

# THE WPI PLAN

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## WPI DEGREE REQUIREMENTS (effective for students matriculating after August 1, 2008)

WPI's academic requirements are specifically designed to develop an overall educational experience which meets the goals of the college. Each requirement plays a supporting role as follows:

- To provide intellectual breadth and a better understanding of themselves and the diversity and creativity of human experience, every WPI student must complete a **Humanities and Arts Requirement**;
- To provide an understanding of the priorities of other sectors of society, develop the ability to communicate effectively with disparate groups, organize and derive solutions to complex problems, and gain an awareness of the interrelationships between technology and people, every WPI student must complete an **Interactive Qualifying Project (IQP)**;
- To provide a capstone experience in the professional discipline, to develop creativity, instill self-confidence and enhance the ability to communicate ideas and synthesize fundamental concepts, every student must complete a **Major Qualifying Project (MQP)**;
- To provide for learning through an academic program with fabric and course balance while encouraging individual student choices within that framework, every student must fulfill **Distribution Requirements**.

### WPI TERMS AND CREDIT UNITS

The Bachelor degree from WPI normally is based upon a residency at WPI of 16 terms. WPI operates on a system with four seven-week *terms*, two in the autumn semester (Terms A and B) and two in the spring semester (Terms C and D). A summer session, Term E, is also available. The normal academic load for each term is defined as *one unit* of work, usually divided among three courses or projects. Thus, the usual credit unit for courses or independent study/projects is 1/3 unit. *Qualifying Projects*, defined on pages 38-39, require one full unit of activity which may be concentrated into a single term (especially if conducted off-campus) or spread throughout an academic year. The degree will be awarded upon completion of the following:

### DEGREE REQUIREMENTS

1. **The Humanities and Arts Requirement** (See page 26)  
Qualification by overall evaluation of two units of work in the humanities and arts.  
To provide intellectual breadth and a better understanding of themselves and the diversity and creativity of human experience, every WPI student must complete a **Humanities and Arts requirement**.
2. **The Interactive Qualifying Project** (See page 17)  
Successful completion of a qualifying project relating science and/or technology to society (the Interactive Qualifying Project, or IQP) representing at least one unit of credit in project or independent study work. The format of the documentation is to be in accordance with current WPI policy on such documentation.

An IQP shall address a topic relating science and/or technology to society. In this context, both "society" and "technology" should be construed as broadly as possible. Technology refers to the application of rational and efficient principles to a body of knowledge or to the control of space, matter and/or human beings. Thus, the IQP encompasses not only techniques of production embodied in tools and machines, but also advances in methods of social and economic organization, in managerial techniques, and in methods of analysis in science, mathematics, and engineering. Society refers not only to a grouping of individuals but also to the culture, values, laws, customs, and institutions shared by these individuals.

3. **The Major Qualifying Project** (See page 16)  
Successful completion of a qualifying project in the major area of study (the Major Qualifying Project, or MQP) representing at least one unit of credit in project or independent study work. The format of the documentation is to be in accordance with current WPI policy on such documentation.
4. **Distribution Requirements** (See program description for specified departments – page 31)  
Satisfaction of published academic activity distribution requirements in or relating to the major area of study. These requirements total no more than ten units (including the MQP) and are specified by general topical subject area, not by specific courses. Completion of distribution requirements will be certified by the appropriate departmental or Interdisciplinary and Global Studies Division (IGSD) Program Review Committee (PRC), upon recommendation by the student's academic advisor. For students desiring designation of a major area for which a determination regarding distribution requirements has not previously been made and published, a faculty committee will be appointed by the department head or IGSD dean to review and approve the student's program of study.
5. **Social Sciences** (See page 30)  
Completion of 2/3 unit of work in the social sciences, exclusive of qualifying project.
6. **Residency Requirement**  
A minimum of eight units *must* be completed satisfactorily in residence at WPI. (It is anticipated the normal residence at WPI will be 16 terms.)
7. **Minimum Academic Credit**  
The minimum academic credit required for the Bachelor degree is 15 units. Credit accumulated beyond the published distribution requirements shall be accomplished by the addition of "free elective" work.
8. **Physical Education** (See page 93)  
Qualification in physical education shall be established by completing 1/3 unit of course work (four PE classes) or its equivalent. Such an equivalent, for example, may be participation in club or varsity sports.

Guidelines for the construction of the most common major programs are given alphabetically by area in the “Department and Program Descriptions” section beginning on page 31. The exact program of study for any student, however, is developed by the student with the aid of an advisor.

