems
Catherine Salvaggio
Kenneth Savage
Rayna Sharma
Michael Souza
Advait Surana
Minor: Business
Gabriel Tamayo Uribe

Interactive Media and Game Development - Technology:
Kateri Bajer
Olivia Bell
Double Major
Hao Chen
Double Major
Zihang Chen
Minor: Media Arts
Ryan Darcey
Double Major
Lena Dias
Double Major
Shen Fang
Double Major
Nadiyah Garris
Geoffrey Garsson
Matthew Hendrickson
Double Major
Zack Koval
Double Major
David Mahany
Double Major
Jacob Matthews
Double Major
Alexandra McFann
Thi Quynh Ha Nguyen
Yihong Xu
Double Major

Interdisciplinary:
Victoria Buyck
Joshua Caron
Benjamin Mills

International and Global Studies:
Sophia Togneri
Double Major

Management Engineering:
Jackson Baker
Mechanical Engineering Concentration

Management Engineering cont.:

Abdoul Barry
Mechanical Engineering Concentration
Calisto Betti
Operations Management Concentration
Chelsea Chang
Manufacturing Engineering Concentration
Dante Coccagnia
Civil Engineering Concentration
Domenic Dicenso
Civil Engineering Concentration
Rachelle Gonzales
Operations Management Concentration
Double Major
Kevin Inger
Mechanical Engineering Concentration
Gevorg Khukeyan
Industrial Engineering Concentration
Abigael Kihu
Biomedical Engineering Concentration
Josephine Kim
Custom Concentration
Ralph Lambert
Civil Engineering Concentration
Corey Logan
Electrical and Computer Engineering Concentration
Nicole Logrecco
Operations Management Concentration
Jaden Meng
Mechanical Engineering Concentration
Michael Modine
Civil Engineering Concentration
Minor: Spanish
Aleksander Proko
Operations Management Concentration
Minor: International and Global Studies
Lilly Proulx
Mechanical Engineering Concentration
Olivia Scola
Operations Management Concentration
Minor: Industrial Engineering
Benjamin Sseruwagi
Mechanical Engineering Concentration
Addie Suckow
Operations Management Concentration
Minor: History
Noah Willey
Civil Engineering Concentration
Minor: Data Science

Management Information Systems:

Benjamin Sakac
Minor: Computer Science

Mathematical Sciences:

Julie Andrade
Double Major
Samuel Berbeco
Ye Chen
Liz Cole
Minor: Financial Technology
Nicole Dombrowski
Double Major
Lora Dufresne
Double Major
Ryan Firenze
Lindsey Fletcher
Double Major
Spencer Francis
Double Major
Ben Gobler
Brendan King
Minor: Computer Science
Anne Lapsley
Double Major
Wesley Lo
Double Major
Minor: Music
Frederick Miller
Double Major
Margaret Munroe
Minor: Data Science
Cole Peterson
Double Major
Benjamin Rajotte
Mitchell Sirois
Minor: Business
Minor: Data Science

Mathematical Sciences cont.:
Brandon Voci
Double Major
Anthony Vuolo
Double Major
Jessica Wang
Minor: Computer Science
Jing Wu

Mechanical Engineering:
Sarah Abatiello
Minor: Creative Writing
Aashish Singh Alag
Zenia Alarcon
Jennifer Albores
Daniel Ali Tribaldos
Alexander Almazan
Minor: Business
Kalle Asaro
Emily Austin
Double Major
Elena Bachman
Minor: Robotics Engineering
Abigail Benoit
David Bilis
Minor: Philosophy and Religion
Grace Blackadar
Abbey Blauser
Erica Bonelli
Mechanical Design Concentration
Minor: Media Arts
Hannah Boucher
Mechanical Design Concentration
Minor: Robotics Engineering
Samuel Boudreau
Mechanical Design Concentration
Jeffrey Brennan
Jared Bushnell
Caylee Butler
Minor: English
Colin Canniff
Minor: Business
Rachel Chan
Double Major
Sophia Cheng
Double Major
Minor: Music
Sophie Chretien
Conner Christensen
Thomas Ciolfi
Daniel Colgate
Allison Colon-Heyliger
Walter Conway
Biomechanical Concentration
Christopher Cook
Double Major
Maren Cork
Minor: Architectural Engineering
Minor: Sustainability Engineering
Brandon Cote
Emily Coughlin
Delaney Cox
Minor: Environmental and Sustainability Studies
Noelle Crump
Connor Cumming
Minor: Aerospace Engineering
Minor: Business
Grace Cummings
Mackenzie Damon
Minor: Data Science
Stephen Davis
Biomechanical Concentration
Minor: Fire Protection Engineering
Mitchell Devillers
Kevin Doan
Eli Doggart
Emily Doucette
Cooper Ducharme
Double Major
Joseph Durocher
Timothy Duval
Thomas Emrick
Minor: Business
Julia Farnum
Minor: Chinese Studies
Brian Fennell
Andrew Ferrecchia
Amanda Forgione

Mechanical Engineering cont.:

Sakeena Ghandour
Mechanical Design Concentration
Minor: Sustainability Engineering
Karl Ghosn
Emily Giancola
David Gibson
Double Major
Minor: Business
Ryan Gillett
Minor: Music
Hayley Gray
Matthew Guarneri
Peter Guertin
Shu Guo
Mechanical Design Concentration
Minor: Manufacturing Engineering
Eric Gustafson
Khalil Haboub
Minor: Aerospace Engineering
Dylan Ham
James Hammel
Yutai Han
Minor: International and Global Studies
Melissa Hauman
Biomechanical Concentration
Minor: Biology
Tara Haymon
Double Major
Roe Hendrick
Mechanical Design Concentration
Giulia Herszage Rocha
Double Major
Sola Hoffman
Mechanical Design Concentration
Sarah Homsy
William Hopkins
Mechanical Design Concentration
Robert Hyers
Geneva Isaacson
Double Major
Hannah Jayne
Jack Johnson
Robotics Concentration
Minor: Computer Science
Grace Jolin
Double Major
Edwin Joseph
Minor: Business
Asha Karmen-Chan
Biomechanical Concentration
Minor: Global Public Health
Annika Keck
Patrick Keiran
Kaitlin Kelley
Michaela Kelly
Minor: Business
Richard Kern
Double Major
Ethan Knight
Alexander Kochling
Materials Science and Engineering
Concentration
Samuel Krimmel
Regan Krizan
Double Major
Marisa Lamprey
Minor: International and Global Studies
David Lapointe
Patrick Leach
Erin Lee
Double Major
Julie Lee
Double Major
Collin Levin
Mechanical Design Concentration
Noah Litzinger
Aaron Longo
Double Major
Matthew Lovoi
Minor: Business
Aidan Lynn
Ashton Lyon
Tessa Lytle
Molly MacAllister
Evan MacGregor
Grace Magnotta
Minor: International and Global Studies
Pranjal Mann
John Marcotte
Double Major

Mechanical Engineering cont.:

Rebecca Marion
Bradley Markiewicz
Adam Marsh
Minor: Business
Christopher Martin
James Martin
Joseph Martin
Kelly McDonald
Macey McEnaney
Minor: Environmental and Sustainability Studies
Fiona McEvilly
Biomechanical Concentration
Minor: Business
Mathieu Michaud
Kelly Miller
Minor: Writing and Rhetoric
Nick Miragliotta
Brian-Marcio Montenegro
Douglas Moore
Minor: Electrical and Computer Engineering
Jacob Morin
Double Major
Michael Morin
Minor: Materials
Katherine Morissette
Minor: Materials
Esteban Murguia
Minor: Fire Protection Engineering
Crystal Murray
Double Major
Peter Murray
Adam Murrison
Michael Nason
Biomechanical Concentration
Minor: Spanish
Aidan Nunes
Finbarr O'Sullivan
Heather Oxford
Josh Palmer
Trevor Parks
Mechanical Design Concentration
Ashley Pavlov
Mechanical Design Concentration
Blake Pedersen
Kevin Pine
Blaise Pingree
Minor: Sustainability Engineering
Cabot Priestner
Minor: Robotics Engineering
Luke Reid
Minor: Robotics Engineering
Tyler Riggs
Minor: Business
Jose Rivera
Mechanical Design Concentration
Wynn Roberts
Minor: Spanish
Grace Rydout
Joseph Salvon
Minor: Fire Protection Engineering
Samuel Sands
Mechanical Design Concentration
Brendyn Sang
Double Major
Aaron Searth
Marilyn Senger
Thijs Seppenwolde
Double Major
Liudmila Serebrennikova
Biomechanical Concentration
Double Major
Julia Sheats
Brian Shin
Double Major
Noah Skinner
Minor: Materials
Amanda Smith
Sydney Smith
Double Major
Jane Spear
Lily Spero
Jakob Sperry
Double Major
Michael Sposato
Minor: Manufacturing Engineering
Minor: Fire Protection Engineering
Bradley Sprunger
Minor: Robotics Engineering
William Stanley
Double Major

Mechanical Engineering cont.:

William Stottlemyer
Zhengrong Tang
Deniz Terek
Zachery Therrien
Madelyn Thrasher
Double Major
Lydia Ellen Tonani
Minor: Individually-Designed
Julia Toplyn
Minor: Philosophy and Religion
Thanh Trac
Double Major
Kian Tuma
Mechanical Design Concentration
Luese Ufuah
Double Major
Francesco Valagussa
Mechanical Design Concentration
James Van Milligen
Jade Veth
Elizabeth Viveiros
Marc Voorhees
Martin Wadzinski
Thomas Walsh
Mechanical Design Concentration
Effelia Dawn Warden
Thermal-Fluid Engineering Concentration
Benjamin Watkins
Niklas Weckerle
Lauryn Whiteside
Double Major
Skyler Wise
Minor: Manufacturing Engineering
Everett Wonson
Mechanical Design Concentration
Kathryn Woodland
Double Major
Haojun Yan
Jay Yen
Robotics Concentration
Double Major
Minor: Spanish
Julianna Ziegler
Eli Zimmerman

Physics:

Clark Apuy
Maxwell Dargie
Minor: Political Science and Law
Mara Decesare
Nicole Dombrowski
Double Major
Rhys Forster
Minor: Management Information Systems
Minor: Data Science
Spencer Francis
Double Major
Geneva Isaacson
Double Major
Alex Kiely
Mike MacGregor
Minor: Latin American and Caribbean Studies
Minor: Mathematics
Kyle Marquez
Mason Miguel
Minor: Computer Science
Simon Rees
Sahana Venkatesh
Double Major
Minor: Data Science
Amy Welch

Professional Writing:

Emily Bendremer
Double Major
Minor: Drama/Theatre
Kayla Brown
Double Major
Alex Friedman
Double Major
Hope Hutchinson
Double Major
Khaled Jarad
Double Major
Anastasia Mina
Double Major
Sahana Venkatesh
Double Major
Minor: Data Science

Psychological Science:
Claire Behning
Double Major
Emily Bendremer
Double Major
Minor: Drama/Theatre
Lali Berelashvili
Double Major
Michaela Champagne
Rachelle Gonzales
Operations Management Concentration
Double Major
Jada Hinds-Williams
Shannen Lin
Double Major
Christina Tsillas
Psychobiology Concentration
Double Major
Minor: Global Public Health

Robotics Engineering:
David Acuna
Double Major
Samuel Alden
Rohan Anand
Double Major
Maya Angeles
Yasmine Aoua
Double Major
Emily Austin
Double Major
Spencer Belleville
Minor: Astrophysics
Theodore Belmont
Jacob Bernard
Michael Beskid
Double Major
Nicholas Biliouris
Martin Bleakley
Kalina Bonofiglio
Alexander Brattstrom
Samantha Braun
Double Major
Minor: Bioinformatics and Computational Biology
Alexander Breiling
Double Major
Carter Bullock
Minor: Computer Science
Vanessa Cardaropoli
Double Major
Sophia Cheng
Double Major
Minor: Music
Christopher Cook
Double Major
Daniel Correa
Double Major
Christopher DeMaio
Minor: Computer Science
Cooper Ducharme
Double Major
Ayden Duncan
Hushmand Esmaeili
Ashley Espeland
Double Major
Joshua Fernandez
Minor: Economics
Mason Figler
Double Major
Patrick Flanigan
Minor: Computer Science
Brian Francis
Chandler Garcia
Double Major
Roopsa Ghosh
Double Major
David Gibson
Double Major
Minor: Business
Jonathan Gong
Minor: Computer Science
Minor: Mechanical Engineering
Minor: Music
Ananya Gopalan
Minor: Computer Science
Mayank Govilla
Double Major
Yichen Guo
Double Major
Minor: Computer Science

Robotics Engineering cont.:

Matthew Haahr
Minor: Computer Science
Patrick Hagearty
Double Major
Aislin Hanscom
Minor: Mechanical Engineering
Minor: Astrophysics
Victoria Heffern
Minor: Interactive Media and Game Development
Grace Holden
Jim Huang
Cameron Huneke
Maanav Iyengar
Minor: Data Science
Yveder Joseph
Double Major
Kohmei Kadoya
Minor: Computer Science
Emily Kelley
Ryan Kievra
Curtis Lee
Erin Lee
Double Major
Kayla Lepping
Jack Leserman
Minor: Computer Science
Minor: Business
Yuen Lam Leung
Minor: Computer Science
Aaron Longo
Double Major
Jacquelyn Lopez
Kyle Lopez
Double Major
Liang Lu
Double Major
Alyssa Magaha
Double Major
Gregory Marshall
Double Major
James Mitchell
Mason Mitchell
Leo Morris
Ndenda Mutsaku Fierro
Nikolas Neathery
Hoang Nguyen
Grace O'Reilly
Victor Paiz
Double Major
Rahil Parikh
Double Major
Owen Pfannenstiehl
Double Major
Ronald Pfisterer
Derik Pignone
Thananart Piyajarawong
Double Major
Minor: Computer Science
Julian Poindexter
Minor: Computer Science
Ishan Rathi
Double Major
Logan Rinaldi
Minor: Electrical and Computer Engineering
Zachary Rivernider
Double Major
John Robinson
Angelo Ruggeri
Double Major
Brendyn Sang
Double Major
Blaise Schroeder
Brian Shin
Double Major
Brandon Simpson
Jakob Sperry
Double Major
William Stanley
Double Major
Christian Stilwagen
Andrew Strauss
Alexander Strickland
Double Major
Jeremy Trembley
Ethan Turett
Minor: Mathematics
Minor: Materials
Minor: Physics
Jolie Walts

Robotics Engineering cont.:

Shiyue Wang
Double Major
Lauryn Whiteside
Double Major
Declan Williams
Minor: Individually-Designed
Jay Yen
Robotics Concentration
Double Major
Minor: Spanish
Haohao Yi
Yifei Zhao
Double Major

Society, Technology and Policy:

Catherine Pittelli
Minor: History
Max Wojtas
Minor: Environmental and Sustainability Studies

Date: May 9, 2023
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Medich, Chair)
Re: Motion to approve the May 2023 graduate student graduation list

Motion: 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 May 11, 2023. They therefore are or will be eligible to receive that degree, and on behalf of the Committee on Graduate Studies and Research, I move that – pending final verification by the Registrar that all those on the list have in fact completed their degree requirements - they be approved for May 11, 2023, graduation.

Doctor of Philosophy

Biochemistry:
Andre Vieira

Bioinformatics and Computational Biology:
Alicia Howell-Munson

Biology and Biotechnology:
Luis Gutierrez Zamalloa

Business Administration:
Lojain Alkhuzaim
Basma Khoja
Scorpio Rogers
Yu Shi

Chemical Engineering:
Cameron Armstrong
Kevin Keating
Heather Leclerc

Chemistry:
Tadas Buivydas
Julia Martin

Civil Engineering:
Kaoutar Diouri
Jihan El Ouaragli
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Peter Chlastawa

Date: May 9, 2023
To: WPI Faculty
From: Committee on Governance
(Prof. Albano, Chair, COG; Prof. Heineman, Sec., COG; Prof. Richman, Secretary of the Faculty**)**
Re: Motion to adopt the reorganized Faculty Handbook

Motion: The Committee on Governance (COG) recommends and we move that the reorganized Faculty Handbook, distributed to the WPI Faculty and attached here, be adopted in place of the current Faculty Handbook updated as of July 1, 2022.

Description of the Motion:
The motion would replace the current (July 1, 2022) Faculty Handbook with the proposed reorganized Faculty Handbook attached to this motion.

Background/Rationale:
The WPI Faculty Handbook has always been updated carefully at the end of each academic year to incorporate the most recent changes and additions approved by the Faculty during that year. The current version in use since July 1, 2022 that is posted on the WPI Faculty Governance website (https://www.wpi.edu/sites/default/files/FacultyHandbook-July1%2C2022.pdf) reflects all such changes through May 10, 2022.

However, while the Faculty Handbook is kept up-to-date and the changes and additions to it are vetted at every step by the Faculty and made in a manner consistent with the internal logic of each new change, the handbook has as a result evolved in a piecemeal fashion in which the changes could not be synthesized at every step. The result is that over an extended period of time, the current Faculty Handbook has become increasingly difficult to navigate. Information related to single topics and specific processes is oftentimes scattered throughout the handbook. Finding definitive answers to even simple questions is difficult because locating a single reference or even several scattered references to the matter of interest may not tell the whole story.

Furthermore, as the University, its academic programs, and our faculty composition and structures have become increasingly complex, the need to make repeated and continuous changes and additions to the Faculty Handbook has increased dramatically in the past ten to fifteen years. This phenomenon has accelerated the rate at which confusion about old, new, and changing policies and procedures in the handbook has compounded. And, while the handbook was substantially improved when it was last reformatted in May 2005, many important rules and procedures, especially those related to governance, academic appointments and tenure remained in their original forms as ad hoc appendices and procedural amendments added in the late 1960s. So even the *starting point* for the many modifications that have been made to the handbook since 2005 was itself not entirely well synthesized.

The proposed structure of the reorganized Faculty Handbook brings together and weaves together related content that is oftentimes located in disparate parts of the current faculty handbook. The content that has been significantly reorganized in the draft has been unified within five broad themes: Governance; Academic Appointments; Tenure; Promotions; and a Faculty Grievance Procedure. In this manner, the content is presented in a more logical order that is self-explanatory, self-contained, and much easier to follow. As a result, the draft functions better as a source of information for non-experts and experts alike, and it is amenable to much clearer interpretation for all users.

The newly reorganized Faculty Handbook is put forward to the Faculty as a vast improvement over the current version and as a document that will make it much easier to have future discussions about how we can further refine our faculty polices and processes. However, no project of this magnitude and complexity can repair all the defects of our current Faculty Handbook, and no organizational scheme or set of interpretations will ever satisfy everyone perfectly. Instead, by establishing a unified, synthesized baseline

for our current policies, and by eliminating much of the confusion about what those policies and processes currently mean and where exactly they can be found, the new Faculty Handbook will serve to identify and clarify the broad and the technical issues as well as the gaps we need to address to make them better.

In this sense, the newly reorganized faculty is presented, not as an endpoint, but as a new starting point for discussions among the Faculty that may well be complex based on substantive matters but should not be unnecessarily complicated by confusions among us created by a disorganized foundation.

General Approach:

The overwhelming emphasis of the work done to produce the new draft version of the Faculty Handbook has been on reorganizing current content rather than incorporating any substantive changes to current policy or accepted current practice. This has been done in several smaller steps:

- Reordering entirely unchanged sections;
- Combining parts of existing sections;
- Reorganizing content within existing sections;
- Extracting elements from different sections and recombining them into new sections and subsections. This sometimes involved weaving together related but separated subsections, paragraphs, and sentences.

In order to maintain focus on reorganizing the handbook rather than on making substantive changes, COG adopted the following working hierarchy of possible modifications:

- Pure reorganization and the moving of whole sections - which involved no changes in text;
- Necessary editorial, stylistic, and grammatical changes – which were needed to patch adjacent elements together and to reformat appropriately;
- Corrections to obvious inconsistencies;
- Helpful clarifications – which involved changing or adding text for better and easier understanding without changing substance;
- Simple process improvements – which involved adding text without changing the effect of current policy;
- Documentation of accepted current practices not yet formally adopted in the current handbook – which involved changing text to update the handbook to conform to established current practices.

The Structure of the Reorganized Faculty Handbook:

As a result of the approach outlined above, the reorganized Faculty Handbook is currently divided into two parts, each with five chapters.

Part One of the reorganized Faculty Handbook contains the content that has been substantially reorganized in the following five new chapters:

- Chapter One: Governance
- Chapter Two: Academic Appointments
- Chapter Three: Tenure
- Chapter Four: Promotions
- Chapter Five: Faculty Grievance Procedure

A more detailed overview of the contents of each new chapter is provided in table-form in five separate Appendices attached to this motion. Those tables also contain **high-level mappings** that describe the original location (in the current faculty handbook) of content that has been placed in individual chapters and sections of chapters in the reorganized Faculty Handbook.

Part Two of the reorganized Faculty Handbook contains the content that has been placed unchanged as it currently appears in the current Faculty Handbook (although reordered) in the following five new chapters:

- Chapter Six: Policies Regarding Academics and Academic Programs
- Chapter Seven: Awards and Awards Committees
- Chapter Eight: Certain Policies on Faculty Benefits and Opportunities
- Chapter Nine: Certain Legal Policies
- Chapter Ten: Faculty Conduct Policies

Iterative Reorganization Process and Timeline:

The iterative process used to produce the current draft of the reorganized Faculty Handbook has welcomed feedback and input at every stage described below and has proceeded according to the following ongoing timeline:

- Summer 2022:
  - Prepared preliminary drafts of Governance, Academic Appointments, Tenure, Promotions, and Faculty Grievance chapters;
  - Shared relevant drafts with Chairs of:
    - COG (Prof. Albano) – all chapters
    - CTAF (Prof. Claypool and Prof. Mathews)
    - COAP (Prof. Skorinko and Prof. Strauss)

- Fall 2022:
  - Reviewed extensively by COG (including Provost Heinricher) for:
    - Section-by-section modifications
    - Accuracy and consistency checks
    - Clarifications
  - Shared evolving versions of each chapter with President Soboyejo
  - Shared evolving versions of each chapter with Office of General Counsel

- Spring 2023 (January to March):
  - Shared Governance chapter with Committee Chairs (January 2023);
  - Shared updated relevant chapters with CTAF, COAP, and CTRF (January 2023);
  - Provided overviews at faculty meetings (Feb. 2 and Mar. 6);
  - Distributed first full draft to the Faculty (February 22, 2023);
  - Convened a reading group (including the Secretary of the Faculty, the Chair of COG, the Secretary of COG, the Provost, and the Associate Dean of the Global School, and the Office of University Counsel) to re-verify in detail that the reorganized draft of the Faculty Handbook is consistent with the sensibility and constraints described above under General Approach (March 2023).

