**Worcester Polytechnic Institute**
# IQP Syllabus

*Faculty Advisor Name and Contact Info Go Here*

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## IQP Objectives and Learning Outcomes

The Interactive Qualifying Project presents students with the opportunity to work on an extended research project to address a problem involving science, technology and society. Faculty expect that students will gain a greater understanding of the role and impacts of technology in society, and the human and social response to technological change. Unlike most coursework, however, the IQP engages students as self-directed learners. Although advisors may suggest specific assignments, the student team is required to take responsibility for the definition and progress of the project. Unlike a class that is largely directive, this is your IQP. If you put self-directed initiative, creativity and energy into it, and you will likely find it a great learning opportunity and an exciting chapter of your educational career.

The WPI Faculty created the IQP to help students understand the social and humanistic implications of their work, and to understand how science and technology influence and are influenced by social systems and human needs. The IQP is not related to students' majors, but rather is a general education requirement with broad educational objectives. According to the learning outcomes stated for IQPs, students will:

1. Demonstrate an understanding of the project's technical, social, and humanistic context.
2. Define clear, achievable goals and objectives for the project.
3. Critically identify, utilize, and properly cite information sources, and integrate information from multiple sources to identify appropriate approaches to addressing the project goals.
4. Select and implement a sound approach to solving an interdisciplinary problem.
5. Analyze and synthesize results from social, ethical, humanistic, technical or other perspectives, as appropriate.
6. Maintain effective working relationships within the project team and with the project advisor(s), recognizing and resolving problems that may arise.
7. Demonstrate the ability to write clearly, critically, and persuasively.
8. Demonstrate strong oral communication skills, using appropriate, effective visual aids.

9. Demonstrate an awareness of the ethical dimensions of their project work.

The IQP is an opportunity for significant intellectual and professional development that, done well, makes WPI graduates stand out from others.

## Schedule and Content of Project Work

Usually, the IQP begins in the first term with the development of a project proposal. The second term is dedicated to executing the research plan explained in the proposal. The third term is reserved for finishing the research, concluding analysis of information gathered, finalizing a project report, and preparing a final presentation of the project. Below is presented an overview of each term's objectives and activities.

### A-Term - The Project Proposal

Completing a project proposal is the major activity of the first term. To give you experience with oral presentations, you will prepare and deliver a presentation of your proposal at the end of the term. The proposal will contain evidence of a substantial research effort both into the research question(s) you've identified and into the appropriate sources of information and methods of research appropriate for answering your research questions. It normally contains the following three sections (usually presented as three separate chapters which also get used in the final report). See the *IQP Writing Guide* for additional guidelines.

1. Introduction: The Introduction appears first, but is often rewritten late in the project. It explains the research problem and identifies specific research questions that the authors wish to pursue during the project. In addition, the Introduction should give the reader a sense of the significance of the issues to be addressed. You should tell the reader both what to expect and why to bother reading further. This can usually be accomplished in 2-3 pages.

2. Background & Literature Review: These are two different writing tasks; usually, an IQP has a Background chapter containing a literature review along with project-specific background information.

**The *background information* explains the nature and history of the problem or issue that is the focus of the project.** Because this is an *interactive* project, information on the relevant scientific or technological aspects of the problem and also the societal dimensions of the problem should be presented.

**The *literature review* explains how others have conducted research on the same or similar research questions that you propose to address, and synthesize their findings.** It may be that there is no identical study that can be found, but by reading research reports on similar questions, you learn how others have conducted similar research, successful and, perhaps, unsuccessful research methods, and you can identify models for your own research. *This prior work should inform your own research methodology. That is to say, you must draw lessons from the prior research regarding the best methods for conducting your own research.* In writing the literature review you may well criticize prior work if it seems inadequate or flawed in some way. You should explain why the prior work is a good or poor guide for your own research. You might explain why it is important to replicate that research or to deviate from it in some way to further the research on the topic. This section will conclude with the lessons learned from the background and literature review that are important to your own study.

A literature review is a normal part of scholarly work. When you find scholarly work related to your project problem, you will find yourself reading literature reviews written by others. If the work is highly relevant to yours, you should read the literature described in other authors' literature reviews. See the Gordon Library webpages for more advice on literature reviews and background research.

3.  Methodology: The final chapter of the project proposal describes the research methodology that you believe is appropriate to your research questions and justifies it. It also presents a plan to guide the research that you intend to undertake. Research methods may include interviews, focus groups, survey work, observation, cost/benefit analysis, and archival research based on research methodologies such as participatory action, experimental, historical, descriptive, evaluation, comparative among many other recognized research approaches. The Gordon Library webpages include a lot of helpful information on methods.