All of the majors below, with the exception of Liberal Arts and Engineering, are awarded with the B.S. degree. Some programs are listed that are developed through the departments indicated in parentheses. In the past, WPI has graduated students in the following fields, but this list should not be interpreted as necessarily putting any restriction on a student’s “major:”

Actuarial Mathematics (MA)

Aerospace Engineering (ME)

Biochemistry (CBC)(certified by the American Chemical Society)

Biology/Biotechnology (BB)

Concentrations in:

Bioprocess

Cell and Molecular Biology and Genetics

Computational Biology

Ecology and Environmental Biology

Organismal Biology

Biomedical Engineering (BME)(accredited by ABET)

Specializations in:

Biomaterials

Biomechanics

Biomedical Imaging

Biosensors and Bioinstrumentation

Tissue Engineering

Chemical Engineering (CHE)(accredited by ABET)

Concentrations in:

Biochemical

Biomedical

Environmental

Materials

Chemistry (CBC)(certified by the American Chemical Society)

Concentrations in:

Medicinal Chemistry

Specializations in:

Computational Chemistry and Molecular Modeling

Gene Regulation

Ion Transport

Materials

Medicinal Chemistry

Membrane Proteins

Molecular Spectroscopy

Nanoscale Design

Natural Products Synthesis

Plant-Virus Biochemistry

Photochemistry

Photophysics

Sensors

Supramolecular Chemistry

Civil Engineering (CEE)(accredited by ABET)

Subareas in:

Structural and Geotechnical Engineering

Environmental Engineering

Transportation Engineering

Urban and Environmental Planning

Construction Engineering and Project Management

Concentration in:

Environmental

Computer Science (CS)(accredited by ABET)

Computers with Applications (CS)

Economic Science (SSPS)

Concentrations in:

Sustainable Economic Development

Computational Economics

Electrical and Computer Engineering (ECE)(accredited by ABET)

Subdisciplines in:

Robotics

Power Systems Engineering

RF Circuits and Microwaves

Aerospace

Communications and Signal Analysis

Biomedical Engineering

Analog Microelectronics

Computer Engineering

Engineering Physics (PH)

Environmental Engineering (CEE; CH; CHE; ME)

Environmental Policy and Development (SSPS)

Humanities and Arts (HU)

Concentrations in:

American Studies

Environmental Studies

Humanities Studies of Science and Technology

Industrial Engineering (MG) (accredited by ABET)

Interactive Media and Game Development (HU; CS)

Interdisciplinary (by arrangement)(IGSD)

International Studies (IGSD)

Liberal Arts and Engineering (B.A. degree)(HU)

Management (MG)(accredited by AACSB)

Management Engineering (MG)(accredited by AACSB)

Concentrations in:

Operations Management

Biomedical Engineering

Civil Engineering

Electrical and Computer Engineering

Mechanical Engineering

Manufacturing Engineering

Management Information Systems (MG)(accredited by AACSB)

Manufacturing Engineering (ME)(accredited by ABET)

Mathematical Sciences (MA)

Subareas in:

Algebraic and Discrete Mathematics

Computational and Applied Analysis

Operations Research

Probability and Statistics

Mechanical Engineering (ME)(accredited by ABET)

Concentrations in:

Aerospace Engineering

Biomechanical

Engineering Mechanics

Mechanical Design

Manufacturing

Materials Science and Engineering

Thermal-Fluid Engineering

Physics (PH)

Professional Writing (IGSD)

Psychological Science (SSPS)

Robotics Engineering (CS; ECE; ME)

Society, Technology and Policy (SSPS)

System Dynamics (SSPS)

Programs for students interested in medicine, law or pre-college education can be readily developed from many of the above majors.

Interdisciplinary (individually-designed) majors (ID) may also be developed under the B.S. or B.A. degree; see Interdisciplinary Programs, page 70.

WPI undergraduate diplomas designate “Bachelor of Science” or “Bachelor of Arts” as appropriate. The transcript will list the student’s major. If a Minor or Concentration was completed, this will also be included on the transcript.

The number of majors associated with a single WPI Bachelor of Science degree is **limited to two**.

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## PROFESSIONALLY ACCREDITED PROGRAMS

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WPI is accredited as an institution by the New England Association of Schools and Colleges. In addition, a number of major areas are accredited within their specific disciplines. Seven majors at WPI are accredited by the Engineering Accreditation Commission of ABET. These majors are *biomedical engineering, civil engineering, chemical engineering, electrical and computer engineering, industrial engineering, mechanical engineering, and manufacturing engineering*. *Computer Science* is accredited by the Computing Accreditation Commission of ABET. Please note that some departments bearing those particular names may also grant designated majors through their programs that are not ABET accredited. The titles of majors are carried on the students’ transcripts and have a bearing on engineering licensing and other professional activities.

The Chemistry and Biochemistry Department and its program at WPI are approved by the American Chemical Society for a major in chemistry. Those chemistry majors who complete a program satisfying the guidelines established by the American Chemical Society are certified to that organization as having received an undergraduate professional education in chemistry.