- Spring 2023 (March to May):
  - Welcome, discuss, and incorporate continuous feedback from all individuals, committees, groups as it is received and processed;
  - Distributed second full draft to the Faculty (April 4, 2023)

- Provided overview of Governance and Academic Appointments chapters at March 30, 2023 faculty meeting;
- Provided overview on Tenure, Promotions, and Faculty Grievance Procedure chapters at April 18, 2023 faculty meeting;
- Distributed third full draft to the Faculty (April 25, 2023);
- Disseminated motion to adopt the reorganized Faculty Handbook for consideration at the May 9, 2023 faculty meeting.

Chapter-by-Chapter Outline of Notable Improved Features:
The following outline itemizes the features that have been incorporated into the new Faculty Handbook consistent with the constraint that no change introduces a substantive new effect:

1. Chapter One: Governance

a. Included in Reorganized Governance Content:

i. In Bylaw Two: General Rules for Committees of the Faculty

- Committees should review their roles and responsibilities, and membership every three years.

  • Improves practice – will be initiated after Faculty Handbook reorganization effort

ii. In Bylaw Three: Roles and Responsibilities, and Membership of Standing Committees

- Committee on Governance

  • Clarifies: "COG coordinates its efforts and those of all other faculty governance committees in the formulation of recommendations on changes to all parts of the Faculty Handbook."

  • Co-locates: Responsibility to disseminate and present an annual report on WPI's faculty population by faculty category.

  • Co-locates: Responsibility to review, refer, and present proposals from the Administration to create, merge, realign, or eliminate academic programs, academic departments, or major academic or research facilities.

- Fringe Benefits Committee

  • Relocated: As a permanent subcommittee under the Committee on Financial and Administrative Policy

iii. (New) Bylaw Six: Educational and Research Councils

- Relocated from Part Two, Section 5: More parity with our established committees and sub-committees

iv. (New) Bylaw Ten: Policy on Creating, Merging, Realigning or Eliminating Academic Programs, Academic Departments, and Research Facilities

- Relocated from Part Two, Section 5: Consistent with COG's responsibilities in Bylaw Three

b. Moved from Governance Content:

i. Numerical goals for faculty populations by faculty category

- From Part One, Appendix D: The Roles and Balance of the Faculty in Carrying Out WPI's Mission
- Moved to Chapter Two: Academic Appointments – where categories are defined

ii. Partial information related to probationary appointments, dismissals, and resignations

- From Part One, Appendix A. A: Report of the Ad Hoc Tenure Committee, General Procedural Matters

- Moved to Chapter Two: Academic Appointments – where all appointment information is centralized.

iii. Operational elements of tenure process: (e.g., DTCs, JTCs, Recusals, Conf. of Interest, Tenure Clock)

- From Part One, Bylaw One. V: Committee on Tenure and Academic Freedom
- From Part One, Appendix A: Report of the Ad Hoc Tenure Committee (Subsections A, B, and D: General Procedural Matters; Procedure for Granting Tenure; and Procedural Amendments)
- Moved to Chapter Three: Tenure – where all tenure information is centralized.

iv. Operational elements of promotions process: (e.g., Nominator, Advocate, JPCs, Recusals)

- From Part One, Bylaw One, V: Committee on Appointments and Promotions
- Moved to Chapter Four: Promotions – where all promotions information is centralized.

2. Chapter Two: Academic Appointments

a. Modified/Added Wording to Conform to Accepted Current Practice:

i. Formalizes the administrative review process for faculty appointments with tenure:

- "An initial appointment of a faculty member with tenure is reviewed by the Department Head, the Dean of the appropriate school, and the Provost."
- Uses a generalization of the review process for probationary appointments

ii. Defines "Terminal Appointments" (when tenure is not granted):

- Appointments for one additional year at current rank and title on schedule used for regular reappointments

iii. Broadens materials submitted for annual DTC review of probationary faculty:

- Materials submitted to DTCs for annual reviews will document faculty members' efforts **"up to that date"** rather than just **"for the preceding year…"**

iii. Aligns our policy with our practice of reviewing the teaching of tenured faculty members:

- Formation and reviews of teaching by **Departmental Peer Review Committees - at the discretion of each department** rather than **required**.

iv. Allows internal Department Head searches to go forward with only one candidate

v. Includes updated sample letters of appointment for Teaching Professors and Professors of Practice

b. Incorporated Process Clarifications/Improvements:

i. Adds the "appropriate Dean" explicitly in place to review of all new probationary appointments.

ii. Clarifies "terms and conditions" to be included in letters of appts. for probationary faculty:

- Rank, title, and probationary status;
- Year of scheduled mandatory tenure review and number of years credit on the tenure clock;
- Statement that probationary faculty at the assoc. rank should first achieve tenure before seeking promotion to full rank.

c. Broadened/Generalized Wording to include Professors of Teaching as TTTs:

i. Includes/adds "continuing professional growth and currency," etc., as appropriate

ii. Allows credit on the tenure clock for full-time academic experience while at WPI

d. Included Explicit Numerical Goals Concerning Faculty Categories:

i. Originates from Part One: Appendix D of Current Faculty Handbook

e. Clarified Minimum Time on a Probationary Appointment Before Tenure Review:

i. At the assistant rank, minimum time = three years

- Because promotion to associate rank is granted when tenure is granted; AND three years required (in the same track) prior to review for promotion to associate rank

ii. At the associate or full rank, minimum time = two years

- No probationary faculty member may serve less than two years on the tenure clock prior to tenure review

3. Chapter Three: Tenure

a. Modified/Added Wording to Conform to Accepted Current Practice:

i. Assistant Profs. and Assistant Profs. of Teaching receive a combined review for tenure and promotion:

- Recognizes that tenure criteria and promotion criteria are the same;
- Eliminates the possibilities of contradictory and/or moot/untenable CTAF deliberations;
- Avoids confusions created by permitting an undesirable possibility;
- Aligns with rationale for changes to tenure and promotion made over 20 years ago.

ii. Department Head given responsibility for writing JTC letter of recommendation in the case of a negative tenure recommendation:

- Consistent with Dept. Head's responsibility in the case of a positive recommendation.

iii. Provost's annual list of probationary faculty members to include only relevant information:

- Year of scheduled tenure review;
- Exact title rank/title and department/program affiliation;
- Eliminates "…conditions attached to probationary appointment…"

iv. Requirement for JTCs to file minutes with SOF by May 1 – eliminated

- Because JTC deliberations are confidential and final tenure decisions are made known to the community soon after Board of Trustees' vote in late February.

v. Replacement process for JTC member who resigns – clarified

- Same as process used for recusals due to dept affiliation and/or conflict of interest.

vi. Disagreements between the JTC and the Provost are expected to be rare

- Restores clarity about shared authority while recognizing Provost's responsibility for making tenure recommendations to the Board

b. Incorporated Process Improvements

i. Clarity about the effect of tenure clock stoppages on individual faculty members:

- Provost must send letter to faculty candidate with new date of scheduled tenure review;
- New date of tenure review must be stated in reappointment letters.

ii. Timely formation of Joint Tenure Committees for interdisciplinary candidates:

- JTCs should be formed in the year before the tenure review rather than during the year of the tenure review – to allow for preliminary gathering of external letters of reference, etc.

iii. Provost's annual list of probationary faculty members includes only relevant information:

- Includes: Year of scheduled tenure review;
- Includes: Exact title rank/title and department/program affiliation;
- Eliminates: "…conditions attached to probationary appointment…"

c. Provided Clear/Explicit Definitions of Probationary Periods, Tenure Clock, and Tenure Review Timing;

i. *Probationary period* - refers to the *total* time served at WPI *as a tenure-track faculty* member regardless of whether the tenure clock is running or is stopped, including time served during the academic year of the tenure review.

ii. Tenure Clock - The tenure clock measures the five years that must be accumulated prior to the academic year of the mandatory tenure review. Time is accumulated on the tenure clock in only two ways: through actual time served as a tenure-track faculty member at WPI while the tenure clock is running; and through time credited on the tenure clock at the time of the initial tenure-track probationary appointment.

iii. Mandatory Tenure Review - conducted for all tenure-track probationary faculty members in the academic year immediately after they have accumulated five years on the tenure clock.

d. Clarified elements of the process for early tenure for special contributions by the faculty member:

i. Must be consistent with minimum allowable probationary period;

ii. Must meet same (April 15) deadline as all other tenure cases.

e. Clarified elements of the process for early tenure when the academic freedom of a probationary faculty member is in jeopardy

i. Candidate is "invited" rather than required to apply for tenure;

ii. Tenure (if) granted to an Assistant Professor/Assistant Professor of Teaching includes promotion to associate rank.

g. Broadened/Generalized Wording to include Professors of Teaching as TTTs:

i. Includes/adds "continuing professional growth and currency," etc., as appropriate

ii. Allows credit on the tenure clock for full-time academic experience while at WPI

4. Chapter Four: Promotions

a. Modified/Added Wording to Conform to Accepted Current Practice:

i. Assistant Profs. and Assistant Profs. of Teaching receive a combined review for tenure and promotion:

- Recognizes that tenure criteria and promotion criteria are the same;
- Eliminates the possibilities of contradictory and/or moot/untenable CTAF deliberations;
- Avoids confusions created by permitting an undesirable possibility;
- Aligns with rationale for changes to tenure and promotion made over 20 years ago.

ii. All Associate Professors and Associate Professors of Teaching should first achieve tenure before seeking promotion to the full rank:

- Clarifies for consistency between the two tracks and with long standing practice.

iii. Procedures and dossier format for promotion to Associate Teaching Professor and (full) Teaching Professor explicitly follow those described in detail for promotion to (full) Professor and (full) Professors of Teaching:

- With differences for (full) Professors and (full) Professors of Teaching highlighted;

iv. Letter of recommendation in promotion cases:

- Signed by voting members of the Joint Promotion Committee, only;

v. "Standards for Evaluation of the Promotion Dossier" apply to all reviewers:

- Explicitly identifies Joint Promotion Committee Members, Provost, and peer reviewers;

b. Simplified how credit for time-in-rank is documented:

i. Covered by date of mandatory tenure review and time on the tenure clock for probationary faculty;

ii. Covered more flexibly by promotion eligibility guidelines in faculty handbook for tenured faculty and non-tenure track faculty.

c. Broadened/generalized wording throughout to be consistent with expectations of the teaching faculty.

5. ***<u>Chapter Five: Faculty Grievance Procedure</u>***

   a. **Clarified that existing provisions for cases of non-renewal of probationary appointments also apply to non-renewal and termination of appointments of secured nontenure-track faculty members on 3-year and 5 (or more)-year contracts:**
      i. *Deadline to file;*
      ii. *Requirement that the FRC first request and receive a finding from CTAF.:*

<u>Implementation</u>: The reorganized Faculty Handbook will be in effect as of July 1, 2023.

APPENDIX ONE: Contents and Mapping of Chapter One GOVERNANCE

CONTENTS and MAPPING: CHAPTER ONE, CONSTITUTION of Reorganized Faculty Handbook from Current Faculty Handbook

FINAL CONSTITUTION LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
CONSTITUTION **CHAPTER ONE: SECTION ONE** Definition and Governance of the Faculty	**Part One: Section One** Definition of the Faculty; Governance of the Faculty
CONSTITUTION **CHAPTER ONE: SECTION TWO** Duties, Responsibilities, Authority, and Academic Freedom of the Faculty	**Part One: Section Two** Duties, Responsibilities, Authority, and Academic Freedom of the Faculty **Part Two: Section 1.A** Academic Freedom and Tenure
CONSTITUTION **CHAPTER ONE: SECTION THREE** The Roles and General Balance of the Faculty in Carrying Out WPI's Mission	**Part One: Appendix D** The Roles and Balance of the Faculty in Carrying Out WPI's Mission
CONSTITUTION **CHAPTER ONE: SECTION FOUR** Faculty Meetings	**Part One: Section Three** General Rules and Procedures for Academic Governance *-Subsection II: Faculty Meetings* *-Subsection IV: Rules Governing Committees Item: I*
CONSTITUTION **CHAPTER ONE: SECTION FIVE** Committees of the Faculty	**Part One: Section Three** General Rules and Procedures for Academic Governance *-Subsection III: Committees of the Faculty* *-Subsection IV: Rules Governing Committees Items: G & J*
CONSTITUTION **CHAPTER ONE: SECTION SIX** Amending the Constitution of the WPI Faculty	**Part One: Section Three** General Rules and Procedures for Academic Governance *-Subsection I: Amending the Constitution and Adopting Bylaws*

CONTENTS and MAPPING: CHAPTER ONE, BYLAWS ONE TO THREE
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL BYLAW LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
BYLAWS **CHAPTER ONE: BYLAW ONE** General Standing Rules for Faculty Meetings	**Part One: Section Three** General Rules and Procedures for Academic Governance *-Subsection II: Faculty Meetings*
	Part One: Bylaw Seven Standing and Special Rules of Order *-Subsection I: Standing Rule of Order One* *-Subsection II: Special Rule of Order One* *- Subsection III: Special Rule of Order Two*
BYLAWS **CHAPTER ONE: BYLAW TWO** General Rules for Committees of the Faculty	**Part One: Section Three** General Rules and Procedures for Academic Governance *-Subsection IV: Rules Governing Committees Items: Intro; A; B; C; D; F; G; H; K; and L*
	Part One: Bylaw One Membership, Duties, and Responsibilities of Standing Committees of the Faculty *- Introduction*
	Part One: Bylaw Five Secretary of the Faculty
	New Committees review their charges regularly
BYLAWS **CHAPTER ONE: BYLAW THREE** Roles, Responsibilities, and Membership of Standing Committees and Sub-Committees of the Faculty	**Part One: Bylaw One** Membership, Duties, and Responsibilities of Standing Committees of the Faculty *-Subsections: I; I.a; II; III; IV; V; VI; VII; VIII; IX; X*
	Part One: Appendix D The Roles and Balance of the Faculty in Carrying Out WPI's Mission
	Part Two: Section 2.D Policy on Initiating and Terminating Departments and Programs
	Part Two: Section 3.F The Fringe Benefits Committee

CONTENTS and MAPPING: CHAPTER ONE, BYLAWS FOUR TO SIX
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL BYLAW LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
BYLAWS **CHAPTER ONE: BYLAW FOUR** Election Procedures for Committees of the Faculty	**Part One: Bylaw One** Membership, Duties, and Responsibilities of Standing Committees of the Faculty *-Subsections: I; V; VI; and IX*
	Part One: Bylaw Three Elections of Committees of the Faculty
	Part One: Bylaw Four Unexpired Terms – Appointment and Election of Replacements
	Part One: Section Three General Rules and Procedures for Academic Governance *-Subsection IV: Rules Governing Committees Item E*
	Part One: Appendix A Report on the Ad Hoc Tenure Committee *-Subsection B: Procedure for Granting Tenure* *Sub-section 2: Joint Tenure*
BYLAWS **CHAPTER ONE: BYLAW FIVE** Appointments by the Provost and the President to the Standing Committees and Sub-Committees of the Faculty	**Part One: Bylaw One** Membership, Duties, and Responsibilities of Standing Committees of the Faculty *-Subsections: I; I.a; VIII; and IX*
	Part One: Bylaw Two Appointments of Representatives of the Provost's Office to Serve on the Five Standing Committees: CAP, CAO, CASL, CGSR, and UOAC
BYLAWS **CHAPTER ONE: BYLAW SIX** Development Councils for Education and Research	**Part Two: Section 5.A** Educational Development Council
	Part Two: Section 5.B Research Development Council

CONTENTS and MAPPING: CHAPTER ONE, BYLAWS SEVEN to TEN (and APPENDIX)
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL BYLAW LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
BYLAWS **CHAPTER ONE: BYLAW SEVEN** Secretary of the Faculty	**Part One: Bylaw Five** Secretary of the Faculty
	Part One: Bylaw One Membership, Duties, and Responsibilities of Standing Committees of the Faculty *-Subsection: I*
	Part One: Section Three General Rules and Procedures for Academic Governance *-Subsection IV: Rules Governing Committees* *Item F*
BYLAWS **CHAPTER ONE: BYLAW EIGHT** Membership of Faculty on Committees of the WPI Board of Trustees and Faculty Participation at Board of Trustees' Meetings	**Part One: Bylaw Six** Membership of Faculty on Committees of the WPI Board of Trustees and Faculty Participation at Board of Trustees' Meetings
BYLAWS **CHAPTER ONE: BYLAW NINE** Adopting and Amending Bylaws of the WPI Faculty	**Part One: Section Three** General Rules and Procedures for Academic Governance *-Subsection I: Amending the Constitution and Adopting Bylaws*
BYLAWS **CHAPTER ONE: BYLAW TEN** Policy on Creating, Merging, Realigning or Eliminating Academic Programs, Academic Departments and Research Facilities	**Part Two: Section 2.D** Policy on Initiating and Terminating Departments and Programs
BYLAWS **APPENDIX** The Instant Run-Off Voting (IRV) Method	**Part One: Appendix C** Description of the Instant Run-Off Voting Method

APPENDIX TWO: Contents and Mapping of Chapter Two
ACADEMIC APPOINTMENTS

CONTENTS and MAPPING: CHAPTER TWO, ACADEMIC APPOINTMENTS - SECTIONS 1 and 2
of Reorganized Faculty Handbook
from Current Faculty Handbook

LOCATION OF SECTIONS 1 AND 2 IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
1. Categories, Titles, and Roles of Faculty members at WPI a. **The Roles and Titles of the Tenured and Tenure-Track Faculty** b. **Categories, Titles, and Roles of Nontenure-Track Faculty** i. **Secured nontenure-Track Teaching Faculty** ii. **Short-term Nontenure-Track Teaching Faculty** iii. **Nontenure-Track Research Faculty** iv. **Adjunct Nontenure-Track Faculty** v. **Others with Teaching and Research Responsibilities at WPI**	**Part One: Appendix D** The Roles and Balance of the Faculty in Carrying Out WPI's Mission **Part Two: 7, A + B** Categories of Faculty members at WPI
2. Balance of the Faculty at WPI: Faculty Populations	**Part One: Appendix D** The Roles and Balance of the Faculty in Carrying Out WPI's Mission

CONTENTS and MAPPING: CHAPTER TWO, ACADEMIC APPOINTMENTS - SECTIONS 3 and 4
of Reorganized Faculty Handbook
from Current Faculty Handbook

LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
3. Policies on Tenured and Tenure-Track Faculty Appointments a. **Probationary Appointments and Periods, Initial Appointments, Reappointments, Reviews, Non-Reappointments, Terminal Appointments, and Resignations of Tenure-Track Faculty Members** b. **Initial Appointments, Resignations, and Terminations of Faculty Members with Tenure**	**Part One: Appendix A, A, General Procedural Matters** 1. **Applicability** 2. **Limitations on time in service for probationary appointment** 3. **Notice and policy for dismissal and resignation**
	Part Two, I, B: Appointments and Reappointments of Tenure Track Faculty 1. Initial Appointment 2. Periodic Review 3. Reappointment
	Part Two, I, D. 3 Procedures for Promotion Nomination and Review **1 Eligibility and Time in Rank for Tenured and Tenure-Track Faculty**
	Part Two, I, G. Review of Tenured Faculty
4. Appointment, Reappointment, and Review of nontenure-track Faculty Members a. **Secured Nontenure-Track Teaching Faculty** b. **Secured Nontenure-Track Teaching Faculty** c. **Short-term Nontenure-Track Teaching Faculty** d. **Nontenure-Track Research Professors**	**Part Two, 8, Appointment, Reappointment, and Review of Nontenure-Track Faculty Members** **A. Secured Nontenure-Track Teaching Faculty** **B. Secured Nontenure-Track Teaching Faculty – Professors of Practice** **C. Short-term Nontenure-Track Teaching Faculty** **D. Nontenure-Track Research Professors**
	Part Two, 9: Procedures and Criteria for Reappointment or Professors or Practice

CONTENTS and MAPPING: CHAPTER TWO - SECTIONS 5 to 8
of Reorganized Faculty Handbook
from Current Faculty Handbook

LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
5. Roles and Responsibilities, Initial Appointments, Reviews, and Reappointments of Department Heads a. **Roles and Responsibilities** b. **Initial Appointment** c. **Performance Reviews** d. **Reappointment**	**Part Two: I, C: Department Heads** 1. Appointment of Department Heads 2. Performance Evaluation of Department Heads 3. Reappointment of Department Heads **Part Two, I, D. 3 Procedures for Promotion Nomination and Review** **1 Eligibility and Time in Rank for Tenured and Tenure-Track Faculty** **Part Two, I, G. Review of Tenured Faculty**
6. Guidelines for Searches to fill Academic Administrative Positions a. **Academic Administrative Positions** b. **Formation of the Search Committee** c. **Conducting the Search** d. **Evaluating the Candidates**	**Part Two, I: Guidelines for Searches to Fill Academic Administrative Positions**
7. Definitions, Conditions, and Procedures for Faculty Joint Appointments a. **Dual Appointment** b. **Collaborative Appointment** c. **Procedure to Establish a Faculty Joint Appointment**	**Part Two, H: Definitions of Joint Appointments of Tenured and Tenure-Track Faculty**
8. Policy on Leaves a. **Sabbatical Leaves** b. **Unpaid Leaves**	**Part Two: 3, C: Policy on Sabbatical Leaves** 1. Basic Objectives 2. Financial Arrangements 3. Procedures for Review and Award **Part Two, 3, E: Unpaid Leaves**

APPENDIX THREE: Contents and Mapping of Chapter Three
TENURE

CONTENTS and MAPPING: CHAPTER THREE, TENURE – SECTION 1
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL CONSTITUTION LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
Section 1 **Eligibility and Conditions for Tenure, Probationary Periods, and Mandatory Tenure Reviews**	**Part One: Bylaw One** **Membership, Duties, Responsibilities of the Standing Committees of the Faculty** Section V: Committee on Tenure and Academic Freedom
	Part One: Appendix A **Report of the Ad Hoc Tenure Committee** Section A: General Procedural Matters *Subsection 1: Applicability* *Subsection 2: Limitations on time in service for probationary appointments*
	Part One: Appendix A **Report of the Ad Hoc Tenure Committee** Section B: Procedure for Granting Tenure *Subsection 1: Policy*
	Part Two: Section 1 **Policies Regarding the Status of Faculty** Section A: Academic Freedom and Tenure *Subsection: Tenure* - *Eligibility and Conditions for Tenure*
	Part Two: Section 1 **Policies Regarding the Status of Faculty** Section B: Appointments and Reappointments of Tenure-Track Faculty *Subsection 1: Initial Appointment*
	Part Two: Section 1 **Policies Regarding the Status of Faculty** Section D.3: Promotion *Subsection 1: Eligibility and Time in Rank for Tenured and Tenure-Track Faculty*