Note:  *Research that involves human subjects may need approval from WPI's Institutional Review Board (IRB) which is charged with ensuring that human subjects research be conducted in an ethical and professional manner.* The IRB has a formal review process for this research and you will be required to complete an application describing your research methods in some detail, if you are to receive IRB approval for the work. The IRB application process and review takes some time which can delay your project. Plan the work with that potential delay in mind. For more information see the WPI IRB website.

## B-Term – Conducting the Research

If adequate progress is made in the first term, you should begin the second term with a working plan for going forward, conducting research and gathering information. If approval of the Institutional Review Board (IRB) is required, the documentation should be provided to the IRB at the beginning of the second term. The IRB may request changes to the application, informed consent agreements and research protocols that you prepare. You must be conscientious and timely in responding to the IRB to avoid a delay that could impair the ability to gather information from human subjects. Once you have received approval, you should begin your data collection as soon as possible in this term. This phase of the IQP may involve coordinating with interviewees and conducting other forms of field research, so don't delay in setting up these activities.

Because much of the second term is usually devoted to executing a research plan, the project team may be writing less in this term than in the others.   However, this term is the time to develop a draft outline of the entire project report, to revise the Methodology chapter to reflect the work as it was actually done, and to begin reporting findings from your original research.   This writing, plus perhaps another presentation at the end of the term, will provide the evidence needed for your work to be evaluated at the end of the term. Adequate progress during this term means that the team has substantially completed the research portion of the project and has been able to write about some portion of this work.

## C-Term – Project Completion

It is not unusual for data collection to continue into the third term, but ideally all interviews, etc. will be complete by the end of the second term or very early in the third term. Once the research activities are complete, attention can focus on analyzing the information gathered, generating conclusions and recommendations and finishing the report. The initial proposal including the introduction will also need revision to reflect any new information that belongs in the background or literature review, any significant changes in the project direction since the proposal was written, and how the research was actually executed. In addition, students should prepare a final bibliography and/or reference list, a title page,

abstract, table of contents, executive summary, and authorship page. See the Writing Guidelines document for more details. The final conclusions and recommendations should be well-grounded and persuasively argued.

*A note on deadlines:* Projects can extend for more than 3 terms, but a failure to complete a project in three terms usually indicates some fault on the students' part. Although the Registrar will allow submission of projects any time before the beginning of the subsequent term, the expectation is that all projects will be complete and ready for electronic submission to the Registrar on or before the last day of the third term. Projects that extend past the third term must be completed by continuing registration of 1/6th unit per term until the project is completed. A grade of A is usually not awarded to projects that extend beyond 1 unit of work.

## *Project Expectations and Guidelines*

This section describes basic expectations for "time on task" along with expectations for written drafts, presentations, meetings, and teamwork. It also explains the criteria advisors use to evaluate each team's and student's work.

### *Time Commitment*

Although IQPs are not organized like courses, with pre-scheduled meeting times and highly structured assignments, they carry a full unit of academic credit – equal to three courses – and require substantial effort. If you are scheduled for 1/3 unit of work in a term, you should put in between 15 and 20 hours of work per week on the project. Thus, a team of three should give evidence of 45 to 60 person-hours of work each week. This evidence typically involves submission of written material and other deliverables created by the team.

### *Written Report Draft Material*

The written report will be the only complete, permanent, public record of your project, aside from deliverables you present to your sponsor. In addition, writing is a powerful way of testing and advancing your thinking while a project is in progress. Therefore, advisors place a lot of emphasis on how your thinking about the project and its outcomes is documented in drafts and in the report. See the *IQP Writing Guide* for detailed advice and examples.

Advisors expect a well-organized, tightly written report that synthesizes ideas and demonstrates critical thinking. Grammar, spelling, and syntax are also important, but advisors will not note every grammatical problem. You are expected to know or learn basic rules of grammar and style; visit WPI's [Writing Center](#) if you need assistance. It is your responsibility to manage document revisions and back up your work systematically.

***All draft submissions should be critically edited by the group.*** This means that anything you submit belongs to the whole group, and should represent the best writing that your group can produce. The quality of your draft submissions will influence your final grade, since final drafts may well reflect a lot of input from your advisors. Draft material should be neat and complete; content and form are both important.

***With every revision of a previous draft, your team should submit a short cover memo,*** briefly summarizing the rationale for major changes in content and organization, how you attempted to respond

to "big picture" comments, and anything in particular that you would like feedback on. Please use this memo to help your advisors know where to focus time and attention.

***With every draft you should also submit the current Table of Contents of the report,*** showing your organization of sections and subsections. Remember that section headings should be sufficiently descriptive such that someone could predict accurately the content of that section without reading it.