The undergraduate and graduate business offerings in the Department of Management are accredited by AACSB International, the Association to Advance Collegiate Schools of Business. AACSB International is a not-for-profit organization consisting of more than 1,000 educational organizations and corporations. Its mission is excellence in management education in colleges and universities. AACSB International is the premier accrediting agency and service organization for business schools.

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## ACADEMIC ADVISING

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WPI’s advising program is based on a cooperative and understanding relationship between the students and advisors. Under the WPI Plan, ***students have the final responsibility*** for designing their own educational experience at WPI which includes ***understanding all their degree requirements and making sure all those requirements have been satisfied for graduation***. The role of the faculty advisor is to help his/her advisees design a program of study which reflects the students’ interests and professional goals. While advisors are willing to suggest specific programs of study, they will not insist that

students follow a particular path. Advisors also help students choose among academic alternatives, help them interpret catalogs requirements and review degree audits and grade reports with them. Students are expected to understand these documents and their implications for academic progress and act accordingly. Therefore it is critical that students take the initiative to consult regularly with their academic advisors.

For more information about advising, contact Dale Snyder, Director of Academic Advising, at 508-831-5381.

## CONCENTRATIONS

### DEFINITION

A Concentration is an option associated with a Major which provides recognition for focused and coordinated academic work either within the Major or within an area of study closely related to the Major.

### RULES

1. All Concentrations require completion of two units of integrated academic study plus an MQP with a topic and content appropriate to the given Concentration.
2. Concentrations deemed to belong exclusively or primarily within the stated Major must be accommodated within the distribution requirements of that Major.
3. Concentrations deemed to have a substantial interdisciplinary nature can exceed the normal 10-unit allotment of the Major by as much as 1 unit, provided that the additional requirements do not include or permit academic work designated by the Major prefix or coursework normally taken to satisfy the Major's portion of the distribution requirements. Furthermore, Concentrations of an interdisciplinary nature are permitted to use up to 1 unit of the academic program beyond the distribution requirements of the Major, including the IQP, Sufficiency, Social Science requirement, and Free Electives, as deemed appropriate.
4. The requirements of the Concentration must be designed to offer choices for the student within the Major area and, if relevant, outside the distribution requirements of the Major; however, the Concentration requirements must not preclude meeting the normal distribution requirements for the Major.
5. Rules and guidelines for each Concentration will be formulated by the faculty associated with the governing Major, and must be reviewed by the Committee on Academic Operations (CAO) and subsequently approved by the Faculty. CAO is empowered to rule on whether a proposed Concentration is disciplinary or interdisciplinary.
6. An individual program of study leading to a Major with a Concentration will be planned by a student in consultation with his/her academic advisor. The student's intention to pursue a Concentration will be declared by application to the appropriate Program Review Committee in accordance with that Committee's schedule of deadlines. Application deadlines should be designed to enable Committee review and communication of decisions to students at a sufficiently early point that flexibility of schedule still exists. Extenuating circumstances may be considered at the discretion of the Program Review Committee.
7. Concentrations and minors are additional degree designations. Any credit earned for an additional degree designation must not overlap with credit earned for another additional degree designation by more than one unit. Also, no credit-bearing activity may be triple-counted towards degree designations or degree requirements.

Listings of Concentrations may be found in the "Department and Program Descriptions" section beginning on page 31.

## MINORS

### DEFINITION

A Minor is a thematically-related set of academic activities leading to a degree designation in addition to but separate from that granted by the Major. A Minor should be available to students of any Major, with the exception of a Minor which overlaps with a Major area to such an extent that it is not sufficiently distinct from that Major. The Committee on Academic Operations (CAO) is responsible for the review of proposed Minor Programs and decisions regarding allowed Major/Minor combinations.

### RULES

1. A Minor requires completion of two or more units of thematically related activity. The concluding 1/3 unit of the Minor must be a capstone experience that marks completion of the Minor.
2. It is expected that Minor requirements will be structured so that all acceptable Major/Minor combinations can be accommodated within a normal 16 term framework.
3. A Minor may include any portion of the academic program, excluding the MQP and the final Type 5 IS/P of the Sufficiency. Academic activities used in satisfying the regular degree requirements may be double-counted toward meeting all but one unit of the Minor requirements, subject to the following restrictions:
  - a. The first unit of double-counted work may include at most 1/3 unit of the IQP, 3/3 units of the Sufficiency (excluding the final Type 5 IS/P), or a combination thereof.
  - b. At least one unit of the Minor, including the capstone activity, must be free elective choices.
4. The Program Review Committee for a Minor area will consist of faculty members designated by the sponsoring faculty members.
5. A Minor area must be proposed by a sponsoring group of faculty and must be defined by the purpose of achieving an educational goal beyond those apparent or implicit in the regular degree requirements. Student-initiated Minor Programs must be developed with the approval of a sponsoring group of faculty advisors. Each Minor Program must be reviewed by CAO for its individual merit.
6. Concentrations and minors are additional degree designations. Any credit earned for an additional degree designation must not overlap with credit earned for another additional degree designation by more than one unit. Also, no credit-bearing activity may be triple-counted towards degree designations or degree requirements.