CONTENTS and MAPPING: CHAPTER THREE, TENURE - SECTIONS 2 to 4
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL CONSTITUTION LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
Section 2 **The Tenure Clock** a. Starting and Running the Tenure Clock b. Stopping the Tenure Clock c. Early Tenure Review Prior to the Scheduled Tenure Review	**Part One: Appendix A** **Report of the Ad Hoc Tenure Committee** Section A: General Procedural Matters *Subsection 2: Limitations on time in service for probationary appointments*
	Part One: Appendix A **Report of the Ad Hoc Tenure Committee** Section D: Procedural Amendments
	Part Two: Section 1 **Policies Regarding the Status of Faculty** Section A: Academic Freedom and Tenure *Subsection: Stopping the Tenure Clock* - *New Child Provision* - *Unpaid Leaves and Part-time Employment* - *Effect on Tenure Review*
Section 3 **The Tenure Criteria** a. Tenure Criteria for Associate and (full) Professors b. Tenure Criteria for Associate and (full) Professors of Teaching c. Guidance for Documenting and Assessing Activities Toward Tenure for Professors of Teaching	**Part Two: Section 1** **Policies Regarding the Status of Faculty** Section A: Academic Freedom and Tenure *Subsection: Tenure* - *Tenure Criteria for Assoc. and full Professor* - *Tenure Criteria for Assoc. and full Professors of Teaching* - *Guidance for Documenting and Assessing Activities Toward Tenure for Professors of Teaching*
Section 4 **Department Tenure Committees**	**Part One: Bylaw One** **Membership, Duties, Responsibilities of the Standing Committees of the Faculty** Section V: Committee on Tenure and Academic Freedom
	Part One: Appendix A **Report of the Ad Hoc Tenure Committee** Section B: Procedure for Granting Tenure *Subsection 2: Joint Tenure*
	Part One: Appendix A **Report of the Ad Hoc Tenure Committee** Section D: Procedural Amendments

CONTENTS and MAPPING: CHAPTER THREE, TENURE – SECTIONS 5 to 6
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
Section 5 **Joint Tenure Committees**	**Part One: Bylaw One** **Membership, Duties, Responsibilities of the Standing Committees of the Faculty** Section V: Committee on Tenure and Academic Freedom
	Part One: Appendix A **Report of the Ad Hoc Tenure Committee** Section B: Procedure for Granting Tenure *Subsection 2: Joint Tenure*
	Part Two: Section 1 **Policies Regarding the Status of Faculty** Section A: Academic Freedom and Tenure *Subsection: Tenure* - *Introduction*
Section 6 **Joint Tenure Committees for Interdisciplinary Candidates**	**Part One: Bylaw One** **Membership, Duties, Responsibilities of the Standing Committees of the Faculty** Section V: Committee on Tenure and Academic Freedom
	Part One: Appendix A **Report of the Ad Hoc Tenure Committee** Section B: Procedure for Granting Tenure *Subsection 2: Joint Tenure*

CONTENTS and MAPPING: CHAPTER THREE, TENURE- SECTION 7
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
Section 7 **Tenure Procedures** a. General Overview b. Procedures for Tenure Reviews, Recommendations, Final Decisions, and Appeals	**Part One: Bylaw One** **Membership, Duties, Responsibilities of the Standing Committees of the Faculty** Section V: Committee on Tenure and Academic Freedom
	Part One: Appendix A **Report of the Ad Hoc Tenure Committee** Section B: Procedure for Granting Tenure *Subsection 1: Policy* *Subsection 2: Joint Tenure*
	Part One: Appendix A **Report of the Ad Hoc Tenure Committee** Section D: Procedural Amendments
	Part Two: Section 1 **Policies Regarding the Status of Faculty** Section A: Academic Freedom and Tenure *Subsection: Tenure* - *Introduction* - *Eligibility and Conditions for Tenure* - *Procedures for Tenure*

APPENDIX FOUR: Contents and Mapping of Chapter Four PROMOTIONS

CONTENTS and MAPPING: CHAPTER FOUR, PROMOTION – SECTION 1
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL CONSTITUTION LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
Section 1 **Eligibility, Time in Rank, and Conditions for Promotion** a. Eligibility, Time in Rank, and Conditions for Promotion of Tenured and Tenure-Track Faculty b. Eligibility, Time in Rank, and Conditions for Promotion of Nontenure-Track Faculty	**Part Two, Section 1.D: Promotion** D.3.1 Eligibility and Time in Rank for Tenured and Tenure-Track Faculty **Part Two, Section 10, Promotion Procedures and Criteria for NonTenure-Track Faculty** A. Promotion to Senior Instructor from Instructor or to Assistant Teaching Professor from Instructor (of either level) B. Criteria for Promotion to Associate Teaching Professor C. Criteria for Promotion to (full) Teaching Professor D. Promotion to Associate Research Professor E. Promotion to Full Research Professor

CONTENTS and MAPPING: CHAPTER FOUR, PROMOTION – SECTIONS 2 to 3
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL CONSTITUTION LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
Section 2 **Promotion Criteria** a. Criteria for Promotion of Tenured and Tenure-Track Dual Mission Faculty b. Criteria for Promotion of Tenured and Tenure-Track Teaching Faculty c. Criteria for Promotion of Secured Teaching Faculty d. Criteria for Promotion of Research Faculty	**Part Two: Section 2, 1.D. Promotion** D.1.1 The Criteria for Promotion to Associate and full Professor D.1.2. Definition of Scholarship D.2.1. Criteria for Promotion in the Professor of Teaching Track D.2.2. Definition of Teaching Practice, Professional Growth and Currency **Part Two: Section 10, Promotion Procedures and Criteria for Nontenure-Track Faculty** A. Promotion to Senior Instructor from Instructor or to Assistant Teaching Professor from Instructor (of either level) B. Promotion to Associate Teaching Professor C. Promotion to (full) Teaching Professor D. Promotion to Associate Research Professor E. Promotion to (full) Research Professor
Section 3 **Promotion Procedures:** **to (full) Professor;** **(full) Professor of Teaching;** **(full) Teaching Professor;** **Associate Teaching Professor** a. Process b. The Promotion Dossier	**Part Two: Section 2, 1. D. Promotion** D.1.3. Documentation in the Dossier for Promotion to full Professor D.1.4. Standards for Evaluation of the Dossier for Promotion to full Professor: Quality, Impact and Peer Review D.2.3 Documentation in the Dossier for Promotion to full Professor of Teaching D.2.4. Standards for Evaluation of the Promotion Dossier: Quality, Commitment, Impact and Peer Review D.3.2 Nomination and the Formation of a Joint Promotion Committee D.3.3. Selection of Internal and External Peer Reviewers D.3.5 Review by the Joint Promotion Committee, Dean, and Provost **Bylaw One Membership, Duties, and Responsibilities of the Standing Committees of the Faculty** VI. The Committee on Appointments and Promotions (COAP)

CONTENTS and MAPPING: CHAPTER FOUR, PROMOTION – SECTIONS 4 to 5
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
Section 4 **Promotion Procedures:** **to Senior Instructor;** **Assistant Teaching Professor;** **Associate Research Professor;** **and (full) Research Professor**	**Part Two: Section 10, Promotion Procedures and Criteria for Nontenure-Track Faculty** A. Promotion to Senior Instructor from Instructor or to Assistant Teaching Professor from Instructor (of either level) D. Promotion to Associate Research Professor E. Promotion to (full) Research Professor
Section 5 **Mentoring and Professional Development of Professors at the Associate Level**	**Part Two: Section 2, 1. D. Promotion** E. Mentoring and Professional Development of Professors at the Associate Level

APPENDIX FIVE: Contents and Mapping of Chapter Five
FACULTY GRIEVANCE PROCEDURE
of Reorganized Faculty Handbook
from Current Faculty Handbook

FINAL LOCATION IN THE REORGANIZED HANDBOOK	LOCATION IN THE CURRENT HANDBOOK FROM WHERE REORGANIZED TEXT COMES
Section 1 Grounds	**Part One: Bylaw One** Membership, Duties, and Responsibilities of Standing Committees of the Faculty *- Subsection IX: The Faculty Review Committee*
	Part One: Appendix B Operational Guidelines for the Faculty Review Committee
Section 2 Submission of Relevant Documentation and Dates for Filing a Grievance	**Part One: Appendix B** Operational Guidelines for the Faculty Review Committee
Section 3 Formation of and FRC Subcommittee and Recusals	**Part One: Bylaw One** Membership, Duties, and Responsibilities of Standing Committees of the Faculty *- Subsection IX: The Faculty Review Committee*
	Part One: Appendix B Operational Guidelines for the Faculty Review Committee
Section 4 Investigation of the Grievance and Access to Relevant Documentation	**Part One: Appendix B** Operational Guidelines for the Faculty Review Committee
Section 5 Resolution of the Grievance, Required Actions, and Final Appeals	**Part One: Appendix B** Operational Guidelines for the Faculty Review Committee

Date: May 9, 2023
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Medich, Chair)
Re: Motion to establish a graduate Master of Architecture (M. Arch.) program in the Civil, Environmental, and Architectural Engineering Department

Motion: On behalf of the Civil, Environmental, and Architectural Engineering Department and the Architectural Engineering Program, the Committee on Graduate Studies and Research recommends and I move that a new Master of Architecture (M. Arch.) graduate program, as described below, be added.

Description of the Motion: (with ~~struckthrough~~ text eliminated and red text added by friendly amendment)

1. Description of the Program

The Master of Architecture (M. Arch.) is a professional degree program that prepares graduates for the practice of architecture. The program balances core disciplinary competency with design experimentation, to explore creative architectural and engineering solutions that address societal and environmental concerns and opportunities for the built environment and the making of buildings. Emphasis is placed on the completion of a design thesis where students learn to synthesize social, environmental, and technical thinking through informed design practice. The thesis project is supported by coursework in a focus area that emphasizes the broadening of technical and theoretical exploration of design and supporting topics. Students develop a tailored curriculum in close collaboration with a faculty advisor.

2. Faculty

Faculty Core M. Arch Program:
Shichao Liu, Nancy Ma, Soroush Farzin, Steven Van Dessel, Navneet Anand, Clyde Robinson

Associated Faculty M. Arch Program:
Leonard Albano, Nima Rahbar, Mingjiang Tao, Tahar El-Korchi, Carrick Eggleston, Suzanne LePage, Jessica Rosewitz, Aaron Sakulich, Jeanine Dudle, Paul Mathisen, Leila Abu-Lail, Hal Walker, John Bergendahl, Laureen Elgert. Sarah Strauss, Melissa Malouf-Belz, Katherine Foo, Stephen McCauley, Rob Krueger, Lisa Stoddard, Derren Rosbach, David Samson, Joseph Cullon

Faculty Contact / Program Management:
Steven Van Dessel, Associate Professor & Director Architectural Engineering Program (CEAE)

3. Degree Requirements

The Master of Architecture program requires a minimum of 30 semester credit hours of graduate coursework. The curriculum is composed of 2 professional practice courses (6 credits), a thesis research seminar (3 credits), 3 focus area courses (9 credits), and a design thesis (12 credits), as shown in table 1 below.

Table 1. Master of Architecture Major Requirements			Credit Hours
Research Seminar	New course	Thesis Research seminar	3
Professional Practice	CE 501	Professional Practice	3
		Professional practice elective	3
Focus Area Electives		Elective	3
		Elective	3
		Elective	3
Design Thesis	new Course	Design Thesis	12
Minimum semester credits hours of graduate coursework			30

• **Thesis Research Seminar (3 credits)** This seminar prepares students to conceive and develop a graduate thesis project proposal that is rooted in the originality and innovation of research and design practice. The course is structured with seminars of invited speakers, discussions of readings, workshops, student presentations, and thesis proposal development. The seminar may include a travel component. The topics vary each year with the focus on research methodologies and broad issues relevant to the discipline of architecture.

• **Professional Practice Courses (6 credits)**
CE 501. Professional Practice (required – 3 credits)
CE 580. Advanced Project Management
CE 584. Advanced Cost Estimating Procedures
CE 583. Contracts and Law for Civil Engineers

• **Design Thesis (12 credits)** The graduate design thesis involves creating and advancing a comprehensive architectural project that exhibits adequate scope and intricacy. Thesis design topics are developed in close collaboration with a thesis committee, which is composed of a primary thesis advisor and an advisor in a focus area. A formal thesis rational and plan is developed during the thesis research seminar. The design thesis is required of all graduate students in the Master of Architecture program. Students register for 6 credits during the fall semester and 6 credits during the spring semester of their master's year.

• **Focus area (9 credits)** The design thesis is underpinned by elective courses that are thematically aligned with a focus area, allowing students to broaden their skills and develop a meaningful grasp of a thematic area of interest. To ensure this depth, students complete at least three courses of thematically related work. Different focus areas are possible and currently include a focus on (1) structures, and (2) climate adaptation. Other focus areas can be developed, and students can propose alternative thematically related coursework with sponsorship from a thesis advisor and approval of the M. Arch program committee. The focus area is seen as an important mechanism to connect the graduate program with faculty from other research domains and programs across campus. A list of recommended courses for two exemplary focus areas is included below:

Focus area – **Structures.**
CE 524: Finite Element Method and Applications
CE 510: Structural Mechanics
CE 511: Structural Dynamics
CE 514/ME 5383: Continuum Mechanics
CE 519: Advanced Structural Analysis

CE 531: Advanced Design of Steel Structures
CE 532: Advanced Design of Reinforced Concrete Structures
CE 534: Structural Design for Fire Conditions
CE/ME 5303: Applied Finite Element Methods in Engineering

Focus area – **Climate Adaptation.**
IGS 501: Theorizing Place, Community, and Global Environmental Change
IGS 505: Qualitative Methods for Community-Engaged Research
IGS 510: Human Dimensions of Global Environmental Change
IGS 545: Climate Change: Vulnerability and Mitigation
IGS 590: Capstone Seminar: Comparative Climate Action

4. Admissions Requirements

Admission to the M-Arch program is decided by the program committee on a case-by-case basis. The M-Arch. is offered in 2 tracks, corresponding to an applicant's educational preparation and experience:

TRACK 1 – 4-year B.S. in Architectural Engineering / 1-year Master of Architecture

For the combined BS AREN/ M. Arch. program, students must have earned a BS in Architectural Engineering from WPI, complete complementary courses to round out their backgrounds (see note 1 below) and submit a portfolio of creative work and a resume. Students interested in the combined BS AREN/ M. Arch. program indicate this on their undergraduate application and formally apply to the program during A-term of their junior year. Admission to the program is decided by the program committee on a case-by-case basis. The following is required before a decision for admission can be made:

- Complete the online WPI application for graduate school,
- Earned BS in Architectural Engineering from WPI ~~with a minimum 3.00 GPA~~ in good standing (see Note 1),
- Portfolio of creative work,
- Resume,
- Statement of goals,
- Three Letters of recommendations, with one from a relevant non-academic source.

The normal residency for the combined BS AREN/ M. Arch. Program track is one year. A decision on admittance to the M. Arch program is made by the program committee during the fall term of a student's junior year, after which students are assigned a faculty graduate advisor.

Note 1: For the combined BS AREN/ M. Arch. program, students are required to take complementary courses during their 4 years of undergraduate studies to meet minimum total credit hour requirements (6 credit hours above the normal 135 credit hours needed for the B.S. AREN) and to round out their backgrounds in topics related to the history and theory of architecture and urban planning, design, and social and environmental justice - broadly defined. Students select at least 2 complimentary courses (6 credit hours total) from existing WPI offerings, as indicated below [1,2,3]

CE 3070: Urban and Environmental Planning
CE 4071: Land use Development and Controls
ENV 2201: Planning for Sustainable Communities

ENV 2710: Designing for Climate Resilience and Justice
ENV 3100: Adventures in Sustainable Urbanism
AR 2114: Modern Architecture in the American Era, 1750-2001 and beyond [4]
AR 2115: Topics in Architecture Since 1960
AR 3112: Modernism, Mass Culture, and the Avant-Garde
HI 1311: Introduction to American Urban History
HI 2310: Topics in Urban History
HI 2335: Topics in The History of American Science and Technology [5]
HI 3317: Topics in Environmental History [5]
BB 290X/HI 331X: Urban Ecology and Environmental Justice [6]
IGS 501: Theorizing Place, Community, and Global Environmental Change

[1] This list of courses is indicative of the course topics that are expected, this list will be updated periodically. Other courses may also be chosen and students can also pursue independent study credit to count towards the requirement, but this will need approval by the program committee.
[2] Undergraduate students can complete these courses (or equivalent courses) as free electives, or as part of the general education requirements when completing their undergraduate BS degree in Architectural Engineering.
[3] With approval of the graduate committee, up to 3 credit hours (1/3 unit) of IQP work can be counted towards this requirement depending on the IQP topic and a student's contributions to the project and report.
[4] This course is already a distribution requirement for the BS in Architectural Engineering and cannot be double counted towards this requirement.
[5] Topics change each year and per faculty, only applicable when covering cities and urban systems.
[6] Currently an experimental course, applicable only when the course becomes permanent.

TRACK 2 – Master of Architecture

This track is intended for those that have earned a baccalaureate degree from other majors at WPI or from other institutions. Admission to the program is decided by the program committee on a case-by-case basis. The expected residency for this track varies depending on a candidate's previous education and experiences. Courses and work from the candidate's prior degree program are reviewed by the program committee for conformance to the distribution requirements for WPI's BS in Architectural Engineering and the additional course requirement (see track 1). This review is used, in combination with a candidate's professional experience and portfolio of creative work, to determine additional coursework needed to assure that candidates are well rounded and that their program of study satisfies NAAB requirements. The following criteria need to be met before a decision for admission can be made:

- Complete the online WPI application for graduate school,
- Earned Baccalaureate degree in any field with a minimum 3.00 GPA,
- Portfolio of creative work
- Resume,
- Statement of goals,
- Three Letters of recommendations, with one from a relevant non-academic source.

Rationale:

The practice of building engineering and architecture follow two distinct education pathways that lead to different forms of licensure in the US. Most states require individuals to have obtained an ABET accredited degree to become eligible for professional engineering licensure, while a NAAB accredited degree is typically required to become eligible for professional architectural licensure. There is substantial and increasing overlap in the knowledge base and skills essential to either discipline, as is exemplified in the large numbers of integrated AE firms as well as the close collaboration already required in practice. Global challenges, such as climate change and growing energy dependencies, are furthermore intensifying the need for professionals astute to both fields. Young individuals in the US that are qualified and interested to pursue both fields are however faced with the dilemma of making this choice at relatively young age – there are no time-effective academic pathways for dual accredited programs in the US (obtaining a dual accredited degree would typically take 6 to 7 years, or more).

We are hereby proposing to develop a professional Master of Architecture (M. Arch) program that is NAAB-accredited. The program is designed to work in conjunction with our existing 4-year ABET-accredited undergraduate BS degree in Architectural Engineering. The combined BS-AREN/M. Arch program has a total expected residency of 5 years, which is on a par with traditional NAAB accredited undergraduate programs in architecture but offers the unique benefit of dual accreditation. Upon graduation, graduates can decide to become registered engineers or architects, or both, depending on their career goals and aspirations. The proposed new program is also designed for applicants that earned a baccalaureate degree in other fields, in which case the duration of study will depend on the candidate's previous education and experience.

Interactions with prospective students and current AREN students has taught us that many are interested in both building engineering and architecture. While the current Architectural Engineering program is a fitting degree program for such students, many good applicants decide to pursue a more traditional NAAB accredited undergraduate degree in architecture, which WPI is not offering. About ten times more students are enrolled in NAAB accredited programs in the US when compared to ABET accredited architectural engineering programs. The purpose of the proposed Master of Architecture program is to create an attractive academic pathway for applicants motivated and passionate to become qualified as both engineers and architects, which is missing from the US market.

For WPI, the integrated ABET/NAAB degree program represents a niche offering that can become a powerful tool to attract less traditional students, i.e., those that are interested in design and engineering. The program offers an opportunity to diversify WPI's student body and broaden the applicant pool. The proposal is intended to also increase competitiveness of the existing AREN program relative to competing programs within the field of study in the US. As a Polytechnic Institute with an established Architectural Engineering program, WPI is uniquely placed to offer a program that integrates engineering and architecture. The program would be the first such program in the US, thus offering first-to-market recruiting benefits. It would be difficult for other institutions to follow WPI's lead in this area, due to vested interest in existing more traditional educational tracks in architecture and engineering.

***Cost benefits for WPI students*:** For WPI students, a combined ABET/NAAB accredited degree is attractive as it offers career flexibility and broader marketability upon graduation. The

abbreviated 5-year timeframe (for internal applicants) compares quite favorably to other universities where such dual accredited program takes 6 to 7 years. Students thus save money for one or more years of education and start earning income faster. Table 2 below presents tuition costs for the proposed integrated 4-year ABET accredited BS AREN degree and the one-year NAAB accredited Master of Architecture program (track 1). Also included are the costs of comparable degree program combinations at other universities, including Northeastern University, Wentworth, and the University of Massachusetts at Amherst. The table includes tuition costs of their 4-year ABET accredited BS engineering degree and their NAAB accredited Master of Architecture degree. All three universities lack the integrated track option and require students entering with an ABET accredited BS in Engineering to complete a 3-year track for their accredited Master of Architecture program. The newly proposed Master of Architecture program at WPI is unique in that it will be the first in the nation to offer an integrated curriculum in a 5-year timeframe. Also included are the costs of attending a more traditional 5-year NAAB accredited Bachelor of Architecture program at two private universities, MIT and RPI. The costs are on a par with our proposed 5-year integrated program – but the options at MIT and RPI do not offer dual accreditation. Overall, the cost benefits are substantial in comparison to other private universities. The tuition costs are also quite competitive with in-state tuition costs at UMass, especially considering that this takes 7 years as opposed to 5 years for the integrated track at WPI.