***Responding to advisor comments is an essential part of the writing process.*** The purpose of comments is, first and foremost, to advance your critical thinking and argumentation, and also to help you write more clearly. Often, an advisor's goal when giving feedback is to be a "helpful reader." Comments will sometimes be in the form of a question, or a description of how a reader might react at a particular point in the document. *All types of comments, even if they do not suggest exactly what you should do, should result in some sort of revision or response*. Consider and act on feedback sincerely and thoughtfully. If you submit a draft in which you have not made changes in response to suggestions made or questions asked on the previous draft, attach some explanation as to your reasoning, or explain what you're still working on. Similarly, if you do not understand feedback, please ask for clarification. *Without evidence otherwise, lack of response to feedback suggests lack of effort or close-mindedness.*

***For each new writing submission, try to demonstrate lessons learned from previous submissions.*** Advisors are looking for you to improve your writing, not just "fix problems," and will be looking for you to apply previous advice as you draft new chapters of the report. For example, the importance of introductory paragraphs, "researcher's voice," logical and coherent organization, and use of evidence applies to all chapters of the report. The "first drafts" that you should submit should not be *your* first draft. For example, in first drafts of a section or chapter, advisors expect to see helpful introductory material and tight paragraphs with clear topic sentences.

## Using and Citing  Sources

We expect students to research a wide variety of high quality materials including scholarly journal articles, government and NGO reports, books, and primary source newspapers. In addition, students may use magazines, trade journals, and web sources, if used in an appropriate context. Encyclopedic information such as that found on Wikipedia should not be cited in your IQP and should serve only as a place to gather background information and find leads to further primary or scholarly resources. Review Gordon Library's IQP research guide for detailed information about search strategies and sources. Librarians meet with IQP teams on a regular basis; please contact them early in your project to ensure that you are on the right track for finding and citing high quality sources for your project.

Project work must comply with standards of academic honesty and professionalism in writing and citing sources. All citations must follow an approved style; the APA style is most appropriate for most IQPs. Visit the Gordon Library website to find information about using a citation manager such as EndNote or EndNote Web; such tools will enable you and your team to compile sources in one place and generate APA citations automatically.

## Academic Integrity

The WPI Academic Honesty Policy identifies several acts that constitute academic dishonesty that could apply in projects, including fabrication and plagiarism. Such acts will not be tolerated and will be addressed according to WPI's policies and procedures. (See the Student Guide to Academic Integrity for more information.) In particular, *please ask your advisor if you have any uncertainty about what constitutes plagiarism and how to avoid it*.

## About Copyright

Since IQPs, MQPs, theses, and dissertations are published online and often distributed to a sponsor you need to pay close attention to copyright law.

When submitting your project, theses or dissertation, you will be asked to agree to the following statement:

> *I hereby certify that, if appropriate, I have obtained and attached hereto a written permission statement from the owner(s) of each third party copyrighted matter to be included in my project report, allowing distribution as specified below. I certify that the version I submitted is the same as that approved by my advisor(s) and sponsor(s).*

For information about copyright and your IQP please review the University's copyright policy. Gordon Library provides information and suggestions for how to locate copyright-free materials. Write to copyright@wpi.edu with specific questions you might have.

## Weekly Meetings with Advisors

Typically, IQP teams meet each week with their advisor(s). It is the students' responsibility to identify times when the entire team is available to meet and notify the advisor(s) at the start of each term. Once the project is underway, the project team has the responsibility to run weekly meetings. The progress report /agenda for each meeting should always include the following items:

- *Accomplishments in the previous week.* Do not use the agenda as notes for yourselves; make it useful to the people you're meeting with by conveying content of interest. Instead of a list of topics or tasks, make your agenda informational, so that it has take-away value. What specifically did you learn or research? What major issues emerged? What key resources did you find? Where appropriate, include attachments as part of an agenda "packet" in order to provide more information. *There is no need to list "trivial" accomplishments such as sending an e-mail, making a telephone call, etc. Focus on substantive accomplishments of interest to the attendees, and especially on the outcomes of your efforts.*

- *Plans for the next week.* Again, focus on substantive plans and what you intend to accomplish by the next meeting. Be specific, and include who will be doing what.

- *Any problems you are encountering.* Advisors understand that projects don't always go as planned. Take advantage of the weekly meeting to get advice on your greatest challenges.

Another way to gauge the appropriateness of these agenda items is to ask yourselves if the content reflects the level of expected effort for a one week period, which for a 3-person team doing 1/3 unit of work is about 50 person-hours per week. Are the outcomes of those hours' worth of work evident?

