

IQP Syllabus

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The IQP

The Interactive Qualifying Project presents students with the opportunity to work together, with an advisor, on an extended research project to study a problem involving science, technology and society. Faculty expect that students will gain a greater understanding of the role and impact of technology on society, and the human and social response to technological change. Unlike other coursework, however, the IQP engages students as self-directed learners. Although I will suggest assignments from time to time, student teams are required to take responsibility for the definition and progress of the project. This exercise is not my project or class, and I am not the director of your research. (You are not my research assistant.) It is *your* IQP and it is a great learning opportunity, should you choose to take it. If you embrace it fully, you'll find it to be an exciting time in your university life and you'll find much to be proud of, when the work is complete.

IQP Objectives and Learning Outcomes

Fortunately or not, the IQP is not simply a research effort at the intersection of science, technology and science. Faculty anticipate that in the course of completing your project you will also achieve some progress on a wide variety of learning goals. (See below.) First, students are expected to work effectively on teams. This means you must meet together to assess project activities and assign responsibility to team members. Plainly, team members are expected to expend sufficient time and effort to meet the group's objectives. A first goal is to be able to define the objective(s) of the project and important research question(s). In addition, students are expected to learn elements of research design and research techniques appropriate to the project. Communication skills are also an important part of an IQP, both written communication (interim and final reports) and oral communication (in meetings and possibly in a presentation).

The Faculty of WPI have identified the following nine learning outcomes for the IQP:

“Students who complete an Interactive Qualifying Project 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 methodology for 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.”

Thinking about these outcomes will help align your project expectations with mine. I shall try to keep them in mind for the duration of the project.

Schedule and Content of Project Work

Faculty use a standard template to organize IQP work and IQP reports, but your activities and presentation of those activities may differ from the standard model, if variations from the model serve to improve your work and presentation.

In general, 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 this work, concluding analysis of information gathered, finalizing a project report, and, in some cases, preparing a presentation of the project.

Term I - The Project Proposal

Completing an adequate project proposal is the major activity of the first term. The proposal will contain evidence of a substantial research effort both into the research question(s) selected 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 or four separate chapters):

1. Introduction: The Introduction should probably be written last, but will appear first, of course! It will explain the research problem and identify 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 2-4 pages.

2. Background & Literature Review: These should really be seen as two different writing tasks, however the same research effort will produce the information for both the background and literature review. Nevertheless, the difference is key.

The background will explain the nature and history of the problem/issue that is the focus of the project. For many of the projects I advise, this will include some policy history, the legal context in which the problem arises and, perhaps, data reflecting how the problem has changed over time. It might also contain information on political or

policy actors involved in the policy debate and those who try to influence policy on this topic. Information on public opinion may also be relevant. Because this is an *Interactive* project, information on the relevant science/technology aspects of the problem should also be presented.

The literature review will explain how others have conducted research on the same research questions that you propose to address. 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 methods. 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. If you are still unclear on this concept, I can show you examples.

3. Methods: The final section of the project proposal describes the research methods that you believe are appropriate to your research questions and justifies them. It also presents a plan to guide the research that you intend to undertake in the second term of the project. Research methods may include interviews, content analysis, legal research and analysis, survey work, historical analysis, economic analysis, cost/benefit analysis, and archival research, among many other recognized research approaches. The **IQP handbook** (See IQP Resources, below) can provide information on these and other methods. *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 following web site:
<http://www.wpi.edu/Admin/Research/IRB/>

Terms II – Conducting the Research

If adequate progress is made in the first term, students should begin the second term with a working plan for going forward, conducting research and gathering information. If IRB approval is required, the documentation should be provided to the IRB at the beginning of the second

term. The IRB will likely request changes to the application, informed consent agreements and research protocols that you prepare. Students must be conscientious to avoid a delay that could seriously impair your ability to gather information from human subjects. Because most of the second term is usually devoted to executing a research plan, the project team will not be doing a great deal of writing during this period. Nevertheless, I will require that a draft outline of the entire project report be assembled, using the project proposal as the first chapters. I will also require that teams produce some written work at the end of the term that is evidence of work progress, and will help me to assess an appropriate grade for 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 a paper about some portion of this work.

