

WORCESTER POLYTECHNIC INSTITUTE

May 7, 2020

To: The WPI Faculty
From: Tanja Dominko
Secretary of the Faculty

The ninth scheduled Faculty meeting of the 2019-2020 academic year will be held on **Thursday, May 7, 2020 at 11:00 am via ZOOM.**

1. Call to Order
 - Approval of the Agenda
 - Approval of the Consent Agenda and the Minutes from 4-16-2020
2. Secretary of the faculty Report
3. President's Report
4. Provost's Report
5. Committee Business
 - COG**
 - Motion: Suspend election of new members to faculty governance standing committees
 - Motion: Extend faculty responsibilities during FY19/20
 - COG and CAP**
 - Motion: Student options for grading of PQP/IQP/MQP projects completed in D-term
 - COG and COAP – this motion was not included in the two week notice**
 - Motion: Update to Faculty Handbook, Part 2.1.C: Policies and Operating Procedures: Policies Regarding the Status of Faculty: Department Heads
 - CGSR**
 - Motion: Approve a new Science and Technology for Innovation MS degree and Program in Global Development
 - Motion: Approve a BS-MS and BA-MS degree in Science and Technology for Innovation in Global Development
6. New Business
7. Closing Announcements
8. Adjournment

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WORCESTER POLYTECHNIC INSTITUTE
Faculty Meeting Minutes
April 16, 2020

Summary:

1. Call to Order
 - Approval of Agenda
 - Approval of the Consent Agenda and Minutes from March 19, 2020 & March 27, 2020
2. SoF Report
3. President's Report
4. Provost's Report
5. Committee Business: CTAF, CAP/CGSR, CGSR, COG/COAP, CGSR, CAP
6. Closing Announcements
7. Adjournment

Detail:

1. Call to Order

The ninth Faculty meeting of the 2019-2020 academic year was called to order at 3:15pm via ZOOM by **Prof. Dominko (BBT)**. She reminded everyone that the meeting is being recorded for the purpose of accuracy in taking minutes. She stated that all voting would be held in this open forum. She also asked that participants do not post questions in "chat", but instead "raise their hand" in ZOOM to participate.

Approval of Consent Agenda and Minutes of March 19, 2020 & March 27, 2020

The agenda (including one modification to move the CAP motion ahead of previously announced) and consent agenda (including one change to page 23, distribution requirements for CEE had the year of 21-22, which has been changed to academic year 20-21; and including the minutes from the March 19, 2020 Faculty meeting) were approved. The minutes from the March 27 Special Faculty Meeting were approved.

2. Secretary of the Faculty Report

Secretary of the Faculty Dominko announced that the 2020 Faculty Awards Convocation, previously scheduled to be held tomorrow, March 17, 2020, is cancelled, due to Covid19. She stated that we would not be scheduling a virtual Convocation and deemed it more appropriate to postpone this special celebratory event to Fall of 2020.

She announced that there will be a Special Faculty Meeting held on May 21, 2020 at 11am.

Secretary of the Faculty Dominko announced that the Spring elections for COG, CTAF and COAP had already taken place and the new members were in place. She announced that COG is considering a recommendation that the remaining committee elections take place in the Fall and asked those members whose terms would expire at the end of this academic year, to continue to serve until voting can take place, in order to preserve the composition of the committees, and that committee chairs need not continue to serve as chairs. She stated that since the Presidential and Provost appointments do not depend on the election, that process need not wait, and that COG will be asking for those appointees to be filled now.

Secretary of the Faculty Dominko reflected on the commitment we have all made last year to shared governance, and stated that the commitment seems to be waiving this year. She stressed that it is important that we renew these commitments and view shared governance at WPI as one of the strengths of the university and a sign of institutional resilience in these extraordinary times.

Recent developments regarding adoption and implementation of the Process for Creating and Revising Institutional Administrative Policies go against the spirit of shared governance and Faculty Governance is stating its opposition in a formal Statement. She expressed her hope that the President will address faculty concerns and consider recommendations to rectify this situation.

The statement will be delivered to the President in its entirety (included below), but in the interest of time, Secretary of the Faculty Dominko read a few highlighted objections, recommendations and requests on behalf of the Faculty.

**Faculty Statement in Opposition to the
Process for Creating and Revising Institutional Administrative Policies**

April 16, 2020

On behalf of Faculty Governance, we express our grave concern with and disapproval of the recent action taken by President Leshin and the WPI Administration to put in place a “Process for Creating and Revising Institutional Administrative Policies” (PCRIAP). This action was finalized on March 18 without proper collaboration with the WPI Faculty through its Faculty Governance structure and representation. The process was imposed on us without adequately addressing the legitimate concerns raised by the faculty in our good-faith attempt to ensure that it respected the central role played by the faculty in establishing policies that bear on conditions affecting how we carry out our teaching and research at this University.

This is our opportunity to explain our objections to the President’s action regarding the PCRIAP.

We object to the substance and structure of the PCRIAP, a process for “administrative policymaking” that fails to define what is meant by “Institutional Administrative Policies,” and offers only vague assurances that it will not transgress into educational policies central to the faculty.

The process established by the President in the PCRIAP is dominated by administrative judgments and decision making, with only token faculty input permitted in the form of two faculty members on an Administrative Policy Group with 12 administrators appointed by the President. While the document explicitly states that it does not cover educational policies that bear on conditions facilitating instruction, research, publication, and other scholarly or cultural activities of faculty members and students, it contradicts itself by ignoring the fact that many institutional policies do just that. Whereas our current governance structure places such policies squarely within the purview of the faculty, in the new process, all questions about whether a policy falls under the purview of our faculty governance process or this new administrative process are to be resolved first by the Administrative Policy Group dominated by administrators, and then, if necessary, by the President herself.

In this manner, the PCRIAP is a direct threat to the principles of shared governance, which for decades

have distinguished WPI and facilitated its strength. These principles were reaffirmed at the end of last year's difficult confrontation between the administration and the faculty, and agreed to and endorsed by the ByLaws and Governance Working Group (BGWG) as well as the entire WPI faculty less than a year ago in May 2019.

We object to the process and timing that gave rise to the PCRIAP: The document describing the process was forwarded to COG for its input on March 16. It was then adopted just two days later by the President - without notifying the faculty, *including WPI's chief academic officer, Provost Soboyejo*. At that same time, COG and CITP continued to meet to review the PCRIAP process and continued to give its feedback to the administration. We could hardly have imagined that while we were working together for the good of WPI, the President had already approved in secret the very document under discussion. It wasn't until two and a half weeks later, on April 6, that she notified Professor Gaudette and me that the policy had already been imposed.

Please explore with me for a moment what it meant that President Leshin approved the PCRIAP on March 18th. That was also the day WPI announced that all D-term teaching, advising, and research would be done remotely. You'll remember how we scrambled to clear out our offices and labs before the campus shut-down. You'll remember how hard the faculty and staff worked to prepare for remote teaching. You'll remember that by then we'd already done something unprecedented and gathered remotely at our March 11 emergency faculty meeting to collectively identify the obstacles we had ahead of us, to provide a way to expedite our own governance processes, and to figure out how to best work together to ensure our students continue to receive the best education available anywhere. You'll appreciate how, since then, the various faculty governance committees (COG, CAP, CGSR, CTAF) have already rushed to implement temporary policies that would help alleviate the anxieties of our students and our pre-tenure colleagues. You may know that we were also acting to help meet the COVID-related needs of our greater Worcester community.

At every turn, we have acted and continue to demonstrate our agility in time of crisis, our ability to act quickly with only the benefit of the institution in mind. We have acted in good faith, expeditiously, and in a way that should bring pride to anyone associated with WPI. At the very same time, President Leshin has chosen this moment to take purposeful steps that, if left unchallenged, will permanently and profoundly stifle the voice of the faculty and weaken our University.

We object that the Administration is imposing permanent changes in a time of crisis: The WPI faculty, like the rest of the world, has been distracted by a global pandemic. Devoted to our students, we are focused on doing our best to meet their academic and personal needs. At the same time, we are all laboring under our own anxieties – about our families, our health, our livelihoods - and the faculty deserves to be respected by the administration with the same sensitivities that we have shown our students to suit these unprecedented circumstances. Instead, the President has used this time of distraction and overwork to impose on us an illegitimate but permanent process. She has confused the need to take emergency measures in response to the COVID-19 crisis, on the one hand, with a desire to make a permanent, fundamental change in the balance of shared governance at WPI, on the other.

We object to the very first actions taken by the Administrative Policy Group: This new process, which will encroach on our faculty rights and responsibilities by reclassifying as administrative policies many policies that are broadly defined in the faculty handbook as educational policies – and will do so based on the interpretation of a group dominated by administrators and with very little faculty voice – is already underway.

As an example of our worst fears playing out in real time, the Administrative Policy Group met for the first time on April 6, and has already infringed on our long-established faculty responsibilities by posting a Computer Hardware Purchasing Policy proposal for 30-day comment, effectively eliminating the central role that our Committee on Information Technology Policy would otherwise occupy, and relegating to the faculty a subsidiary role in formalizing purchasing restrictions that will have direct impact on the conditions of our instruction and research – the very essence of an educational policy.

Our understanding is that two additional policy proposals otherwise within CITP's charge were discussed at the April 13 meeting and will soon be posted by the Administrative Policy Group in the same unsatisfactory manner.

Requests on behalf of the WPI Faculty: Under the current circumstances, we very much regret the need to do so, but we have no choice but to ask that the Administration renew its commitment to shared governance at WPI by agreeing to the following:

- (As soon as possible:) Fully collaborate with Faculty Governance to reformulate a “Process for Creating and Revising Institutional Administrative Policies” that more clearly delineates Institutional Administrative Policies from Educational Policies defined in the Faculty Handbook and resolves disputes in a balanced, open, and fair manner that ensures the process cannot encroach on WPI's Educational Policies.
- (Until the PCRIAP is reformulated:) Fully collaborate with Faculty Governance leadership to agree on an interim plan to deal with proposed policies whose classification (administrative or educational) are in dispute.
- (In the longer-term:) Actively re-engage Faculty Governance leaders in a serious discussion of what shared governance is, its importance as a process to come to joint decisions, and its special value in times of Institutional crisis. Arrange a meeting between the Administrative leaders and Faculty Governance representatives as soon as is reasonable, with Board members invited at the discretion of the administration, and scheduled in a manner that does not interfere with the management and demands of the current crisis.

Conclusion:

The faculty have acted in good faith during this crisis. We have expended whatever effort was required to successfully transform our courses and projects for remote delivery and to adopt necessary but temporary new measures to help us cope with the crisis while maintaining our standards and our care for our students and each other.

We believe that it is more important than ever to include us in key decisions bearing on the mission of this university. The administrative actions described above are a breach of trust and our good faith. They run contrary to the values of shared governance, and threaten the health of the Institution. They alienate a faculty that by its very nature would otherwise engage itself as full owners of the University. And they do so at a specific moment in time when WPI's survival depends now more than ever on the faculty's unwavering commitment to the Institution.

The objective of WPI's Faculty Governance remains to vigorously represent the interests of the WPI Faculty by taking actions that are in the best interest of the University while respecting that we are all members of the greater WPI family. We will continue to do so while also steadfastly advancing the

academic objectives of the Institute. It is our hope that we can do so with a commitment from the President to a true partnership.

Respectfully,

Secretary of the Faculty, Prof. Tanja Dominko (BBT)
Committee on Governance, Prof. Gaudette (BME), Chair
Committee on Appointments and Promotion, Prof. Weathers (BBT), Chair
Committee on Tenure and Academic Freedom, Prof. Deskins (CHE), Chair
Committee on Academic Policy, Prof. Heineman (CS), Chair
Committee on Financial and Administrative Policy, Prof. Burnham (PH), Chair
Committee on Information Technology Policy, Prof. Cocola (HUA), Chair
Committee on Academic Operations, Prof. Mathisen (CEE), Chair
Committee on Graduate Studies and Research, Prof. Fischer (ME), Chair
Undergraduate Outcomes Assessment Committee, Prof. Mallick (CEE), Chair
Faculty Review Committee, Prof. Rangwala (FPE), Chair
Committee on Advising and Student Life, Prof. Medich (PH), Chair
Fringe Benefits Committee, Prof. Fehribach (MA), Chair
Parliamentarian, Prof. Hanlan (HUA)

3. President's Report

President Leshin began by stating that we are currently living history, dealing with an unprecedented intersection of a public health emergency and financial crisis with no other choice than to do all we can to get through it. Never in the long history of WPI have we been asked to deal with so much. With the possible exception of World War, never have the challenges been so great, nor the dangers so real. Never has it been more difficult that we stay connected and never has it been so important that we do so, for our mission to educate and discover in ways that are unique to WPI.

She stated that our actions now will define the future of this great institution, of our students, their families and the WPI family. The need to stay focused on that future and take required actions is urgent. She recognizes that, through the statement just read, some people are upset by what they are being told as unwarranted actions on her part to create a structure for transparently and inclusively considering and adopting administrative policies. She stated that she has always led this institution based on her own values. To have it suggested that she would take advantage of this historic moment to act in a way that violates her core values, to see her own integrity and that of other administrative leaders openly questioned, when in fact they are spending every waking hour working to keep this institution and this family together, is extremely disheartening. She stated that she strongly disagrees with the characterization of how this all came about and disagrees with what the Faculty are being told. She stated that it is inaccurate.

Faculty Governance has transparent and highly structured processes for the creation of academic policies, and the administration is trying to do the same for administrative policies, and only administrative policies. She believes that the administrative policy group will advance our goals as an institution especially in this unique moment, where integrative thinking and decisive action is required. She stressed that this group is not intended to impinge in any way, on the legitimate authority of Faculty over academic policies. She gave her commitment that the administration

will continue to take Faculty input to improve the process and administrative policies that are so critical to provide guidance in this moment and in the future.

With this commitment, she asks of the Faculty what she calls our “North Star”, as we work through this challenging time. In this moment she asks that we do all we can to treat each other with care and respect and to give one another the benefit of the doubt. She understands the stress level right now, so gives her colleagues on COG, who have questioned her integrity, the benefit of the doubt. She stated that they clearly are upset, evidenced in the COG minutes circulated and by the statement just read. Though it is not her intention to upset anyone, she realizes that she will have to live with some level of upset, since she knows what she is doing is what is needed in this moment.

She recommitted to continuing the conversations with how we can all do our work as effectively as we can. She asked that Faculty work with the administration to work our kinks in this new process to come together, in order to achieve the best work for WPI. It is her hope that this begins to address questions and concerns, and that everyone hears her openness in continuing these conversations, understanding that she strongly believes the work being done through the administrative policy group is good for WPI and is necessary. She thanked everyone for considering her request, and for all they do in this most trying time.

She reported that she is focusing completely on planning to get the university opened as soon as it is safe to do so. For our Fall, that remains highly uncertain, and for managing our institution in ways that align with our values and honor the dedication of the WPI family. As is consistent with those values, the administration are including elected Faculty Governance leaders in these conversations, in fact she reported that she has a meeting with a group of committee chairs tomorrow where they will discuss this, and will include the whole campus in these conversations about our future. She deeply appreciates everyone’s contributions to advance our mission, serve our students and support one another. In this moment, her focus is keeping our WPI family safe, healthy and together. Because, she stated, divided we will not meet the powerful forces of this moment, but united, we can do anything.

4. Provost’s Report

Provost Soboyejo extended his thanks to Faculty, Administration, Staff and the Board members, everyone who has worked so hard to get us this far at this time. He stated that, through this existential crisis time for WPI, nothing is guaranteed and that our President has made a commitment for salaries to be paid through the end of the term, even with A and B terms uncertain with enrollment, which pays for us as a community to survive. The Provost stated that complexities in the world around us require administrative responses that are truly administrative, which are different from Faculty Academic issues. He argued that we need an administrative policy framework that is robust, and without it, we expose the institution to significant risks, especially at a time with arisings which are difficult to anticipate. This, he explained is why the President has taken the measure of initiating this policy and we need to give the President and those that run the university, the opportunity to evolve quickly to address these issues. He stated that when we pull together, we can do truly remarkable things, like putting online course together in two weeks’ time. The Provost urged everyone to work together, as we move forward, and to find ways of collaborating together to keep WPI first and foremost in our

minds, for the well-being of students, staff, Faculty and Administration, as our ultimate goal to drive this great institution forward. He stated that we can't afford to fight each other, that we should pull together, and hopefully retaining our jobs in overcoming challenges. The Provost is glad to hear the openness of continued collaboration from Faculty Governance to improve robustness of this process, along with the response from the President, which shows she is open to this as is he, as is the university administration. His hopes are to seize this moment to continue to work and evolve together through what he calls a "coronavirus revolution", a revolution that has changed how we deliver teaching, a revolution that will leave a permanent imprint on us and requires us to continue to collaborate and work together. He urged everyone to talk through issues that can divide us and to use this moment to unite and move forward.