Minors are described in the "Program Description" section of this catalog. Minors sponsored by a department are described following the department. Others are listed alphabetically by title. As of the printing of this catalog, the following Minors have been approved:

Computer Science; Drama/Theatre; Computer Engineering; Entrepreneurship; Foreign Language; International Studies; Law and Technology; Management; Management Information Systems; Manufacturing Engineering; Materials; Music; Organizational Leadership; Physics; Social Science; Economics; Political Science and Law; Psychology; Sociology; System Dynamics; Statistics; Writing & Rhetoric.

Interdisciplinary or Individually Designed (ID) minors are approved by the Committee on Academic Operations (CAO).

The form needed to add a minor or to propose an interdisciplinary or individually designed minor can be found at the Registrar's website, under the form section: <http://www.wpi.edu/Admin/Registrar/Forms/index.html>. Please contact the Registrar's Office at 508-831-5211 if you have any questions.

## DOUBLE MAJORS

An option for some students who wish to broaden their WPI experience is the completion of two distinct majors through the double major option. The choice to pursue a double major should be made early in a student's career. The limit on the number of majors that a student may complete per degree is two.

For double majors, the diploma may list both majors (in order of preference by the student), either major, or no major as indicated by the student.

The following modifications are made to the degree requirements for students who elect to pursue a double major:

### 1. The Humanities and Arts Requirement.

Satisfactory completion of an MQP in Humanities and Arts or International Studies will satisfy the Humanities and Arts requirement.

### 2. The Interactive Qualifying Project.

If one of the majors of a double major is in Social Science and Policy Studies, a single project bearing at least one unit credit may be used to satisfy both the MQP requirement for the SSPS major and the IQP requirement. In order to be used to satisfy both requirements, the combined social science MQP and IQP must meet the goals of both projects. It must be interactive in nature involving an aspect of technology, and must also be an application of social science knowledge and analytical techniques. In order to select a single project that satisfies both the goals of the MQP and the goals of the IQP, the decision to pursue a social science double major needs to be made fairly early in the student's career.

### 3. The Major Qualifying Project.

At least one separate and distinct major qualifying project of at least one unit of work must be completed for each major, unless a student receives permission from MQP advisors to pursue a single interdisciplinary MQP of at least 4/3 units of credit (see page 16).

### 4. Distribution Requirements.

The distribution requirements of each major must be met, but requirements common to both majors have to be met only once. The MQP requirements for Double Majors may be fulfilled in either one of two ways:

- Two distinct projects, one in each major, each of at least one unit of credit.
- One interdisciplinary project of at least 4/3 units of credit, and having significant work associated with each major. An interdisciplinary project must be jointly advised by at least two faculty members, one associated with each of the relevant departments or programs. An interdisciplinary MQP involving social science may not be used as an IQP.

This second option takes advantage of the value of interdisciplinary work at the intersection of the two majors. Students choosing this second option must complete an interdisciplinary MQP approval form in advance of project registration, and this form must be signed by all advisors. This form must contain a summary of the proposed project work indicating the content relating to each major. All faculty advisors have equal status in approving the final project, and a single grade is submitted for each term's work and a single project grade is submitted on the CDR form. Should an interdisciplinary MQP, once completed, be deemed acceptable as an MQP for one of the two majors, but not for the other, and/or if the faculty advisors can not agree on a single grade after much effort to do so, the project may be considered as the MQP for a single major. This conversion can only occur with the consent of the student and the advisor(s) from the single major being selected.

The interdisciplinary MQP option is available only at the discretion of the faculty and only when both faculty members involved agree on the project content. Students planning to use this option should identify and consult with their faculty advisors well before the end of their junior year.

Note: It is anticipated that in some cases a student pursuing a double major will join a project team whose other members are pursuing a single major. The double-majoring student will bring the interdisciplinary content to the project, and this additional work will be represented by the additional credit that that student (perhaps only that student) earns, and with an enlarged report prepared by that student.

For students wishing to pursue double majors, the program audit for each intended major must be completed and certified by the review committee of each department involved. Academic activities appropriate to both majors may be counted in both majors. For the policy in the special situation of double majors involving the social sciences, see page 101. For specific policies, see pages 101 and 170.

No student shall complete more than two undergraduate majors.

Project activity is an integral part of the educational experience for all students under the WPI Plan. The two types of qualifying projects are:

1. A project in the major field of study (the Major Qualifying Project, or MQP).
2. A project which relates technology and science to society or human needs (the Interactive Qualifying Project, or IQP).