One team member should be the *facilitator* for each meeting, and another person should be the *secretary;* roles should rotate through all team members during the project. Each team member should participate in every meeting, with responsibility for some subset of the agenda items. The chair's role is to keep the meeting on track, not to report everything him or herself. While everyone should be taking notes, the secretary should take detailed enough notes to send out *minutes* that focus on action items – things that are agreed on during the meeting.

*Data gathering instruments (e.g., interview protocols, observation protocols) must be reviewed by advisors before use, and should be pre-tested wherever possible.* This type of review is essential to make sure that your questions will be understood, that there are not "leading questions," and that the information you gather from them will be useful in meeting your goal and objectives. Be sure to schedule in time for this review and pre-testing. If your research involves human subjects, you will need to submit

your plans to WPI's Institutional Review Board (IRB) for approval.

Much can happen in one week of a project, so in order to give your advisors the opportunity to provide you with useful input and feedback, it is important to keep everyone updated regularly. If something important comes up between meetings, do not wait until the next regularly scheduled meeting to address it—get in touch with your advisors as soon as possible.

***The facilitator should send out the agenda a day in advance of the meeting. The secretary should send out the minutes the day after the meeting.***

### Teamwork

Your career success will depend on your ability to work effectively with people who have different perspectives, attitudes, and backgrounds than you. One of the most important skills you will be asked to develop during this project is that of effective teamwork. The basis of good teamwork is a shared desire for the team, and not just individuals, to excel.

It is very important to have lots of team discussion time prior to meetings with advisors, and when major decisions about the project need to be made. Your partners should always know what you are going to say during a meeting—*never "spring surprises" on each other*. Avoid passing in material that you have worked on alone and not shown to your partners. Put everyone's name on everything, in alphabetical order. Do not denigrate the performance of your partners in front of your advisors or liaisons. Spend meetings performing as a team rather than highlighting your own accomplishments. In meetings, you should find yourself saying "we" more than "I"—just make sure that you have discussed and agree upon statements where you use "we"!

Although advisors see you in action during meetings and will see the outcomes of your work, they rarely see the "daily grind" and process of teamwork behind the scenes. It is not unusual for team members to have some disagreements or difficulty meeting each other's expectations. Some teams try to hide concerns about individuals' efforts or their team processes thinking that bringing it out in the open will reflect poorly on their group dynamics. On the contrary, addressing group dynamic issues that come up shows a commitment to work constructively and to learn about effective teamwork. Even teams that work very smoothly together may not in fact learn much about teamwork if they do not reflect on the processes and seek improvement. The goal is not for you to get along well – it is for you to make progress in effective teamwork.

### Self and Team Assessment

At the end of the first and second terms, you are asked to conduct a **Formative Team Assessment**. The word "formative" means *for purposes of improvement*. This assessment has two components:

a. *Team process and products*: Each team member should assess project progress and identify strengths and areas for improvement for the team as a whole.

b. *Individual performance:* Each person should assess his/her own performance and contributions of group members. Identify several areas of strength and several areas for improvement for every person on the team, including him or herself.

After individuals have prepared items *a* and *b*, the team should gather together and discuss everyone's assessments as a group. Submit a single report to advisors that contains the following items:

1. Several specific actions that the team will take to improve its performance. Please note that a

specific action is different from a goal. For example, *be more focused* is a worthy goal, but NOT a specific action. *Close web browsers in an effort to maintain focus during the day* would be a specific action.

2. Several <u>specific actions each team member commits to take</u> to improve personal effectiveness.

3. All individual input (items *a* and *b* above).

At the end of the final term, each individual will submit a self- and team-assessment directly to advisors, assessing team progress and individual contributions.

## *Evaluation and Grading*

Project grading is very different from course grading. In a class, "correctly" completing all assignments and evaluations (designed by the professor) earns a student an A grade. However, projects have no "correct" solution. *An A project grade requires that students go beyond what is expected and demonstrate originality, initiative, and creativity.* Students sometimes feel that lots of hard work deserves an A; certainly, you are likely to devote more effort to this project than anything you've done thus far at WPI. However, advisors evaluate work based on outcomes, not just effort – as in the real world.

Project grades reflect not only the final *products* (e.g., results, reports, presentations, etc.), but also the *process* by which they were attained, including steadiness of effort (not a last-minute crunch), teamwork, quality of drafts, and self-direction. The evaluation criteria in this guide are aligned with the intended learning outcomes of the IQP listed earlier in this document. Later in this document, the outcomes are organized into four tables, with descriptions of various levels of achievement (at the A, B, and C level) for each. You should refer to these *grading rubrics* regularly for self-assessment and improvement, and also to help your teammates improve. At the end of each term, you will get feedback relative to these criteria, to make sure you understand the assessment of your progress.