Table 2 Tuition costs comparison for the proposed integrated 4-year ABET accredited BS AREN degree and the one-year NAAB accredited Master of Architecture program (track 1).

	ABET accreditted Eng. Degree				NAAB accredited M-Arch Degree				Total
	Net	Average*	years	Total	Net	Discount***	credits	Total	
WPI AREN ABET/NAAB 5 year	$ 56,000	$ 33,600	4	$ 134,400	$ 1,610	$ 1,288	24	$ 30,912	$ 165,312
Northeastern University	$ 62,392	$ 37,435	4	$ 149,741	$ 1,804		**96**	$ 173,184	$ 322,925
Wentworth Institute of Technology	$ 38,160	$ 22,896	4	$ 91,584	$ 1,140		**106**	$ 120,840	$ 212,424
UMass Amherst (in State)	$ 17,364		4	$ 69,456	$ 725		**87**	$ 63,075	$ 132,531
UMass Amherst (out of state)	$ 39,300				$ 1,533		**87**	$ 133,371	$ 309,171
RPI Bachelor of Architecture (5-years)	$ 58,600	$ 35,160	5	$ 175,800					$ 175,800
MIT Bachelor of Architecture (5-years)	$ 55,878	$ 33,527	5	$ 167,634					$ 167,634

* Assuming 40% discount

** assuming 24 of 30 credits will be taken after completion of the undergraduate degree

*** 20% graduate credit tuition discount for WPI graduates.

Opportunity and Market Analysis: The proposal has received positive feedback and support from AREN students and the AREN advisory board, and a market study was performed by the office for Academic Affairs:

• Survey of AREN students: A survey was completed in 2020 to solicit interest among existing undergraduate students in Architectural Engineering at WPI. About 90% of the students in the AREN major responded. Of the respondents, about 88% indicated that they were very interested (60%) or somewhat interested (28%) in pursuing the M. Arch if it was offered at WPI.

• A market study was performed by Academic Affairs to collect statistical and anecdotal evidence to demonstrate market viability and opportunities for differentiation for the proposed M. Arch program. The study concluded that *"WPI would have a distinct edge in terms of curriculum, marketability, and uniquely positioned reputation in STEM."* (Appendix B)

In summary, we anticipate that the M. Arch program at WPI will **(i)** will be of national appeal by offering a unique alternative to the traditional degree programs in architecture or architectural engineering, **(ii)** will lower the cost of obtaining a dually accredited degree, **(iii)** will be the first such program in the US, offering first-to-market recruiting benefits to WPI. **(iv)** can expand the applicant pool for our undergraduate AREN program, and **(v)** will diversify the AREN and WPI student body by attracting students equally interested in architectural design and building engineering.

Funding, Research, and Development Opportunities: The Master of Architecture program is a professional program that brings together faculty from across campus from multiple architectural sub-disciplines and areas of specialization. These subdisciplines include such areas as engineering and architectural design, urban design and planning, sustainability, development, policy studies, and design for climate adaptation. Faculty across the university with an interest in architecture can become involved in supporting student design thesis projects and serve as co-advisors for thesis concentration areas. Such collaboration will create a new multi-disciplinary / cross-disciplinary environment that brings together faculty in engineering, architecture, arts and humanities, the social sciences, and the global school. We anticipate that the increased collaboration will enhance our collective capacity to pursue research at the nexus of architecture, urban planning, climate change, sustainability, and social and environmental justice. There are many possible synergies with the newly established institute for sustainability studies and student thesis topics can align with the goals of this initiative to some extent, for example.

Resources Required:

Faculty affiliated with the ABET accredited AREN program will bear primary responsibility for delivering the program. This includes review of applications for incoming students, advising graduate students, advising master level thesis work, program administration, and program accreditation. The undergraduate AREN program currently has grown to approximately 100 undergraduate students and is supported by 4 full-time faculty and several part-time faculty. The AREN undergraduate major also receives support from faculty in the CEAE department, who support courses in such areas as structural engineering, construction, professional practice, and who also co-advice MQPs.

The program requires (a) One new 3 credit hour thesis research seminar, (b) design thesis advising, and (c) existing courses as electives and concentration areas. Assuming 8 graduate students enrolled in the first year, ramping up by 2 students/year, the program is self-sustaining from the start with possible net positive income of $231,840 (year 1) to $637,560 (year 7) annually. See pro forma revenue calculation in Table 3 below.

Table 3. Pro-Forma revenue calculation Master of Architecture Program*

	25-26	26-27	27-28	28-29	29-30	30-31	31-32
M-Arch Program	8	10	12	14	16	20	22
Total Students #	8	10	12	14	16	20	**22**
Graduate Program Revenue	$ 231,840	$ 289,800	$ 347,760	$ 405,720	$ 463,680	$ 579,600	$ 637,560

* Graduate tuition includes 20% discount

Program Assessment:
This is a unique program that combines engineering and architectural accreditation in a 5-year schedule. Two different accreditation bodies are in place, ABET and NAAB, each requiring processes for assessing student outcomes and program and student criteria. ABET uses a 5-year program review cycle, while NAAB uses an 8-year review cycle. The AREN program already has an active and supportive industry advisory board composed of engineers, architects, and contractors – which will help guide refining the quality of the program. The AREN program, while relatively young, also has an emerging alumni network that can be engaged in program development and assessment.

Impact on Existing Programs at WPI:
We anticipate no impact to existing programs at WPI.

Implementation Timeline:
AY 22-23 Program development and approval,
AY 24-25 Recruit applicants and admit new students,
AY 26-27 First cohort completes master's degree program,
AY 27-28 Evaluate Program, enhance /modify as appropriate.

Comparison to Existing Programs at WPI:
There are no comparable existing programs at WPI.

Comparable Programs at other Universities:
Track 1: The integrated BS AREN / M. Arch track is a unique offering – there are no comparable ABET/NAAB dually accredited 5-year programs in the US today.

Track 2: Many universities offer Master of Architecture programs; these differ however from our proposed program in that they are not specifically tailored towards engineering centered applicants. The duration of study for existing programs also varies, ranging from 1 to 3.5 years depending on a candidate's background. Universities with ~ 1-year track offerings require entering students to have completed their own non accredited architectural studies program. Examples include programs at Northeastern University and Wentworth. Our proposed BS AREN / M. Arch program differs in that student first obtain an ABET accredited engineering degree before pursuing their 1-year NAAB accredited architecture degree. An overview of different programs and their expected duration of study are included in table 4 below.

Table 4. Overview of different programs and their expected duration of study

	Duration of study options (years)						Advanced Placement Options	Notes
	1	1.5	2	2.5	3	3.5		
Northeastern University	●		●		●		1	1-year tracks designed for internal Architectural Studies majors
Wentworth	●		●		●			
Univ. of Hartford	●		●		●			
Temple Tyler School of	●		●		●			
Kent State	●		●		●		●	
MassArt		●		●				
UMass Amherst			●		●			
RISD			●		●		●	
NYIT			●		●			
RISD			●			●	●	
University of Miami			●			●	●	
Taubman			●			●	●	
Buffalo			●			●	●	
Georgia Tech			●			●		
Harvard			●			●	●	
Yale					●		●	
Princeton					●		●	
UPenn					●		●	
MIT						●	●	
Cornell						●	●	
Pratt			●		●		●	
RPI					●		●	
NJIT					●		●	
IIT			●		●		●	
Georgia Tech			●			●	●	
BAC						●	●	
SciArc					●			
PSU			●		●		●	

APPENDIX A: Program Criteria and Student Learning Objectives

Adopted from the 2020 NAAB conditions for accreditation.

Program Criteria (PC) A program must demonstrate how its curriculum, structure, and other experiences address the following criteria.

PC.1 Career Paths—How the program ensures that students understand the paths to becoming licensed as an architect in the United States and the range of available career opportunities that utilize the discipline's skills and knowledge.

PC.2 Design—How the program instills in students the role of the design process in shaping the built environment and conveys the methods by which design processes integrate multiple factors, in different settings and scales of development, from buildings to cities.

PC.3 Ecological Knowledge and Responsibility—How the program instills in students a holistic understanding of the dynamic between built and natural environments, enabling future architects to mitigate climate change responsibly by leveraging ecological, advanced building performance, adaptation, and resilience principles in their work and advocacy activities.

PC.4 History and Theory—How the program ensures that students understand the histories and theories of architecture and urbanism, framed by diverse social, cultural, economic, and political forces, nationally and globally.

PC.5 Research and Innovation—How the program prepares students to engage and participate in architectural research to test and evaluate innovations in the field.

PC.6 Leadership and Collaboration—How the program ensures that students understand approaches to leadership in multidisciplinary teams, diverse stakeholder constituents, and dynamic physical and social contexts, and learn how to apply effective collaboration skills to solve complex problems.

PC.7 Learning and Teaching Culture—How the program fosters and ensures a positive and respectful environment that encourages optimism, respect, sharing, engagement, and innovation among its faculty, students, administration, and staff.

PC.8 Social Equity and Inclusion—How the program furthers and deepens students' understanding of diverse cultural and social contexts and helps them translate that understanding into built environments that equitably support and include people of different backgrounds, resources, and abilities.

Student Criteria (SC): Student Learning Objectives and Outcomes A program must demonstrate how it addresses the following criteria through program curricula and other experiences, with an emphasis on the articulation of learning objectives and assessment.

SC.1 Health, Safety, and Welfare in the Built Environment—How the program ensures that students understand the impact of the built environment on human health, safety, and welfare at multiple scales, from buildings to cities.

SC.2 Professional Practice—How the program ensures that students understand professional ethics, the regulatory requirements, the fundamental business processes relevant to architecture practice in the United States, and the forces influencing change in these subjects.

SC.3 Regulatory Context—How the program ensures that students understand the fundamental principles of life safety, land use, and current laws and regulations that apply to buildings and sites in the United States, and the evaluative process architects use to comply with those laws and regulations as part of a project.

SC.4 Technical Knowledge—How the program ensures that students understand the established and emerging systems, technologies, and assemblies of building construction, and the methods and criteria architects use to assess those technologies against the design, economics, and performance objectives of projects.

APPENDIX B: Market Evaluation M. Arch program

Architectural Engineering (4+1 Program) Market Research

Statistical and Anecdotal Evidence to Demonstrate Market Viability, Opportunities for Differentiation

Academic Affairs Market Research September 28, 2020 Kyle McAlice

Objective

Identify evidence of a market that would support the launch of a 4+1 Bachelor of Science in Architectural Engineering/Master of Architecture (dual accreditation) program at WPI. This report iteration provides additional support to substantiate the initial market strength determined in an abridged assessment in August. Anecdotal evidence and select statistics aimed at assessing market strength will be included in order to attempt to support the development of this proposed program.

Assessment of Market Strength

These points are aimed at framing the evidence that follows. Assessments will be summarized in the conclusions.

1. Initial conversations with WPI Architectural Engineering faculty identified a potential risk when incorporating additional design work into an engineering program to adequately prepare for a 4+1 dual program resulting in a Master's degree in Architecture. Would this alienate traditional engineers who do not share a passion for design? Based on an assessment of identified sources, this is not likely to be the case. There is a great deal of overlap between Civil Engineering, Structural Engineering, and Architectural Engineering. The Bureau of Labor Statistics considers the latter two disciplines as subsets of Civil Engineering. In an academic setting, and based on anecdotal evidence identified, students are drawn to Architectural Engineering degree programs because they are design-inclined, and are specifically interested in the creation of buildings. Students with broader aspirations to work on structural functionality, a broad portfolio of civil engineering projects, or in areas considered to be heavily engineering-focused, students have several other options with a great deal of shared curriculum.

2. Outsourcing trends suggest a need for increased overlap between engineering and architecture principles in domestically trained talent pools. Evidence suggests that the European talent pool of Architects and Architectural Engineers benefits from broader knowledge across each discipline. For this reason, American design firms, contractors, owners, etc., outsource work to European organizations and individual consultants.

3. At the same time, and according to studies cited below, the European Architectural Engineering Services market is poised for a decline in revenue over the next five years. This is due to several factors. Projects require ever increasing, stringent engineering standards. The need for Architectural Engineers remains high. Budgetary constraints are resulting in the outsourcing of design services, CAD work, etc., to smaller Asian companies. There is a notable market gap that could be filled by professionals with dual licensure (engineering and architecture). This can streamline interaction with clients, and reduce their costs.

4. Market disruptors such as Building Information Modeling (BIM) are viewed as having a major impacting on building and construction, architecture, and engineering services. As BIM

automates the design process, and allows informed decisions to be made across disciplines, the lines have become increasingly blurred between architects and engineers. More information will be provided below, but there is confirmation of a growing need for dual-purpose talent with equally strong capabilities in design and engineering.

5. As stated in previous discussions, WPI would likely be first to market with a five year (total) program that results in degrees with both architecture and engineering accreditation. It may be assumed that job candidates possessing skills from each background are increasingly sought after. However, these are fields with stringent licensure requirements. An architect with engineering knowledge must either take additional years of schooling in order to pursue an engineering licensure, or work strictly as an architect and only be able to provide engineering input. At present, there are only a handful of schools that efficiently train students in both capacities, and none of them offer dual accreditation or dual degrees with engineering included – at least within a five year time frame (**more below – there is at least one, but with a six year timeframe for those WITHOUT an undergraduate design or architecture background**). The proposed program would be the most efficient path to dual licensure in the domestic market.
6. Architects are increasingly tied to technology, the technical requirements of building, code, and efficiency, through shared operating picture software, data-driven design, etc., making their work edge closer to that of an architectural engineer, in many respects.
7. Engineers are limited in terms of design/studio study opportunities, yet are used in tandem/interchangeably with architects in a modernized project management methodology within the architecture and construction industries.

Anecdotal Support

Given that this program would be first to market, it is challenging to identify a student pool from the academic side. This research will identify evidence to suggest a need for cross-trained, dual-licensed professional talent. At the same time, it will assess the typical duration of study required to achieve that professional standing. The findings should substantiate the benefit of offering an efficient, accredited program like WPI is proposing.

The Architecture education market is fairly robust. While the fact that it is growing (enrollment, number of programs, etc.) is a positive attribute, it does not necessarily tell the story that we may need to tell in order to justify the launch of this program. There is growing evidence to suggest that market disruptors, technology implementation, and budgetary constraints are blurring the lines between architects and engineers. It may be more valuable to assess the factors outside of higher education which may indicate a talent gap that could be addressed by a "first to market" program pairing architectural engineering and traditional design curriculum.

1. According to Rand Engineering and Architecture: "The differences between engineers and architects, while they do exist, are not as great as what the two professions share—the expertise to evaluate, design, and maintain buildings and building systems and provide aesthetically pleasing, safe, well-functioning spaces to work and live. The question is, then, which one is better suited for the particular project at hand?" This evolution has shifted hiring practices, and continues to shape their recommendations for professional development. In most states, a PE or RA license is required depending on the background of the individual. There are requirements for each license type to sign off on different aspects of a project. Despite the fact that the practical experience and shared knowledge, in the eyes of Rand's leadership team, is similar across

engineering and architecture, multiple people must be on the payroll to meet the standard set forth by the state. Dual licensure is in high demand in these cases.

2. There is evidence to suggest that the traditional building project management model has shifted. Historically, the architect led the project, interfaced with the owner or customer, and drove the timeline, budget, team assembly, etc. In modern firms, the architect and engineer work in tandem. They are equally involved in customer interfacing, in an ideal setting. Because this tandem approach increases costs, it is largely reserved for commercial projects. Smaller firms and projects require a decision on their focus areas: engineering or architecture. In these cases, there is either a deficit in knowledge, or a need to outsource. Again, pointing to a need to professionals with shared knowledge.

3. Assessments of the civil engineering market suggest that the architectural engineering subset is driven by students who seek more studio time by nature. They are often capped, professionally, by not being qualified to pursue an RA licensure, though that may align with their career goals more than they realize when entering a program. An efficient (i.e. 5 years or less), single campus path to that end, is missing from the US market.

4. CHRON: Dr. Kelly Meier wrote an article for the Houston Chronicle comparing careers in Structural and Architecture Engineering. After decades in industry, it is argued that there may need to be more differentiation between the two disciplines. This piece states the following on their differences in work: “Structural engineers create drawings, use computer modeling and build 3-D models of structures to determine safety requirements, weight load, and size approximations. During inspections, a structural engineer studies the building site, evaluates the ground to determine load factors, and problem solves when building issues arise. An architectural engineer works with clients, construction managers and structural engineers to ensure that the original design of the project will come to fruition. Similar to a structural engineer, an architectural engineer spends time at a building site to help solve design problems, check building codes, and monitor the aesthetics of the project. Both positions require strong interpersonal communication skills, an understanding of engineering design and a knack for problem-solving.” Dr. Meier also states that there is a distinct need for “drafting for design” in undergraduate curriculum. If the aforementioned information is true, then architectural engineers are increasingly overlapping with architects, and would benefit from additional design work/studio training, and licensure opportunities to conduct the work that they are now being asked to do.

5. CHRON: “Although architects fall on the creative side and engineers on the technical/mechanical, they're not that far apart. Good architects need to know the engineering limits on design, for instance. Both may serve as project managers on a job, supervising a team; both architects and engineers serve as liaisons between the project teams and the client.”

6. According to Clare Olsen, a professor at Cal Poly, “Architects who are protective of their vision might feel that structure can get in the way.” She also states that their “frustrations come about when the engineers don’t recognize the vision and value of a particular architectural goal.” Conversely, architects who do not understand modern tolerances, materials, and smart technology integration, struggle to design to standard at first attempt. There is an ever-growing need for cross-training, and, potentially, cross licensure.

7. Collaboration between architects and engineers is a major focus of case studies, white papers, and talks across an increasingly integrated set of industries:

https://d2rjvl4n5h2b61.cloudfront.net/media/documents/Improving_Collaboration_Between_Architects_and_Engineers.pdf

8. Business Wire Magazine: The "Architectural/Engineering services landscape is changing rapidly due to the global sourcing opportunities and increasing internet penetration. Online crowd sourcing enables customers to submit requirements online and architectural, engineering service providers to send design ideas and plans to customers directly. Once the customer selects a plan and design, they receive further customization based on their specific requirements. For instance, Arcbazar and competitionline offers architectural services to customers online through its crowd sourcing platform." In projects that leverage these types of services, there is almost exclusive management capacity given to engineers and/or builders, with the design/architect work being largely removed. In order to counter this type of disruption, dual-purpose industry leaders are necessary.

9. BIM Disruption According to S3DA: "Technologies like Building Information Modeling (BIM) have over time become very valuable for architecture, engineering, and construction (AEC) professionals. In particular, this is instrumental when it comes to architectural and engineering design as it helps to avoid design problems and considerably reduces building costs." Additionally, "BIM allows the architects, engineers and project owners to digitally explore the main physical and functional characteristics of a project, for example, the environmental impact and cost scheduling before the commencement of a construction project. In return, this reduces uncertainty, enhances interactions and understanding of the project, resolves conflicts between disciplines, simulates and analyzes the building process as well as performance."

   As a result, they summarize this disruption impact as: "The modern-day architecture, engineering, and construction (AEC) industry are confronting enormous institutional and technological shifts, for instance, the growing demand for proper application of sustainable practices and the ever-increasing utilization of information technology. Therefore, civil and structural engineers, architects and other relevant construction professionals must adapt and be capable of sustainable dealing with the briskly changing technology, the modern-day complex problems necessitating multidimensional solutions, as well as a world that is rapidly becoming interconnected."

10. According to NV5, technological implementation at the crossroads between architectural and engineering firms has brought about an entirely new career field. The BIM Engineer must be well-versed in not only IT and software-related foundations, but also architecture and engineering, further demonstrating rapidly increasing overlap between the two traditional disciplines.

11. According to United BIM, drafting outsourcing is a "Strategic Growth Approach for Architect and Engineering Firms. While drafting, design, modeling, etc., are not the sole tasks of registered architects, they do require human capital, time, and money to complete. To that end, outsourcing is repeatedly talked about as a way to strengthen finances and build upon core strengths. In many respects, each of the following points can ALSO be viewed as justification for engineers who also possess an architecture degree and license:

    a. "Outsourcing is a popular phenomenon in the architectural and engineering fraternity. Many growing as well as established firms outsource basic tasks like drafting, correcting mark-ups, 3D modeling to outside firms. Outsourcing fundamental tasks broaden the horizon of a firm's offerings while at the same time helping them focus on core business activities."

b. "With the growing demand for architectural and engineering services, keeping up pace with client expectations without compromising on quality is a hard nut to crack. Outsourcing allows firms to meet dynamic client needs without investing in additional resources."

c. "Reduced Cost of Operations and Services" – not requiring an in-house team of drafters, modelers, and/or architects focused on design, allows companies to bring down operating costs. While this can, and often IS, satisfied by outsourcing, dually-licensed engineering and architecture practitioners can satisfy this need with even more attention given to customer needs.

d. "Improved Focus on Core Activities" – Outsourcing drafting, markup, 3D modeling, etc., allows for more emphasis on regulations, structural tolerances, planning and construction – not to mention code adherence. Again, outsourcing these tasks is valuable to the bottom line, but there may be even more value in cross-trained talent in-house.

12. Compilation of Articles citing Large Scale Disruption due to BIM:

    a. Convergence – BIM is Disrupting Design and Engineering

    b. Autodesk, Construction in the Era of Connection – Disruptions Impacting the Construction Industry

    c. Viatechnik – Disrupt the Construction Industry Through Pre-Fab, BIM, and AI

    d. S3DA – The Power of BIM in Architecture, Engineering, and Construction

    e. BIM – A Guide for Architects and Engineers

13. Rand: "The professional's practical experience outweighs whether he or she is a PE or an RA." Yet, there are stringent project requirements that do require this distinction, and input from both. There are many individuals who are capable of providing both skillsets. There are few individuals who are adequately trained, accredited, and licensed to official address both areas in the job market.

14. "Learn computational design" – Engineering.com biggest key to surviving the BIM revolution, and the next wave of disruption, which they view as data driven.

15. Architecture Daily: "BIM allows the joint work of architects, clients, builders, engineers and other relevant actors to occur within in a single intelligent and shared process." With this, technical engineers, creative designers, suppliers and materials specialists, are all learning (and often required to learn) across disciplines. "In any design and construction project there are an unlimited number of participants, as well as infinite interactions between parties. The projects are multidisciplinary and include information that is not necessary to all involved. So who is responsible for what in each project? How far does my responsibility go and where does yours start? BIM helps to order the complexity of this process." Holding multiple skill-sets, and moreover, the licensure to act in several capacities, may be invaluable in such a setting.