5. Committee Business

CTAF

Prof. Deskins (CHE), for the Committee on Tenure and Academic Freedom (CTAF) moved that current tenure-track Faculty have their probationary period extended by one year due to hardships associated with COVID-19, with the right to opt out of this provision. (See **Addendum #1** attached to these minutes.)

Prof. Deskins gave a brief overview of this motion and explained that tenure-track faculty would have the option to extend their probationary period before going through with their tenure candidacy year, due to pandemic Covid-19. They would have the opportunity to opt out of this 1-year extension process by notifying the Provost and their respective Dean.

Dean McNeill (Eng.) asked when they would have to opt-out by. Prof. Deskins stated that as in the motion, faculty that would have gone up for tenure this year must make this request by end of D term (May 13, 2020). All other faculty have until end of D term 2021 (May 4, 2021). The motion passed.

CAP/CGSR

Prof. Heineman (CS), for the Committee on Academic Policy (CAP) and **Prof. Fischer** (ME), for the Committee on Graduate Studies and Research (CGSR), moved to change the policy regarding the automatic sharing of the results of online course reports of undergraduate and graduate classes for D-2020 term, and Graduate classes for the Spring 2020 semester with the WPI community and administration. (See **Addendum #2** attached to these minutes.)

Prof. Heineman gave a brief overview of this motion. He explained that some faculty members were concerned that this information may be used as part of a personnel evaluation or even as part of a tenure evaluation, since the numbers are routinely shared with the administration. While course reports will continue to be processed as usual, all results will be returned only to the instructor, and it will be entirely up to the instructor to do what they choose with the information. He explained that this process is similar to the IDEA process back in 2004.

Prof. Loiacono (FBS) asked if someone decided not to include the course report data in their tenure file, would that be held against them. Prof. Heineman stating that, while he couldn't speak for CTAF, his hopes would be that because of these certain circumstances, any

information not shared would not necessarily be viewed as negative information, and should not, in any way, be held against the individual candidate.

Dean Taylor (FBS) asked if aggregate data would still be available. Professor Fischer confirmed that it would still be available, that nothing in this motion precludes aggregate data.

The motion passed.

CGSR

Prof. Fischer (ME), for the Committee on Graduate Studies and Research (CGSR), moved to give graduate students the option to receive a Pass/NC grade for any course taken in D-term 2020. (See **Addendum #3** attached to these minutes.) Prof. Fischer gave a brief description of the motion, emphasizing that it is important to give the graduate students this choice and at the same time, making them aware that there are certain implications should they choose to use this.

Prof. Ryder (BBT) stated that many graduate students are required to receive a grade of B level for their degree. In this case, is a Pass grade meaningless? Prof. Fischer stated that these factors have to come to mind, and that his hopes were that graduate program committees are amenable to this information.

Prof. Panchapakesan (ME) asked if a student receives a Pass grade, would that have any implications on future research scholarships in the department. Prof. Fischer stated that it shouldn't have any implications, but that it is up to the departments to review this.

Prof. Fehribach (MA) asked, for the purpose of this motion, is a D a passing grade? Prof. Fischer stated that grades of A, B or C become a P.

Prof. Gatsonis (ME) asked when the student would have the opportunity to declare whether or not they want a Pass/NR grade choice. Prof. Fischer stated that the deadline would be the same as undergraduate grades, which is May 21, after the grades are posted. Prof. Gatsonis raised some issues with perhaps a friendly amendment to modify the motion but decided not to make a friendly amendment.

The motion passed.

CGSR

Prof. Fischer (ME), for the Committee on Graduate Studies and Research (CGSR), moved that a policy for the participation of Graduate Students in Commencement who will not complete degree requirements by the ceremony date be added to the graduate catalog. (See **Addendum #4** attached to these minutes.)

Prof. Burnham (PH) asked for clarification of what exactly would be added to the graduate catalog. Prof. Fischer stated that the policy for participation would be added to the catalog, not the graduation list.

The motion passed.

COG/COAP

Prof. Weathers (BBT), for the Committee on Appointments and Promotions (COAP), moved that review of sabbatical leave applications no longer be handled by COAP, but instead be reviewed by department heads (as is currently done) and the appropriate Dean prior to the request being sent to the Provost by amending the Faculty Handbook. (See **Amendment #5** attached to these minutes.)

The motion passed.

COG/COAP

Prof. Weathers (BBT), for the Committee on Appointments and Promotions (COAP) moved to clarify the wording in the Faculty Handbook related to years required for eligibility to take a sabbatical leave and remove mention of one-term sabbatical leaves of absence, which are no longer available as of 2006, by amending the Faculty Handbook. Prof. Weathers explained that COAP and COG propose that time spent on unpaid leave or less than half-time activities should not count towards eligibility for sabbatical leaves. (See **Amendment #6** attached to these minutes.)

The motion passed.

COG/COAP

Prof. Weathers (BBT), for the Committee on Appointments and Promotions (COAP) moved to change the review process for requests for unpaid leaves of absence to parallel the process for requests for sabbatical leaves of absence by amending the Faculty Handbook. (See **Addendum #7** attached to these minutes.)

The motion passed.

COG/COAP

Prof. Weathers (BBT), for the Committee on Appointments and Promotions (COAP) moved that the process (described in the Faculty Handbook, Part Two, Section 1.D.2.5) for providing written feedback to faculty candidates who have been denied promotion be modified so that the letter comes only from the Provost. (See **Addendum #8** attached to these minutes.)

Prof. Weathers stated that COAP gives a recommendation to the Provost, who has the final decision. She explained that if there is a disagreement between COAP and/or Dean and the Provost, it is difficult for all parties to write a letter.

Prof. DeWinter (HUA) shared thoughts about the benefit of having a co-authored letter even if tensions were present in that decision, and that those tensions could be represented in that letter. Prof. Weathers stated that, though one would hope that would occur, it is not necessarily the case. In fact, in past, when conflicts have occurred, it has created such a conflict, it made it very difficult for COAP members to sign that letter. She explained that variables do come into pace, like who the Provost is at the time, but that this is something COAP feels very strongly about this. She stated that COAP forwards much information about the Candidate to the Provost,

in positive and negative cases, along with their recommendations, and it is the Provost's responsibility, along with the Nominator and the Advocate, to forward that information to the Candidate.

Prof. Panchapakesan (ME) suggested, instead of a letter that COAP, the respective Dean and the Provost give written feedback to the candidate containing thoughts from meetings and possible contents of the recommendation letters from Reviewers. Prof. Weathers stated that it is COAP's opinion that that is the role and responsibility of the Nominator and Advocate in a case, who sit in on, and are a part of every one of the discussions; even discussions with a Provost who is having a difference of opinion.

Prof. Oates (BBT) shared her opinion that this was a good idea, that this doesn't mean the Nominator and Advocate wouldn't provide feedback to the candidate but that it ultimately puts the responsibility on the Provost to write the letter, since the Provost has the final say in every case.

Prof. Gaudette (BME) shared that the Provost, in COG meetings, conveyed that he was in support of the letter to the candidate coming specifically from him.

Dean McNeill (Eng.) shared his thoughts about working with COAP back during the COACHE survey time when there was much disconnect about the promotion process, vs. the tenure process. He stated that one important change was to get the Nominator and Advocate into every meeting. He stated that he personally would rather talk to the candidate, that to get every thought into a letter would be very difficult and it is much more effective to have a talk with the candidate face to face, with all questions answered, and without breaching confidentiality, so candidates know what may need to be changed for a future case.

Provost Soboyejo stated that he agrees with this motion, that at times, if the Provost doesn't agree with the Committee, it is still the Provost's final decision and the Provost should own the decision and communicate this to the candidate.

The motion passed.

CGSR

Prof. Fischer (ME), for the Committee on Graduate Studies and Research (CGSR), moved that an Applied Physics Graduate Program be established at WPI. (See **Addendum #9** attached to these minutes.)

Prof. Medich (PH) gave a brief description of the motion and stated that it was a motion with cross-cutting of many different areas.

Prof. Panchapakesan (ME) asked about extending the program to other areas other than Physics. Prof. Medich stated that it was the hope to increase the program, and that they were open to incorporating it with university programs, not restricting it to just Physics.

President Leshin asked about additional resources needed to run this program. Prof. Medich stated that no new resources would be needed. He stated that other than two new courses, five of the courses have been taught for years now.

Prof. Dominko asked for a motion to extend the meeting by 15 minutes. A motion was made, seconded and passed.

The main motion passed.

CGSR

Prof. Fischer (ME), for the Committee on Graduate Studies and Research (CGSR), moved that new Applied Physics graduate courses be established to support the new graduate program in Applied Physics. (See **Addendum #10** attached to these minutes.)

Prof. Medich explained that, other than two courses, all others have already been taught on a test basis for many years now.

The motion passed.

CAP

Prof. Heineman (CS), for the Committee on Academic Policy (CAP), moved that the current trial policy allowing students to be paid by sponsors for credit-bearing work on MQPs and IQPs be made permanent. The policy should be updated to emphasize the central role of WPI's academic mission in all student project work and emphasize the primary authority and responsibility of the faculty advisor(s) in all decisions related to the project work. (See **Addendum #11** attached to these minutes.)

Prof. Heineman gave a brief description of the motion, stating that each case would have to be approved or denied by the office of Undergraduate Studies, and that this policy would not be applicable to work done by the student in the past. He also stated that this motion would formalize the process, for when a sponsor will only allow for the project to move forward if the student can get paid. CAP would ask of the Office Undergraduate Studies, statistics on yearly participation.

The motion passed.

6. Closing Announcements

Associate Dean Weekes (UG Studies), spoke about Undergraduate Research activities, and encouraged Faculty to participate in early research activity in E Term. She reported that there are currently 118 students (rising sophomores and rising juniors) who have expressed interest in doing research with Faculty this summer, remotely, and that there is funding available for about 16-17 students. She asked the Faculty who may have funding means, and may benefit from student's assistance in their research, to please reach out, so they can provide students with the appropriate background. She also encouraged Faculty who already have grants (i.e. NSF) to apply for research supplements to those grants (which typically supply funding for 1-2 undergraduate students). Dean Weekes also announced the virtual undergraduate research

symposium in the week of May 4th. These symposiums are where research students display slides and videos on the work they have been doing, which is of value to families and prospective students. She announced that registration is still open.

6. Adjournment

Meeting was adjourned at 4:50 pm by **Prof. Dominko**.

Respectfully submitted,

Tanja Dominko
Secretary of the Faculty

Addenda on file with these minutes:

1. Addendum #1 CTAF - motion that current tenure-track Faculty have their probationary period extended by one year due to hardships associated with COVID-19, with the right to opt out of this provision – April 16, 2020.
2. **Addendum #2** CAP/CGSR - motion to change the policy regarding the automatic sharing of the results of online course reports of undergraduate and graduate classes for D-2020 term, and Graduate classes for the Spring 2020 semester with the WPI community and administration - April 16, 2020.
3. **Addendum #3** CGSR - motion to give graduate students the option to receive a Pass/NC grade for any course taken in D-term 2020 - April 16, 2020
4. **Addendum #4** CGSR - motion that a policy for the participation of Graduate Students in Commencement who will not complete degree requirements by the ceremony date be added to the graduate catalog - April 16, 2020
5. **Addendum #5** COAP - motion that review of sabbatical leave applications no longer be handled by COAP, but instead be reviewed by department heads (as is currently done) and the appropriate Dean prior to the request being sent to the Provost by amending the Faculty Handbook - April 16, 2020
6. **Addendum #6** COAP – motion to clarify the wording in the Faculty Handbook related to years required for eligibility to take a sabbatical leave and remove mention of one-term sabbatical leaves of absence, which are no longer available as of 2006, by amending the Faculty Handbook - April 16, 2020
7. **Addendum #7** COAP – motion to change the review process for requests for unpaid leaves of absence to parallel the process for requests for sabbatical leaves of absence by amending the Faculty Handbook. -- April 16, 2020
8. **Addendum #8** COAP -- motion that the process (described in the Faculty Handbook, Part Two, Section 1.D.2.5) for providing written feedback to faculty candidates who have been denied promotion be modified so that the letter comes only from the Provost. -- April 16, 2020
9. **Addendum #9** CGSR -- motion that an Applied Physics Graduate Program be established at WPI. -- April 16, 2020
10. **Addendum #10** CGSR -- motion that new Applied Physics graduate courses be established to support the new graduate program in Applied Physics. -- April 16, 2020
11. **Addendum #11** CAP -- motion that the current trial policy allowing students to be paid by sponsors for credit-bearing work on MQPs and IQPs be made permanent. The policy should be updated to emphasize the central role of WPI's academic mission in all student project work and

emphasize the primary authority and responsibility of the faculty advisor(s) in all decisions related to the project work. -- April 16, 2020

Consent Agenda Motions

CAO Add AR/IMGD 3210

CAO Change the title and description for CE3061

CAO Add FP 4001

CAO Change the title for FP 3070

CAO Modify the course listings for the Minor in Sustainability Engineering

CGSR Update the Combined B.S./M.S. description in the FBS section of the Graduate Catalog

Date: May 7, 2020
To: WPI Faculty
From: Committee on Academic Operations (Prof. Mathisen, Chair)
RE: Motion to add *AR/IMGD 3210: Human Figure in Motion* approved by *Humanities and Arts* (approved 4/12/19) and *Interactive Media and Game Development* (approved 4/11/19).

Motion: The Committee on Academic Operations recommends and I move that the following permanent Cat II course (AR/IMGD 3210. Human Figure in Motion) be approved starting in AY 2020-21.

Course/Catalogue Description:

AR/IMGD 3210 Human Figure in Motion - Cat II

This course offers in-depth analysis of the human figure in action. Motion is analyzed and studied through drawing and sketching of live models, video clips, performance and pantomime, studying not only the physical exterior but also how thoughts and emotion are expressed through gesture. Students will develop skill in figure posing and staging for applications in animation, storyboards, comics, and illustration.

Recommended background: Observational and gesture drawing and color (AR 1101), experience drawing live model (AR 2202), composition skills and color (AR/IMGD 2700).

Anticipated Instructors(s): Professor Ed Gutierrez and other qualified instructors.

Rationale: This course will help meet the expanding needs and goals of the IMGD visual and technical art curriculum, preparing students with knowledge and skills increasing demand by the entertainment, education, medical and simulation industries. It will focus on the Physiological and emotional laws influencing human action and performance, and the application of these principles in production planning, illustration and animation.

- Drawing the human form accurately.
- Develop the skills of construction, proportions and perspective.
- Develop the ability to draw from memory and imagination.
- Develop the skill of composition (balance, rhythm, harmony, contrast, perspective, stylization).
- Deepen the knowledge and understanding of human anatomy.
- Develop basic understanding of color theory, tones and value.
- Develop basic understanding of kinesiology, weight, balance and movement.
- Develop individual artistic expression.

This course was taught twice as an experimental offering in B-term 2018 and B-term in 2019. Enrollment was at capacity of 25 students for both terms. Below are the student evaluations.

Student course evaluations for IMGD 240X:

B term 2018: 17 out of 25 students responded.

Question 1: 4.5



Question 2: 4.4

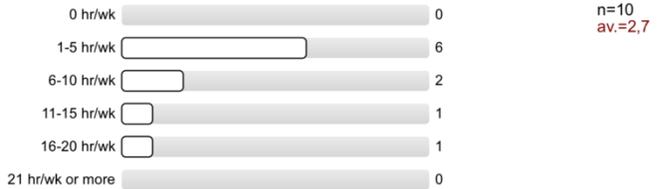


Question 9: 4.2



Question 26B:

26B. On average, what were the total hours spent in each 7-day week OUTSIDE of formally scheduled class time in work related to this course (including studying, reading, writing, homework, rehearsal, etc.)?