Each student will get an individual grade each term, plus an "overall" grade at the conclusion of the project. The available project grades and their interpretations are as follows:

**A:** *Consistently excellent work* that attains, and perhaps exceeds, project goals and the IQP Learning Outcomes. Characteristics of A work include meeting all requirements of the B grade, then exceeding them in several areas, for example by developing particularly effective or creative goals and/or methodologies, and demonstrating notable initiative, originality, depth and critical thought in analysis and recommendations. Students take the lead in discussions and analysis rather than just responding to faculty suggestions (particularly as the project matures). Teamwork self-assessment shows critical thought and tangible evidence of learning. Any individual earning an A will have been assessed positively by his or her team members, with tangible and appropriate evidence to support the assessment.

**B:** *Consistently good work* that attains project goals and the IQP Learning Outcomes. Characteristics of B work include: following up on advisor suggestions; defining a clear goal and objectives; writing a clear, professionally presented report with good and improving drafts along the way; completing all work in a timely and satisfactory manner; demonstrating sound analysis that includes logical interpretation of findings; delivering useful recommendations; coming to meetings well prepared, and working hard, consistently, and diligently. A B grade means the team did a good, strong job, but perhaps did not show lots of initiative, originality, or critical thinking in a self-directing and proactive manner. The teamwork self-assessment shows reflective ability and tangible evidence of learning. Any individual earning a B will have contributed consistently to the team effort, with tangible and appropriate evidence to support that assessment.

**C:** Acceptable work that partially attains project goals and the IQP Learning Outcomes. Characteristics of C work include meeting some but not all requirements for a B grade; writing that is readable but didn't show much progress between drafts and required lots of faculty input; weaknesses in methodology and analysis that could have been anticipated and addressed, and demonstrating little or no originality and initiative. Missing deadlines, missing meetings without prior notification, and lack of response to faculty comments on report drafts are traits common to C-level performance. The teamwork self-assessment may show little evidence of critical introspection or learning about teamwork, or avoidance of conflict. An individual may earn a C, even if the project as a whole is evaluated more positively, if his or her contribution is sub-par, with tangible and appropriate evidence to support the assessment.

**NR**: This grade denotes effort insufficient for registered credit. Characteristics of NR work include doing very little throughout the project; missing several meetings without prior notification; coming unprepared to meetings or having little to show; repeatedly missing deadlines; turning in substandard work; not completing assigned tasks and showing little or no initiative and originality.

**NAC:** This grade is reserved for performance that is unacceptable for credit. It means that a student's performance (or lack of it) has seriously impeded group progress, or it has embarrassed the group, the project sponsor, or WPI. Note that this grade remains on the transcript.

At the conclusion of the project, a "Completion of Degree Requirements" form is required from each team member. At that time, each student gets an overall grade for the project work. As mentioned previously, each team member should be assuming the primary responsibility for certain aspects of the project. At the same time, however, each team member should be familiar with all aspects of the project and be able to discuss the project in an in-depth, articulate manner. Also remember that individuals are assessed in the context of team effort. Note that in the evaluation rubrics, some elements are examined at a team level and some at an individual level to reflect the importance of both.


## *IQP Resources*

WPI has been in the IQP business for over 40 years and during that time, many projects have been completed and are available in the Gordon Library. Projects completed from 1999-2003 have been scanned and made available through the library website but in most cases only to those who are trying to access them from a computer within the campus' IP range. Since 2003 we have archived projects electronically through the website, and in most cases they are available for worldwide viewing. These projects are searchable through the library website and are indexed in Google Scholar. Projects completed prior to 1999 but that are related to WPI or Worcester may be available in print through the archives at Gordon Library. Always look for IQPs in your topic area and become generally familiar with IQPs so that you have models for your own work and an understanding of faculty expectations. An additional place to find completed IQPs is:  http://www.wpi.edu/academics/library/find/iqp-mqp.html.

This document contains a Project Evaluation Criteria and Rubrics. An *IQP Writing Guide* is also available from IGSD.

WPI's Institutional Review Board (IRB) provides guidelines and oversight for research involving human subjects: wpi.edu/Admin/Research/IRB/.

Following are some additional sources that may be useful for your project. The Gordon Library has many of these sources, and a great deal of information about IQP research on its website.

- Berg, Bruce. (2011). *Qualitative Research Methods for the Social Sciences* (8th ed). Boston: Pearson Education Inc.