Projects should be chosen in consultation with the student's academic advisor and must be accepted by a project advisor before project registration can be completed. Many project opportunities come from off-campus organizations, and provide challenges to solve real-world problems and thus gain experience invaluable for seeking jobs and for professional practice.

Students are encouraged to develop their own projects, to solicit support for their ideas from potentially interested faculty, and to form teams to pool resources and share points of view.

The Major Qualifying Project should focus on the synthesis of all previous study to solve problems or perform tasks in the major field with confidence, and communicate the results effectively.

The Interactive Qualifying Project should challenge students to relate social needs or concerns to specific issues raised by technological developments.

#### **PAY AND CREDIT**

The WPI Faculty approved the following project policies in 1973:

1. A student may receive pay for related work that is above and beyond the work clearly defined for academic credit for a project.
2. Wherever possible remuneration for this extra work will be paid by WPI to the student from funds directly obtained through grants from the company to the college.
3. Results obtained from paid or unpaid work performed while students are not registered for project credit at WPI may be used in projects only after consultation with the project advisor. When possible such consultation should take place before the work begins.
4. Students who wish to pursue project work off-campus for WPI credit can do so only if 1) they are registered for that term at WPI, 2) their project advisors have established appropriate methods of supervising the off-campus work. Such supervision must make adequate provision for periodic review and advising.

#### **RESOURCES - GETTING STARTED**

Students are encouraged to avail themselves of the many resources and advice areas found in the Projects Program web page ([www.wpi.edu/Academics/Projects](http://www.wpi.edu/Academics/Projects)).

In addition, personal advice can be provided by meeting with the Projects Administrator (Daniels Hall) or the project coordinators listed on page 176.

#### **AVAILABLE PROJECTS**

Students may obtain information about new or ongoing projects from a variety of sources. Principal sources include discussions with other students, especially those currently involved in a project, the Projects Program web site, department offices, or their web pages. Off-campus projects are discussed annually in the fall. In the spring, "Available Projects" on the Projects Program web site ([www.wpi.edu/Academics/Projects/](http://www.wpi.edu/Academics/Projects/)) can be used as a directory of specific projects or as a source of ideas for developing your own projects. Some students will find a project listed which fits their needs and interests exactly. In other cases, the listing will serve to lead students to a faculty member with whom project involvement can be negotiated. The proposals in the Projects Program web page are updated periodically to provide an accurate listing of available projects.

#### **PROJECT ADVISOR**

Academic advisors can assist students in identifying a project. They are aware of the project interests of many other faculty members, and have a list of faculty interests which will enable a student to find a faculty member who can help to develop a project idea. Faculty associated with the Interdisciplinary and Global Studies Division (IGSD) are available to assist students in interdisciplinary and interactive projects. The Projects Office can also assist in finding an appropriate project advisor. See pages 261-262.

#### **PROJECT PERFORMANCE AND TIME-ON-TASK**

A student is normally expected to expend 15-17 hours per week on the average for each 1/3 unit of credit for project work, and expected achievement is based upon that commitment.

A project group, whether it involves one student or more, should have a minimum of one scheduled conference per week with the advisor(s). Additional time should be scheduled when the effort exceeds 1/3 unit per student or when more students are involved.

Students should be prepared to submit interim project reports to the advisor each week. Students are also encouraged to complete a proposal at the beginning of the project activity to define the scope and timeline for completion of the effort. In addition, oral reports may be required as determined by the advisor. At the end of the project, a report must be prepared to the satisfaction of the project advisor. For projects sponsored by off-campus organizations, both a written and oral report for the sponsors is normally expected.

#### **ELECTRONIC PROJECT SUBMISSION**

WPI requires that all undergraduate students submit their Interactive Qualifying Project (IQP) and Major Qualifying Project (MQP) electronically ("eProjects").

Students must be registered for a minimum of 1/6 unit of qualifying project credit in the term in which the final project report is submitted. An eProject must be submitted via the web site, [wpi.edu/+eprojects](http://wpi.edu/+eprojects), following the steps outlined there.

No matter which format is used to create the original report document (Microsoft Word, La Tex, or other), the final report must be converted to a PDF format in order to be submitted as

an eProject. For information on converting to a PDF, go to [wpi.edu/+ATC/Collaboratory/HowTo/](http://wpi.edu/+ATC/Collaboratory/HowTo/). Every eProject must include a title page and must follow the formatting guidelines described at [wpi.edu/+Projects/finishing.html](http://wpi.edu/+Projects/finishing.html).

The deadline for the submission of the initial report draft and the final document may be established at the discretion of the project advisor. Drafts and reports need *not* be accepted by the advisor after the established deadline.

The final PDF is required, but additional related files such as simulations, computer programs, multimedia, and data sets may be submitted as a component of the project.

A project that is completed by a team of students, except in extenuating circumstances, will submit ONE project report from the group. After the MQP or IQP team submits the final version of the project report, the advisor must review the work and approve or reject it online at [wpi.edu/+eproject](http://wpi.edu/+eproject).