Note:

Students were strongly encouraged to spend the minimum 8 - 10hrs of work outside of class, although a great deal of students took advantage of office hours and class time leaving them with a few less hours outside of class. In addition, many students attended the two workshops scheduled outside of the regular scheduled class time.

B term 2019: 11 out of 25 students responded.

Question 1:

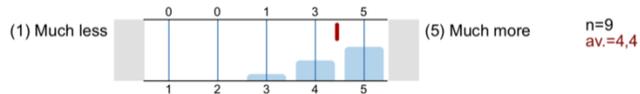


Question 2:



Question 9:

9. The instructor's personal interest in helping students learn was



Question 19:

19. On average, what were the total hours spent in each 7-day week OUTSIDE of formally scheduled class time in work related to this course (including studying, reading, writing, homework, rehearsal, etc.)?



It was wonderful to see students of many disciplines take this course to expand their drawing and awareness of human figure in motion. Students had the most dramatic improvement in drawing when sketching from a live costumed model. The use of a live model will be expanded in future classes.

B Term 2018: 25 students

B Term 2019: 25 students

Implementation Date: Implementation date for this action is the 2020-2021 academic year.

Resource Needs:

Instructor: This course will be taught by Prof. Edward Gutierrez

Classroom: This course can be adapted for teaching in any lab, lecture hall or open studio space with a video projection system. Access to Adobe Photoshop, Cintiqs or Wacom tablets will be required for final portfolio project – the IMGD Lab (FL222) is already equipped with all necessary hardware and software. A small budget for costumed models will be supplied by the IMGD program.

Laboratory: N/A

Library resources: N/A

Information Technology: N/A

Impact on Distribution Requirements and Other Courses:

This course could be used to fulfill the distribution requirement in the following areas:

1. 8/3 units General Requirement of IMGD (BA in IMGD),
2. 5/3 units General Requirement of IMGD (BS in IMGD Technology),
3. 4/3 units IMGD Electives (BA in IMGD),
4. Requirement for Concentration in Visual Arts.

The course will also count as an art course toward fulfillment of Humanities and Arts Requirement.

Original Experimental Course Proposal:

To: Chair, Committee on Academic Operations

From: Jennifer deWinter, IMGD and Kris Boudreau, Humanities & Arts

Re: Motion to add Human Figure in Motion (IMGD/AR 22XX) approved by IMGD Steering Committee on __/__/__ and by Humanities & Arts Faculty on __/__/__.

Date: __/__/__ [Date submitted to CAO]

The IMGD program and the Humanities & Arts department request the approval of the following experimental course (IMGD/AR 22XX: Human Figure in Motion) in Academic Years 2016 and 2017 during D and B-terms.

Contact: Prof. Jennifer deWinter

Preferred term: D17, B17

Expected enrollment: 24

Intended audience: IMGD majors and minors, and students with Humanities & Arts depth in visual art.

Anticipated Instructor: Prof. Edward Gutierrez

Course/Catalogue Description:

IMGD/AR 22XX: Human Figure in Motion.

This course offers in-depth analysis of the human figure in action. Motion will be observed through drawing and sketching of live models, video clips, performance and pantomime, studying not only the physical exterior but also how thoughts and emotion are expressed through gesture. Students will develop skill in figure posing and staging for applications in animation, storyboards, comics and illustration.

Recommended background: Essentials of Art (AR 1100) and Figure Drawing (AR2202).

Rationale: This course will help meet the expanding needs and goals of the IMGD visual and technical art curriculum, preparing students with knowledge and skills increasing demanded by the entertainment, education, medical and simulation industries. It will focus on the physiological and emotional laws influencing human action and performance, and the application of these principles in production planning, illustration and animation.

Specific course objectives include:

- Familiarity with human anatomy and kinesiology through life drawing and observation sketching.
- Understanding of the balance and transference of weight in static or moving poses,

- Understanding how inertia, tension, speed and impact affect the movement of human forms.
- Developing a sense of how volume and perspective affect the perception of human motion.
- Effective use of visual design and staging to enhance the clarity of pose.
- Grounding figures in reality to control the believability, caricature or exaggeration of a pose.
- Improvement of storytelling poses through impromptu acting sessions.
- Communication of story, action, ideas and emotion through expressive animation and performance.
- Production of a portfolio incorporating the techniques and skills acquired in coursework.

Like most art courses at WPI, this offering will be cross-listed in both AR and IMGD, reflecting its relevance to both Humanities & Arts students and IMGD majors/minors.

Resource Needs:

Instructor: This course will be taught by Prof. Edward Gutierrez. As a new hire, his teaching schedule is currently under arrangement, and this course will be part of his regular teaching load.

Classroom: Classroom: This course can be adapted for teaching in any lab, lecture hall or open studio space with a video projection system. A small budget for live models will be requested.

Library: No additional library resources will be required.

Information Technology: No additional IT resources will be required.

Assessment: This experimental course will be assessed based on the aesthetic and technical quality of the student work produced in the course assignments. Student feedback, particularly the outcomes of questions 1, 2, 9, and 26 of student course evaluations, and instructor feedback and reflections will also be taken into account.

Date: May 7, 2020
To: WPI Faculty
From: Committee on Academic Operations (Prof. Mathisen, Chair)
Re: Motion to change the title and description for CE3061 Waste Water Treatment approved by the CEE Faculty on April 14, 2020.

Motion: The Committee on Academic Operation recommends, and I move that the title and description for CE3061 Waste Water Treatment be changed as described below.

Existing title, description and course offering schedule:

CE3061 Waste Water Treatment (Cat. I)

This course provides in-depth coverage of processes used in wastewater treatment. Topics include: review of water quality standards, wastewater characteristics, application of biochemical oxygen demand, sources and effects of pollution, physical, chemical, and biological wastewater treatment processes, and waste sludge management.

Recommended background: CE 3059 and ES 3004.

Proposed title, description, and course offering:

CE3061 Sustainable Wastewater Engineering: Treatment and Reuse (Cat. I)

This course provides an in-depth study of the theory and practice of sustainable wastewater management practices, including treatment operations and reuse opportunities. The course will incorporate resource recovery concepts involving water, nutrients, and energy. Topics include: sources of wastewater, wastewater characteristics, emerging contaminants, biosolids operations, wastewater reuse approaches, and physical, chemical, and biological processes for wastewater treatment and reuse.

Recommended background: CE 3059 and ES 3004.

Explanation of Motion: This motion updates the course to incorporate sustainability aspects and to how the course is currently taught.

Rationale: The existing (old) title and description was developed when the main purpose of wastewater treatment was to discharge treated wastewater to receiving waters with little regard for sustainable practices and alleviating water shortages. Current engineering thought requires the use of treatment processes with regard for sustainability, including evaluating use of wastewater for beneficial purposes instead of discharge. The future concerns of the wastewater industry are covered including presence of emerging contaminants in wastewater and sustainable management of biosolids. These modifications reflect the current “as taught” course, and the direction for future course offerings.

Impacts on students: This course has typically been taken by Civil Engineering majors, Environmental Engineering majors, and Chemical Engineering majors with interest in the environmental engineering area. There will be no deleterious impact on these students; and in fact, the proposed course title/description will reflect the current and future needs of the

environmental engineering industry. Students who have taken CE3061 prior to these changes will not be allowed to retake CE3061 for credit after the changes are implemented.

Resource Needs:

This is a change to an existing course, so no new resources are needed. It is being taught by a CEE professor, and is held in a Kaven Hall classroom.

Implementation Date:

The 2020-21 Academic year.

Date: May 7, 2020
To: WPI Faculty
From: Committee on Academic Operations (Prof. Mathisen, Chair)
Re: Motion to add FP 4001 - Fire, Risk, and Sustainability approved by Fire Protection Engineering Department on 1/6/2020

Motion: The Committee on Academic Operation recommends and I move that FP 4001 – Fire, Risk, and Sustainability, as described below, be added.

Course/Catalog Description: FP 4001 – Fire, Risk, and Sustainability, Cat. I

As the pace of development increases around the world, fire prevention and control are becoming more vital for individuals, organizations, and society itself. This course introduces students to the fundamental concepts of fire risk and sustainability along with related multi-disciplinary topics such as economics, human behavior, and decision-making. The process of fire risk assessment is taught and applied to the built environment and to the wildland fire problem. Students will undertake a structured applied-research project (individually or in small groups) to develop sustainable solutions at the interface of fire and a chosen area of sustainability such as climate change, safe drinking water, public health, housing, and more.

Recommended background: Basic knowledge of fire behavior and control (FP 3070 or equivalent).

Students cannot receive credit for both FP 4001 and FP 580S – Fire, Risk and Sustainability.

Anticipated Instructor: Kathy A. Notarianni

Rationale: This class is needed to round out the undergraduate minor in Fire Protection Engineering. It has broad appeal across the UG disciplines and has vital learning objectives and outcomes as it addresses solutions at the intersection of fire and sustainability. In the WPI tradition, this is a project-oriented class where the main deliverable is a research project in a particular area of fire/sustainability; ex. Wildland fires and Global Warming, fire suppression and effects on public water supply, or fire safety of energy storage devices. This class is expected to enroll 40 students per offering.

This course is currently being offered as FP 580S – Fire, Risk, and Sustainability. This semester is the first offering of this class so no formal course evaluations are available. The instructor has received student feedback (unsolicited).

The instructor reflects that from her perspective, the course is surpassing the original ideas it was designed upon. For example, most electric companies are closing their coal-fired plants and turning to alternative energy sources. Students are studying the implications of such things as fires in Windmills, which can throw the fire a great distance (as they are being built taller and with larger blades than ever before). There are countless such examples of fire protection issues of “the future” as how we live on this planet changes. Student projects in this course have sparked some very important MQP topics as well.

This class was announced very close to the start date and it has 15 students, which is a good number for a graduate class, it is expected to enroll 40 students when offered as an undergraduate course and one of interest across many disciplines.

Implementation Date: Implementation date for this action is the 2020-2021 Academic year.

Resource Needs:

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

- **Instructor** – Prof. Kathy Notarianni designed and developed this course. She is currently teaching the course and is committed to it for the foreseeable future.
- **Classroom** – This course is and will be taught in the FPE classroom in Gateway II. No scheduling conflicts exist and lecture capture is already available and being used.
- **Laboratory (computer or otherwise)** – At present, the course does not require use of a laboratory. However, if in the future, such need should arise, the FPE fundamentals and the UL Performance Laboratories are available. Lab space and expertise of our lab director are also available to work with students who form MQP groups on related topics.
- **Library resources** current library research staff are being utilized, the course has no additional needs for library resources
- **Information Technology** – no special support or equipment is needed from the ATC.

Impact on Distribution Requirements and Other Courses:

This course does not replace any existing courses and will have minimal impact on existing programs. If an undergraduate student takes the course and joins the 5 year master's program, it could be counted as a graduate course with the approval of the FPE department head.

The proposed course numbers were provided to the FPE department by Kristin McAdams after being checked for previous use.

Date: May 7, 2020

To: WPI Faculty

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

Re: Motion to change the title for FP 3070, approved by Dept. Faculty on February 14, 2020

Motion: The Committee on Academic Operation recommends, and I move that the title and course description for FP 3070 be changed as described below.

Existing title, description and course offering schedule:

FP 3070 – Fundamentals of Fire Safety Analysis - Cat. I

This course introduces students of different technical disciplines to analytical methods and techniques to address problems of fire and explosions. Emphasis will be placed on understanding the physical concepts of the problem and their interactions. Quantification will adapt existing procedures to appropriate levels of theoretical and empirical methods in the field of fire science and engineering. Computer applications will be incorporated. Recommended background: mathematics through differential equations; engineering science; fluid mechanics.

Proposed title, description, and course offering:

FP 3070 – Introduction to Fire Protection Engineering – Cat. I

This course teaches students of different technical disciplines the fundamentals of fire protection engineering including combustion chemistry, fire behavior, compartment fire dynamics, toxicity, human behavior in fire, and fire modelling. Students have an opportunity to conduct and view fire experiments in both the WPI Fire Safety Engineering and the WPI Fire Fundamentals laboratories. Fire models are used to aid in use of the scientific method to determine cause and origin of a fire. This course is intended for both majors and non-majors as an introduction into Fire Protection Engineering (FPE) and how engineering knowledge can be used to save lives and property around the world.

Explanation of Motion: There is no need to drop this course and propose another course as the material taught is not changing. The title is changing to demonstrate a good fit with the FPE minor and the course description, as it can be seen, still state that the course covers similar material, but the new course description is more explicit on what and how is offered to the students. It is an improved description, not a different one.

Rationale: The rationale for the change in title and description is to demonstrate alignment with the course intent, and learning objectives, and to provide clarity as to how this class fits into the FPE minor.

Impacts on students: Since fire protection engineering is a unique discipline, and, more importantly, since the material taught will not change (just the description of it), no impact is expected relative to other courses, programs, and distribution requirements in FPE or in other departments.

Resource Needs:

- **Instructor** - Kathy Notarianni designed and developed this course. She is currently teaching the course and is committed to it for the foreseeable future.
- **Classroom** – this course is and will be taught in the FPE classroom in Gateway II. No scheduling conflicts exist and lecture capture is already available and being used.
- **Laboratory (computer or otherwise)** – At present, the course does make use of both the FPE fundamentals and the FPE Full Scale laboratories. The time commitment of the FPE Lab space and expertise of our lab director is one to two days per term that the course is offered, potentially more if students in the course form MQP groups on related topics.
- **Library resources** current library research staff are being utilized, the course has no additional needs for library resources
- **Information Technology** – no special support or equipment is needed from the ATC.

Implementation Date: The implementation date for this action is the 2020-21 academic year. The change in title, once implemented, will not affect the course offering which will remain every D-term, Mon. and Thursday from 2-3:50 in the FPE classroom in GW II.

Date: May 7, 2020
To: WPI Faculty
From: Committee on Academic Operations (Prof. Mathisen, Chair)
Re: Motion to modify the course listings for the Minor in Sustainability Engineering

Motion: The Committee on Academic Operations recommends, and I move that a minor in Sustainability Engineering described below, be modified as described below.

Rational for modifications: The Sustainability Engineering minor has been in place since 2016. However, the course listings are not up-to-date. For this motion, the course listings have been updated so they are more current. In addition, a note is included to allow the use of only one fundamental engineering science course in the engineering courses, which will ensure that students include at least one more advanced engineering course as part of their selection. Overall, the revisions will allow students to develop relevant sustainability minors from a broader, current set of courses.

Implementation Date: Upon approval, the catalog description for this minor will be updated and published in the next edition of the Undergraduate Catalog. The new requirements applied for the Minor in Sustainability Engineering beginning with academic year 2020-21.

Resources: No new courses are requested for the adjustments to this minor.

Review Committee: The Minor Program Review Committee consists of Profs. John Bergendahl, Robert Krueger, and Steven Van Dessel. The Office of Sustainability, directed by Prof. Paul Mathisen, will assist with oversight of the minor.

Catalog description: This academic minor is intended for students who are interested in gaining knowledge and experience in the principles and practices of engineering design for sustainability, and of the critical role of engineering decisions on the sustainability of the resulting designs. Every engineering discipline impacts the environmental and social sustainability of the planet, and knowledge of the principles of sustainability in engineering design will contribute substantially to professional practice. While this minor is intended primarily for engineering students, it is open to all students. For non-engineering students the expected background courses may increase the total minor program to more than two units.