Term III – 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 truly focus on analyzing the information gathered, generating conclusions and recommendations and writing the final report. Once again, I will look for outlines describing the content as proposed. 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 (as opposed to how it was proposed to be executed in the first term). In addition, students should prepare a final bibliography and/or reference list, a title page, abstract, table of contents, and executive summary. It is also helpful to have an authorship page indicating which team members were primarily responsible for each section of the report. Details on the final project report format can be found <http://www.wpi.edu/Academics/Depts/IGSD/Student/handbook.html>. 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 indicates some fault on the students' part. Although the Registrar will allow submission of projects any time before the beginning of the subsequent term, my 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. The grade of A will not be awarded to projects that extend beyond 1 unit of work.

Other Expectations of Students and Student Responsibilities

Weekly Meetings

All project teams are expected to take the responsibility to schedule meetings with me at the outset of each term. Do not wait for me to contact you. We will normally meet one hour/week. During this time, I expect teams to come prepared with an agenda of talking points. The team members should take turns leading this meeting. Agenda and talking points should include:

- Individual reports on the activities of each team member and the team for the preceding week,
- Questions that need my attention regarding the direction of the project or needs of the team, and
- Plans or expectations for work to be done in the coming week(s)
- Also, students are expected to bring in work responding to any specific assignments I have given the previous week (e.g. produce bibliographies, outlines, chapter drafts, etc.)

If you have little or nothing to say at these meetings, my conclusion is that you're not working on the project and this conclusion will be reflected in your grade. ***Faculty expect each student to be working roughly 15 hours per week on the project***, so students should be able to report on a reasonable amount of work effort at these meetings. Communicating with me is important to IQP success. Feel free to do that in these meetings and by email whenever necessary.

Outlines, Drafts and Revisions

Because effective writing is an essential part of the IQP, I expect students to routinely submit work for my review, and to be returned for revision. But in reading "draft" material, students should be aware that I am not interested in reading poor writing. Avoid giving me material that has not been checked for spelling and grammatical errors. *Always proofread your work*. Share it with project partners. (They should know what's going into this report, too!) Provide adequate footnotes or citations to sources. By "draft," I only mean that the writing is subject to revision and may not be wholly complete at the time it is submitted. "Draft" writing is not an excuse for sloppy writing. When the writing is poor, I get confused by your meaning and distracted by grammatical errors. The substance of your work is hidden and I find it more difficult to help you with the substance and content – which is where the focus should be.

Using Sources and Citing Sources

Project work must comply with standards of academic honesty and professionalism in writing and citing sources. Plagiarism will not be tolerated. All citations must follow an approved style and I prefer the APA style (See <http://apastyle.apa.org/>).

Note:

- All quoted material must have a specific source citation.
- All reference to electronic sources must follow an approved citation form. In general, if no person is identified as the author, an organization is the author, and the URL presents the publication data. Do not give me only the URL. See the APA site above for specific instructions.

- I expect students to research scholarly materials, especially journals, as well as materials written for a more general audience.
- I expect students to consult traditional sources of print media in the Gordon Library as well as on-line materials.
- Do not refer to Wikipedia as an accurate source. I certainly cannot forbid you from reading Wikipedia and doing so might be a good general starting place, but because the content has not been screened by editors or peers, it is not always accurate. Reliance on it is, therefore, not recommended.

Team Problems

It is not unusual for team members to have some disagreements or difficulty meeting each other's expectations. I encourage you to work on these difficulties with patience in a constructive spirit. I am available, however, to discuss problems with you individually or with the team together as needed. I am generally capable of sensing problems with teamwork in weekly meetings, but will not always be aware of the frustrations you may have with a teammate. Do not let serious problems go unattended too long as they can become a substantial obstacle to timely completion of assignments.