- Creswell, J.W. and Plano Clark, Vicki L. (2011). *Designing and Conducting Mixed Methods Research* (2nd ed.) Thousand Oaks, CA: Sage Publications.
- Fenichel, M., & Schweingruber, H.A. (2010). *Surrounded by Science: Learning Science in Informal Environments*. Washington, D.C.: The National Academies Press.
- Krueger, Richard A., & Casey, Mary Anne. (2000). *Focus Groups* (3rd edition). Thousand Oaks, CA: Sage Publications.
- National Research Council (2009). *Learning Science in Informal Environments.* Washington, D.C.: The National Academies Press.
- Salant, Priscilla, & Dillman, Don A. (1994). *How To Conduct Your Own Survey*. New York: John Wiley & Sons. [On reserve in Library]
- Wholey, J.S., Hatry, H.P., Newcomer, K.E., Eds. *Handbook of Practical Program Evaluation* (3rd ed.)
- University of Illinois Extension, Program Planning and Assessment, "Key Informant Interviews," http://ppa.aces.uiuc.edu/KeyInform.htm.

## *Project Expenses*

IQP students don't usually incur too many project-related expenses except for transportation, but there may be some exceptional circumstance that involves expense. The first source to politely ask for support is your sponsoring agency, if you have one; after all, they are getting valuable work from you. Gratefully accept any support they offer.

In the rare event that a project involves significant out-of-pocket expenses, students can request reimbursement for approved expenses under the following conditions:

- Students are responsible for commuting expenses to visit their sponsor. However, any unusual travel for project field work is eligible for reimbursement (ask your sponsors first if they can cover the costs).

- You will not be reimbursed for the first $150 per student; this must be paid out of your own pocket. This is WPI policy—the idea is that students are expected to cover some level of expense, such as books or supplies, associated with any activity. *You will need to provide evidence (i.e., receipts or careful records) of these initial expenses before requesting reimbursement for additional project expenses.*

- All expenses should be borne equally by team members.

- **All expenses must be approved by IGSD *before* you spend the money**; see Ruth McKeogh (rmkeogh@wpi.edu) for details and guidelines.

- Anyone incurring approved expenses who wishes to get reimbursed must provide an expense summary listing what the expenses were, as well as the receipts. *You will not be reimbursed for any expense unless you have a receipt.* This includes travel, communication, or any other expense.

## Project Evaluation Criteria and Rubrics

| **1. Formulate and complete a project that addresses a combination of social, cultural, humanistic, and technical issues** | | | |
|---|---|---|---|
| *IQP learning outcomes:* 1-5, 9; *Sources of evidence:* Meetings, presentations, report, and project implementation in general | | | |
| | **Excellent (A)** | **Good (B)** | **Fair, Acceptable (C)** |
| Goal and objectives | Project has a well-conceived and clearly stated goal and objectives, and the goal is achieved. | Project has a stated goal and objectives, and the goal is achieved. | Project has a stated goal and objectives, and the goal is partially achieved.* |
| Background and project context | A sophisticated understanding of social, cultural, and technical issues related to the project is evident throughout the students' work, and demonstrate background research with both breadth and depth. | Shows a good understanding of social, cultural, and technical issues related to the project, demonstrating appropriate background research. | Does not consider some important social, cultural, and/or technical issues related to the project or shows a poor understanding of them, limiting project outcomes and credibility. |
| Methodology | Students select and implement a sound methodology to achieve the goal, understanding and communicating their limitations. | Students select a reasonable methodology, and implementation of methods is mostly sound. Limitations are acknowledged. | Weaknesses in methodology are often unrecognized or could have been anticipated and addressed, or students do not approach project systematically. |
| Analytical thinking | Students analyze data or design alternatives systematically, in-depth, and with creativity and critical thinking | Data or design alternatives are analyzed mostly systematically. Critical thinking is usually evident. | Little evidence that a systematic process was used to analyze data or design alternatives. Critical thinking is often weak. |
| Recommendations or other deliverables | Delivers clear, comprehensive recommendations to the sponsor that are well supported by project findings | Delivers useful recommendations to the sponsor that are supported by project findings | Recommendations may not be useful to sponsor or are weakly supported by project findings |

*Sometimes the project goal is not entirely achieved for reasons that are beyond the students' control. Advisors evaluate only what is within the students' control.*