Requirements: Candidates for the Sustainability Engineering Minor must meet the following requirements:

1. Complete and obtain approval for the *Application for the Minor in Sustainability Engineering* available from the Registrar or the Office of Sustainability.
 - I. Define a focus for the minor. Some examples are given below but these are not comprehensive. Note that the focus must be distinct from the content of your major and must be supported by the courses in the minor.
 - II. List the academic activities that will be included in the minor, following the general rules for minors at WPI as well as the rules below.
2. Complete two units of work for the minor, one unit of which may be double counted with other degree requirements. The two units must meet the following requirements:

- I. Must include ES 2800, Environmental Impacts of Engineering Decisions.
- II. May include at most 1/3 U of relevant 1000-level work from the following list (List A):
 - ENV 1100, Introduction to Environmental Studies
 - Relevant GPS FY 1100 credit.
- III. Must include 2/3 U of relevant Humanities, Business, and/or SSPS work selected from the following list (List B):
 - **DEV 2200, Case Studies in International Development Policy and Engineering**
 - **DEV 4400, Science, Engineering and Design in International Development**
 - ECON 2117, Environmental Economics
 - **ECON 2125, Development Economics**
 - ENV 2201, Planning for Sustainable Communities
 - **ENV 2310, Environmental Governance and Innovation**
 - ENV 2400, Environmental Problems and Human Behavior
 - ENV 2600, Environmental Problems in the Developing World
 - ENV 2700, Social Media, Social Movements, and the Environment
 - **ENV 3100, Adventures in Sustainable Urbanism**
 - ENV 4400, Senior Seminar in Environmental Studies
 - ETR 2900, Social Entrepreneurship
 - GOV 2311, Environmental Policy and Law
 - GOV 2312, International Environmental Policy
 - GOV 2319, Global Environmental Politics
 - **STS 1200 Fundamentals of Global Health**
 - **STS 4000 Senior Seminar in Global Health**
 - HI 2400, Topics in Environmental History
 - HI 3317, Topics in Environmental History
 - **OBC 4367 Leadership, Ethics, and Social Responsibility**
 - PY 2717, Philosophy and the Environment
- IV. Must include at least 2/3 U of engineering work from the following list (List C):
 - AREN 3003, Principles of HVAC Design for Buildings
 - AREN 3024, Building Physics
 - **AREN ~~3025~~3020, Architectural Design Studio IV - Building Energy Simulation**
 - CHE 3702, Energy Challenges of the 21st Century
 - **CHE 3722, Bioenergy**
 - CHE/CE 4063, Transport and Transformations in the Environment
 - CE 3059, Environmental Engineering
 - **CE3060, Water Treatment**
 - **CE3061, Sustainable Wastewater Engineering, Treatment and Reuse**
 - **CE 3062, Hydraulics**
 - CE 3070, Urban and Environmental Planning
 - CE 3074, Environmental Analysis
 - **CE 4600, Hazardous and Industrial Waste Management**

- CE 4061, Hydrology
- ECE 3500, Introduction to Contemporary Electric Power Systems
- ES 3001, Introduction to Thermodynamics*
- ES3002, Introduction to Mass Transfer*
- ES 3003, Heat Transfer*
- ES 3004, Fluid Mechanics*
- ME 2820, Materials Processing
- ME 4422, Design and Optimization of Thermal Systems
- ME 4429, Thermofluid Application and Design
- ME 5105, Renewable Energy

note – the course selections from Item IV cannot include more than one ES course.

3. To accommodate new sustainability-related courses and independent study and project activities, up to two-thirds units of equivalent course-work may be substituted for the activities listed under Items I through IV in items III and IV with the approval of the Sustainability Engineering Minor program review committee. This committee may be contacted through the Registrar or the Director of Sustainability.
4. See the WPI Undergraduate Catalog for additional rules for all minors, in particular that the MQP cannot be used in satisfying any Minor and that at most one unit may be double counted with another degree requirement.

Guidance for Students

Possible Focus Areas (not exhaustive):

The following focus areas and sample programs may be helpful in selecting the activities that compose the two units of credit for the minor, but they are not meant to be restrictive in any way.

- Sustainable Engineering in the Developing World
- Engineering Design for Sustainability
- Sustainable Manufacturing
- Clean and Renewable Energy
- Sustainable Engineering Materials
- Resource Recovery and Reuse
- Green Buildings

Example Programs

Clean and Renewable Energy

- FY 1100, Power the World
- ES 2800, Environmental Impacts of Engineering Decisions
- CHE 3702, Energy Challenges of the 21st Century
- AREN 3025, Building Energy Simulation
- ENV 2201, Planning for Sustainable Communities
- ENV 2600 Environmental Problems in the Developing World

Engineering Design for Sustainability

- FY 1100, Recover, Reuse, and Recycle: Building a Lasting World
- ES 2800, Environmental Impacts of Engineering Decisions

- CE 3059, Environmental Engineering
- AREN 3025, Building Energy Simulation
- ENV 2600, Environmental Problems in the Developing World
- CE 3070, Urban and Environmental Planning

Sustainable Engineering in the Developing World

- ES 2800, Environmental Impacts of Engineering Decisions
- ENV 2600, Environmental Problems in the Developing World
- ETR 2900, Social Entrepreneurship
- CE 3070, Urban and Environmental Planning
- ECE 3500, Introduction to Contemporary Electric Power Systems
- GOV 2319, Global Environmental Politics

Green Buildings (Focus not available to Architectural Engineering students)

- ES 2800, Environmental Impacts of Engineering Decisions
- GOV 2311, Environmental Policy and Law
- ETR 2900, Social Entrepreneurship
- AREN 3003, Principles of HVAC Design for Buildings
- AREN 3024, Building Physics
- CE 3070, Urban and Environmental Planning

Application for Minor in Sustainability Engineering

Student name _____
ID number _____ **Email Address** _____ @wpi.edu
Academic Advisor _____ **Major** _____

The Sustainability Engineering Minor consists of 2 units of work distributed as follows with no more than 1 unit of work overlapping other degree requirements.

Requirement/Option	Course #	Units	Term	Grade	X if double counted
Required 1/3 U of ES 2800	ES 2800	1/3			
Optional 1/3 U of 1000 level work from List A					
Required 2/3 U of HU/A, BUS, and/or SSPS from list B					
Required 2/3 U from list C					
1/3 U from list B or C if needed to total 2U					
Approved substitute activity, if any					
Total Units		2			

Focus of this Minor (such as, Engineering Design for Sustainability, Sustainable Manufacturing, Clean and Renewable Energy, etc.):

Required Signatures
Approval of substitution for any of the requirements

The following activity _____ is approved for substitution of _____

 Sustainability Minor Review Committee signature

Date _____

Approval of the Minor Plan of Study verifying that this represents a thematically related set of activities distinct from the student's major area of study.

Sustainability Minor Review Committee signature _____

Date _____

The student is responsible for completing this form and obtaining the required signatures in advance of application for graduation.

List A, 1000 level Courses

- Relevant GPS activity
- ENV 1100, Introduction to Environmental Studies

List B, HU/A, BUS, SSPS Courses

- DEV 2200, Case Studies in International Development Policy and Engineering
- DEV 4400, Science, Engineering and Design in International Development
- ECON 2117, Environmental Economics
- ECON 2125, Development Economics
- ENV 2201, Planning for Sustainable Communities
- ENV 2310, Environmental Governance and Innovation
- ENV 2400, Environmental Problems and Human Behavior
- ENV 2600, Environmental Problems in the Developing World
- ENV 2700 Social Media, Social Movements, and the Environment
- ENV 3100, Adventures in Sustainable Urbanism
- ENV 4400, Senior Seminar in Environmental Studies
- ETR 2900, Social Entrepreneurship
- GOV 2311, Environmental Policy and Law
- GOV 2312, International Environmental Policy
- GOV 2319, Global Environmental Politics
- HI 2401, U.S. Environmental History
- HI 2400, Topics in Environmental History
- HI 3317, Topics in Environmental History
- OBC 4367 Leadership, Ethics, and Social Responsibility
- PY 2717, Philosophy and the Environment
- STS 1200 Fundamentals of Global Health
- STS 4000 Senior Seminar in Global Health

List C, Engineering Courses*1

- AREN 3003, Principles of HVAC Design for Buildings
- AREN 3024, Building Physics
- AREN 3025, Building Energy Simulation
- CHE 3702, Energy Challenges of the 21st Century
- CHE 3722, Bioenergy
- CHE/CE 4063, Transport and Transformations in the Environment
- CE 3059, Environmental Engineering
- CE3060, Water Treatment
- CE3061, Wastewater Treatment
- CE 3062, Hydraulics
- CE 3070, Urban and Environmental Planning
- CE 3074, Environmental Analysis
- CE 4600, Hazardous and Industrial Waste Management
- CE 4061, Hydrology
- ECE 3500, Introduction to Contemporary Electric Power Systems
- ES 2001, Introduction to Materials Science
- ES 3001, Introduction to Thermodynamics

- ES3002, Introduction to Mass Transfer
 - ES 3003, Heat Transfer
 - ES 3004, Fluid Mechanics
 - ME 2820, Materials Processing
 - ME 4422, Design and Optimization of Thermal Systems
 - ME 4429, Thermofluid Application and Design
 - ME 5105, Renewable Energy
- *1 - the course selections from List C cannot include more than one ES course.

Date: May 7, 2020
To: WPI Faculty
From: Committee on Graduate Studies and Research (Prof. Fischer, Chair)
Re: Motion to update the Combined B.S./M.S. description in the FBS section of the Graduate Catalog

Motion: The Committee on Graduate Studies and Research recommends and I move that the following paragraph in the FBS section of the graduate catalog be updated as follows.

Proposed Modifications to Graduate Catalog: (~~strikeout~~ is to be removed, yellow is new text)

Combined B.S./M.S. Program

This program is available to WPI undergraduate students wishing to combine one of the Foisie School of Business' ~~six~~ M.S. degrees with their B.S. A separate and complete application to the M.S. program must be submitted. Admission to the Combined Program is determined by the School of Business. With careful planning, both degrees may be completed within the student's four years of undergraduate study. It is recommended that the M.S. application be submitted at the ~~end of~~ ~~beginning of~~ the student's ~~sophomore~~ ~~junior~~ year of undergraduate study. A student in the Combined Program continues to be registered as an undergraduate until the bachelor's degree is awarded. To obtain a bachelor's degree via the Combined Program, the student must satisfy all requirements for the bachelor's degree, including distribution and project requirements. To obtain an M.S. via the Combined Program, the student must satisfy all M.S. degree requirements. **Note: no undergraduate credit may be counted toward a graduate business degree.** Please refer to the section on the Combined Programs or contact the executive director of business programs for more information.

Rationale: With the addition of our new M.S. in Business Analytics, these catalog changes makes it clear that the Combined B.S./M.S. program applies to all FBS M.S. degrees. Because of the planning required to combine any B.S. degree at WPI with any M.S. degree in the FBS, we recommend that students start the planning at the end of their sophomore year. The sentence about no undergraduate credit counting toward a graduate business degree is taken from the introduction in the graduate catalog about combined B.S./M.S. degrees. It is duplicated here for convenience of students.

Implementation Date: Implementation date for this action is the 2020-2021 academic year. *Additional information; any other information that would help CGSR understand this.*

COMMITTEE BUSINESS

Date: May 7, 2020
To: The WPI Faculty
From: Committee on Governance (Prof Gaudette, Chair)
Re: Extension of Academic Year (AY) during COVID19 crisis

Motion: The Committee on Governance recommends, and I move that WPI faculty complete D term 2020 after their 9 month appointment for AY2020 by extending the AY2020 from May 14 to May 23, 2020. AY2021 will start on August 24, 2020, and ends on May 15, 2021.

Rationale

The Faculty Handbook states in the Summer Supplementary Salary section (Part 2.3.D): Payment for teaching and research activities must be received as salary. The COVID crisis forced the delayed start and end of D term, 2020. The normal 9 month faculty appointments are scheduled to terminate approximately 10 days after the last day of classes, this year on May 14, 2020. With the new end date of classes set for May 13, 2020, faculty will be expected to complete their end of the year responsibilities on May 23, 2020. Thus, COG recommends faculty extend their 9 month appointments until May 23, 2020, with next year's 9 month appointments beginning on August 24, 2020. This change in dates will still allow faculty 3 summer months to conduct their normal activities, while not adding any additional cost on the university.

Date: May 7, 2020
To: The WPI Faculty
From: Committee on Governance (Prof Gaudette, Chair)
Re: Suspension of Faculty governance committee elections

Motion: The Committee on Governance recommends, and I move that Faculty governance committee elections, with the exception of the already completed COG, COAP and CTAF elections, be temporarily suspended until A term of 2020. Elected governance committee membership from AY2020 will remain through the end of A term 2020.

Rationale

The global pandemic has created many challenges in our ability to conduct faculty governance and carry out the mission of WPI. It will be difficult to conduct elections for faculty governance committees in our normal mode of operations. Therefore, we are proposing to extend the current term of elected faculty members on all faculty governance committee except COG, COAP and CTAF (these elections were concluded prior to the campus closure as they are conducted by the Secretary of the Faculty and are conducted prior to other faculty governance committee elections).

Date: May 7, 2020

To: The WPI Faculty

From: Committee on Governance (Prof. Gaudette) & Committee on Academic Policy (Prof. Heineman, Chair)

Re: Motion for students whose PQP/IQP/MQP or HUA Practicum/Inquiry Seminar were affected by the pandemic during D-term 2020

Motion: The Committee on Governance and the Committee on Academic Policy recommends and I move to give undergraduate students the option to be assigned a Pass/NR grade for project work completed in D-term 2020 as described below.

Description of the proposed modifications:

This motion ONLY applies to undergraduate students registered for PQP, IQP or MQP credits or HU 3900 or HU 3910 during D-term 2020. There are two parts to this proposal: (a) Giving students the option to request a P/NR grade for D-term project PQP/IQP/MQP credits; (b) Giving students the option on the Completion of Degree Requirement (CDR) form to request a P/NR grade for the final IQP or MQP project grade or the Humanities & Arts Degree Requirement.

Student option to request P/NR grade for PQP/IQP/MQP credits

1. Students will have the option until Thursday May 21st 5:00 EDT to request that their term grade for a PQP would be either P (Pass) or NR. This means grades of A/B/C would become P. Receiving a P grade for a PQP will count towards degree requirements.
2. Students have the option until Thursday May 21st 5:00 EDT to request that their term grade for their IQP/MQP credits would be either P (Pass) or NR. This means grades of A/B/C would become P. Receiving a P grade for these IQP/MQP credits will count towards degree requirements.
3. Once a student elects the P grade option for a term grade for IQP/MQP credits, it cannot be changed by the assignment of the CDR project grade.

Student option to request P/NR grade for final IQP or MQP project grade

Students completing an IQP or MQP project this term will have an updated CDR form to allow them to select a P final project grade (as a replacement for a B or a C grade). The P grade will count towards degree requirements. The actual wording to appear on the CDR is as follows:

P Grade Option: If my final project grade is the following (check all that apply), then I request a P grade.

B C

(Sign) _____

Any student completing an IQP/MQP in D-term 2020 who intends to graduate in May must complete the CDR form by Monday May 18th 5:00 EDT.

Any student completing an IQP/MQP in D-term 2020 who is NOT graduating in May must complete the CDR form by Monday June 8th 5:00 EDT.

Student option to request P/NR grade for Humanities & Arts Degree Requirement

Students completing their Humanities & Arts degree requirement can select an overall P grade (as a replacement for a B or a C grade). The P grade will count towards degree requirements. Because the CDR form is submitted online, students will have to contact the Registrar to declare their intent to select a P grade.

Any student completing the Humanities & Arts Degree Requirement in D-term 2020 who intends to graduate in May must complete the CDR form by Monday May 18th 5:00 EDT.

Any student completing the Humanities & Arts Degree Requirement in D-term 2020 who is NOT graduating in May must complete the CDR form by Monday June 8th 5:00 EDT.

Rationale:

All courses and projects during D-term 2020 are offered in distance learning format as a result of the COVID-19 pandemic. While all faculty members are committed to offering high quality remote courses, most have not received the extensive training usually associated with offering remote courses. Students, however, did not choose to take their courses remotely. Most have been displaced from their WPI residence (whether on or off campus), and most will not have the same learning environment they have grown accustomed to at WPI. Furthermore, as the COVID-19 pandemic continues, students are more likely to become sick or have family members or friends stricken with this disease. In consideration of these changes, students should be provided with options allowing them to continue to learn without having to worry about their grade.

The WPI Faculty recently approved a motion to allow students to request a P/NR grade for an undergraduate class completing in D term, because of the forced online delivery of all academic credits. This motion tries to apply the same principle to project credits completed in D term, and there are some complications that need to be addressed.