16. According to The Engineering Design, these are the "Top Five Reasons to Outsource Your Architectural Drawing:"

    a. Lower Overhead Costs

b. Much Faster Turn-Around

c. Increased Productivity

d. Decreased Errors Needing Revisions

e. Better Collaboration

17. There are areas in which a job description may describe an Architectural Engineer, which may be easily confused with an Architect. Compiled research from Indeed.com suggests that one of the most sought after skills, currently, is "collaborating with architects to assist with the design process." Examining blueprints, sketches, and models to design viability requires a unique blend of creative and engineering skills to adhere to modern building requirements.

    a. The average salary in the US in $85,570 (higher than that of a bachelor's level architect. As such, design-minded folks who are engineering-forward, would benefit from the salaries attributed to the 4+1 path that WPI proposes, if engineering alone is not a sufficient career.

    b. Additionally, Indeed argues that many companies (though not all) require a graduate degree in any related discipline. It makes sense that architectural engineers would need to pursue an advanced degree, even if they are looking to stay specifically within that realm. At present, many pursue civil engineering, management, or construction project management degrees. Given that many architectural engineering students pursue that degree at the undergraduate level because of some level of creative design interest, it would be beneficial for WPI to have a design-focused MArch offering to position across from CPM or MS in CE.

18. The bottom line: Market evidence suggests a far greater amount of traditional architect tasks being outsourced, and far less of the engineering requirements moving to niche firms or overseas agencies. This mirrors the belief that engineers are taking over some of the project lead roles that traditionally went to architects. If this shift is, in fact, as is suggested above, then architectural engineering degree programs are poised for a rise in applicants. Programs that align themselves with architectural design opportunities, and offer differentiated strengths through accreditation, formatting, efficiency, etc., are very well positioned in this market.

Employment Trends for Architects vs. Architectural Engineers

Architecture Industry Disruption Overview:

1. A 2019 study cited by Construction Executive, detailed "Five Mounting Forces Disrupting the Construction Industry." With respect to architecture and architectural engineering, some interesting statistics were presented:

    a. 70% of contractors cited trouble finding skilled craft workers, and 65% believe it will not get better, or could get worse. When expanded upon, this boiled down to drafting, modeling, etc., in the architecture space, and hourly labor on the building side.

    b. MEP Systems (lighting, plumbing, HVAC, etc.) accounted for approximately 40% of build costs. Complexity, code, and time consumption has led these to become a focus area for hiring practices. As is evident in leading Architectural Engineering programs, these sub-sets are often studied as specific tracks or specializations within an AREN program. Firms,

contractors, and so forth, are leading projects with architectural engineers over architects to attempt to minimize overrun.

c. "To address these issues, the historically conservative construction industry is embracing new digital technologies from 3D printing to LIDAR-equipped robots to monitor progress. The first wave of digitization, including BIM software, has already demonstrated full project cost reductions of 5-7%..."

Regarding the Market for Traditional Architecture Roles:

1. BLS: 2019 Median Pay for Architects - $80,750.
2. According to statistics cited by Investopedia in 2019, MA is the second highest paying state for Architects to work (average salary of $103,920).
3. Nationally, the highest pay levels are found in the following industries (BLS, 2019):
    a. Insurance Carriers - $127,000 (annual mean wage)
    b. Electric Power Generation - $109,570
    c. Land Subdivision - $107,500
    d. General Medical and Surgical Hospitals - $103,730

    NOTE: These categories are not necessarily viewed as traditional fields for architects (such as residential or commercial construction, government contracts, etc.). It may be assumed that business management, science and engineering, and public health specific knowledge would be valuable interdisciplinary skillsets for employment in these areas.
4. According to Investopedia, "…more healthcare facilities will be needed to accommodate an aging population in need of medical treatment." Also, **"Architects who can create sustainable or green designs, which help address climate change issues are also in demand." With respect to the latter, there is increasing evidence to suggest a need for engineering design knowledge to meet the needs of architecture employers.**
5. In the 2018 analysis of Architect careers by BLS, they were expected to experience 8% growth (faster than average) between 2018 and 2028. That equated to 11,200 new jobs, in total.
6. **In 2019, the projections above were reduced to just 1% projected growth between 2019 and 2029. That is an addition of just 1,100 jobs, or slower than average growth.** This is a significant change. Experts believe increasingly blurred lines between architect and engineer, and the technical, function-forward emphasis in the construction industry, have contributed to this change. It is not that the jobs aren't still there, but qualifications may be shifting. Outsourcing is another potential factor for this discrepancy.
    a. According to the BLS Occupational Outlook Handbook, "Architects are expected to be needed to make plans and designs for the construction and renovation of homes, schools, healthcare facilities, and other structures, particularly in the area of sustainable design. **However, improved building information modeling (BIM) software and measuring technology are expected to increase architects' productivity, thereby limiting employment growth for these workers."**

b. **It is clear that disruptors such as BIM are limiting the job opportunities for traditional architects. With that said, there are opportunities for architects to greatly increase their marketability. One such opportunity is increasing their technical aptitude through engineering and/or software skills and project management training. A program to efficiently train dually-focused (form AND function) talent would greatly increase individual job prospects and be valuable to a field that is in a downturn.**

7. Similarly, Architectural Drafters are expected to experience a 4% DECLINE between 2019 and 2029 (approximately -7,100 jobs). "Expected employment decreases in manufacturing and engineering services will more than offset the small increases in construction. These decreases will be driven by the use of computer-aided design (CAD) and building information modeling (BIM) technologies, which allow engineers and architects to perform many tasks that used to be done by drafters" (BLS, 2020). Again, it is evident that disruptors like outsourcing and BIM are changing the needs of employers. **This does not eliminate the need for design architects or drafters, but it emphasizes the increasing need for interdisciplinary, technical knowledge across traditional architecture disciplines.**

8. Dating back to 2006: It was estimated that ~40% of architect fees are related to the development of construction drawings. Outsourcing can cut that by more than half. The remaining work is often related to technical requirements, code assessment, tolerances, and an understanding of materials. Much of this work is conducted by engineers. For this reason, many companies now employ structural or architectural engineers in the building project management role, while outsourcing the design work. It may be assumed that engineers with dual licensure in architecture would further efficiencies and reduce costs by removing the need for outsourcing, depending on project scale.

9. According to Jordan Goldstein of Gensler: "With the growing usage of digital printing, architects are quickly able to study the 3D implications of design ideas and mature the project. **The understanding of computational design is allowing architects to move right from design to fabrication, leaping over the more conventional aspects of the design process and expedite construction."** As computational design is a technical, computer science-based approach, this provides another strong link to increasing technical requirements for traditional architects. As such, an engineer who then becomes trained as an architect, would be primed for success in a field increasingly reliant on interdisciplinary technical talent.

10. According to a 2020 report from Mckinsey, disruption in the AEC industries "could fundamentally change what it means to be an engineer or an architect in the construction industry." Their research suggests that:

    a. "The coming years will see these stand-alone professional-services firms closely collaborating with productized and branded developers, off-site construction firms, and highly specialized contractors as an integrated R&D-like function."

    b. "The firms will increasingly add value through the standardization of structure and subsystem designs, by developing standardized design libraries of products in their target segment that are highly integrable to allow for a customizable whole."

    c. "This modular design will be reused for a large set of construction projects. In this way, design and engineering firms could influence industry standards."

d. "As the industry shifts to a more product-based approach, **the challenge for engineering and architecture firms will be to reskill their workforces and hire the right talent to design in this new world."**

11. **This same report from McKinsey suggests that Sustainability will be a driving force behind growth in the architecture segments in the future (it is already).** Changes will result in a need to emphasize human resources investments to **reskill a traditional workforce**. An obvious link can be made to architectural engineering, which already specializes in energy conservation, heating and cooling, LEED, and many other functional aspects of building that pertain to sustainable architecture.

Regarding the Market for Engineering-Related Roles in Architecture:

1. Since architectural engineers are rolled up under civil engineering, the following information is relevant. Civil Engineers earned a median pay of $87,060 in 2019. BLS predicts a 6% increase (as fast as average) in employment for Civil Engineers over the period of 2018 to 2028. Within that scope, CEs working in architecture and engineering services experienced an average pay bump up to $93,720 (2018/2019). Though Architectural Engineering is not a standalone discipline tracked by the government, pay data indicates a strong market for civil engineers working in architectural design and building. The employment change over that period will result in around 20,500 new jobs (for civil engineering as a whole). Salary increases for those working in architecture point to a significant portion of that figure being within that same career subset.

2. BLS has found that 1 of 4 civil engineers has a master's degree. When boiled down to Architectural Engineering, that number is closer to 1/3rd.

3. While architectural engineers are viewed as being from a subset of civil engineering at the fundamental level, BLS has separated this career field at the managerial level. BLS tracks data on Architectural and Engineering Managers, which boasts a median pay of $144,830. The associated job description, found here, demonstrates increasing overlap between the two disciplines – particularly at the graduate education/managerial work levels. This may also point to an understated need for graduate degrees when pursuing engineering-related roles in an architecture setting.

4. Regardless of blurred lines, "The global architectural, engineering consultants and related services market is expected to decline between 2019 and 2020 (COVID-19 FIGURES) by a CAGR of 1.1%. However, projections are positive for the coming years. Business Wire cites figures that suggest 6% growth (CAGR) between 2021 and 2023 (up to $1403.2 bil). Western Europe accounts for 37% of this market, while North American comes in at 27%.

Further Comparing Architecture and Architectural Engineering:

1. According to TeachingEngineering.org, architects are becoming increasingly responsible for understanding construction techniques. Additionally, their traditional responsibilities include layout – which has historically been viewed as a part of a building's "form." In sustainable modern design, traffic flow, window locations, air flow features, etc., must be dual purpose. Form and function are intertwined. Energy efficiency features must be designed into the aesthetics of a building. These responsibilities have typically been something that a specialized architectural engineer would be charged with. At the same time, architectural engineers have historically been responsible for a particular area – fire protection systems, HVAC, energy efficiency, etc. There is a need for the two disciplines to meet in the middle. A holistic view from an architect must be

complemented by technical, functional knowledge, while an engineer who possesses the design vision of a licensed architect would hold an invaluable skillset in the modern AEC industry.

2. In the eyes of TONO Group: "Any engineers involved in a project, whether structural, mechanical, electrical, or any other discipline, work in coordination with the architect to design the project's technical systems by applying scientific principles. Their professional education does not include abstract artistic concepts (as an architect's would) but rather subjects related to the real-world application of systems, including extensive math and physics. They answer the question, 'Will the system work as the design intends?' setting functional limits and creating parameters for the design plan."

    a. The fact that their education does not include studio design experience, does not have to be the case. Programs, such as WPI's, can market and advertise a program based on a unique mix of design work incorporated into a technical program like architectural engineering.

    b. Furthermore, architects are asked to do much more than design and manage a project. If an architect possesses even one of the many technical skillsets that teams of engineers have traditionally been responsible for, then a company can save on time and money, and the design will likely have more function incorporated from the start. This allows them to understand more information shared across a BIM platform, and incorporate meaningful, functional design aspects to increase sustainability from the outset.

3. According to Penn State's College of Engineering, **Architectural Engineers are so well positioned to impact sustainability (through practices, materials, planning, etc.) that they have "been identified as the discipline with the highest potential to combat climate change" by numerous studies.** They also tout their design studio requirements as having a unique ability to facilitate this impact. "Graduates of architectural engineering are widely considered to be creative systems engineers, with formal training in creativity and design through architectural design studios married with a solid engineering education."

4. Engineering.com: "Architectural engineering jobs involve designing, constructing, maintaining and renovating buildings, including all interior and exterior systems such as structural, lighting and electrical, fire protection, acoustics and more. Many architectural engineering careers focus on meeting challenges such as sustainable building materials and power, earthquake or tornado resistance and specializations in residential, commercial or industrial structures." **This definition is not unlike many aspects of a modern architect job description.** The overlap between these areas of study continues to grow, yet there are limitations to each that can only be solved by multiple individuals – **or by a cross-trained professional from a dual-licensure program.**

Regarding Graduate Architecture Programs in WPI's Projected Competitive Market:

1. With a Master of Architecture, WPI would be one of approximately 108 schools with such a program, according to the latest figures.

    a. **WPI would be just one of 25 in the Northeast** – a number that is more in line with typical competition in engineering and science. This is actually a fairly manageable number when approaching a marketing campaign to differentiate a program in a "full" market. The market is less concentrated than it appears at first glance. Especially when WPI can differentiate in the following way….

2. **WPI would be the only university with a 4+1 program resulting in both an ABET accredited engineering degree, and an NAAB accredited Master's degree in Architecture.**

3. There were approximately 2,230 Master of Architecture Students in the Northeast (as of the latest figures from NAAB – 2018)

Additional Information on Industry Disruption

1. A 2014 article by the Association of Consulting Architects (ACA), titled "Deskilling and Reskilling," recognized a need to adapt with industry. One of the major themes cited was on the interdisciplinary aspects of modern integrated construction projects. As most acknowledge, BIM threatens traditionally trained architects who are unwilling to evolve. In reality, BIM is less about a sophisticated software package or database of shared information, and more about cross-leveling skills, and adopting an individual and organizational approach of integration.

   "Being able to truly collaborate with other professionals and building team members from early design through to well past handover of the building changes behaviors, programs, briefing and cost control. It demands better-resolved briefs, structured decision-making, better design resolution, and a better grasp of construction. There is no longer an excuse for a lack of coordination, shoddy documentation and an attitude that someone else will sort it out later. It demands truth, and that truth can set us free, if we can rise to the challenge. No longer is documentation a commodity, but an essential part of the virtual construction process that precedes the actual construction. No longer should the loudest voice in the room win. Truly integrated project teams should function very differently to the way many current projects are run, and there is no reason to think that architects should not be leaders in this process."

2. Global Construction Perspectives and Oxford Economics estimates that "worldwide construction output will grow by 85% by 2030 (upwards of $15.5 trillion in revenue). By growing at an annual rate of over a percentage point above GDP, AEC firms have a promising outlook. With that said, sustainability is paramount, and something that not all professionals are well-versed in handling. According to this report, 23% of the air pollution in the US is related to the construction industry, along with 40% of water pollution, and 50% of landfill waste. Also, according to the US Green Building Council, and cited in this same report, 40% of global energy consumption can be attributed to buildings and constructions projects.

   a. The bottom line is that while architects may be experiencing a decline in traditional design roles, **the sustainable building and architecture discipline is poised for exponential growth.**

3. "The global green buildings market is likely to expand at a CAGR of 10.26% over the forecast period (2018-2023)" – (Globe Newswire, 2019)

4. According to Proud Green Building (2017), the sustainable construction market is expected to top $523 billion by 2026 (worldwide). This is driven by an emphasis on the following:

   a. Identifying and using sustainable materials

   b. An increased focus on emissions reduction

   c. An increased emphasis on energy consumption

   d. Identifying and using materials based on their ability to be reused and recycled

5. As viewed by Architizer, "A key component in the sustainable construction revolution will be building information modeling (BIM)." One aspect is the ability to model and predict timeline – with the level of detail of forecasting for "reduced curing and drying allowances, sequencing, or interdependencies with other areas." According to their assessment: "Simply put, the less time a construction crew spends on a worksite, the less time high-emissions heavy machinery and power-hungry tools are in use, resulting in far lower project energy consumption."

6. Another benefit of BIM is the facilitation of circular construction. Understanding materials and applications through Data Driven Design (DDD) and BIM, allows for organizations to salvage waste, utilize products and practices that increase the lifespan of materials, and so forth. It is important for architects and/or architectural engineers to grasp these concepts, all while effectively leveraging BIM, to achieve sustainability.

    a. A clear advantage for architectural engineers is in the areas of HVAC and energy consumption design. With that said, there are knowledge limitations (for engineers) with respect to the holistic design of a functional space. Cross-trained individuals are uniquely positioned to integrate multiple aspects of design and functional tolerance in order to achieve efficiency and sustainability.

Examples of Similar Academic Offerings

1. New Jersey Institute of Technology offers a program in reverse of WPI's proposal. They deliver a Bachelor of Architecture (assume 5 years) with a concurrent 6th year resulting in a Master's degree in Civil Engineering. Based on a review of curriculum, this program presents a significant amount of studio time. **It appears that they also offer dual accreditation for both engineering and architecture, however, the program is at least one year longer than WPI's proposal, due to the length of an undergraduate architecture program.**

2. University of Miami offers a Bachelor of Science in Architectural Engineering with a Master of Architecture. This program is six years in total, graduates are accredited in both areas, and they are eligible for licensure in both disciplines. This is the only identified instance where a dual degree contains an engineering (specifically, AREN) base. This is very similar to WPI's plan, but requires an extra year. **Program information:** http://bulletin.miami.edu/undergraduate-academic-programs/engineering/civil-architectural-environmental-engineering/architectural-engineering-bs-master-architecture-dual-degree/#curriculumtext

    a. As will be noted below, there are opportunities to complete both types of degrees within six years. Regardless, they appear uncommon. For most without a degree in design or architectural studies, NAAB MArch programs take three years at the graduate level. For those without an undergraduate degree in architecture, or similar (design, etc.), earning a combination of a BS AREN and MArch typically takes seven years.

    b. Miami's program has been highlighted as they are the only readily identifiable program that has paired and marketed this combination in detail: "A six-year dual-degree program leading to a Bachelor of Science in Architectural Engineering and a Master of Science in Architecture is available. The program is open to exceptional students who are admitted to the graduate program at the end of their junior year. Upon completion of this program, graduates are eligible for professional registration as both an engineer and an architect. The course requirements for the BSAE/MArch program are shown in the Plan of Study."

3. University of Michigan offers a dual MEng/MArch program. It is a significant academic undertaking beyond undergraduate study, but demonstrates a need for this type of academic talent in the eyes of a top tier university.
4. Pennsylvania State University offers perspective into the needs of industry. This is one of the largest and most recognizable undergraduate architectural engineering programs in the US. They offer four specific tracks, which mirror the needs of the job market:
    a. Construction
    b. Lighting/Electrical
    c. Mechanical (HVAC, etc.)
    d. Structural

Master of Architecture Program Comparison

This section provides an overview of NAAB accredited graduate programs. This is merely a sample of efficient (accelerated), reputable programs. The purpose of this sample is to demonstrate the average time required to complete a master's program without an undergraduate degree in architectural studies, or similar. There is a belief that there may be instances where civil engineers, architectural engineers, etc., are able to be admitted to accelerated MArch programs (completing them within ~6 total years). It is conceivable that some universities would offer admission to students with an undergraduate AREN degree (in place of a BS or BA in Architecture). However, most schools specifically state that they are looking for undergraduate degrees in architecture due to theory, studio time, etc. The findings in this section lead us to believe that the aforementioned program from the University of Miami, remains one of the only six year options for students specifically with an undergraduate engineering background.

Regardless of options for admissions to accelerated programs, engineering students may feel limited in their options due to marketing. There are very few schools that market their programs in a way that would make an AREN student feel eligible for an accelerated MArch program. WPI would have a distinct advantage. Beyond that, it is clear that there are very few pairings of engineering and architecture in a meaningful way – meaning, Universities making a concerted attempt to market the shared benefits of a dual degree in this format.

While studying both concurrently is not unheard of, the responsibility is on the student to establish a goal, research and apply to programs, and complete their studies in order to achieve dual licensure in engineering and architecture (and map out specific coursework to meet the requirements of multiple universities or programs). Not only is it rare that these disciplines are co-promoted, options are not efficient. As will be observed below, across a range of universities from varying reputation levels, "accelerated" or "advanced standing" MArch programs are mainly only accessible to undergraduate Architecture (BS or BA in Architectural Studies) or Environmental Design students.

An exception to this would be admission with limited standing. Several schools offer this pathway to admission for students with a degree other than a BA or BS in Architecture. Student curriculum background is reviewed, and a customized pathway is determined. **In the case of limited standing admission to an accelerated program, many students with engineering backgrounds can complete a MArch in ~2.5 years.**

NOTES:

This section does not consider the MS in Architecture format as it is not NAAB accredited or a direct comparison to WPI's proposed program.

The majority of these program duration estimates are for full-time study. Many programs (for example, where a 3+ is noted) take longer where a part-time, online study option is available.

1. School: Boston Architectural College
    a. Program Title(s)/Level(s), Duration:
        i. 2 year Online Master of Architecture
            1. "With an undergraduate degree in architecture or design and a satisfactory portfolio, you can earn your Master of Architecture in 2 to 2.5 years."
        ii. 2 year Onsite Master of Architecture
            1. "With an undergraduate degree in architecture or design and a satisfactory portfolio, you can earn your Master of Architecture in just 2 years."
            2. This program is largely interchangeable with the online program. Students can elect delivery format by semester.
        iii. 3.5 year Master of Architecture
            1. 7 semester program. Regarding background: "Any student who has completed an undergraduate program is eligible to enter one of our onsite graduate programs, regardless of their undergraduate major." A design background allows a student to reduce the course load down to four semesters.
        iv. NOTE: Advanced standing programs require portfolio submission (2 year online or onsite)

2. School: The Catholic University of America
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture (2 year program)
            1. "60-credit-hour professional degree program for students with a four-year undergraduate pre-professional degree in architecture."
            2. Students from within the university may complete an advanced standing program within 1.5 years, or 3 semesters (down from 4).
        ii. Master of Architecture (3 year program)
            1. "111-credit-hour professional degree program for students with a four-year undergraduate non-architectural bachelor degree."
            2. **There are undergraduate prerequisites for calculus and a mechanics-based physics course. Students with this background, regardless of major, may reduce their course load to some degree (case-by-case basis, and an insignificant reduction in time – i.e. still more than 6 total years of education).**

3. School: Lawrence Technical University
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture Track III
            1. ~3 years of study
            2. For students who hold an undergraduate degree in a field other than architecture

3. Full- or Part-time options

ii. Master of Architecture Track II
1. ~2 years of study
2. "The M.Arch Track II program is intended for students who have completed the undergraduate curriculum at Lawrence Tech; those who have earned at least a pre-professional degree, typically the Bachelor of Science in Architecture, at another institution; or who have earned the professional Bachelor of Architecture degree at another institution."

iii. Master of Architecture Track I
1. BSArch/MArch (133 cr + 36 cr)

4. School: New School of Architecture and Design
   a. Program Title(s)/Level(s), Duration:
      i. Master of Architecture (4+3)
         1. "A 3-year (10-quarter) curriculum designed for students holding an undergraduate degree outside of architecture."
      ii. Master of Architecture (4+2)
         1. "A 2-year (6-quarter) track for students holding a 4-year undergraduate pre-professional degree in architecture or architectural studies."