Self and Team Assessment

I will periodically distribute forms on which you can assess your own contribution to the project and the work of your teammates. The assessment is designed to help you to focus on things you can do to improve your contribution to the project and help me to identify underperforming team members. These assessments are not shared with other team members and the information you provide will be considered to be confidential.

Grading

It is my practice to assign a grade to each team member each term. There is no requirement that each member of a team receive the same grade, but that is the normal practice. To the extent I am aware that one or more team members have made an extraordinarily strong or weak contribution to the team's work, I will assign team members different grades.

NOTE WELL: Your grades reflect BOTH the content of your work and the execution of it. Students who receive high grades will do so in recognition of a consistent and conscientious effort to work effectively in meeting the team's goals throughout the duration of the project. So, the grade reflects more than just the final project report, although that is an important part. At the conclusion of the project, a "Completion of Degree Requirements" form is required from each team member. At that time, I will assign a final grade for the entire project work and have the opportunity to re-assess grades assigned for the first two terms of the project. I am unlikely to change them, however, unless students have made an extraordinary effort to raise the level of project work as the project continues. You may, therefore, end the project with, for example, 2 Bs and 1 A or any other combination of passing grades.

The Faculty have adopted general grading guidelines to which I adhere. In part, they are as follows:

A: This grade represents a consistently excellent effort that exceeds explicit project goals. Characteristics of A work include meeting all project goals, and exceeding them in several areas such as development of project objectives, initiative, originality, depth of analysis, and creativity. This grade is reserved for performance that is exceptional and thus is not achieved easily.

B: This grade represents a consistently good effort that attains the project goals. Characteristics of B work include doing all that was asked in a substantially correct form; setting clear project goals, writing a clear, professionally presented report that has not required many drafts; completing all work in a timely and satisfactory manner; demonstrating sound analysis that includes logical interpretation of results; coming to meetings well prepared; and working hard, consistently, and diligently. A “B” grade means the group worked well and did a good, strong job. Students should be proud of this grade.

C: This grade represents an acceptable effort that partially attains the project goals. Characteristics of C work include meeting some but not all of the project goals; and writing a readable but average report requiring many drafts and lots of faculty corrections. Missing deadlines, missing meetings without prior notification, and ignoring faculty comments on report drafts are traits common to some C projects. Students who receive this grade have fallen short of expectations in a number of ways.

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; repeatedly missing deadlines; turning in substandard work; not completing assigned tasks and showing little or no initiative and originality.

SP: a grade denoting an effort sufficient for the granting of the credit for which you are registered. It will be used only under the rare circumstance in which the project advisor is unable to judge the quality of the work, yet can still determine that the granting of the credit is appropriate. This is usually a only temporary grade for an IQP.

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 advisor, the project sponsor, and WPI. Note that this grade remains on the transcript.

Reminder: Projects that are not completed in 1 unit of work (normally 3 terms) will not receive the grade of A.

IQP Resources

First, WPI has been in the IQP business for over 30 years and during that time, many projects have been completed and are available in the Gordon Library. More recently we have begun archiving projects electronically for the permanent collection and easy retrieval. 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. Find completed IQPs here: <http://www.wpi.edu/Academics/Library/Collections/Projects/>

Secondly, WPI has many on-line resources for project students. Here are a few, but others are linked to these pages:

- The IQP: <http://www.wpi.edu/Academics/Depts/IGSD/iqp.html>
- Resources for project students:
<http://www.wpi.edu/Academics/Depts/IGSD/Student/index.html>
- Handbook for IQP Students and Advisors – including how to write a project proposal and including chapters on commonly used IQP methodologies:
<http://www.wpi.edu/Academics/Depts/IGSD/Student/handbook.html>
- Various guidelines and tips for writing different parts of the project report:
<http://wpi.edu/Academics/Depts/IGSD/IQP/reportproduction.html>
- APA Style Guidelines: <http://apastyle.apa.org/>

WPI's Institutional Review Board (IRB) for research involving human subjects:
<http://www.wpi.edu/Admin/Research/IRB/>