## 2. Communicate the process and outcomes of the project persuasively and professionally both in written and oral form

*IQP learning outcomes:* 7,8; *Sources of evidence:* Presentations, report

| | **Excellent (A)** | **Good (B)** | **Fair/Acceptable (C)** |
|---|---|---|---|
| | ***Team Products*** | | |
| Use of guidelines and feedback | Students clearly make use of writing guidelines, such that each section clearly meets its expected purpose. Students learn from advisor feedback such that advisors' role in writing improvement decreases as project progresses. | Students attempt to make use of writing guidelines, and each section/chapter mostly meets its expected purpose. Reliance on advisor feedback for writing improvements may be steady throughout the project. | Students often do not make use of writing guidelines. Report requires high levels of advisor effort to make it acceptable. |
| Persuasion and use of evidence | Writing and presentations reflect critical thinking: claims are persuasive because they are supported by credible evidence, using high quality sources of information, and because they are qualified appropriately. | Clear progress is shown in making writing and presentations more persuasive. Most claims are supported by credible evidence and are qualified appropriately, but some are overstated or exaggerated. | Some progress is shown in making writing and presentations more persuasive, but many claims are still not supported by credible evidence or qualified appropriately. |
| Organization and coherence | Writing and presentations are logically organized with a coherent line of reasoning. Formatting assists in conveying structure of paper or presentation. Paragraphs feature clear topic sentences and are tightly written about that point. Almost all transitions are smooth. | Writing and presentations are usually logically organized with a coherent line of reasoning. Formatting usually conveys structure of paper or presentation. Readers occasionally struggle through wandering paragraphs or unclear transitions. | Writing and presentations don't show much improvement in organization and coherence, and readers often struggle to identify a line of reasoning. |
| Clarity and writing mechanics | Writing is mostly clear and concise. Active constructions and a "research voice" is used throughout. Mostly free of errors in writing mechanics (e.g., grammar, spelling, punctuation, sentence structure). Word usage is almost always varied and appropriate. | Writing is usually clear and concise. Passive constructions may occasionally obscure meaning, and some writing may be conversational in tone. Most elements of writing mechanics are correct, and errors do not obscure meaning. Word choice sometimes does not convey intended meaning. | Frequent writing errors begin to obstruct meaning or cast doubt on the credibility of the authors. Overuse of passive constructions may obscure meaning and make reading hard to follow. Word choice often does not convey intended meaning. Conversational tone may not be consistent with credible research. |
| Visual aids | Visual aids are creative, engaging, and convey messages effectively to diverse audiences. | Visual aids are professional and add value beyond spoken remarks. | Visual aids are professional but do not add much value beyond spoken remarks. |
| | ***Individual Products*** | | |
| Quality and extent of writing contributions | Authorship page indicates a substantial writing contribution. Produces writing of good quality that requires minimal revision and editing by team members. | Authorship indicates a reasonable amount of writing contribution. Produces writing of sufficient quality that team members can proceed with reasonable levels of revision and editing. | Authorship indicates few writing contributions. Or produces writing of insufficient quality such that it cannot be used without substantial revision from team members. |
| Presentation skills | Demonstrates professional presentation skills. Clearly prepared and succeeds in engaging the audience. | Shows noticeable effort and improvement in presentations skills. Clearly prepared and attempts to engage the audience. | Shows some effort and improvement in presentation skills. Sometimes does not seem prepared or is unable to engage the audience. |

**WPI**

| | **3. Work productively as a team, make effective use of all person-power, and reflect critically and constructively on group process** | | |
|---|---|---|---|
| | *IQP learning outcome*: 6; *Sources of evidence:* Teamwork assessments, meetings, report authorship | | |
| | **Excellent (A)** | **Good (B)** | **Fair/Acceptable (C)** |
| | *Team as a whole* | | |
| Teamwork monitoring | Our team can identify specific processes, norms, and/or guidelines we use to work effectively and respectfully together. We regularly monitor our group processes along with individuals' ideas, feelings, and contributions. We can identify actions or adjustments made as a result. | Our team can identify processes, norms, and guidelines used to work effectively and respectfully together. We regularly monitor our group processes along with individuals' ideas, feelings, and contributions. We may have some difficulty showing useful, tangible outcomes and actions from that monitoring. | Our team attempted to develop processes, norms, or guidelines to work effectively and respectfully together. We tried to monitor our group processes but often did not succeed in making adjustments. We tried but did not always succeed in monitoring individuals' ideas, feelings, and contributions. |
| Team critique and conflict identification | Our team reflects critically on its effectiveness and communicates with each other and with advisors regarding challenges it is facing and how it has responded effectively to those challenges. | Team reflects on its effectiveness and attempts to communicate with each other and with advisors regarding challenges it is facing and how it has attempted to respond to those challenges. | Team does not critically reflect on its effectiveness or does not communicate with each other or with advisors regarding challenges it is facing. Conflict avoidance. |
| | *Individuals* | | |
| Reliability, effort, quality of work | Partners would say that I am always reliable, and deliver my best effort and high quality work. | Partners would say that I am almost always reliable and deliver solid effort and good quality work. | Partners would say I am inconsistently reliable and don't always deliver solid effort. Quality of work sometimes suffers. |
| Openness to feedback | When partners or advisors target an issue that relates to me, I am not defensive and always open to discussion. I try to resolve the issue promptly and succeed in doing so. | When partners or advisors target an issue that relates to me, I am usually not defensive and am usually open to discussion. I try to resolve the issue promptly and usually succeed. | When partners or advisors target an issue that related to me, I sometimes am defensive or not always open to discussion. I still try to improve the situation satisfactorily. |
| Self-assessment and response to feedback | I show critical introspection in identifying my strengths and weaknesses as a team member from the perspective of diverse others. I can identify specific actions I have taken to modify my behavior. | I can identify my strengths and weaknesses as a team member from others' perspectives. I can identify some general ways in which I have attempted to modify my behavior. | I can identify some of my strengths and weaknesses as a team member but not always from others' perspectives. I have difficulty showing evidence of actions I took that led to noticeable improvement. |
| Support for other team members | I regularly share my feelings and opinions and elicit those of others. I give constructive, actionable feedback to team members and support their efforts to improve. | I usually share my feelings and opinions and consider those of others. I show attempts to give constructive feedback to team members and support their efforts to improve. | I occasionally share my feelings and opinions and sometimes disregard those of others. I show little progress in learning to give constructive feedback to team members. |