This motion ONLY applies to undergraduate students registered for PQP, IQP or MQP credits during D-term 2020 or students completing a HU 3900 Inquiry Seminar or HU 3910 Practicum. Faculty will continue to grade undergraduate students using A/B/C/NR grading scale.

For projects, a *term grade* is assigned for the project work for each term of registration and a *CDR grade* is assigned to the overall project at completion. One student on a project team might choose to have a term grade for a project recorded as P/NR for D-term 2020, while another student on the same project might not choose that option.

Each student completes a CDR when completing a project, and each student will be given the right to request a P grade for the final project grade, instead of a B or a C grade that might be earned. Again, one student might request to receive a P grade for a project, while another student on the same project might not choose that option.

There is an electronic CDR process for the Humanities & Arts Degree Requirement, which might not be able to be updated given the time constraints. If it can be updated, then the student will be presented with the same two options given to IQP and MQP students (i.e., “If my final project grade is the following (check all that apply), then I request a P grade”). If the existing system cannot be modified, then the students will have to contact the Registrar separately and appropriate information will be sent to students completing their Humanities & Arts Degree Requirement this term.

Note that students who elect to have a project grade of P will not be eligible to receive a graduation honor of **High Distinction** upon completing their undergraduate degree, since that designation requires an A grade on all project work. However, it is still possible for students to receive the **Graduation with Distinction** honor because they would only need a grade of A on two of the three projects (MQP, IQP and Humanities & Arts Degree Requirement) in addition to their courses.

Date: May 7, 2020
To: The WPI Faculty
From: Committee on Governance (Prof Gaudette, Chair) and Committee on Appointments and Promotions (Prof. Weather, Chair)
Re: Update to Faculty Handbook, Part 2.1.C: Policies and Operating Procedures: Policies Regarding the Status of Faculty: Department Heads

Motion: The Committee on Governance and the Committee on Appointments and Promotions recommend, and I move that the WPI faculty update the Faculty Handbook, Part 2.1.C: Policies and Operating Procedures: Policies Regarding the Status of Faculty: Department Heads with the updates below.

Rationale

Approximately 10 years ago, WPI hired its inaugural academic deans and in May, 2019, the Board of Trustees created Schools of Engineering, Arts and Science, Business and Global. Since then, the Faculty have worked to incorporate them into our Faculty Handbook. This motion incorporates them into the review process of Department Heads.

The Deans should have more of a role in evaluating their department heads. This reflects the evolving administrative structure associated with School and Deans at WPI. The modified language in this motion provides oversight and input of the Deans to the appointment, evaluation, and reappointment processes.

Updates to Faculty Handbook:

Current language in the Faculty Handbook (~~deleted~~, **proposed**)

Faculty Handbook

Part Two: POLICIES AND OPERATING PROCEDURES

1. POLICIES REGARDING THE STATUS OF FACULTY

Part C. Department Heads

Department Heads*

(Developed and prepared by the Committee on Appointments and Promotions, September 1985 Approved by the Provost, December 17, 1985

Amended by the Committee on Appointments and Promotions and approved by the Provost, March 1991)

Heads of Departments report to **the Dean of the school their department reports in (referred to in this section as Dean)**~~the Provost~~ and are responsible for the operation of the respective academic departments, for the development of the faculty, and for the quality of the programs and facilities of those units. Department Heads are appointed by the **Provost**~~President~~ upon the recommendation of the **Provost Dean and the Committee on Appointments and Promotions** and subject to approval by the ~~Board of Trustees~~**President**.

1. *Appointment of Department Heads*

The position of Department Head is an administrative position, and the initial appointment is for a five year period. Only one reappointment will be made, for a total of 10 years of

service, unless special circumstances exist. The ~~Provost~~ Dean will form a Department Head Search Committee according to the following procedure, after consulting with the faculty in the department concerned.

When a new department head is to be selected from either inside or outside of WPI, a Search Committee is formed consisting of two faculty members elected by the department, one member of the Committee on Appointments and Promotions, a faculty member appointed by the ~~Provost~~ President, and the ~~Dean~~ Provost or her/his representative who serves as Chairman of the Search Committee. The Search Committee first establishes its procedures for operation.

The Search Committee will solicit nominations for the position, evaluate the nominees, and select at least two candidates for the position. The Search Committee makes arrangements for each of the candidates to meet with the departmental faculty. The Search Committee will determine the preferences of the members of the department.

The ~~Dean~~ Provost submits to the ~~Provost~~ President the names of the candidates, her/his recommendation, the preferences and comments of the departmental faculty, and the preferences and comments of the Search Committee. The Committee on Appointments and Promotions is given copies of all documents submitted to the ~~Provost~~ President concerning the selection. The ~~Provost~~, after consultation with the President, generally will appoint one of the candidates as department head. However, if none of the candidates is acceptable to the ~~Provost~~ President, the reasons will be discussed with the Search Committee and the Committee on Appointments and Promotions, and the Search Committee will continue the selection process.

2. *Performance Evaluation of Department Heads*

A performance evaluation is made of a department head in order to determine if the department is accomplishing its goals in an effective, efficient and harmonious way. The ~~Dean~~ Provost has the responsibility for conducting this evaluation and reporting back to the person being evaluated.

A performance evaluation will be scheduled during the spring of the second and fourth year of ~~the first each~~ five year appointment. ~~In the second 5-year appointment, reviews will be done only in the second year.~~ In addition, the ~~Provost~~ Dean, the Committee on Appointments and Promotions, or the department head may request an evaluation at any time. A list of the regular schedule for evaluations is maintained by the Committee on Appointments and Promotions.

In the first phase of the evaluation, the ~~Provost~~ Dean will distribute a questionnaire to the faculty in the department. The Committee on Appointments and Promotions has the responsibility for preparing and up-dating the questionnaire. The faculty will send the unsigned completed questionnaires to ~~the~~ ~~Provost~~ Faculty Governance who will ~~confidentially collate responses~~. The responses will be reviewed only by the ~~Dean~~, Provost and the Committee on Appointments and Promotions.

If either the ~~Dean~~, Provost or the Committee on Appointments and Promotions decides that more information is needed, then the COAP will make arrangements for its members to meet with each faculty member in the department concerned. The purpose of these individual meetings is to gain a better understanding of any problem that may have been brought out in the questionnaire. Complete confidentiality will be maintained by the Committee concerning the views of individuals.

The Committee on Appointments and Promotions will discuss all of the information obtained from the interviews and will prepare a summary describing the perceived strengths and weaknesses of the department head being evaluated. The COAP will send the summary letter to the ~~Provost~~ **Dean** who, after reviewing the contents, will meet with the COAP to discuss the case. Only the **Dean**, Provost and the President of the Institute ~~may~~ **will** read the COAP letter. The **Dean** ~~Provost~~ will then meet with the Department Head to discuss the evaluation and also send a letter to the department head which summarizes the performance evaluation. A copy of that letter will be sent to the Chairman of the Committee on Appointments and Promotions.

3. *Reappointment of Department Heads*

The reappointment of a department head for a second term will involve the following procedure.

A. In the spring of the fourth year of tenure, the Committee on Appointments and Promotions will evaluate the Department Head. The evaluation will involve:

i. Review of all written materials of the department head obtained in the second and fourth year review plus any additional evaluations deemed necessary by the Committee.

ii. Interview with all faculty members in the department, including the department head involved.

Collection and review of any other information the COAP feels will influence the evaluation.

B. The Committee on Appointments and Promotions will write its recommendation to the ~~Dean~~ **Provost** before the end of Term D of the fourth year of tenure.

The ~~Dean~~ **Provost** will provide the ~~Provost~~ **President** ~~her~~/his recommendations and a copy of the Committee on Appointments and Promotions report. The **Provost, after consultation with the President**, decides on the reappointment. The ~~Provost~~ **President** will discuss his or her decision ~~with the Provost and~~ with the Committee on Appointments and Promotions.

Date: May 7, 2020

To: WPI Faculty

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

Re: Motion to approve an MS degree, the addition of associated courses, and the graduate program

Motion: The Committee on Graduate Studies and Research recommends and I move that a graduate program in **Science and Technology for Innovation in Global Development** be established by coordinated efforts from of faculty from 4 programs, 4 departments, and 3 schools. The program will award an MS degree in Science and Technology for Global Development.

Graduate Program in Science and Technology for Innovation in Global Development

The **Science and Technology for Innovation in Global Development** program offers graduate studies a transdisciplinary experience as they work toward completing MS degree. The motivation for this degree comes from the recognition that socio-technical problems around the global are more complex than many originally imagined. In fact, these problems are so complex that many scientists, engineers, social scientists, policy makers, and practitioners agree that they are not solvable by an individual or even a single discipline. They require change agents to work across disciplines within academia and the wider realms of policy and practice and engage a broad range of stakeholders, especially affected communities. Whether one works in business, government, the non-profit sector, or academia there is a clear and imminent need to revolutionize how we deploy knowledge and action with scholars and practitioners who possess diverse knowledge bases and skill sets. WPI is uniquely suited to offer such a program. We will achieve this effort with a set of core courses in our own brand of *design theory and practice*. These core courses will develop a student's strategic thinking skills, empathy toward practice, and cross-cultural competency. In addition, students can choose between various technical fields, development studies, and/or language. We believe that WPI's pedagogy and these skills will enable students to better, more accurately, understand what it means to design for communities and customers who are different than they are. Indeed, graduates will understand what it means to bring a *transdisciplinary* approach to problem definition and design solutions across different contexts. Here, a transdisciplinary approach requires researchers to organize teams of actors from different disciplines and life experiences to work collaboratively to co-create new conceptual, theoretical, and methodological innovations that, in their integrative character, move beyond discipline specific approaches to identify and address problems that exist in the spaces between these disciplines.

The program thus educates professionals who want to be innovators in the production of purpose driven basic and applied knowledge, technological development, technology transfer, program management, program development, or activists. Using theories and methods drawn from humanities, social sciences, natural sciences, engineering, and business students completing this program will learn essential skills that will contribute to their own success as well as those whom they serve. Students will: 1) utilize and relate and integrate different types of knowledge from a broad range of perspectives, 2) be aware of the social responsibilities attached to actions in the world, and have that drive their projects rather than personal gain, 3) willingly, and with curiosity, accept cultural differences, and learn to work with them rather than against them, 4) deploy

multiple communication strategies, research methods, and have proficiency in multiple disciplinary languages, 5) bring all of this to a purpose-driven approach to real world problems.

To facilitate this process of creating transdisciplinary thinkers we will bring together a highly motivated team of faculty from WPI and Clark University to deliver a graduate education framed around innovative classroom experiences, design studios focused on real-world problems, and high-impact, on the ground, global experiences where they will work with various partners from the academy, government, partner communities and business. Those who possess this degree will become leaders in a variety of professions: innovative health and technology start-ups, government, or non-profit community development, the global policy stage, and new forms of value creation. It does not matter where one wants to work, whether domestically or internationally, we live in a world where knowledge and problems have global reach and local implications. Students will have a competitive advantage because of their experience working on teams, sharing knowledge, experience in a variety of social contexts, and addressing real problems that a single discipline or person cannot thoughtfully engage with in a single discipline.

Program Opportunities

The program faculty exist across every School at WPI: Arts and Sciences, Engineering, Business, and the Global School. Further, with our deep collaboration with Clark University and its exceptional programs in International Development, Environmental Science, and Geography, this program can appeal to a broad variety of interests. No matter whether one's core interest is in technology, entrepreneurship, health and environmental concerns, or international development, our coterie of enthusiastic and invested faculty will work across campuses, and across the world, to provide mentorship and a working environment that will provide graduates with the skills, opportunities, and resources to succeed after graduation. This program requires students develop advanced knowledge in several fields. These include but are not limited to: social entrepreneurship, engineering, data science, social innovation, physical sciences, development studies, or another, non-English, language. However, the program remains flexible enough to provide students with opportunities to create their own transdisciplinary purpose-driven research. We expect to be able to add concentrations in community development and economic development from a systems approach. Finally, this program offered by two schools will be attractive to foundations and other funders given the opportunity it presents. With WPI's strengths in engineering, science, innovation, and development to Clark's expertise in climate change adaptation, livelihoods, environmental sciences, extractive industry governance, and geographical information science our partnership will create a demand-driven program stronger than either university could produce on its own.

Degree Objectives:

The MS degree in Science and Technology for Innovation in Global Development will cultivate a future generation of scholars and practitioners who are able to:

- Demonstrate knowledge in three core fields of study, one of which is be technical, and show their relationship. These fields are to be chosen by the student and their committee;
- Show a broad understanding of critical design thinking and how it applies to their work;

- Assess the suitability of different research methods for a range of socio-technical problems;
- Demonstrate cultural competence in at least one area;
- Be able to work with a between different disciplines that operate at the nexus of global innovation development.

Admissions Requirements

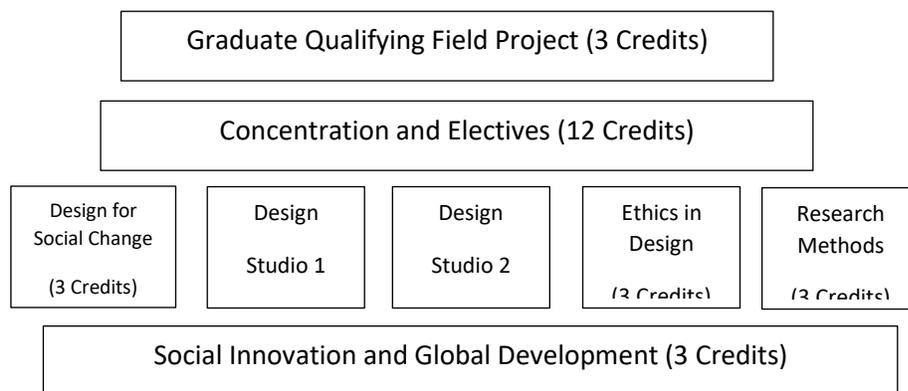
Students applying to the Science and Technology for Innovation in Global Development program are expected to have an undergraduate degree.

Requirements for the MS Degree

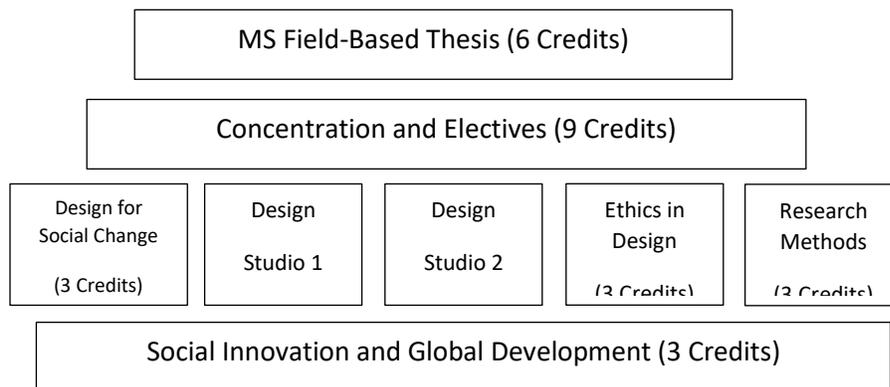
Students pursuing the MS degree in Science and Technology for Innovation in Global Development must complete a minimum of 30 credits of relevant work at the graduate level. In some cases, students may enter the program if they have a related graduate certificate. Students may not retake courses they have already taken at WPI or elsewhere.

There are two project options satisfaction of the degree requirements. Students may take a three-credit Graduate Qualifying Project (GQP) or a six-credit MS thesis. Students will typically have a field experience no matter which track they choose. The MS degree with a GQP concentration can be completed in twelve months. The MS degree with the Thesis option will typically take one-and-a-half to two academic years. If a student seeks to add a language to their study, the program will take two years.

GQP track



Thesis Track



Upon acceptance to the MS Program, a student will be assigned to a team of academic advisors from different disciplines. In consultation with that committee the student must prepare a Plan of Study that outlines the pathway the student will take to meet the MS degree requirements.

Core Coursework Requirement (15 Credits)

A student in the Science, Technology, and Innovation for Global Development program must take the Design Boot Camp, which begins in mid-August each year.