5. School: North Carolina State University
   a. Program Title(s)/Level(s), Duration:
      i. Master of Architecture (Track 1)
         1. 2 year program (4 semesters)
         2. "For students with a four-year undergraduate preprofessional degree in architecture."
      ii. Master of Architecture (Track 2)
         1. 1.5 year program (3 semesters)
         2. For students with a five year NAAB accredited BArch degree
      iii. Master of Architecture (Track 3)
         1. 8 semester program (3.5-4 years)
         2. For students not holding a degree in architecture

6. School: Portland State University
   a. Program Title(s)/Level(s), Duration:
      i. Master of Architecture
         1. 2 year program
         2. "..for those with a four-year-pre-professional undergraduate degree in architecture"
      ii. Master of Architecture
         1. 3 year program
         2. For those who hold a degree in any discipline

7. School: Savannah College of Art and Design
   a. Program Title(s)/Level(s), Duration:
      i. Professional Master of Architecture
         1. Even at 90 credit hours, requires a pre-professional degree in architecture for admission

8. School: Kansas University

a. Program Title(s)/Level(s), Duration:
    i. Master of Architecture – Track I
        1. "5-year 180-credit Master of Architecture (M.Arch. I) is a professionally-accredited degree necessary for becoming a licensed architect."
        2. "KU is one of several schools in the U.S. that offer a 5-year accredited Master of Architecture degree."
    ii. Master of Architecture – Track II
        1. 2+ year program
        2. Designed for students with an undergraduate or graduate architecture background (pre-professional) – 4+2 model
    iii. Master of Architecture – Track III
        1. 3+ year program
        2. Designed for students with a BA/BS outside of architecture

9. School: University of Maryland
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture – Path A
            1. 2 year program
            2. "If you studied architecture at the undergraduate level and received a Bachelor of Science in Architecture, you may qualify for the four-semester Path A Advanced Standing Track."
        ii. Master of Architecture – Path B
            1. 3+ year program
            2. "If you studied in another discipline at the undergraduate level the seven-semester Path B track is the right course of study for you."
        iii. NOTE: **Students who studied architecture, but did not receive a BS in Architecture, may be considered for advanced standing. They describe this as a BS in Environmental Design, or a BA in Architecture. A BS in AREN is not stated, but it may be considered.**

10. School: University of North Carolina, Charlotte
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture I
            1. 3+ years, 96 credits
            2. "NAAB-accredited professional degree designed for those who have completed an undergraduate degree in a discipline other than architecture (such as Business, **Engineering**, Political Science, etc.)."
        ii. Master of Architecture II
            1. 2 years, 60 credits
            2. For students holding a four-year BA or BS in Architecture
        iii. Master of Architecture, Advanced Standing
            1. 12 month track
            2. For Internal/Alumni candidates with an undergraduate BA in Architecture from UNC-Charlotte

11. School: University of Southern California
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture (+3)
            1. 3 year program

2. For students with a BA or BS in any discipline
3. Students must have at least an undergraduate course in physics or calculus

ii. Master of Architecture (+2)

1. **Advanced Standing track for students with a four year Architectural Studies degree from a US School with an accredited architecture program**

iii. **NOTE: This is a STEM Designated Program**

12. School: Woodbury University
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture
            1. 7 semester program for students of any background
        ii. Master of Architecture, Advanced Placement
            1. 5 semesters
            2. For students with an undergraduate degree in architectural studies
        iii. **NOTE: This is a STEM Designated Program**
            1. "The MArch program is designated as a STEM program in Architectural and Building Science/ Technology. This STEM-designated degree program is characterized by a pedagogy with emphases on computational design, building science, industry, and practice. International MArch students may be eligible to extend their F-1 visas for an additional 24 months of Optional Practical Training (OPT), for a total of 36 months of post-completion OPT. This designation applies to both current and incoming MArch students."

13. School: Bowling Green State University
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture
            1. 2 year program
            2. For students holding an undergraduate degree in architecture or equivalent.
            3. They also allow for admission with Limited Standing: "Those holding an equivalent pre-professional degree with a major in architecture from a domestic or international institution, **including students holding a degree in any field other than architecture, may be admitted to the Master of Architecture program with limited standing until specific prerequisite courses have been completed.** Students admitted to the Master of Architecture program with limited standing shall be duly informed of the extended length of time required for graduation prior to acceptance into the program."

14. School: Carnegie Mellon University
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture
            1. 2 year program
            2. Admission is selective. It is primarily granted to students holding a pre-professional BA/BS in architecture, but international architecture degrees, as well as professional experience, are accepted on a case-by-

case basis. It is conceivable that an engineering degree in architecture would be considered.

15. School: University of Arizona
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture III
            1. 3 year program
            2. "For students with little or no design background"
            3. "This program is available to students with a baccalaureate degree from a regionally accredited institution, in any discipline. No previous architecture or design experience is required."
        ii. Master of Architecture II
            1. 2 year program
            2. "For students with an undergraduate studio-based architecture degree"
        iii. "For each program, students' past work will be individually assessed and a personal curriculum developed to insure success."
            1. **NOTE: Assuming an AREN program contained a design component, it is likely that they may be considered for admission into the 2 year program.**

16. School: University of Massachusetts, Amherst
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture (pre-professional degree + 57 credits)
            1. 2 year program
            2. **Students must hold an undergraduate degree in architecture or equivalent. An AREN degree may be considered equivalent, however, they state that the equivalent degree must come from a school with an existing NAAB accredited program. WPI would not qualify for this. This is another reason that adding a MArch program could be beneficial.**
        ii. Master of Architecture (non-pre-professional degree + up to 87 credits)
            1. 3 year program
            2. Prerequisite courses include college-level calculus and physics. Architectural History is recommended, as well.

17. School: Yale University
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture I
            1. 3 years of full-time study
            2. "The School believes that the educational experience of its program is enriched by students who have diverse educational backgrounds and, therefore, embraces students who in their undergraduate education have majored in a wide spectrum of disciplines, from architecture to any of the arts, sciences, or humanities. This program, leading to a degree of Master of Architecture (M.Arch.), is for students holding undergraduate liberal arts degrees, such as a B.A. or B.S., who seek their first professional architectural degree. It typically requires three years of full-time residency to complete the degree requirements."
        ii. Master of Architecture II
            1. 2 year program

2. This is considered a post-professional degree program.
3. This program is for students who hold a Bachelor of Architecture degree, or a first professional degree.

18. School: University of California, Berkeley
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture – Option 3
            1. 3 year program
            2. For students of any background
        ii. Master of Architecture – Option 2
            1. 2 year program
            2. Students applying with an undergraduate degree in architecture are eligible to receive 1 year of advanced standing, resulting in a 2 year program.

19. School: Harvard University
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture I
            1. 3.5 year program
            2. "…intended for individuals who have completed the bachelor's degree with a major other than one of the design professions or with a pre-professional undergraduate major in one of the design professions."
            3. Students of any background are admitted to the first semester of study. They must complete coursework in calculus, physics, and history of architecture x2, and achieve at least a B- or better in all courses. Credit and full admission are granted upon completion.
        ii. Master of Architecture I AP (Advanced Standing)
            1. 2.5 year program
            2. Students with an undergraduate degree in Architectural Studies or similar are granted a two semester exemption, and begin in the 3rd term of study.
        iii. Master of Architecture II
            1. ~2 years, four terms of full-time study
            2. Post-professional degree for students holding a 5 year professional degree in architecture

20. School: University of Illinois, Chicago
    a. Program Title(s)/Level(s), Duration:
        i. Master of Architecture
            1. 3 year program
            2. Any field of study may be admitted. However, applicants "without a background in architecture must have completed one calculus course as well as two art history or architectural history courses prior to enrolling in the program."
            3. It is assumed that BA or BS in Architectural Studies would satisfied the aforementioned requirements. If an equivalent degree, such as AREN, would have afforded an opportunity to study those prerequisite courses, it may be considered.

Conclusions and Recommendations

1. Based on the evidence reviewed, the market appears to be viable for several reasons:

    a. The regional competitiveness of architecture programs may not be as robust as initially believed.

    b. There are increasing requirements for advanced degrees for prospective civil engineers (architectural engineers included). Options primarily include Civil Engineering, Construction Project Management, etc. Knowing the preference for design and building specific alignment that many architectural engineering students/professionals show, it behooves WPI to consider an alternative offering to position adjacent to graduate engineering and business programs (a design-focused MArch degree makes sense).

    c. There is a great deal of market disruption leading to outsourcing, budget constraints, overlap between fundamental career disciplines, etc. Many of these can be addressed by cross-trained professionals holding dual licensure. At the same time, an efficient path to this end does not exist in our competitive market.

    d. Evidence suggests that engineers are taking over project management roles (at very least, at equal responsibility levels to that of an architect) in large scale building projects. As a result, much of the design work is being offloaded. Companies are left paying outsourcing fees, increasing staff to maintain a licensed architect, etc. Budget constraints are increasing.

    e. Architects are being asked to impact sustainability. In fact, one of the only segments of architecture that is poised for strong growth is sustainable building/design. Architects must have technical knowledge of function, to inform design, when considering energy efficiency, carbon footprint of construction procedures, material lifespan, and even heating and cooling efficiently. With that said, there are very few programs that efficiently (i.e. as fast as WPI's proposed program) train multifaceted talent (architect and engineer) who are eligible for dual licensure. HVAC, energy and power consumption, and more building systems, are core concepts for architectural engineers. This is further evidence of value that arises from merging concepts from these two disciplines.

    f. In taking a more holistic approach to technical design and project management, engineers must maintain some degree of design skill. Studio time is relatively rare for architectural engineering undergraduates, and advancing the skills of seasoned engineers in order to take on some of the overall design responsibilities is viewed as essential in modern sustainable building practices. Engineers must be able to absorb some of the job requirements of architects as the industry evolves. In order to achieve this level of skill, and prepare for efficient advanced study in Architecture (beyond an engineering undergraduate program), design studio time must be incorporated into the 1st and/or 2nd year curriculum.

    g. A massive decrease in projected growth for traditional architects was noted between 2018 and 2019, according to BLS. 8% projected growth over a 10 year period beginning in 2018 was reduced to a projected 1% growth between 2019 and 2029. If this holds true, traditional architects are going to need to reskill, driving more towards technical areas of work, if not other fields. A greater understanding of construction practices, BIM, and

engineering design of particular systems, will greatly increase professional marketability in a potentially volatile, transforming job market.

h. While architectural engineers are the beneficiaries of higher projected growth over the next decade, they are often limited to expertise in a particular area (or system) within the overall design. Even young, prospective students who are the beneficiaries of foresight to see the need for a broad approach to learning technical design, are still limited by the small number of architectural engineering programs in existence. It is important to reiterate that there is only limited design work in an already limited number of programs. WPI is already uniquely positioned to address this need. A dually-accredited five year program resulting in a technically qualified engineer with the ability to design with the scope of a traditional architect, is a marketable skillset in this modernizing field.

2. Ultimately, the need appears clear. While hard to quantify, there is distinct evidence of a cross-leveling of skills between engineers and architects. While clear to note, there are also limitations that can only be met by a single individual if they are dually licensed (both in terms of knowledge, and in legal capacity to design, manage, and operate). This is not an instance where two topics are melded together and marketed as an interdisciplinary solution. Two concrete, accredited, degrees would be awarded, in the most efficient amount of time possible. WPI would be first to market with such a program. As noted in previous sections, similar courses of study in the competitive market take at least six years, and lack some of the specific differentiators that WPI possesses. The decreasing number of traditional architecture roles, along with increasing requirements for technical knowledge to inform design, make this type of program a marketable offering to prospective architects in an evolving market.

3. As previously mentioned, there are very few options for students to complete both an engineering degree and a Master of Architecture in less than seven years. There are several options to complete this combination in six years, however these remain minimal. It was noted that many accelerated MArch programs will accept students with degrees that are similar or equivalent to a pre-professional BA or BS in Architecture or Architectural Studies. In many cases, one could assume that an Architectural Engineering degree would be sufficient for equivalency. However, it was noted that many schools with flexible equivalency statements explicitly state that the equivalent undergraduate degree program must come from a school that has an existing NAAB program of some form (if not a full school of architecture). WPI would not currently meet this criteria. This is another reason that WPI's AREN students seeking MArch qualifications would benefit from the development of the proposed program. Beyond that, WPI's AREN program may become more marketable to students when they know that they would become eligible for a range of accelerated MArch programs across the country (because we would now have an NAAB accredited program on campus).

4. STEM Designation: WPI has many prominent graduate programs (such as the MBA) which are STEM-designated. University of Southern California, Woodbury University, and others in the limited sample reviewed, maintain STEM designation for their architecture degree programs. This is important when recruiting from international markets with strict Visa requirements, and is marketable to domestic students looking to pursue careers in sustainability, green building, energy efficient design, and so forth. This designation could be beneficial, in terms of marketing and recruiting, as it has been with other programs offered by WPI.

The bottom line is that architectural engineering and traditional architecture are becoming increasingly reliant on each other. In an academic setting, there has been little effort to cross-promote these areas. There are only limited opportunities to study both, concurrently. A five year professional BArch recipient would need at least an additional year of study to complete a Master of Engineering in Architectural Engineering – likely longer. As stated above, six years is the most efficient amount of time for an AREN recipient to earn an accredited professional master's degree in architecture. The University of Miami example is one of the only examples of a carefully mapped and marketed cross-promotion of both disciplines (students begin taking graduate architecture courses in their junior year of their engineering program). WPI's proposal would exceed that time frame by a year. While other six year options exist, they are not clear to prospective students. This is an automatic deterrent. WPI would have a distinct edge in terms of curriculum, marketability, and uniquely positioned reputation in STEM.

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Date: May 9, 2023
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Medich, Chair)
Re: Motion to establish an M.S. program in Financial Technology (FinTech) and four new graduate courses: MIS 510; MIS 520; FIN 530; and FIN 540

Motion: (with *underlined italics text* added by friendly amendment)
On behalf of the Business School, the Committee on Graduate Studies and Research recommends, and I move that an M.S. program in Financial Technology (FinTech) and four new courses (MIS 510, MIS 520, FIN 530, and FIN 540) be added, all as described below meeting, *with the understanding that ethics will be integrated into revised course descriptions*.

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Description of the Proposed M.S. Program:
Add the following to the graduate catalog:

There is a growing demand for FinTech talent that can operate outside the world of structured financial data. This new FinTech talent needs to be familiar with unstructured data, predictive analytics, and artificial intelligence (A.I.) insights to drive new financial thinking and processes that deliver innovative financial products and strategies for long-term productivity improvements and economic growth. The FinTech program prepares students to develop key competencies in predictive analytics and programming applications for quantitative risk management, financial forecasting, corporate innovation, and financial modeling. Graduates from the M.S. FinTech program will possess the financial and applied technical skills to transform business and disrupts business practices through innovations that will undoubtedly shape the nature and boundaries of firms in the coming years. These skills will be invaluable to established firms and startups as we move rapidly to a digitized and data-intensive world.

The MS in FinTech is available on-campus.

Type: Master of Science

Core Courses (9 Credits):

1.	MIS 510	Business application of Blockchain Tech	3 cr. [New]
2.	MIS 520	Artificial Intelligence and its Business Applications	3 cr. [New]
3.	MIS 587	Business Applications in Machine Learning	3 cr.

Select three courses from any two of the three specialties (18 Credits):

- Specialty in Advanced Financial Mathematics: [Must select three courses from the list below, one of which must be either FIN 530 or FIN 540]

FIN 530	Cryptocurrencies and Financial Markets	3 cr.	[New]
FIN 540	Financial Analytics	3 cr.	[New]
MA 571	Financial Mathematics I	3 cr.	

MA 572	Financial Mathematics II	3 cr.
MA 573	Computational Methods of Financial Mathematics	3 cr.
MA 574	Portfolio Valuation and Risk Management	3 cr.
MA 575	Market and Credit Risk Models and Management	3 cr.
MA 590	Computational Statistics	3 cr.

- Specialty in FinTech Analytics: [Must select three courses from the list below, one of which must be either FIN 530 or FIN 540]

FIN 530	Cryptocurrencies and Financial Markets	3 cr.	[New]
FIN 540	Financial Analytics	3 cr.	[New]
DS 502	Statistical Methods for Data Science	3 cr.	
MIS 502	Data Management for Analytics	3 cr.	
DS 503	Big Data Management	3 cr.	
DS 541	Deep Learning	3 cr.	
OIE 559	Adv Perspective Analytics: From Data to Impact	3 cr.	
MIS 584	Business Intelligence	3 cr.	
MIS 571	Database Applications Development	3 cr.	

- Specialty in FinTech Development: [Must select three courses from the list below, one of which must be either FIN 530 or FIN 540]. *For those who have taken CS5007, CS5008, or equivalent, we recommend taking CS528.*

FIN 530	Cryptocurrencies and Financial Markets	3 cr.	[New]
FIN 540	Financial Analytics	3 cr.	[New]
CS 5007	Intro to Prog Concepts, Data Struct and Algorithms	3 cr.	
CS 5008	Networks and Systems	3 cr.	
CS 5084	Intro to Algorithms: Design and Analysis	3 cr.	
CS 513	Computer Networks	3 cr.	
CS 528	Mobile and Ubiquitous Computing	3 cr.	
CS 573	Data Visualization	3 cr.	
CS 578	Cryptography and Data Security	3 cr.	
MIS 583	User Experience Applications	3 cr.	

Capstone Experience (3 Credits):

1.	OBC 505	Teaming and Organizing for Innovation	3 cr.
2.	BUS 596	Capstone	3 cr.

Additional Requirements - On-campus, international students are encouraged to complete up to three additional credits of internship to ensure their readiness for employment in the U.S.

Add the following to "Admissions Requirements" section as the last sentence in the first paragraph:

Additionally, applicants to the MS FinTech program must have prior college-level statistics and finance/accounting preparation.

Descriptions of Proposed Courses:

MIS 510 Business Application of Blockchain Tech (3 credits)
This course examines the foundations of blockchain technology from multiple perspectives, including engineering, law, and economics. The course will cover blockchain technologies, distributed ledger technology, cryptocurrencies (e.g., Bitcoin), and their applications, implementation, and security concerns. Students will learn how these systems work, analyze the security and regulation issues relating to blockchain technologies and understand the impact of blockchain technologies on financial services and other industries. The student will get a detailed picture of blockchain business networks' components and structures, such as ledgers, smart contracts, consensus, certificate authorities, security, roles, transaction processes, participants, and fabrics. This course also examines the BTC ecosystem, XRP, ETH, tokens and ICOs, and CBDC. Students will also explore the history, current environment, and near-term outlook of financial innovation (FinTech), focusing on applications of Blockchain technology. Students will learn to formulate an accurate image and a deep practical understanding of the capabilities and limitations of various blockchain techniques. Students will also gain hands-on experience creating a simple Blockchain contract and will be able to converse on a practical basis about what Blockchain can and cannot do.

MIS 520 Artificial Intelligence and its Business Applications (3 credits)
This course aims to provide the students with a comprehensive introduction to the recent developments in AI through the coverage of fundamental AI concepts and practical applications of these concepts in business. The course will allow students to understand AI's basic concepts and methods and apply AI-based techniques to solving practical business problems. Students will also experience how AI can transform businesses and gain an understanding of where AI technologies are heading within the next few years.

Fin 530 Cryptocurrencies and Financial Markets (3 Credits)
This course covers digital currencies and related topics in the FinTech area. The course begins with studying the nature of money, legacy payment, and banking systems. The course then examines the emergence of stateless, cloud-based digital currency systems since 2009. Students will also gain insight into the functioning of decentralized assets in today's financial markets and the role of fintech assets such as cryptos in financial intermediation. Students will learn about central bank digital currencies and how they will help to improve banking by reducing the under-banked and un-banked population.

FIN 540 Financial Analytics (3 credits)
The course introduces advanced methodological tools required for conducting finance and investment analysis research. The course aims to equip students with a working knowledge of important econometric techniques used in financial economics, such as event study, advanced time series analysis, and survival analysis. Substantial emphasis will be placed on developing programming skills in computer programs. The course emphasizes understanding and learning how to apply practitioners' econometric tools in these areas. Students will also cover the basic

theory of statistical inference with linear models, general linear models, Heteroskedasticity models, time series models, analysis of variance, discriminate analysis, factor analysis, and non-parametric tests.

Rationale:

Ongoing technology innovations are disrupting existing structures of the financial services industry. Technologies such as blockchain, cryptocurrency, peer-to-peer lending, mobile payment systems, robo-advising, and automated insurance underwriting are all redefining how financial services are offered and consumed. As a result, many traditional financial firms are rethinking the way they need to do business. These new paradigms are also changing the skill set that companies are seeking. As a result, the demand for business students proficient in financial technology has increased dramatically. Consequently, we are proposing the launch of an **MS graduate program in Financial Technology (FinTech)** that is created based on industry and business community feedback.

Business schools are experiencing declining enrollment across various business programs and degrees. However, a rapidly emerging opportunity is around Financial Technology. The Pioneer Institute, an independent public-policy research organization based in Massachusetts, reports that Fintech is quickly revolutionizing the banking and insurance industries.[1] This trend is particularly important in Massachusetts, which is the third leading region in the U.S. in FinTech (See **Appendix C**). To meet the growing skillsets that firms require in this emerging sector, the Pioneer institute says colleges and universities must adapt their business and computer science programs to reflect changes and intersections in financial services.

The WBS is well positioned to offer this program at this time because of its more technically proficient faculty relative to most traditional business schools. In fact, we already have most of the appropriate courses.

Why now? Why did we not do this already?

The field of FinTech is new but rapidly developing. Currently, there are a variety of institutions that offer either specific courses or certifications in Fintech. However, only a handful have developed a full graduate program. Outside of the United States, a variety of programs are available in Hong Kong, the United Kingdom, and France. However, in the United States, only a few institutions offer full Graduate Programs focused specifically on Fintech (See **Appendix A**). We believe this MS FinTech program will complement our existing graduate analytics-based programs and help build WPI's reputation in the FinTech space.

Opportunity and Market Analysis

The FinTech graduate program prepares students for employment in this high-demand field in jobs that include blockchain developer, application developer, quantitative analyst, data scientist, financial analyst, business development manager, product manager, cybersecurity analyst, risk control manager, and compliance analyst.