The final project report should be carefully proofread. Once the submitted project has been approved by the advisor and released for archiving by the Registrar's Office, it is considered an academic record and cannot be edited.

A completed electronic Completion-of-Degree-Requirement (eCDR) form, must be printed for signature by each student and signed individually by the advisor as the final step in the submission process. The eCDR form must be submitted in person by the project advisor or a member of the academic department of the advisor to the Office of the Registrar by no later than the second day of the next academic term.

### **GROUP QUALIFYING PROJECT EFFORTS**

Students meeting a qualifying project degree requirement by participation in a group, or team effort, will submit, at the discretion of the project advisor, either a single, comprehensive written report from the group, or individual written reports from each member of the group. A single, comprehensive written report must, however, include some means by which each individual's contribution to the group effort may be clearly identified. This identification may take the form of an "authorship page," simply a list of individual chapters and their respective authors, or of a prefacing statement in which each contributing group member is named as having carried out one or more specific tasks within the overall project effort.

In the case where one or more students leave an ongoing group project after having contributed at least one unit each of project effort, those students, again at the discretion of the project advisor, will submit either a single written report or individual written reports in satisfying the qualifying project documentation requirement. The same means of identifying individual contributions will be employed as described above.

### **CENTER FOR COMMUNICATION ACROSS THE CURRICULUM**

*(Upper Level; Project Center)*

Accompanying strong emphasis on project work at WPI is strong emphasis on high quality presentation of materials such as proposals, written reports, term papers, and abstracts. To assist you in developing your writing and oral presentation skills, WPI has established a Center for Communication Across the Curriculum that offers writing and presentation consultations, style guidelines, writing manuals and presentation videotapes. Style guidelines, writing manuals and specially prepared handouts concerned with report writing are available. Small group or individual conferences scheduled by appointment with the writing tutors constitute an additional service provided by the Center to help students with their writing skills. For further information, contact Dr. Higgins at x5503.

### **DISSEMINATION OF PROJECT REPORTS**

MQPs and IQPs completed for off-campus agencies are usually distributed within the sponsoring agency by the agency project liaison. A project report may be restricted from public viewing if it contains confidential or proprietary information of a sponsoring agency.

Students are responsible for keeping personal copies of project reports for their own permanent professional records. In this way, reports can be reviewed for later use, and incorporated into a professional portfolio.

Thus, MQPs and IQPs are best viewed as research reports which establish good professional practices as well as being potential sources for further study and research.

### **OFF-CAMPUS INSURANCE AND LEGAL AGREEMENTS**

WPI's insurance program includes a broad range of coverage for students doing projects in cooperation with off-campus organizations. This insurance coverage requires proper documentation of individual student participation. All students doing project work with off-campus organizations must complete the pertinent portion of the project registration form. In certain cases, where the project is included as part of a regular course, the course instructor must submit to the Projects Office a list of the students going off campus and the name(s) and address(es) of the organization(s) involved.

WPI has entered into a variety of agreements with off-campus organizations, covering a wide range of issues common to the projects program. Students agree to abide by these agreements during the registration for the project.

The qualifying project in the major field of study should demonstrate application of the skills, methods, and knowledge of the discipline to the solution of a problem that would be representative of the type to be encountered in one's career. The project's content area should be carefully selected to complement the student's total educational program. In defining the project area within which a specific topic is to be selected, the student and academic advisor should pay particular attention to the interrelationships that will exist between the bodies of knowledge represented by courses, independent studies, and Preliminary Qualifying Projects; and by the Interactive Qualifying Projects.

MQP activities encompass research, development, and application, involve analysis or synthesis, are experimental or theoretical, emphasize a particular subarea of the major, or combine aspects of several subareas. In many cases, especially in engineering, MQP's involve capstone design activity. Long before final selection of a project topic, serious thought should be given as to which of these types of activities are to be included. Beyond these considerations, the MQP can also be viewed as an opportunity to publish, to gain experience in the business or public sectors.

Off-campus MQPs are also very valuable for access to state-of-the-art resources and contacts for future professional work.

### GETTING STARTED ON AN MQP

Project topics are originated by students, faculty, or practicing professionals participating in WPI's off-campus project programs. A faculty member in each academic department acts as Project Coordinator for all majors within the department. The Project Coordinator has assembled MQP topic descriptions being proposed and has identified the faculty who will serve as project advisors for each topic. All project opportunities—MQP, IQP, PQP, on-campus originated and off-campus originated—are made available to the student body through a planned information-sharing program of activities during C and D terms of the academic year prior to the start of the project.

### PROJECT PROPOSALS

Students are strongly encouraged to begin their MQPs with a project proposal. A detailed guide to preparing project proposals is available in department offices or on the Projects Program web page ([www.wpi.edu/Academics/Projects/](http://www.wpi.edu/Academics/Projects/)).