Design Thinking for Social Innovation in Global Development Sequence

DEV 501	Social Innovation and Global Development (new course)
DEV 4400/Dev 502	Design for Social Change
DEV 510	Design Studio 1 (new course)(1 unit)
DEV 520	Design Studio 2(new course)(2 units)
DEV 530	Ethics and Social Justice in Science, Engineering, and Development
DEV 540	Research Methods

Graduate Qualifying Project / MS Thesis (3 – 6 Credits)

A three-credit Graduate Qualifying Project (GQP) (DEV 598) is most commonly a team-based project and provides a capstone experience for students to apply their newly acquired knowledge to a real-world problem. The GQP will be carried out with a partner organization and shall be supervised by two appropriate faculty members associated with the program. Students choosing this option will be required to take two additional courses, a total of six credits, in one of their fields of concentration.

A six-credit Master's Thesis (DEV 599) consists of a theory-driven research or design project. Students interested in research, and especially those who plan to pursue a PhD, are encouraged to select the thesis option. Any two DEV affiliated faculty may serve as a thesis advisor. Prior to registering, the candidate must prepare a research proposal and gain approval from the DEV faculty advisory committee. Before human subject research can commence the candidate must acquire appropriate approvals from the Institutional Review Board. Upon completion of the thesis the candidate must present their results in a public presentation to the campus community.

Areas of Concentration (9-12 Credits)

A student in the Science and Technology for Innovation in Global Development program must take course work from the program electives below to satisfy the 30 required units for graduation. An elective may be any of these graduate-level courses and undergraduate courses as approved by the advisory committee and a department liaison. Students must have the prerequisite knowledge, if required, to take courses outside the program.

While design thinking for science and technology for innovation in global development is at the core of this degree requirement students may tailor their program to suit their professional needs. Course selection should provide a logical program of study. We expect that the elective courses

will add depth in at least one concentration. The list of pre-approved courses follows. Other courses may be acceptable but will require approval from the advisory committee and the department liaison (when necessary).

List of Program Concentration and Elective Courses

Concentrations

Biology*

BB 515. Environmental Change: Problems and Approaches

BB 551. Research Integrity in the Sciences

BB 553. Experimental Design and Statistics

BB 554. Journal Club

BB 561. Model Systems: Experimental Approaches and Applications

*Other courses, graduate or undergraduate, may be approved after consultation with the department liaison and the instructor's permission. Students may satisfy requirements through the certificate program in Life Science Management.

Biomedical Engineering*

BME 531. Biomaterials in the Design of Medical Devices

BME 535. Medical Device Design Controls

BME 592. Healthcare Systems and Clinical Practice

BME 593. Scientific Communication

BME 594. Biomedical Engineering Journal Club

BME 595. Special Topics in Biomedical Engineering

BME 698. Laboratory Rotation in Biomedical Engineering

*These and other courses in BME could be taken after consultation with the department liaison and the instructor's permission.

Chemistry and Biochemistry*

TBD

*Courses may be taken after consultation with the department liaison and the instructor's permission. Courses under 4000-level will require extra work and will be negotiated by the department liaison and the course instructor. Courses cannot duplicate a course the student has taken as an undergraduate.

Economics*

ECON 2125. Development Economics

ECON 2126. Public Economics

ECON 2130. Econometric Modeling

ECON 2145. Behavioral Economics

ECON 2155. Experimental Economics

*These courses may be taken after consultation with the program liaison and the instructor's permission. Courses under 4000-level will require extra work and will be negotiated by the program liaison and the course instructor. Courses cannot duplicate a course the student has taken as an undergraduate.

Foisie School of Business*

BUS 2080. Data Analysis for Decision Making

BUS 3010. Creating Value through Innovation

ETR 2900. Social Entrepreneurship

ETR 500. Entrepreneurship and Innovation

ETR 593. Technology Commercialization: Theory, Strategy, and Practice

ETR 596. Selling and Sales

OBC 505. Teaming and Organizing for Innovation

OBC 506. The Heart of Leadership: Power, Reflection, and Interpersonal Skills

OBC 533. Negotiations

OBC 537. Leading Change

OBC 538. Developing Managerial Talent

*These and other courses in the FSB could be taken after consultation with the school liaison and the instructor's permission. Courses under 4000-level will require extra work and will be negotiated by the school liaison and the course instructor. Courses cannot duplicate a course the student has taken as an undergraduate.

Civil and Environmental Engineering*

CE 542. Geohydrology

CE 560. Advanced Principles of Water Treatment

CE 561. Advanced Principles of Wastewater Treatment

CE 562. Biosystems in Environmental Engineering

CE 563. Industrial Waste Treatment

CE 565. Surface Water Quality Monitoring

CE 566. Groundwater Flow and Pollution

CE 572. Physical and Chemical Treatment Processes

CE 574. Water Resource Management

CE 567. Hazardous Waste Management

CE 570. Contaminant Fate and Transport

*These and other courses in CEE could be taken after consultation with the department liaison and the instructor's permission. Courses cannot duplicate a course the student has taken as an undergraduate.

Data Sciences* +*

CS5007. Introduction to Applications of Computer Science with Data Structures and Algorithms

DS 517. Mathematical Foundations for Data Science

DS 501. Introduction to Data Sciences+

DS 502. Statistical Methods for Data Science

CS 542. Database Management Systems –or– MIS571. Database Applications Development

CS 548. Knowledge Discovery and Data Mining

CS 539. Machine Learning

DS 503. Big Data Management

DS 504. Big Data Analytics (on-line)

*These and other courses in DS could be taken after consultation with the program liaison.

+This course is required for everyone who seeks this concentration.

+*This concentration can be satisfied if students take the Data Science Certificate program

Interactive Media and Gaming*

IMGD 5100. Immersive Human-Computer Interaction

IMGD 5200. History and Future of Immersive Interactive Media and Gaming

IMGD 5300. Design of Interactive Experiences

IMGD 5400. Production Management for Interactive Media

*These and other courses in IMGD could be taken after consultation with the department liaison and the instructor's permission.

Clark IDCE Courses

IDCE 360: Development Theory

IDCE 361: Development Program and Project Management

IDCE 30102: Case Studies in Environmental Issues and Policy Analysis

IDCE 30118: Science Meets Policy in the Real World

IDCE 30110: Social Policy: Qualitative Methods for Design and Analytics

IDCE 30229: Program Monitoring and Evaluation

IDCE 332: Sustainable Development Assessment and Planning

IDCE 395: Culture, Environment, and Development

IDCE 30245: Natural Resource Management

IDCE 312: Famine and Food Security

IDCE 30248: Theorizing Women, Gender, and Development

IDCE 30254: Gender, Power, and Social Change

IDCE 30275: Gender and Development Planning

IDCE 30306: GIS for International Development in Practice

IDCE 329: Property and Community

IDCE 30701: Beyond the Population Bomb

Other Relevant Courses

Beyond the courses referenced above other potential areas of concentration could be developed in the future. We anticipate future partnerships with Economic Development, Community Development, Architectural Engineering, Chemical Engineering, Robotics Engineering, and Systems Engineering.

Schedule of a Typical Student

The process for achieving a degree in Science and Technology for Innovation in Global Development is meant have some flexibility. However, the one calendar year option does require a certain sequence if a student plans to complete all required courses. A concentration, once approved by the review committee, can be broad, from natural sciences, to engineering, data sciences, business, social sciences and others.

- 1) A student in the one-calendar year **GQP option** who comes with an engineering background and chooses an **international development concentration** may have the following schedule:

Pre-Term:

Social Innovation for Global Development (core)

Term A:

International Development and Society (concentration (Clark/semester))

Politics of Expertise (concentration)

Design for Social Change (core)

Term B:

Design Studio I (core)

Ethics in Design (core)

Term C:

Rethinking How We Help Developing Communities (concentration (Clark/semester))

Development Program and Project Management (concentration (Clark/semester))

Ethnography and Research Methods (concentration WPI/Semester)

Term D:

Continuation of semester-long courses

Term E(1):

Design Studio II

Term E(2):

Research and GQP writing

- 2) A student in the one-calendar year **Thesis option** who comes with a liberal arts background and chooses a **Biomedical Engineering and International Development concentrations** may have the following schedule:

Pre-Term:

Social Innovation for Global Development(core)

Term A:

International Development and Society (concentration (Clark/semester))

Healthcare Systems and Clinical Practice (concentration/semester/ 1 unit)

Medical Device Design Controls (online)

Term B:

Design Studio I (core)

Ethics in Design (core)

Term C:

Biomaterials in the Design of Medical Devices (concentration/semester)
BME Graduate Seminar (concentration)
Ethnography and Research Methods (concentration WPI/Semester)

Term D:

Continuation of semester-long courses

Term E(1):

Design Studio II

Term E(2)/A-B term year two :

Field Experience and Thesis

- 3) A student in the one-calendar year **Thesis option** who comes with a liberal arts background and chooses a **Biology and International Development concentrations** may have the following schedule:

Pre-Term:

Social Innovation for Global Development (core)

Term A:

International Development and Society (concentration (Clark/semester))
Graduate Seminar Biology (1 unit)
Research Integrity in the Sciences (1 unit)
Biology Journal Club (1 Unit)

Term B:

Design Studio I (core)
Ethics in Design (core)

Term C:

Graduate Seminar Biology (concentration)
Biology Journal Club (concentration)
Seminar in Global Public Health (concentration)
Ethnography and Research Methods (concentration WPI/Semester)

Term D:

Continuation of semester-long courses

Term E(1):

Design Studio II

Term E(2)/A-B term year two :

Field Experience and Thesis

Faculty Contacts and Program Management

The program will be a graduate program within the Global School and consist of a partnership between programs and departments from the School of Arts and Sciences, the School of Engineering, the Foisie Business School, and the Global School. There will be one program director responsible for overseeing the program from WPI who will also liaise with the Clark IDCE Director. A set of core faculty will oversee program offerings and its growth. These faculty, or the Program Review Board, will be drawn from the departments/programs with faculty participating in the program. The initial set of faculty who will take on this role are:

WPI

Emmanuel Agu, Computer Science
Laureen Elgert, International Development, Environment and Sustainability*
Glenn Gaudette, Biomedical Engineering*
Robert Krueger, Social Sciences and Policy Studies, and Program Director
Geoff Pfeifer, Department of Global Studies
Anita Mattson, Chemistry and Biochemistry*
Pratap Rao, Mechanical Engineering*
Jennifer Rudolph, Humanities and Arts
Elke Rundensteiner, Data Science*
Aaron Sakulich, Civil and Environmental Engineering*
Alex Smith, Economic Sciences*
Steve Taylor, Foisie School of Business*
Yunus Telliell, Humanities and Arts
Pam Weathers, Biology and Biotechnology*
Craig Wills, Computer Science*

*Denotes faculty school/department/program liaison

Clark University

Edward Carr, International Development, Community, and Environment (IDCE)
Timothy Downs, Environmental Science, IDCE
Yelena Himmelberger, GIS and Remote Sensing, IDCE
Anthony Bebbington, Graduate School of Geography
Denise Humphreys Bebbington, International Development, IDCE
James Murphy, Graduate School of Geography
Morgan Ruelle, IDCE
Lis Gilmore, IDCE
Shadrock Roberts, IDCE

Affiliated Departments and Programs at WPI

Biomedical Engineering
Biology and Biotechnology
Chemistry and Biochemistry
Data Science Program
Economics Science Program

Foisie School of Business
Global Studies
Interactive Media and Game Development
Humanities and Arts
International Development, Environment and Sustainability Program
Social Sciences and Policy Studies

Affiliated Faculty

Biomedical Engineering

Kris Billiar
Glenn Gaudette
Solomon Mensah

Biology and Biotechnology

Reeta Rao
Pam Weathers

Chemistry and Biochemistry

Arne Gericke
Anita Mattson
Susanne Scarlata

Civil and Environmental Engineering

John Bergendahl
Rajib Mallick
Paul Mathisen
Derren Rosbach
Aaron Sakulich

Data Science Program

Randy Paffenroth
Carolina Ruiz
Elke Rundensteiner

Economic Science Program

Alex Smith
Gbeton Somasse

Foisie School of Business

Mike Elmes
Nima Kordzadeh
Elizabeth Lingo
Steve Taylor

Humanities and Arts

Jennifer deWinter

Jennifer Rudolph
Yunus Telliell

IMGD Program
Jennifer deWinter

International Development, Environment, and Sustainability Program
Laureen Elgert
Robert Krueger
Lisa Stoddard

Global Studies
Katherine Foo
Geof Pfeifer
Derren Rossbach
Lisa Stoddard

Mechanical Engineering and Materials Science
Brajendra Misha
Pratap Rao
Winston Soboyejo
Sarah Wodin-Schwartz

SSPS
Crystal Brown
Emily Douglas
Angela Rodriguez

Clark University
Anthony Bebbington
Denise Humphreys Bebbington
Nigel Brissett
Edward Carr
Timothy Downs
Lis Gilmore
Yelena Himmelberger
James Murphy
Morgan Ruelle
Shadrock Roberts

Rationale

The proposal was endorsed by programs, departments, and schools across WPI

Biomedical Engineering

Chemistry/Biochemistry
Data Science
Dean of Arts and Sciences
Foisie School of Business
Humanities and Arts
Interactive Media and Game Development
Social Sciences and Policy Studies

Trends in the Development Sector

According to the International Labor Organization, the ambitious agenda of the SDGs is shaping current trends within the development sector. Arising from the 2030 Agenda, there are six trends that are paving the course for the development sector. They are as follows:

1. Poverty and inequalities
2. Demography
3. Environmental degradation and climate change
4. Shocks and crises
5. Financing for development
6. Technological innovations

All together, they are altering the course for the global labor market. These six trends will have an impact on prospective jobs throughout the developed, emerging, and developing countries, challenging and modifying current and future hiring practices.

Technological innovation, for example, is expected to reshape the development sector. Rapidly developing technologies will see future hiring practices experience a tremendous shift.

The emergence of technology will address the challenges facing the development sector. Food shortages, water scarcity, increasing natural hazards will soon be effectively managed by harnessing technological opportunities.

The potential for technology to address issues surrounding food and water security, health, education, climate change and environment, among others, will create a platform for future hiring practices, new job prospects, and specialized roles within the development sector.

Policy efforts will also play a role in overcoming structural impediments to growth, particularly among these six trends. Policies set out by local governing bodies and the UN will address the root causes of global inequalities with regard to global unemployment and vulnerable employment.

Expertise in science, technology, and public policy will be essential to help nations, citizens, and industries recognize shared problems and agree on solutions.

Similar Programs

Initiatives have taken off at a handful of academic institutions around the country. Each program emphasizes multi-disciplinary teams, real world projects, and the unique challenges of low-

resource communities. The program list covered here is by no means exhaustive but it is representative of other programs already in existence.

UC-Davis' D-lab was developed to engage students in finding solutions for energy issues in developed and developing countries. The D-lab focuses on innovative technologies and business models to afford people in low resource communities to save and earn more money. Faculty mentors from a number of different departments work with student teams and community partners to understand specific technical, social, environmental, and economic issues. The D-lab has funding from US AID.

The UC-Berkeley Blum Center for Developing Economies is host to a development engineering program. Through coursework, research mentoring, and professional development students from a variety of disciplines can have a certification in an area outside their home discipline. It's a program for doctoral students whose research includes topics related to the application of technology for people living poverty. The program has funding from the NSF and US AID.

Boston University hosts the Lab for Engineering Education and Development (LEED). LEED is dedicated to creating the next generation of engineering scientists and scholars who are cognizant of engineering challenges in the developing world and are equipped with the appropriate knowledge to meet these challenges. In collaboration with partners and stakeholders in the field, LEED strategizes the development of context-specific solutions and local devices specifically designed to work in resource-limited environments. LEED identifies health technology deficits through consultation with health care professionals in the field and assigns a student team to work on it. Once a prototype has been developed and tested, the process of transporting the technology innovation to the field and, in effect, the global market begins. LEED has funding from US AID and the World Health Organization.

The Institute of Design, or D-School, at Stanford University is one paradigmatic example. The D-School recognizes that human problems are messy and complex. To help their students better understand how to address these, the D-School adds tools to a student's toolkit. The idea is to meet the student where they are and develop their creative confidence.