[1] https://pioneerinstitute.org/featured/some-public-private-ma-universities-adapting-to-rise-of-tech-in-finance-industry-but-students-still-insufficiently-prepared/

A 2019 study by PwC found that 48 percent of financial services organizations and 48 percent of technology, media, and telecommunications companies have "embedded fintech fully into their strategic operating model."[2] Notably, PwC also reported that 80 percent of telecommunications organizations and 75 percent of financial services companies are creating jobs relating to fintech. However, 42 percent of both categories need help to fill their growing talent needs.

Techguide.org reports that over the next decade, banks and governments worldwide will update their systems to 21st-century standards, thereby creating the need for large numbers of fintech professionals.[3] Most importantly, upgrading the financial system means adopting blockchain and distributed ledger technology, which makes a need for professionals with the requisite training. Therefore, job seekers who complete a FinTech graduate program stand to graduate into a robust job market, a market that will only improve as more companies and governments seek to capitalize on the latest financial technologies. While tech hubs like Singapore, Tel Aviv, Hong Kong, New York, and London are where most jobs will be, FinTech professionals can work in almost any city.

Comparison to Existing Programs at WPI:
The proposed MS FinTech overlaps with the other Business school MS programs through its core and specialty offerings.

- The FinTech core overlaps with the MBA, MSBA, MSIT, and MS in Operations and Supply Chain Analytics (MSOSCA).

This overlap is designed to capture in the MS FinTech program the analytics content of our specialty MS programs, enabling us to offer an MS FinTech without developing a large set of new courses. The new MS FinTech also complements the MSBA and the Data Science program by providing an applied degree focusing on integrating mathematics and quantitative methods with modern finance and investment analysis theory and practice. The FinTech program prepares students to develop key competencies in predictive analytics and programming applications for quantitative risk management, financial forecasting, corporate innovation, and financial modeling. Graduates from the MS FinTech program will possess the financial and applied programming skills to manage and use innovative technology in the financial services industry.

Impact on Existing Programs at WPI:
The impact of this program should be minimal on existing programs within the Business School. The Proposed MS FinTech program responds directly to a specific need for expert technical FinTech talent beyond traditional MS Business Analytics, Data Science, or MBA programs as the financial service industries undergo the FinTech transformation. Therefore, to satisfy the requirements of this program, students will need to pursue a rigorous multidisciplinary program of study in Computer Science, Data Science, Financial Mathematics, and Business. This program will not be offered as a joint BS-MS program. Students can enroll in this graduate program after they have completed their undergraduate degree.

Comparable Programs at other Universities:
The field of FinTech is new but rapidly developing. Currently, there are a variety of institutions that offer either specific courses or certifications in Fintech. However, only a handful have

[2] Global Fintech Report 2019 (pwc.com)
[3] Fintech Degree | Best Schools for Fintech (techguide.org)

developed a full graduate program. Outside of the United States, a variety of programs are available in Hong Kong, the United Kingdom, and France. However, in the United States, only a few institutions offer full Graduate Programs focused specifically on Fintech (**See Appendix A**). This contrasts with the industry feedback in **Appendix B**, calling for graduates with greater FinTech skills as companies shift to a digitized structure.

Implementation:

Program Management

Like the three specialized MS degrees offered by WBS, this program will also be the responsibility of the Graduate Policy and Curriculum Committee (GPCC) for WBS graduate programs, current chair Professor Purvi Shah. This committee will go through changes to the program, student petitions, etc.

Implementation Date

On-campus: Implementation date for this new program is the 2023-2024 academic year. We intend to launch two new courses in the 2023-24 academic year and two in 2024-25.

Online: Online implementation (if we implement online) will commence in the following academic year.

Resources Required:

We have hired a new Finance faculty who will teach finance courses starting Fall 2023.

APPENDIX A: MARKET SURVEY OF INSTITUTIONS WITH FinTech PROGRAM

Schools offering FinTech Programs

University	Program			
	Certificate	Concentration	Major	MS
Northeastern University		X		
University of Rhode Island		X		
Jacksonville University			X	X
University of Georgia	X			
New Jersey Institute of Technology			X	X
Seton Hall University			X	
Virginia Commonwealth University			X	
Creighton University			X	
Brandeis University				X
University of Connecticut				X
New York University				X
Duke				X
University of Central Florida				X
Kennesaw State				X
University of Texas - Dallas				X
Carnegie Mellon University	X			
Columbia University	X			
Cornell	X			
MIT	X			
Oakland University	X			
University of California Berkley	X			

APPENDIX B: LOCAL FINTECH SUPPORT FROM INDUSTRY

From: David Wolf
Company: Fidelity Investments
Industry: Finance
Title: Chief Product Officer, Finance Platform
LinkedIn profile: https://www.linkedin.com/in/davidtwolf/

Relationship with WPI: Have done Fintech MQPs, Independent Studies, Guest Speaking in Fintech/Finance/Business Courses & Clubs, and in sponsored Fintech Course Real World Industry Case Studies

"As Fidelity has transformed over time from a Financial Services company that utilizes Technology to do its business to a Technology Company that provides Financial Services has created the demand for resources that can speak and act in both Technical and Financial Services. languages simultaneously and fluently. This has become the key critical success factor which is becoming even more critical as we evolve on our journey to being 100% digital. The digital mindset drives innovation and adoption and having resources that can see both sides of the objective is what wins in this space.

Creating, full stack productive resources requires large investments of time, effort and preparation. Identifying the resources that can be successful is generally a bet that we have not been particularly successful at and need to improve our probability of success on. The ability to recruit from a proven school such as WPI, from a program that has already allowed resources to self-identify in this space and gone thru a formal program providing appropriate training in both with the internships and non-classroom learnings that WPI offers would dramatically alter our odds of success and reduce our need to invest in resources for long periods of time. The increase in productivity with less investment would help speed up our journey to whatever comes next."

From: Jim O'Neil (WPI Alumni)
Company: SaaSWorks
Industry: Fintech Startup
Title: Co-Founder and CTO at SaaSWorks
LinkedIn profile: https://www.linkedin.com/in/jim-oneill/

Relationship with WPI: Have done Fintech MQPs and a WPI Alumni

"The financial services industry is going through a major modernization and transformation due to new innovations in the global monetary systems along with major disruptions with crowd-funding and new mechanisms for shared financial ownership. These new financial strategies are creating fractures in how financial services companies both manage money and service their customers and are demanding new talent and creative technical thinking in order to modernize the Financial Services industry. FinTech is the technology paradigm and emerging industry supporting these major changes however the talent pool is not large enough to support the current and future global demands. The time is now to create programs that educate more aspiring

technology professionals to build the next financial platforms and bring more equality and transparency to the aging financial systems of the last decades."

From: Mark Casady
Company: Vestigo Ventures
Industry: Venture Capital investing in Fintech Startups
Title: Vestigo Ventures Founder & General Partner
LinkedIn profile: https://www.linkedin.com/in/mark-casady-5a662b8/

From: Ian Sheridan
Company: Vestigo Ventures
Industry: Venture Capital investing in Fintech Startups
Title: Co-Founder & Managing Director
LinkedIn profile: https://www.linkedin.com/in/iansheridan1/

From: David Blundin
Company: Vestigo Ventures/Cogo Labs
Industry: Venture Capital investing in Fintech Startups
Title: Co-Founder & General Partner
LinkedIn profile: https://www.linkedin.com/in/david-blundin/

Relationship with WPI: Have done Fintech MQPs, Independent Studies, and Guest Speaking in Fintech/Finance Courses & Clubs.

"Fintech has grown ex potentiality over the past six years that we have established Vestigo Ventures as an early stage FinTech venture capital investor. In our early years the question is what is FinTech? Now it's FinTech-I need exposure to this important segment of the economy. This has driven a significant increase in an allocation of capital to venture funds.
The other area of growth besides the entrepreneurial community is in incumbents. We have witnessed the incumbents adding innovation and FinTech insights to their set of corporate priorities. This is from the bank or insurance company or asset manager and evidenced by participant in Mass Challenge among others.
There is demand for graduates of WPI to have this background as part of the need to create resources in all parts of this ecosystem. This talent is difficult to find ready made coming out of a university.
WPI combines the classroom learning with the practical experience I know we value. We hear of that same demand at established financial services organizations. The university is in an amazing cross roads of this demand in startups as well.
Finally our experience of the quality of the WPI students in undergraduate through doctoral programs informs our view. They have been instrumental in helping us support the growth of FinTech. Imagine the force multiplier of a major in FinTech to gain the attention and growth of student interest in this growing segment of economy. "

From: Mohammed Dastigir
Company: MassMutual
Industry: Insurance
Title: Head of FinTech & HealthTech Partnerships, Ecosystem Development
LinkedIn profile: https://www.linkedin.com/in/mohammed-dastigir-30bb6a63/

Relationship with WPI: Partners on Mass Fintech Hub that WPI is also a member of.

"Financial services and technology are closely intertwined in today's digital world. This mergence – the Fintech industry – has tremendous impact on the daily lives of consumers and many business professionals. Creating innovative products and services that act as solutions for both helps support our economy and keep us globally competitive.

As a Computer Systems Engineer and Entrepreneur who did not have the benefit of learning about Fintech in college, I believe offering an accredited Fintech degree is critical for all Academic institutions – providing earlier access to related education will help pave the way for the next generation in this quickly growing field."

From: Sarah Biller
Company: FinTech Sandbox
Industry: Fintech
Title: Executive Director - Vantage Ventures | CoFounder FinTech Sandbox & CMX | Start-up Board Member & Advisor | Investor
LinkedIn profile: https://www.linkedin.com/in/sarahbiller/

Relationship with WPI: WPI and Sarah Partner closely on Mass Fintech Hub, Fintech Sandbox, and Boston Fintech Week.

"The opportunity presented today through the application of emerging technologies to solve for longstanding challenges confronting the financial services such as personalized portfolio construction that consider sustainability, real-time payments to minimize persistent poverty or new forms of digital identity to drive inclusivity is unprecedented in our industry. These are only a few of the many compelling challenges drawing extraordinary students back to the financial services industry and, specifically, their desire to utilize FinTech to make an impact on the world. WPI's interest in developing a rigorous, degree-conferring curriculum around the intersection of financial services and technology to channel these interests with the same vigor that WPI guides its students to merge theory and practice to address real-world global problems is indicative of a bright future for Financial Services.

WPI is uniquely positioned to help its students understand how the Financial Services sector has been impacted by the application of technology over time. The Institution's leadership in other areas such as robotics as demontrated its commitment to leveraging the increasing availability of computational power and big data to usher in a new era of innovation in other industries is an important platform to launch a FinTech program. It has also recruited exceptional industry practitioners to pave the way for WPI to be

a leader in diverse areas if FinTech such as payments, digital ledgers, foreign exchange, lending, insurance, investment advice (i.e., RoboAdvisors), and wealth management among other areas.

The combination of these two decisions are arguably key ingredients to launching a nation-leading FinTech program and the opportunity it presents to provide students a practical approach to critically thinking about these changes. I see WPI's approach to teaching students to understand the application of technology and the economic value of these changes to the financial services industry as well as the agents catalyzing these changes as a remarkable confluence at just the right time."

From: Pete Reiser
Company: Citizens Bank
Industry: Banking
Title: Head of Digital Product Development & FinTech Partnerships
LinkedIn profile: https://www.linkedin.com/in/petereiser/

Relationship with WPI: WPI and Pete partner closely on Mass Fintech Hub events. WPI also does Fintech MQP projects with Citizens Bank.

"In financial services, the ability to effectively utilize the concept of Open Banking will be what separates winners from losers moving forward. Consumers are simply demanding it. Entrenched firms are quickly turning to partnerships with FinTechs as a way to remain relevant to consumers and competitive with new entrants that are typically able to move much more quickly. WPI is uniquely positioned to take advantage of this growing need based on it's approach to cross-domain curriculum, as well as the existing partnerships it has in the New England region with a broad range of small and large financial service firms."

APPENDIX C: FINTECH LANDSCAPE

FinTech Landscape

Region	# Of FinTech firms	Infrastructure & Tech	# Of Incubators	# Of Accelerators
San Francisco	910	Leading Tech Hub	86	196
New York	771	Leading in FinTech innovation	61	104
Massachusetts	357	Leading in robotics and innovation	69	
Atlanta	79	Leading Financial Payments Hub	4	23
Charlotte	28	Growing Tech Hub	5	3

Source: EY (2020)

Appendix
Consent Agenda Motions

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to modify distribution requirements for the Drama/Theatre major

Motion: On behalf of the Humanities and Arts Department, the Committee on Academic Operation recommends and I move that the distribution requirements for the Drama/Theatre major be modified as described below.

Description of the Proposed Modifications:

Current Distribution Requirements*:
Major Requirements
Humanities and Arts with Drama/Theatre Concentration
2 units of TH of drama-theatre-related EN (2000-level or higher) and MQP in Drama/Theatre

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

Proposed Distribution Requirements:
(With modified text highlighted in yellow.)

Major Requirements
Humanities and Arts with Theatre Concentration
2 units of TH or theatre-related courses (listed below, under Theatre Minor) and MQP in Theatre. At least 3/3 units must be non-production courses; at least 2/3 units must be credited production work (may include Practicum and/or Minor Capstone); and all 6/3 units must be 2000 or above.

Rationale:
For change in major requirements:
The primary goal of these revisions is to ensure that the Theatre major include an appropriate balance of traditional academic coursework and hands-on production experiences—both of which are essential in the study of theatre. Previously, students were able to complete an HUA Theatre major with almost no faculty mentorship, either in the theatre or in the classroom. These new proposed requirements—along with the course changes approved earlier this year—make it clear that students completing a major in Theatre must engage not only in student-led club productions, but also in faculty-led productions and courses.

Implementation Date: 2023-24 Academic Year

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to modify the distribution requirements for the Drama/Theatre minor

Motion: On behalf of the Humanities and Arts Department, the Committee on Academic Operation recommends and I move that the distribution requirements for the Drama/Theatre minor be modified as described below.

Description of the Proposed Modifications:

Current Distribution Requirements*:
Minor Requirements
Drama/Theatre Minor
The minor in Drama/Theatre is for students who choose to continue their studies in Drama/Theatre beyond the Humanities and Arts Requirement without majoring in Drama/Theatre. Students who, for personal or career purposes, wish to earn official recognition of their achievements in Drama/Theatre, and who do not have academic time to fulfill the requirements for the major, should consider the Drama/Theatre minor.

Because practical experience in performance, including design and production, is an integral component of Drama/Theatre, the requirements for this minor contain a performance emphasis. The Drama/Theatre minor consists of 2 units of work distributed as follows:

Type: Minor

1. Drama/Theatre Courses: 4/3 units chosen from among the following or any ISU designated TH.

Item #	Title	Units
EN 1222	Shakespeare in the Age of Elizabeth	1/3
EN 2221	American Drama	1/3
EN 3222	Forms in World Drama	1/3
EN 3223	Forms in Modern Drama	1/3

2. Drama/Theatre Performances: 1/3 unit (at least two 1/6 unit TH ISU, Independent Study).

3. Drama/Theatre Capstone Experience: 1/3 unit Performance Independent Study (EN or TH). The student, with faculty guidance, will perform, design, direct, produce or in some other way create a Drama/ Theatre presentation that demonstrates the student's skill and knowledge.

No more than 1 unit of work for the Humanities and Arts Requirement may be applied to the Drama/Theatre minor. The final Inquiry Seminar or Practicum may not be counted toward the minor.

Any student at WPI is eligible to pursue the Minor in Drama/Theatre except for students majoring in Humanities and Arts with a concentration in Drama/Theatre.

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

Proposed Distribution Requirements:
(With deleted text ~~struckthrough~~ and with modified text highlighted in yellow.)

Minor Requirements

Theatre Minor

The Theatre minor offers students the opportunity to deepen their understanding of the field through classroom- and production-based theatre experiences, culminating in a significant research project.

Because both classroom learning and practical experience are integral to the study of theatre, the Theatre minor requires both academic and production work.

The Theatre minor consists of 2 units of work distributed as follows:

Type: Minor

1. Theatre Courses: 2/3 units of non-production TH or theatre-related courses (including those listed below).

Item #	Title	Units
EN 1222	Shakespeare in the Age of Elizabeth	1/3
EN 2226	Infected Shakespeare	1/3
~~EN 2221~~	~~American Drama~~	~~1/3~~
~~EN 3222~~	~~Forms in World Drama~~	~~1/3~~
~~EN 3223~~	~~Forms in Modern Drama~~	~~1/3~~

2. Theatre Productions: 1/3 unit of credited theatrical production work (TH 1800 or TH 2800).

3. Theatre Electives: 2/3 units of TH electives (classes and/or credited theatrical production work).

4. Theatre Minor Capstone Experience (TH 3800): a 1/3-unit research project, supervised by a faculty member.

No more than 1 unit of work for the Humanities and Arts Requirement may be applied to the Theatre minor. The final Inquiry Seminar or Practicum may not be counted toward the minor.

Any student at WPI is eligible to pursue the Minor in Theatre except for students majoring in Humanities and Arts with a concentration in Theatre.

Rationale:

Minor Requirements

The primary goal of these revisions is to ensure that the Theatre minor include an appropriate balance of traditional academic coursework and hands-on production experiences—both of which are essential in the study of theatre. Previously, students were able to complete an HUA Theatre minor with almost no faculty mentorship, either in the theatre or in the classroom. These new proposed requirements—along with the course changes approved earlier this year—make it clear that students completing a minor in Theatre must engage not only in student-led club productions, but also in faculty-led productions and courses.

Implementation Date: 2023-24 Academic Year

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to modify name of the "Drama/Theatre" discipline to "Theater"

Motion: On behalf of the Humanities and Arts Department, the Committee on Academic Operation recommends and I move that the name of the "Drama/Theatre" discipline be modified to "Theater."

Description of the Proposed Modification:

Current Name:
Discipline Name: Drama/Theatre

Proposed Name:
Discipline Name: Theatre

Rationale:
Discipline Name
We seek to change our name primarily for reasons of simplicity & clarity, but also to highlight the expanded offerings & identity of our discipline. As conventionally used, the term "theatre" includes the study of drama (i.e. play texts), *as well as* the study of theatre history, practice, and skills (acting, directing, design, technical production, etc.). As WPI's faculty & course offerings in theatre have expanded over the past few years, we wish for our discipline name to reflect the broader umbrella of our work. This new name also matches our course prefix (TH), which was established in 2020/1.

Implementation Date: 2023-24 Academic Year

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to modify the course description of CS 3043 Social Implications of Information Processing

Motion: On behalf of the Department of Computer Science, the Committee on Academic Operation recommends and I move that the course description of CS 3043 be modified, as described below.

Description of the Proposed Modifications:

Current course description:
CS 3043. Social Implications of Information Processing (Cat. I)
This course makes the student aware of the social, moral, ethical, and philosophical impact of computers and computer-based systems on society, both now and in the future. Topics include major computer-based applications and their impact, human machine relationships, and the major problems of controlling the use of computers. Students will be expected to contribute to classroom discussions and to complete a number of significant writing assignments. This course is recommended for juniors and seniors.

Undergraduate credit may not be earned both for this course and for CS 505. Recommended background: a general knowledge of computers and computer systems.

Proposed course description:
CS 3043. Social Implications of Information Processing (Cat. I)
This course makes the student aware of the social, moral, ethical, and philosophical impact of computers and computer-based systems on society, both now and in the future. Topics include major computer-based applications and their impact, human machine relationships, and the major problems of controlling the use of computers. This course is recommended for juniors and seniors.
Recommended background: a general knowledge of computers and computer systems.

Rationale:
This change will provide more flexibility to instructors. Specifics concerning course delivery, such as the role of classroom discussion and number of writing assignments, should be left to the instructor rather than being codified in a catalog description.

The reference to CS 505 in the old description is superfluous since that course is no longer offered

Resource Needs: This change will not lead to any changes in the resource needs for this course.

Implementation Date: Academic Year 2023-24

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to add CS 4099: Special Topics in Computer Science

Motion: On behalf of the Computer Science Department, the Committee on Academic Operation recommends and I move that CS 4099: Special Topics in Computer Science, as described below, be added as a permanent, undergraduate course.

Proposed Course Description:

CS 4099: Special Topics in Computer Science. (Cat III, 1/3 unit)
Instances of this course will explore advanced and emerging topics that are not covered by the current regular CS offerings. Content and format will vary to suit the interests and needs of the faculty and students. This course may be repeated for credit as topics change.

Rationale:
In light of the rapid pace of change in the computer science research and applications landscape, it is crucial to introduce advanced students to recent trends. Our core curriculum cannot keep pace with everything that is new, and indeed it should not try to. Special topics classes can highlight novel applications, explore unsolved research questions, and inspire ideas for MQPs or graduate study.

Since each special topics course is intended to be offered just once, experimental offerings would be inappropriate. However, computer science faculty have routinely offered Independent Studies classes. Not surprisingly there is considerable student interest in studying advanced topics. Having a Special Topics offering available should enable faculty to serve a larger number of students than would a typical Independent Study class.

Many other departments offer courses similar to what we envision. Courses in the spirit as what is proposed here included BB 570, CHE 580, IMGD 4099, Math 4891, and PSY 4800.

Impact on Distribution Requirements and Other Courses: CS 4099 will be considered a standard 4000-level CS course.

Resources Needs: This course does not require new resources as it relies on current faculty in Computer Science and current practices within the department. Faculty load will be carefully considered when determining when special topics courses are offered and how many are offered an academic year.

Implementation Date: Academic Year 2023—2024.

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to add MIS 2300 Business Applications of Blockchain

Motion: On behalf of the Business School, the Committee on Academic Operation recommends and I move that MIS 2300 Business Applications of Blockchain, as described below, be added.