## MQP PROJECT CENTERS

Each Project Center has a WPI faculty member as the director, well-defined procedures for completing project work, and selective admissions processes. The Centers tend to be highly structured and require superior performance.

At the present time, the WPI project centers close to campus are:

- Gillette Company Project Center.
- Lincoln Laboratory Project Center.
- Sun Microsystems, Inc. Project Center.
- UMass Memorial Health Care, University of Massachusetts Medical Center, and Tufts School of Veterinary Medicine Project Centers.

See also page 19 for residential Project Centers at a distance from WPI.

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## LINCOLN LABORATORY PROJECT CENTER

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MIT Lincoln Laboratory located in Lexington, MA was founded in 1951 as a Federally Funded Research and -Development Center of MIT. The Laboratory's fundamental mission is to apply science and advanced technology to critical problems of national security. The scope of problems includes air defense, communications, space surveillance, missile defense, tactical surveillance systems and air traffic control.

The WPI-MIT Lincoln Laboratory MQP Program is a one-term, off-campus, multidisciplinary for students to complete their MQP requirements. Students participating in the program will be required to complete a Preliminary Qualifying Project (PQP) in D-Term 2007 or at the end of summer employment at Lincoln Laboratory. During this PQP, the students will learn about the project, perform background research, and interact with their project sponsor at Lincoln Laboratory. One of the outcomes of the PQP will be detailed proposal describing the general area of the project, the specific problem to be addressed, and the approach the students will take to solve the problem.

During A-Term 2007, the students will work full-time (five days a week) for 7 weeks at Lincoln Laboratory on their projects. They will work with a mentor from Lincoln Laboratory and with one or more WPI faculty advisors.

Admission to the WPI-MIT Lincoln Laboratory MQP Program is based on the following criteria: academic standing, and performance, essay response, evidence of maturity and independence, availability of projects in a specific area, qualifications relevant to the project offered, and results of an interview.

Project opportunities typically exist in the following disciplines:

- Computer Science
- Electrical and Computer Engineering
- Mathematics
- Mechanical Engineering
- Physics

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## SUN MICROSYSTEMS, INC. PROJECT CENTER

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MQPs for CS, IMGD, ECE, and RBE majors

Co-Directors: Professors G. Heineman & G. Pollice

These MQPs will take place at Sun Microsystems' Burlington campus, roughly 1 hour from campus. This is the "east coast campus" for this Fortune 500 company. The research labs at the Burlington Sun Microsystems campus have been active in developing cutting-edge research prototypes and truly innovative products.

We envision a set of projects that lie within the core disciplines of CS and ECE as well as opportunities to work on interdisciplinary projects for IMGD and RBE majors. The proposed projects range from the game industry's first open source, enterprise grade, highly scalable, online game server (Project DarkStar) to a programmable infrastructure for small wireless devices (Project SunSpot). There is also a project that investigates the Fortress language, seen as the successor to the Java programming language.

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## GILLETTE COMPANY PROJECT CENTER

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Gillette is the world leader in grooming products. Their South Boston Manufacturing Center (SBMC) is their primary location for the manufacture of shaving systems such as the Mach 3 and Venus razors, where over a billion units are produced each year. Many major qualifying project opportunities are available, principally in mechanical and manufacturing engineering. Projects can range from the design of equipment for automated production systems to the analysis and modeling of the kinematics, dynamics, and vibrations of existing systems. Students who do these projects will have the opportunity to solve real engineering problems, interact with professional engineers at one of the most automated assembly facilities in the world, and demonstrate their presentation skills. Those interested in exploring project opportunities at Gillette should contact Professor Robert L. Norton, Mechanical Engineering Department.

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## UMASS MEMORIAL HEALTH CARE/UNIVERSITY OF MASSACHUSETTS MEDICAL SCHOOL/ TUFTS UNIVERSITY SCHOOL OF VETERINARY MEDICINE PROJECT CENTERS

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Biomedical projects (MQP, IQP, PQP, and thesis) are available at UMass Memorial Health Care, University of Massachusetts Medical School (UMMS), and Tufts University School of Veterinary Medicine (TUSVM) for students from all disciplines on campus. Each of these centers is located close to WPI.

It is recommended that students spread their projects over the entire academic year. However, in some cases, full-time activity for a term can be accommodated. Students interested in project opportunities should contact the Biomedical Engineering Department Projects Faculty Coordinator well in advance of their planned project -activity.