The Humanitarian Engineering Program at the Colorado School of Mines (CSM) is another example. CSM brings together engineering and social science professors to transform engineering by changing the ways that engineers are taught to think. CSM's minor (Six courses in all) in Leadership in Social Responsibility seeks to prepare students to become leaders in promoting shared benefits between companies and communities.

For the most part, these programs are fairly new. Further, they seem to deal with projects without the same systematic approach that WPI does. Through this program, WPI can easily meet these programs where they are and show leadership on the global stage.

Discussion

Based on market analysis and review of other programs, when fully up and running we expect to attract a cohort of around 20 to 30 full-time on-campus students to this program; we are unsure

about certificate students. In the first year of operation, the program is estimated to draw 10 students, and in the second year to ramp up to 20 full-time students as steady state. This would generate a revenue of around \$250,000 a year the first year, and \$500,000 a year thereafter.

Given the structure of the proposed program and the existing resources across affiliated departments and the different schools at WPI and Clark, the initial launch could proceed with limited resources. We would need stipends to develop several new courses in DEV; we have the human resources to staff the courses.

Program Assessment

This program is initially going to rely largely on existing resources at WPI and Clark. This enables us to offer the program quickly. However, we intend to continue to shape and build the program over time to define it more precisely, increase its visibility and competitiveness, so that it will remain relevant and attractive to both prospective students and to prospective employers.

To shape the program, we plan to continuously assess the needs and interests of our student applicant pool and our existing student population. This will include interviewing students about their interests, their perception of our program, as well as tracking their subsequent employment. We plan a major marketing campaign on both campuses after this motion receives approval.

To assess our progress, we will create a committee in the coming months for purposes of assessing the program. The charge of this committee will be to design an assessment plan to assure the health of the program. We intend to execute on the recommendations derived from this assessment committee in the subsequent year, which would then be the second year that our program would be offered.

Program Growth

Based on the assessment committee's recommendations, we anticipate adding new courses in areas ranging from "area studies" in Africa and Latin America, and technology development and diffusion in Africa and Latin America. Similarly, we are working with faculty in the business school to offer more developing world case studies in their classes. Areas of concentration and additional affiliated faculty and affiliated departments and programs may be changed over time. The DEV Review Board, with input from the Assessment Committee, will review proposals for extension and changes of the program to assure its healthy growth.

To keep the program nationally competitive and to be able to attract top talent, we anticipate adding high quality faculty with strong area knowledge, those who can bring together technology for the developing world, and design. Is to our DS faculty members.

Furthermore, while the program provides ample opportunity for students to choose electives from a diverse range of disciplines we anticipate that in the future based on level of interest by our students, faculty and external partners we will design specializations of the degree in areas of high impact. These could for example range from health care technology, water treatment, environmentally safe mineral development, materials for affordable sustainable construction, and recycling. Social justice concerns run through all of the themes, current and future.

External Ties and Advisory Board

We are reaching out to potential government, foundation, NGO, industry, and international academic partners to serve on an advisory board. The advisory board will help us shape the program, its offerings, and identify potential new academic linkages. In addition, the advisory board members may provide input on job opportunities, projects, internships, and other resources for our students. These organizations include but are not limited to: US AID, the Rockefeller Foundation, the Ford Foundation, the United Nations Development Program, government contractors, the World Bank, Engineers Without Borders-USA, the University of Ghana, Ashesi University, Universidad de Cuenca, Universidad Nacional Autónoma de México (UNAM), and other universities in Africa and Latin America.

We plan to interact regularly with our advisory board to keep us abreast of skill sets our graduates will need to be successful in the development field, whether they go into entrepreneurship, non-profit work, program management and assessment, or academia. We are in the process of putting this board together from our various international networks.

Discussion of Resources

The WPI administration have committed to supply adequate resources to run the program successfully. We will do our best to offer courses out of existing resources. For instance, we may need to hire two or three adjuncts to cover some undergraduate courses. The Global School has been promised new hires and these positions could support the DEV program. Future investment in the program will be commensurate with the student interest and growth. Funding will be needed to pay for new course development.

Implementation Time-Line*

Spring 2020	Program approval by WPI faculty and MOU with Clark
Winter 2019	Develop website and advertise through our partnership with EWB-USA
Spring 2020	Admission of applicants into the program
Summer 2020	Development of new courses
AY 20/21	Launch the program with the August Boot Camp
AY 20/21	Assist Global School in recruiting complementary faculty
AY 21/22	First cohort graduates

*Ten students have already expressed interest and/or applied to the program based on word of mouth and minimal networking.

Date: May 7, 2020

To: WPI Faculty

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

Re: Motion to approve a BS-MS and BA-MS degree in Science and Technology for Innovation in Global Development

Motion: The Committee on Graduate Studies and Research recommends and I move that a BS-MS and BA-MS degree in **Science and Technology for Innovation in Global Development** be established by coordinated efforts from of faculty from 4 programs, 4 departments, and 3 schools. The program will award an MS degree in Science and Technology for Global Development.

Graduate Program in Science and Technology for Innovation in Global Development

The **Science and Technology for Innovation in Global Development** program offers graduate studies a transdisciplinary experience as they work toward completing the MS degree. The motivation for this degree comes from the recognition that socio-technical problems around the global are more complex than many originally imagined. In fact, these problems are so complex that many scientists, engineers, social scientists, policy makers, and practitioners agree that they are not solvable by an individual or even a single discipline (so-called ‘wicked problems’). They require change agents to work across disciplines within academia and the wider realms of policy and practice and engage a broad range of stakeholders, especially affected communities. Whether one works in business, government, the non-profit sector, or academia there is a clear and imminent need to revolutionize how we deploy knowledge and action with scholars and practitioners who possess diverse knowledge bases and skill sets. WPI is uniquely suited to offer such a program. We will achieve this effort with a set of core courses in our own brand of *design theory and practice*. These core courses will develop a student’s strategic thinking skills, empathy toward practice, and cross-cultural competency. In addition, students can choose between various technical fields, development studies, and/or language. We believe that WPI’s pedagogy and these skills will enable students to better, more accurately, understand what it means to design for communities and customers who are different than they are. Indeed, graduates will understand what it means to bring a *transdisciplinary* approach to problem definition and design solutions across different contexts. Here, a transdisciplinary approach requires researchers to organize teams of actors from different disciplines and life experiences to work collaboratively to co-create new conceptual, theoretical, and methodological innovations that, in their integrative character, move beyond discipline specific approaches to identify and address problems that exist in the spaces between these disciplines.

The program thus educates professionals who want to be innovators in the production of purpose driven basic and applied knowledge, technological development, technology transfer, program management, program development, or activists. Using theories and methods drawn from humanities, social sciences, natural sciences, engineering, and business students completing this program will learn essential skills that will contribute to their own success as well as those whom they serve. Students will: 1) utilize and relate and integrate different types of knowledge from a broad range of perspectives, 2) be aware of the social responsibilities attached to actions in the world, and have that drive their projects rather than personal gain, 3) willingly, and with curiosity, accept cultural differences, and learn to work with them rather than against them, 4) deploy

multiple communication strategies, research methods, and have proficiency in multiple disciplinary languages, 5) bring all of this to a purpose-driven approach to real world problems.

To facilitate this process of creating transdisciplinary thinkers we will bring together highly motivated faculty from WPI and Clark University to deliver a graduate education framed around innovative classroom experiences, design studios focused on real-world problems, and high-impact, on the ground, global experiences where they will work with various partners from the academy, government, partner communities and business. Those who possess this degree will become leaders in a variety of professions: innovative health and technology start-ups, government, or non-profit community development, the global policy stage, and new forms of value creation. It does not matter where one wants to work, whether domestically or internationally, we live in a world where knowledge and problems have global reach and local implications. Students will have a competitive advantage because of their experience working on teams, sharing knowledge, experience in a variety of social contexts, and addressing real problems that a single discipline or person cannot thoughtfully engage with in a single discipline.

Program Opportunities

The program faculty exist across every School at WPI: Arts and Sciences, Engineering, Business, and the Global School. Further, with our deep collaboration with Clark University and its exceptional programs in International Development, Environmental Science, and Geography, this program can appeal to a broad variety of interests. No matter whether one's core interest is in technology, entrepreneurship, health and environmental concerns, or international development, our coterie of enthusiastic and invested faculty will work across campuses, and across the world, to provide mentorship and a working environment that will provide graduates with the skills, opportunities, and resources to succeed after graduation. This program requires students develop advanced knowledge in several fields. These include but are not limited to: social entrepreneurship, engineering, data science, social innovation, physical sciences, development studies, or another, non-English, language. However, the program remains flexible enough to provide students with opportunities to create their own transdisciplinary purpose-driven research. We expect to be able to add concentrations in community development and economic development from a systems approach. Finally, this program offered by two schools will be attractive to foundations and other funders given the opportunity it presents. With WPI's strengths in engineering, science, innovation, and development to Clark's expertise in climate change adaptation, livelihoods, environmental sciences, extractive industry governance, and geographical information science our partnership will create a demand-driven program stronger than either university could produce on its own.

Degree Objectives:

The BS-MS and BA-MS degree in Science and Technology for Innovation in Global Development will cultivate a future generation of scholars and practitioners who are able to:

- Demonstrate knowledge in three core fields of study, one of which is be technical, and show their relationship. These fields are to be chosen by the student and their committee;
- Show a broad understanding of critical design thinking and how it applies to their work;

- Assess the suitability of different research methods for a range of socio-technical problems;
- Demonstrate cultural competence in at least one area;
- Be able to work with a between different disciplines that operate at the nexus of global innovation development.

Admissions Requirements

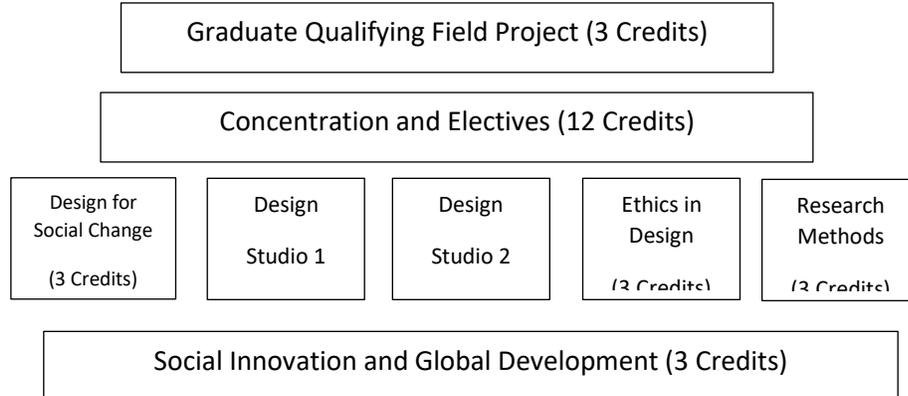
Students applying to the Science and Technology for Innovation in Global Development program are expected to be juniors. As their schedule allows, they may take courses toward the degree. They may also count, per university rules, up to six (6) credits from their undergraduate degree to this graduate degree. Students may not retake an undergraduate course whether that course was offered at WPI or elsewhere.

Requirements for the BS-MS and BA-MS Degree

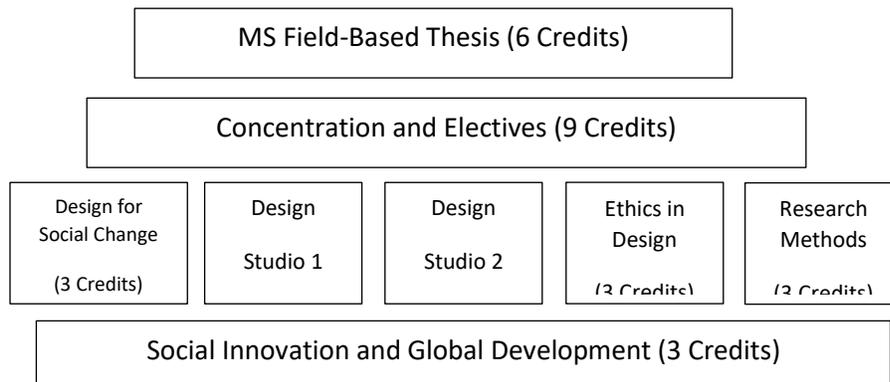
Students enrolled in the BS-MS and BA-MS degree must satisfy all the program requirements of the BS-MS and BA-MS degree and all the program requirements of the MS degree. Every student must take the design sequence. Students are required to work with their faculty supervisors to develop a Plan of Study outlining the courses that the student will take for their BS-MS and BA-MS degree requirements. This Plan of Study must be approved by the program review committee.

The BS-MS and BA-MS degree with a GQP can be completed in twelve months. The thesis option will typically take one-and-a-half to two academic years. If a student seeks to add a language to their study, the program will take two years.

GQP track



Thesis Track



Upon acceptance to the Program, a student will be assigned to a team of academic advisors from different disciplines. In consultation with that committee the student must prepare a Plan of Study that outlines the pathway the student will take to meet the MS degree requirements.

Core Coursework Requirement (15 Credits)

A student in the Design for Social Innovation in Global Development program must take the Design Boot Camp, which begins in mid-August each year.

Design Thinking for Social Innovation in Global Development Sequence

DEV 501	Social Innovation and Global Development (new course)
DEV 502/DEV 4400	Design for Social Change
DEV 510	Design Studio 1 (new course)(1 unit)
DEV 520	Design Studio 2(new course)(2 units)
DEV 530	Ethics and Social Justice in Science, Engineering, and Development
DEV 540	Research Methods

Graduate Qualifying Project / MS Thesis (3 – 9 Credits)

A three-credit Graduate Qualifying Project (GQP) (DEV 598) is most commonly a team-based project and provides a capstone experience for students to apply their newly acquired knowledge to a real-world problem. The GQP will be carried out with a partner organization and shall be supervised by two appropriate faculty members associated with the program. Students choosing this option will be required to take two additional courses, a total of six credits, in one of their fields of concentration.

A six-credit Master's Thesis (DEV 599) consists of a theory-driven research or design project worth a minimum of nine credit hours. Students interested in research, and especially those who plan to pursue a PhD, are encouraged to select the thesis option. Any two DEV affiliated faculty may serve as a thesis advisor. Prior to registering, the candidate must prepare a research proposal and gain approval from a panel of three faculty. Before human subject research can commence the candidate must acquire appropriate approvals from the Institutional Review Board. Upon completion of the thesis the candidate must present their results in a public presentation to the campus community.

Areas of Concentration (9-12 Credits)

A student in the Design for Social Innovation in Global Development program must take course work from the program electives below to satisfy the 30 required units for graduation. An elective may be any of these graduate-level courses and undergraduate courses as approved by the advisory committee. Students must have the prerequisite knowledge, if required, to take courses outside the Global School.

While design thinking for science and technology for innovation is at the core of this degree requirement students may tailor their program to suit their professional needs. Course selection should provide a logical program of study. We expect that the elective courses will add depth in at

least one concentration. The list of pre-approved courses follows. Other courses may be acceptable but will require approval from the advisory committee.

List of Program Concentration and Elective Courses

Concentrations

Biology*

BB 515. Environmental Change Problems and Approaches

BB 551. Research Integrity in the Sciences

BB 553. Experimental Design and Statistics

BB 554. Journal Club

BB 561. Model Systems: Experimental Approaches and Applications

*Other courses, graduate or undergraduate, may be approved after consultation with the department liaison and the instructor's permission. Students may satisfy requirements through the certificate program in Life Science Management.

Biomedical Engineering*

BME 531. Biomaterials in the Design of Medical Devices

BME 535. Medical Device Design Controls

BME 592. Healthcare Systems and Clinical Practice

BME 593. Scientific Communication

BME 594. Biomedical Engineering Journal Club

BME 595. Special Topics in Biomedical Engineering

BME 698. Laboratory Rotation in Biomedical Engineering

*These and other courses in BME could be taken after consultation with the department liaison and the instructor's permission.

Chemistry and Biochemistry*

TBD

*Courses may be taken after consultation with the department liaison and the instructor's permission. Courses under 4000-level will require extra work and will be negotiated by the department liaison and the course instructor. Courses cannot duplicate a course the student has taken as an undergraduate.