Proposed Course Description:

MIS 2300 Business Applications of Blockchain (Cat. I)
This course introduces the fundamental concepts and functionality of blockchain technology. It explores how that technology records, organizes, and verifies information and how it implements smart contracts. The various financial and non-financial applications of blockchain technology are reviewed. Students will demonstrate their knowledge through exercises, exams, and a final project that designs and develops a basic blockchain application for a business problem. The course concludes by examining the legal and regulatory framework, along with potential risks and hurdles faced by those implementing and using blockchain technologies for financial and other business contexts.
Recommended background: Basic knowledge of programming (Equivalent to CS 1004 or other introductory programming courses)

Rationale:
Financial Technology (FinTech) is a rapidly growing industry that uses technology to improve how firms in the financial services industry conduct business. FinTech disrupts the traditional delivery of financial services through the rapid integration of technology, algorithms, data, and mobile applications. This has brought an unprecedented demand for professionals with advanced skills in finance, mathematics, programming, analytics, data science, applied statistics, and regulatory and compliance. This new course will address these growing market realities and will prepare students with hands-on problem-solving experiences. The courses will be appealing to students who are interested in pursuing a career in the newly emerging FinTech industry or a career with traditional businesses that are transforming or expanding into alternative lending, cryptocurrency management, and trading, blockchain technologies, open banking, Insur-tech, Robo-advisement, machine learning, and data mining applications and cybersecurity. Some may work for traditional financial services companies, which need staff with technical skillsets to improve existing business practices and/or develop new processes related to technological innovations. The benefit of adding this course is that MGE, MIS, BU, and IE students will now have an additional technical elective option. This course will also be options to complete the FinTech minor.

Resource Needs:
Instructor: Daniel Treku, instructor-of-record is available
Classroom: Standard classroom
Laboratory: none
Library resources: No additional needs for library resources
Information Technology: No special support or equipment is needed from the ATC.

Assessment: Each course will be assessed through student course feedback (i.e., outcomes 1, 2, 7, and 19) and reflections from students during course delivery.

Implementation Date: AY 2023-2024

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to add MIS 3787 Business Applications of Machine Learning as an elective for the to the Data Science major and as a business course for the Data Science minor

Motion: On behalf of the WPI Data Science program, the Committee on Academic Operation recommends and I move that MIS 3787 Business Applications of Machine Learning be added as an elective for the Data Science Major and as a business courses for Data Science minor.

Explanation of Motion:
The Business School has recently added the new course MIS 3787 Business Applications of Machine Learning. To keep the Data Science undergraduate degree disciplinary electives in line with Business course offerings, we wish to mirror the Business course change in the description of the Data Science undergraduate programs (major and minor). The specific changes in the Undergraduate catalog are as follows:

- Page 166 adding "MIS 3787 Business Applications of Machine Learning" to the Disciplinary Elective Courses in BUS
- Page 167 bottom right box adding "MIS 3787" to the list of Business Courses under Disciplinary Elective Courses
- Page 169 adding "MIS 3787 Business Applications of Machine Learning" to the list of Business Courses.

Rationale:
As the course MIS 3787 Business Applications of Machine Learning is added in the Business course offering, the Data Science program has evaluated MIS 3787 Business Applications of Machine Learning as an appropriate disciplinary elective (Business) for Data Science undergraduate students and an appropriate Business course for the Data Science minor. We wish to update the undergraduate catalog to reflect these changes.

Impacts on Students: The only impact on students will be a clarification of the electives (for Data Science Major) and business courses (for Data Science Minor) based upon current Business offerings.

Resource Needs: No additional resources would be required.

Implementation Date: The implementation date is the 2023-2024 academic year.

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to modify the distribution requirements for the Business minor

Motion: On behalf of the Business School, the Committee on Academic Operations recommends and I move that the distribution requirements for the Business (BUS) minor be modified as described below.

Description of the Proposed Modifications:

Proposed Distribution Requirements: (additions/corrections highlighted)
Business Minor (*note: a previous motion to change course prefixes was approved AY22)

The minor requires the completion of two units of coursework as noted below.

1. Select any five from the following:
   ECON 1110 or ECON 1120
   OBC 1010 Leadership Practice *or* OBC 4367 Leadership Ethics, and Social Responsibility
   BUS 1020 Global Environment of Business Decisions
   FIN 1250 Personal Finance *or* OIE 2850 Engineering Economics
   BUS 2001 WPI Means Business
   BUS 2020 The Legal Environment of Business Decisions
   ACC 2060 Financial Statements for Decision Making
   FIN 2070 Risk Analysis for Decision Making *or* FIN 3300 Finance and Technology (FinTech)
   BUS 2080 Data Analysis for Decision Making
   MIS 3010 Creating Value Through Innovation *or* MIS 4084 Business Intelligence
   OIE 3020 Achieving Effective Operations
   MKT 3650 Consumer Behavior

2. Select one of the following:
   MKT 4030 Achieving Strategic Effectiveness
   ETR 4930 Growing and Managing New Ventures

Rationale:
Proposed changes to the business (BUS) minor offer a wider selection of courses to non-WBS students. As a department, we aim to provide business competencies to all WPI students. The minor in Business will continue to be available to all students at WPI, except for those majoring in Business, Management Engineering or Management Information Systems at WPI. We have previously updated the course prefixes for AY 2023-24 and this motion reflects these changes.

Implementation Date: Implementation date for this action is the 2023-2024 Academic year.

Contact: Prof. Adrienne Hall-Phillips

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to add ID 4000: Topics in Teacher Preparation: Practicum Seminar

Motion: On behalf of the STEM Education Center, the Committee on Academic Operation recommends and I move that ID 4000: Topics in Teacher Preparation: Practicum Seminar, as described below, be added.

Proposed Course Description:
ID 4000 Topics in Teacher Preparation: Practicum Seminar (Cat. I, 1/6 unit)
This course provides teacher candidates with guidance, support, and best practices to successfully complete the Massachusetts state requirements for initial licensure in a STEM field of their choice. The seminar accompanies the student-teaching experience in a local school and *may not be repeated*. It is an essential element in the process of completing the seven (7) essential core competencies of the Department of Elementary and Secondary Education's (DESE) Candidate Assessment of Performance (CAP) portfolio.

Recommended background: Teaching Methods ID3100 or equivalent, Sheltered English Immersion ID3200 or equivalent, PSY2401 Psychology of Education, completion of pre- practicum fieldwork experiences 1 and 2.

Anticipated Instructors: Jillian DiBonaventura, TJ Noviello, Theresa Gerhardt

Preferred Term: D-term

Rationale:
The core of the Teacher Preparation Program for Licensure at the secondary level is the practicum experience, where each teacher candidate (or pre-service teacher) completes a practicum of a minimum of 300 hours classroom teaching in a STEM field. Student teaching takes place in a middle or high school classroom with the guidance and support of the instructional triad, comprising the teacher candidate, a mentor teacher, and a program supervisor from WPI. In conjunction with practicum-based fieldwork, the teacher candidate also completes all components of the State of Massachusetts Candidate Assessment of Performance (CAP) in pursuit of an initial teaching licensure.

Thus, a seminar class that supports and guides the students through the state's requirements for CAP is necessary. In addition, the seminar provides a forum for the student teachers to debrief, reflect, and share their fieldwork experiences with one another and with the instructor. This seminar has been taking place, but not as an official course.

With this Practicum Seminar course, students will receive credit for the work they are completing while interning in their fieldwork-placement classroom, and have the seminar appear on their transcripts.

Expected Enrollment: 10 students per offering

Intended Audience: Undergraduate students

Resource Needs: Current faculty can teach the course. No additional resources are needed to run the

course.

Implementation Date: Academic year 2023-2024.

Contact: Jillian DiBonaventura, Director of Teacher Preparation, jdibonaventura@wpi.edu, or Kathy Chen, Executive Director, STEM Education Center, kcchen@wpi.edu.

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to add "EDU" as a new subject code for WPI courses

Motion: On behalf of the STEM Education Center, the Committee on Academic Operation recommends and I move that "EDU" be added as a new subject code for WPI courses

Details of the Motion:
The university registrar, Sarah Miles, has confirmed that the EDU subject code is available.

The STEM Education Center and Undergraduate Studies will have responsibility of the EDU courses, as well as the oversight and management of the courses.

Rationale:
The EDU designation will easily identify the courses that support the Teacher Preparation program. Two existing courses that Teacher Preparation students currently take are under the ID prefix (ID 3100 and ID 3200) and will be proposed to be changed to EDU. In addition, a new minor (Education) and a new Masters program (Global STEM Education) are in the works, and having the EDU subject code in place would be beneficial for future course proposals.

Resource Needs: none

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to remove CE 4017: Prestressed Concrete Design

Motion: On behalf of the Department of Civil, Environmental, and Architectural Engineering, the Committee on Academic Operations recommends and I move that CE 4017: Prestressed Concrete Design be removed from the undergraduate catalog.

Description of Course to be Removed:

CE 4017. Prestressed Concrete Design (Cat. II)
This course covers analysis and design aspects of prestressed concrete structural elements and systems: principles of prestressing, materials for prestressing, high strength steel, flexural analysis and design methods; allowable stress and strength design methods; design of beams, load balancing, partial prestressing and cracking moment; design for shear, partial loss of prestress; deflections of prestressed concrete and precast construction; connections. Recommended background: CE 2002 and CE 3026. Suggested background: CE 3008. This course will be offered in 2016-17, and in alternating years thereafter.

Rationale:
The last four offerings of this course have had low populations as follows: A17 – 3; A18 – 5; A21 – 8, and A22 – 7.

CE 4017 covers the basic design of a prestressed beam, including flexure, shear, and deflection criteria. These topics are also covered in a graduate course (CE 533. Prestressed Concrete Structures Analysis). Thus, there is significant overlapping content between these two courses. The content is well-suited to graduate level study. Thus, the Department will retain the graduate course, but no longer offer this content at the 4000-level. Undergraduate students are welcome to take the graduate level course.

Resource Needs: There are no changes to resource requirements.

Impact on Distribution Requirements and Other Courses:
This course can be used to fulfill the "depth" requirement for the Civil Engineering degree, which is as follows:

> *ii. Must include 3/3 units of civil engineering depth courses at the 3000-level or above, fulfilled by all CE courses not listed in other notes and with at least 2/3 unit from within one sub-discipline of CE.*

CE 4017 is one of the courses listed in the "Structural and Geotechnical Engineering" sub-discipline. There are currently 6 courses in this sub-discipline; therefore, removing this course will leave 5 courses in this sub-discipline for students to select from.

Because there are many more courses in this sub-discipline than required (for students selecting this as their depth area), there is no replacement course needed. Also, this course will not affect ABET accreditation as it is an upper-level elective and is not used to document fulfillment of student outcomes

or program criteria. Lastly, the department offers a graduate level course for students who wish to take an additional class in this area.

Implementation Date: Academic Year 2023-2024

Contact: Jeanine D. Dudle

Date: May 9, 2023
To: WPI Faculty
From: Committee on Academic Operations (Prof. Srinivasan, Chair)
Re: Motion to establish an undergraduate minor in Africana Studies

Motion: On behalf of the Humanities and Arts Department and the Social Science and Policy Studies Department, the Committee on Academic Operation recommends and I move that an undergraduate minor program in Africana Studies, as described below, be established.

Description of the Proposed Minor:
The Africana Studies Minor examines the experiences of people of African descent whether they live in Africa, the US, the Caribbean, Latin America, Europe, or Asia. The minor requirements offer an interdisciplinary approach for examining the rich cultures, arts, institutions, sciences, technologies, histories, political economies, and philosophies developed and practiced by people of African descent. The Africana Studies minor consists of two units of coursework.

Program Requirements:
Complete two units of coursework that meet the conditions below.

1. 1/3 unit of Africana Studies Core (HU 1400 Introduction to Africana Studies, SOC 1500 Sociology of Race, or EN 1257 Introduction to African American Literature and Culture)
2. One and 1/3 units of Africana Studies Electives. These may be selected from any of the courses below with at least one course at the 2000-level or higher. Balance between HUA and SSPS courses is encouraged.
3. 1/3 unit of Minor Capstone. A Minor Capstone is defined as one 3000- or 4000-level class or an equivalent Undergraduate Independent Study (ISU) that culminates the minor. This course or independent study must be the final course in the sequence. HU 3900 (Inquiry Seminar) cannot count as a minor capstone.
4. WPI policy requires that no more than one unit of course work can be double counted toward other degree requirements. Thus, students may count three courses for the minor taken to fulfill other degree requirements (such as the Humanities and Arts Requirement or the two course requirement in Social Sciences). An HUA inquiry seminar (HU 3900) primarily focused on people of African Descent may be double counted as an Africana Studies Elective.
5. To be counted toward the minor, a course's content must be primarily focused on people of African descent to qualify. A student may petition the Program Directors for other appropriate course(s) to be included.

Africana Studies Courses

HU 1400 introduction to Africana Studies (Cat 1)
SOC 1500 Sociology of Race (Cat 1)
EN 1257 Introduction to African American Literature and Culture (Cat 2)
HI 1331: Introduction to History of Protest and Power (Cat 1)
HI 1345 Atlantic Worlds (Cat 1)
HI 2345 Topics in Urban History: Civil Rights in the City (Cat 2)
HI 2345 Welcome to Paradise: the US and the Caribbean (Cat 1)

INTL 2410 Modern Africa (Cat 2)
INTL 2420 Topics in Global Studies: Black Diaspora (Cat 1)
HU 2502 Global Feminisms (Cat 1)
MU 2640 African Drumming Ensemble* Cat 1
SOC 3500 African American Political Thought (Cat 2)
HI 2900 Topics in Gender and History: Black Women in the US (Cat 2)
EN 3257 Topics in African American Literature (Cat 2)

HUA also offers several HU 3900 capstone Inquiry Seminars that students pursuing the minor might consider as the culminating project of their HUA Requirement. Examples of seminars that can be double counted as one of the minor courses but not as the minor capstone:

HU 3900 The Black 60s
HU 3900 Writing, Rhetoric, and Social Justice
HU 3900 Black Writers of Sci-Fi Horror, and Fantasy
HU 3900 Hip Hop
HU 3900 Riots and Rebellion in Am Cities

*Please recognize that this is a 1/6 unit for a semester work as a music ensemble - for this to work as a 1/3 unit in the unit, a student will need to take a full year of the African Drumming to earn a 1/3 unit

Affiliated Faculty:
Patricia Agupusi (SSPS), Joe Cullon (HUA), Jeanne Essame (HUA), Kara Fontenot (HUA), Achirri Ismael (SSPS), Rob Krueger (SSPS), Trent Masiki (SSPS), Lamine Sagna (SSPS), Gbeton Somasse (SSPS), Hermine Vedogbeton (SSPS).

Program Declaration: Students seeking an Africana Studies Minor should complete the Africana Studies Minor Declaration Form and submit it to the SSPS or HUA office as early in the program of study as possible. The Africana Studies Program Directors, or their designees, will be responsible for review and approval of all Africana Studies changes or substitutions to these requirements.

Rationale:
This motion would establish a program title of Africana Studies. WPI currently has programs in Gender, Sexuality, and Women's Studies and Latin American Studies. With recent hires we now have the expertise to offer a program that relates to the histories and cultures of people of African descent. This program would be jointly supported by HUA and SSPS.

Resource Needs: Program director(s) and a budget to develop and manage activities, initiatives, and marketing.

Impacts on Students: This minor would offer students the chance to learn about the contributions people of African descent have made to literature, music, art, global politics, and science and technology. With three project centers in sub-Saharan Africa, the minor would enrich a student's project experience through and understanding of the cultural, technological, and scientific contributions of people in Africa and the global African diaspora.

Implementation Date: 2023/24 academic year.

Anticipated Enrollment: 50

Date: May 9, 2023
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Medich, Chair)
Re: Motion to remove the graduate M.S. program in Innovation with User Experience (MSIUX)

Motion: On behalf of the Business School, the Committee on Graduate Studies and Research recommends and I move that the graduate M.S. program in Innovation with User Experience (MSIUX) be removed.

Description of the Motion:
The following ~~struckthrough~~ text would be deleted from the WPI Graduate Catalog:

~~M.S. in Innovation with User Experience (MSIUX)~~
~~Rapid advances in science and engineering allow companies to develop increasingly sophisticated IT products. As the IT industry matures, competition is increasingly shifting toward providing outstanding user experiences (UX). Innovation with UX is becoming essential in developing IT products and services that can maintain competitive advantage in the marketplace. The Business School has world-class expertise and resources in UX and is ideally positioned to prepare students as UX professionals and set them on a path to take on leaderships positions such as chief experience officers (CXO).~~
~~The MSIUX is delivered entirely online. Some courses are also available on campus.~~

~~**Type:**~~
~~Master of Science~~

Also remove the following sections that are listed after the above description in the catalog:

- ~~Required Core Courses (3)~~
- ~~Specialty in Brands, Products and Consumers~~
- ~~Specialty in System Design~~
- ~~Specialty in Applied Analytics~~
- ~~Specialty in Organizing and Managing Innovation~~
- ~~Capstone Project Experience (2)~~

Rationale:
The subject matter of IUX is covered in other programs and specialties at the WBS. Therefore, we plan to drop this program (which has low student enrollment), not any of its courses or specialties in other programs.

Impact on Degree Requirements: Dropping the MSIUX graduate program will have no impact on any students' degree requirements.

Implementation Date: Implementation date for this action is the Fall 2023 academic year.

Date: May 9, 2023
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Medich, Chair)
Re: Motion to remove the graduate M.S. program in Marketing and Innovation (MSMI)

Motion: On behalf of the Business School, the Committee on Graduate Studies and Research recommends, and I move that the graduate M.S. program in Marketing and Innovation (MSMI) be removed.

Description of the Motion:
The following ~~struckthrough~~ text would be deleted from the WPI Graduate Catalog:

Proposed Modifications to Graduate Catalog: No change because the program had already been removed from the catalog.

Rationale:
We do not have international student interest in the program as it is not STEM-certified. WBS has not recruited students in this program since a year.

Impact on Degree Requirements: Dropping the MSMI graduate program will have no impact on any students' degree requirements.

Implementation Date: Implementation date for this action is the Fall 2023 academic year.

Date: May 9, 2023
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Medich, Chair)
Re: Motion to modify the name and course description of MKT 568 Data Mining Business Applications

Motion: On behalf of the Business School, the Committee on Graduate Studies and Research recommends and I move that the course description of MKT 568 be modified as described below.

Description of the Proposed Modifications:

Current course name and description:

MKT 568: Data Mining Business Applications (3 credits)
This course provides students with the key concepts and tools to turn raw data into useful business intelligence. A broad spectrum of business situations will be considered for which the tools of classical statistics and modern data mining have proven their usefulness. Problems considered will include such standard marketing research activities as customer segmentation and customer preference as well as more recent issues in credit scoring, churn management and fraud detection. Roughly half the class time will be devoted to discussions on business situations, data mining techniques, their application and their usage. The remaining time will comprise an applications laboratory in which these concepts and techniques are used and interpreted to solve realistic business problems. Some knowledge of basic marketing principles and basic data analysis is assumed.

Proposed course name and description:

MKT 568: Marketing Analytics (3 credits)
Data is at the heart of this new era of marketing. The goal of this course is to provide the skills needed to make intelligent use of marketing data about customers, competitors, and the industry. The focus will be on the application of analytics techniques to enhance marketing decision-making in organizations. The course blends the art and science of marketing and prepares students to generate marketing insights from data in areas such as segmentation, targeting, positioning, product choice, customer satisfaction, and customer lifetime value analysis. This will be a hands-on course, in which students apply the concepts and techniques studied in class to actual business situations.

Rationale:
This revised course provides students with knowledge of marketing and marketing analytic techniques. The course will cover topics such as segmentation, targeting and positioning, customer satisfaction management, and customer lifetime value analysis. Currently, these topics are not taught with marketing analytics tools and techniques in any other course offered at WPI. Learning these topics will give students knowledge of marketing analytics techniques and will help them acquire analytics skills that are highly sought by employers.

A simple search at Google Careers with the “marketing analytics” keyword returns about 500 job openings only at Google. A more detailed analysis of marketing analytics jobs on LinkedIn shows that many top companies such as Apple, Peacock, and Walt Disney are seeking employees who are familiar with the methods that will be taught in this course (e.g., conjoint/discrete choice, segmentation, targeting and positioning). The course will be offered in a variety of delivery formats.

Overall, this revised course fits well with the Analytics focus of our specialty Masters programs.

Impact on Degree Requirements: This revised course will continue to be offered in the current specialties and program electives of the WPI Business School:

- Brands, Products, and Consumers
- Marketing analytics
- Data analytics
- Advanced Operations Analytics

This revised course will continue to be offered in the current Data Science Core Coursework Requirement under the *Business Intelligence and Case Studies* category.
This course will be removed from the *Marketing, Strategy, and Entrepreneurship* category of Master of Science in Systems Engineering Leadership.

Resources and Anticipated Instructors: Prof. Farnoush Reshadi, who was teaching the old MKT 568 course, will now teach this revised version of the course. No additional resources are needed.

Implementation Date: Implementation date for this action is the 2023-24 academic year.

Date: May 9, 2023
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Medich, Chair)
Re: Motion to add IGS 596: Special Topics in Integrative and Global Studies

Motion: On behalf of the Department of Integrative and Global Studies, the Committee on Graduate Studies and Research recommends and I move that IGS 596: Special Topics in Integrative and Global Studies, as described below, be added.

Proposed Course Description:
IGS 596: Special Topics in Integrative and Global Studies (Cat. III; 1-3 credits)
Current issues and state-of-the-art research in Integrative and Global Studies. Repeatable for credit with different topics.
Recommended background: Varies with topic.

Anticipated instructors: DIGS faculty

Rationale: Variable topics course for graduate students in IGS programs (e.g., CCA) and beyond.

Resource Needs:
- This is a new graduate course and will be part of the normal load.
- Classroom/Zoom space for 12-15
- people
- Laboratory: N/A
- Library resources: N/A
- Information Technology: N/A

Impact on Distribution Requirements and Other Courses: None

Implementation Date: It is expected that this course will be first offered in Fall 2024.

Date: May 9, 2023
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Medich, Chair)
Re: Motion to add IGS 597: Independent Study in Integrative and Global Studies

Motion: On behalf of the Department of Integrative and Global Studies, the Committee on Graduate Studies and Research recommends and I move that IGS 597: Independent Study in Integrative and Global Studies, as described below, be added.

Proposed Course Description:
IGS 597: Independent Study in Integrative and Global Studies (Cat. III; 1-3 credits)
Individual investigations or studies of any aspect of Integrative and Global Studies as may be selected by the student and approved by the faculty member who supervises the work.
Recommended background: TBD with Instructor.

Anticipated instructors: DIGS faculty

Rationale: Independent Study opportunity for students enrolled in DIGS or related academic programs.

Resource Needs:
- This is a new graduate course and will be part of the normal load.
- Room: N/A
- Laboratory: N/A
- Library resources: N/A
- Information Technology: N/A

Impact on Distribution Requirements and Other Courses: None

Implementation Date: It is expected that this course will be first offered in A term of 2023.