**WPI**

### 4. Show professionalism

*IQP learning outcomes:* All, but especially 6 ; *Sources of information:* Project implementation, meetings, development of report and presentations

| | **Excellent (A)** | **Good (B)** | **Fair/Acceptable (C)** |
|---|---|---|---|
| Conduct of meetings | Meetings between the team and advisors/liaisons are useful and productive. The team is always well prepared, and all team members have a meaningful role in meetings. | Most meetings between the team and advisors/liaisons are useful and productive. The team is almost always well prepared, and all team members usually play a role. | Team often comes to meetings unprepared, or not all members are engaged. Advisors often step in to ensure that important and useful discussion occurs during meetings. |
| Initiative | Students take the lead in project formulation and implementation. They are proactive and take initiative. They become increasingly self-directed with positive outcomes. | Students become more self-directed and less reliant on advisors as the project progresses. They are usually proactive, take initiative, and show some independent thinking. | Students are often reliant on direction from advisors to deliver a quality project. They do not show much initiative or original independent thinking that is sound. |
| Overall use of feedback | Students respect feedback from advisors and liaisons, critically reflect on it, ask for clarification when necessary, and always respond to the feedback in recognizable ways. | Students respect feedback from advisors and liaisons and attempt to critically reflect on it. They usually ask for clarification when necessary and respond to the feedback in recognizable ways. | Students don't always value feedback from advisors and liaisons and may not reflect critically on it. Feedback that isn't understood is often ignored, or team does not respond to feedback in recognizable ways. |
| Attitude | The team always responds with a positive attitude to unexpected changes in the project. They consistently show flexibility and adaptability. | The team usually responds with a positive attitude to unexpected changes in the project. They attempt to be flexible and adaptable. | The team has difficulty responding positively to unexpected changes and tends to get bogged down by them. |
| Commitment | The team is always in "continuous improvement" mode, shows intrinsic motivation to deliver the best project they can, and shows a commitment to learning. | The team is clearly committed to delivering a high quality product. May rely on advisors' evaluations in deciding how much effort to expend. | The team does what is necessary to deliver an acceptable project. |

WPI

## COMMON IQP FRUSTRATIONS

| If you're feeling or thinking this… | it might mean … | What you can do (learning opportunities)… |
|---|---|---|
| Frustration because your advisors are suggesting different things | They are trying to show how the same problem can be addressed in multiple ways.<br>Or they may be "thinking out loud," trying to sort through the possibilities and promote critical thinking. | Seek to understand multiple perspectives. Establish criteria for your analysis and decision making so that you can explain your reasoning.<br>Ultimately, you are empowered to make decisions about your project, but you need to be able to justify them persuasively orally and in writing. |
| Feeling pulled between sponsor and advisors | Advisors are more broadly focused on educational objectives of the IQP, while sponsors have a narrower set of deliverables in mind. | Realize that both sponsor and advisors can be satisfied with a "superset" of deliverables and evidence of critical thinking.<br>Understanding the needs of multiple stakeholders in a project is a valuable career skill.<br>Keep communication lines open. |
| How come the advisors didn't make that comment on the previous draft?<br>Why did they change their mind about something? | Everyone's understanding and insights about the project change as the project progresses.<br>Advisors don't want to overwhelm you with feedback. "Global issues" (your overall thinking and clarity, organization of ideas) are addressed first before local writing issues. | Take the initiative to reexamine your own writing as the project progresses and make sure it reflects your advancing understanding of the issues.<br>If you are confused by advisors' comments, ask for clarification. |