Economics*

ECON 2125. Development Economics

ECON 2126. Public Economics

ECON 2130. Econometric Modeling

ECON 2145. Behavioral Economics

ECON 2155. Experimental Economics

*These courses may be taken after consultation with the program liaison and the instructor's permission. Courses under 4000-level will require extra work and will be negotiated by the program liaison and the course instructor. Courses cannot duplicate a course the student has taken as an undergraduate.

Foisie School of Business*

BUS 2080. Data Analysis for Decision Making
BUS 3010. Creating Value through Innovation
ETR 2900. Social Entrepreneurship
ETR 500. Entrepreneurship and Innovation
ETR 593. Technology Commercialization: Theory, Strategy, and Practice
ETR 596. Selling and Sales
OBC 505. Teaming and Organizing for Innovation
OBC 506. The Heart of Leadership: Power, Reflection, and Interpersonal Skills
OBC 533. Negotiations
OBC 537. Leading Change
OBC 538. Developing Managerial Talent

*These and other courses in the FSB could be taken after consultation with the school liaison and the instructor's permission. Courses under 4000-level will require extra work and will be negotiated by the school liaison and the course instructor. Courses cannot duplicate a course the student has taken as an undergraduate.

Civil and Environmental Engineering*

CE 542. Geohydrology
CE 560. Advanced Principles of Water Treatment
CE 561. Advanced Principles of Wastewater Treatment
CE 562. Biosystems in Environmental Engineering
CE 563. Industrial Waste Treatment
CE 565. Surface Water Quality Monitoring
CE 566. Groundwater Flow and Pollution
CE 572. Physical and Chemical Treatment Processes
CE 574. Water Resource Management
CE 567. Hazardous Waste Management
CE 570. Contaminant Fate and Transport

*These and other courses in CEE could be taken after consultation with the department liaison and the instructor's permission. Courses under 4000-level will require extra work and will be negotiated by the department liaison and the course instructor. Courses cannot duplicate a course the student has taken as an undergraduate.

Data Sciences* +*

CS5007. Introduction to Applications of Computer Science with Data Structures and Algorithms
DS 517. Mathematical Foundations for Data Science
DS 501. Introduction to Data Sciences+
DS 502. Statistical Methods for Data Science
CS 542. Database Management Systems –or—MIS571. Database Applications Development
CS 548. Knowledge Discovery and Data Mining
CS 539. Machine Learning
DS 503. Big Data Management
DS 504. Big Data Analytics (on-line)

*These and other courses in DS could be taken after consultation with the program liaison.

+This course is required for everyone who seeks this concentration.

+*This concentration can be satisfied if students take the Data Science Certificate program

Interactive Media and Gaming*

IMGD 5100. Immersive Human-Computer Interaction

IMGD 5200. History and Future of Immersive Interactive Media and Gaming

IMGD 5300. Design of Interactive Experiences

IMGD 5400. Production Management for Interactive Media

*These and other courses in IMGD could be taken after consultation with the department liaison and the instructor's permission.

Clark IDCE Courses

IDCE 360: Development Theory

IDCE 361: Development Program and Project Management

IDCE 30102: Case Studies in Environmental Issues and Policy Analysis

IDCE 30118: Science Meets Policy in the Real World

IDCE 30110: Social Policy: Qualitative Methods for Design and Analytics

IDCE 30229: Program Monitoring and Evaluation

IDCE 332: Sustainable Development Assessment and Planning

IDCE 395: Culture, Environment, and Development

IDCE 30245: Natural Resource Management

IDCE 312: Famine and Food Security

IDCE 30248: Theorizing Women, Gender, and Development

IDCE 30254: Gender, Power, and Social Change

IDCE 30275: Gender and Development Planning

IDCE 30306: GIS for International Development in Practice

IDCE 329: Property and Community

IDCE 30701: Beyond the Population Bomb

Other Relevant Courses

Beyond the courses referenced above other potential areas of concentration could be developed in the future. We anticipate future partnerships with Economic Development, Community Development, Architectural Engineering, Chemical Engineering, Robotics Engineering, and Systems Engineering.

Schedule of a Typical Student

The process for achieving a degree in Science and Technology for Innovation in Global Development is meant have some flexibility. However, the one calendar year option does require a certain sequence if a student plans to complete all required courses. A concentration, once approved by the review committee, can be broad, from natural sciences, to engineering, data sciences, business, social sciences and others.

- 4) A student in the one-calendar year **GQP option** who comes with an engineering background and chooses an **international development concentration** may have the following schedule:

Pre-Term:

Cross-Cultural Design Thinking Bootcamp (core)

Term A:

International Development and Society (concentration (Clark/semester))

Politics of Expertise (concentration)

Design for Social Change (core)

Term B:

Design Studio I (core)

Ethics in Design (core)

Term C:

Rethinking How We Help Developing Communities (concentration (Clark/semester))

Development Program and Project Management (concentration (Clark/semester))

Ethnography and Research Methods (concentration WPI/Semester)

Term D:

Continuation of semester-long courses

Term E(1):

Design Studio II

Term E(2):

Research and GQP writing

- 5) A student in the one-calendar year **Thesis option** who comes with a liberal arts background and chooses a **Biomedical Engineering and International Development concentrations** may have the following schedule:

Pre-Term:

Cross-Cultural Design Thinking Bootcamp (core)

Term A:

International Development and Society (concentration (Clark/semester))

Healthcare Systems and Clinical Practice (concentration/semester/ 1 unit)

Medical Device Design Controls (online)

Term B:

Design Studio I (core)

Ethics in Design (core)

Term C:

Biomaterials in the Design of Medical Devices (concentration/semester)

BME Graduate Seminar (concentration)
Ethnography and Research Methods (concentration WPI/Semester)

Term D:

Continuation of semester-long courses

Term E(1):

Design Studio II

Term E(2)/A-B term year two :

Field Experience and Thesis

- 6) A student in the one-calendar year **Thesis option** who comes with a liberal arts background and chooses a **Biology and International Development concentrations** may have the following schedule:

Pre-Term:

Cross-Cultural Design Thinking Bootcamp (core)

Term A:

International Development and Society (concentration (Clark/semester))

Graduate Seminar Biology (1 unit)

Research Integrity in the Sciences (1 unit)

Biology Journal Club (1 Unit)

Term B:

Design Studio I (core)

Ethics in Design (core)

Term C:

Graduate Seminar Biology (concentration)

Biology Journal Club (concentration)

Seminar in Global Public Health (concentration)

Ethnography and Research Methods (concentration WPI/Semester)

Term D:

Continuation of semester-long courses

Term E(1):

Design Studio II

Term E(2)/A-B term year two :

Field Experience and Thesis

Faculty Contacts and Program Management

The program will be a graduate program within the Global School and consist of a partnership between programs and departments from the School of Arts and Sciences, the School of Engineering, the Foisie Business School, and the Global School. There will be one program director responsible for overseeing the program from WPI who will also liaise with the Clark IDCE Director. A set of core faculty will oversee program offerings and its growth. These faculty, or the Program Review Board, will be drawn from the departments/programs with faculty participating in the program. The initial set of faculty who will take on this role are:

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Geoff Pfeifer, Department of Global Studies
Anita Mattson, Chemistry and Biochemistry*
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Elke Rundensteiner, Data Science*
Aaron Sakulich, Civil and Environmental Engineering*
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Yunus Telliel, Humanities and Arts
Pam Weathers, Biology and Biotechnology*
Craig Wills, Computer Science*

*Denotes faculty school/department/program liaison

Clark University

Edward Carr, International Development, Community, and Environment (IDCE)
Timothy Downs, Environmental Science, IDCE
Yelena Himmelberger, GIS and Remote Sensing, IDCE
Anthony Bebbington, Graduate School of Geography
Denise Humphreys Bebbington, International Development, IDCE
James Murphy, Graduate School of Geography
Morgan Ruelle, IDCE
Lis Gilmore, IDCE
Shadrock Roberts, IDCE

Affiliated Departments and Programs at WPI

Biomedical Engineering
Biology and Biotechnology
Chemistry and Biochemistry
Data Science Program
Economics Science Program

Foisie School of Business
Global Studies
Humanities and Arts
Interactive Media and Game Development
International Development, Environment and Sustainability Program
Social Sciences and Policy Studies

Affiliated Faculty

Biomedical Engineering

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Glenn Gaudette
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Biology and Biotechnology

Reeta Rao
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Chemistry and Biochemistry

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Aaron Sakulich

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Elizabeth Lingo
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Humanities and Arts

Jennifer deWinter
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Edward Carr
Timothy Downs
Lis Gilmore
Yelena Himmelberger
James Murphy
Morgan Ruelle
Shadrock Roberts

Rationale

The proposal was endorsed by programs, departments, and schools across WPI

Biomedical Engineering
Chemistry/Biochemistry
Data Science
Dean of Arts and Sciences
Foisie School of Business
Humanities and Arts
Interactive Media and Game Development
Social Sciences and Policy Studies

Trends in the Development Sector

According to the International Labor Organization, the ambitious agenda of the SDGs is shaping current trends within the development sector. Arising from the 2030 Agenda, there are six trends that are paving the course for the development sector. They are as follows:

1. Poverty and inequalities
2. Demography
3. Environmental degradation and climate change
4. Shocks and crises
5. Financing for development
6. Technological innovations

All together, they are altering the course for the global labor market. These six trends will have an impact on prospective jobs throughout the developed, emerging, and developing countries, challenging and modifying current and future hiring practices.

Technological innovation, for example, is expected to reshape the development sector. Rapidly developing technologies will see future hiring practices experience a tremendous shift.

The emergence of technology will address the challenges facing the development sector. Food shortages, water scarcity, increasing natural hazards will soon be effectively managed by harnessing technological opportunities.

The potential for technology to address issues surrounding food and water security, health, education, climate change and environment, among others, will create a platform for future hiring practices, new job prospects, and specialized roles within the development sector.

Policy efforts will also play a role in overcoming structural impediments to growth, particularly among these six trends. Policies set out by local governing bodies and the UN will address the root causes of global inequalities with regard to global unemployment and vulnerable employment.

Expertise in science, technology, and public policy will be essential to help nations, citizens, and industries recognize shared problems and agree on solutions.

Similar Programs

Initiatives have taken off at a handful of academic institutions around the country. Each program emphasizes multi-disciplinary teams, real world projects, and the unique challenges of low-resource communities. The program list covered here is by no means exhaustive but it is representative of other programs already in existence.

UC-Davis' D-lab was developed to engage students in finding solutions for energy issues in developed and developing countries. The D-lab focuses on innovative technologies and business models to afford people in low resource communities to save and earn more money. Faculty mentors from a number of different departments work with student teams and community partners to understand specific technical, social, environmental, and economic issues. The D-lab has funding from US AID.

The UC-Berkeley Blum Center for Developing Economies is host to a development engineering program. Through coursework, research mentoring, and professional development students from a variety of disciplines can have a certification in an area outside their home discipline. It's a

program for doctoral students whose research includes topics related to the application of technology for people living poverty. The program has funding from the NSF and US AID.

Boston University hosts the Lab for Engineering Education and Development (LEED). LEED is dedicated to creating the next generation of engineering scientists and scholars who are cognizant of engineering challenges in the developing world and are equipped with the appropriate knowledge to meet these challenges. In collaboration with partners and stakeholders in the field, LEED strategizes the development of context-specific solutions and local devices specifically designed to work in resource-limited environments. LEED identifies health technology deficits through consultation with health care professionals in the field and assigns a student team to work on it. Once a prototype has been developed and tested, the process of transporting the technology innovation to the field and, in effect, the global market begins. LEED has funding from US AID and the World Health Organization.

The Institute of Design, or D-School, at Stanford University is one paradigmatic example. The D-School recognizes that human problems are messy and complex. To help their students better understand how to address these, the D-School adds tools to a student's toolkit. The idea is to meet the student where they are and develop their creative confidence.

The Humanitarian Engineering Program at the Colorado School of Mines (CSM) is another example. CSM brings together engineering and social science professors to transform engineering by changing the ways that engineers are taught to think. CSM's minor (Six courses in all) in Leadership in Social Responsibility seeks to prepare students to become leaders in promoting shared benefits between companies and communities.

For the most part, these programs are fairly new. Further, they seem to deal with projects without the same systematic approach that WPI does. Through this program, WPI can easily meet these programs where they are and show leadership on the global stage.

Discussion

Based on market analysis and review of other programs, when fully up and running we expect to attract a cohort of around 20 to 30 full-time on-campus students to this program; we are unsure about certificate students. In the first year of operation, the program is estimated to draw 10 students, and in the second year to ramp up to 20 to 30 full-time students as steady state. This would generate a revenue of around \$250,000 a year the first year, and \$500,000 a year thereafter.

Given the structure of the proposed program and the existing resources across affiliated departments and the different schools at WPI and Clark, the initial launch could proceed with limited resources. We would need stipends to develop several new courses in DEV; we have the human resources to staff the courses.

Program Assessment

This program is initially going to rely largely on existing resources at WPI and Clark. This enables us to offer the program quickly. However, we intend to continue to shape and build the program

over time to define it more precisely, increase its visibility and competitiveness, so that it will remain relevant and attractive to both prospective students and to prospective employers.

To shape the program, we plan to continuously assess the needs and interests of our student applicant pool and our existing student population. This will include interviewing students about their interests, their perception of our program, as well as tracking their subsequent employment. We plan a major marketing campaign on both campuses after this motion receives approval.

To assess our progress, we will create a committee in the coming months for purposes of assessing the program. The charge of this committee will be to design an assessment plan to assure the health of the program. We intend to execute on the recommendations derived from this assessment committee in the subsequent year, which would then be the second year that our program would be offered.

Program Growth

Based on the assessment committee's recommendations, we anticipate adding new courses in areas ranging from "area studies" in Africa and Latin America, and technology development and diffusion in Africa and Latin America. Similarly, we are working with faculty in the business school to offer more developing world case studies in their classes. Areas of concentration and additional affiliated faculty and affiliated departments and programs may be changed over time. The DEV Review Board, with input from the Assessment Committee, will review proposals for extension and changes of the program to assure its healthy growth.

To keep the program nationally competitive and to be able to attract top talent, we anticipate adding high quality faculty with strong area knowledge, those who can bring together technology for the developing world, and design. Is to our DS faculty members.

Furthermore, while the program provides ample opportunity for students to choose electives from a diverse range of disciplines we anticipate that in the future based on level of interest by our students, faculty and external partners we will design specializations of the degree in areas of high impact. These could for example range from health care technology, water treatment, environmentally safe mineral development, materials for affordable sustainable construction, and recycling. Social justice concerns run through all of the themes, current and future.

External Ties and Advisory Board

We are reaching out to potential government, foundation, NGO, industry, and international academic partners to serve on an advisory board. The advisory board will help us shape the program, its offerings, and identify potential new academic linkages. In addition, the advisory board members may provide input on job opportunities, projects, internships, and other resources for our students. These organizations include but are not limited to: US AID, the Rockefeller Foundation, the Ford Foundation, the United Nations Development Program, government contractors, the World Bank, Engineers Without Borders-USA, the University of Ghana, Ashesi University, Universidad de Cuenca, Universidad Nacional Autónoma de México (UNAM), and other universities in Africa and Latin America.

We plan to interact regularly with our advisory board to keep us abreast of skill sets our graduates will need to be successful in the development field, whether they go into entrepreneurship, non-profit work, program management and assessment, or academia. We are in the process of putting this board together from our various international networks.

Discussion of Resources

The WPI administration have committed to supply adequate resources to run the program successfully. Given the commitments of the affiliated departments we will be able to run our programs with few resources, though we may need to hire two or three adjuncts to cover some courses. The Global School has been promised new hires and these positions could support the DEV program. Future investment in the program will be commensurate with the student interest and growth.

Implementation Time-Line*

Spring 2020	Program approval by WPI faculty and MOU with Clark
Winter 2019 USA	Develop website and advertise through our partnership with EWB-
Spring 2020	Admission of applicants into the program
Summer 2020	Development of new courses
AY 20/21	Launch the program with the August Boot Camp
AY 20/21	Assist Global School in recruiting complementary faculty
AY 21/22	First cohort graduates

*Six students have already expressed interest and/or applied to the program based on word of mouth and minimal networking.