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# THE INTERACTIVE QUALIFYING PROJECT

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At WPI, students are expected to develop an understanding of how science and technology are embedded in the fabric of society. The Interactive Qualifying Project (IQP) challenges students to address a problem that lies at the intersection of science or technology with society. During the IQP, students work in interdisciplinary teams, often with an external sponsoring organization, to develop solutions to real world problems. In doing so, students learn something about the role of science and technology, its impact on society, its place in meeting human needs and human efforts to regulate, control, promote and manage our changing technologies. The IQP is equivalent to three courses, typically undertaken in a student's junior year. It can be completed over three terms, or as a full course load for a student for one term, and it can be completed on-campus, or at one of our many residential project centers in the U.S. and abroad. For more on the IQP see the websites of the Interdisciplinary and Global Studies Division (IGSD) at <http://www.wpi.edu/Academics/Depts/IGSD/iqp.html>. For more on the IQP and study abroad, see the Global Perspectives Program website: <http://www.wpi.edu/Academics/GPP/index.html>. Completed IQPs are electronically archived at WPI's Gordon Library, are indexed and are available to the public (<http://www.wpi.edu/Academics/Library/Collections/Projects/>).

### **IQP LEARNING OUTCOMES**

The Faculty adopted the following statement defining learning outcomes for the IQP. Successful completion of an IQP is an important element in helping students achieve WPI's overall undergraduate learning outcomes.

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.

### **PREPARING FOR AND FINDING AN IQP**

Students are encouraged to view the IQP as a learning opportunity – a chance to gain knowledge outside their major field – while working with others to solve open-ended, complex problems. The best approach is to consult with one's academic advisor and select courses to be taken in the first and second year at WPI that can provide a foundation for an IQP in the junior year. Often project preparation involves developing an understanding of the social sciences and humanities, as the concepts and analytical techniques of these disciplines are important in understanding the social context of science and technology. In addition, students enrolled in the Global Perspective Program will be expected to complete a course devoted to project preparation in advance of their travel.

Project topics originate with external organizations, faculty and students. Students who complete IQPs at a residential project center through the Global Perspective Program work on project topics identified by external sponsoring organizations. Students can explore these opportunities at the Global Opportunities Fair organized each September by the Interdisciplinary and Global Studies Division (IGSD). Students completing projects on campus are encouraged to seek faculty members that share their interests to advise projects. Faculty interested in

advising specific IQPs will post their project topics on-line at the IQP Registry. See <http://www.wpi.edu/Academics/Projects/available.html>. The IGSD also hosts an On-Campus Project Opportunities Fair each March where students can meet faculty advisors to discuss projects being offered on campus during the following year.

The IGSD (<http://www.wpi.edu/Academics/Depts/IGSD/index.html>) offers administrative support for project activities. Students are welcome to seek further assistance from the staff on the second floor of the Project Center.

### WHAT ARE IQPS ABOUT? SCIENCE, TECHNOLOGY AND SOCIETY

Most, but not all, IQPs are indexed according to the following IQP Divisions. These Divisions assist students in locating projects by topical area in the Registry of IQP opportunities (<http://www.wpi.edu/Academics/Projects/available.html>). These Divisions are also used as subject categories for the Library's archive of completed projects.

**Division 41: *Technology and Environment.*** Subjects have included a wide range of environmental problems, for example, water quality and supply, climate change, open space and growth, hazardous waste and acid rain.

**Division 42: *Energy and Resources.*** These projects have focused on energy supply, alternative energy technologies, conservation, and the economic and policy choices made or proposed to govern this industry.

**Division 43: *Health Care and Technology.*** Projects in this division have focused on the technologies and cost of health care delivery in the US. Ethical questions in health care have also been addressed, including abortion, stem cell research, cloning, and "right to die" issues.

**Division 44: *Urban and Environmental Planning.*** Land use planning, historic preservation, urban renewal, transportation systems and the impacts of infrastructure design are among the subjects studied in this division

**Division 45: *Science and Technology – Policy and Management.*** IQPs in this area focus on public policy as it is used to promote or constrain technology. Examples include both public and private efforts to promote scientific research, manage innovation and understand how changes in technology result in a changing business and economic environment.

**Division 46: *Social Studies of Science and Technology.*** Students working on these projects use a sociological approach to understanding the impact of technology on society. Topics have included equity issues (gender, race, ethnicity), technological literacy, and technology assessment and forecasting.

**Division 47: *Safety Analysis and Liability.*** The study of safety analysis introduces students to the subjects of risk analysis, negligence, and standards of care in product design and use. Projects have also focused on fire risk and safety, risks associated with natural disasters and risk management.

**Division 48: *Humanistic Studies of Technology.*** Humanistic studies illuminate the social context of science and technology. History, literature, philosophy, religion and the fine arts all speak of the nature of human problems and the scientific and technological approaches used to address personal and social problems. Each discipline provides analytic methods for examining society/technology problems. Students working in this division should prepare by taking appropriate humanities courses before beginning their project.

**Division 49: *Economic Growth, Stability and Development.*** Division 49 focuses both on problems of stability and change in mature economies, and the economic problems of developing nations. Tools of economics are used to understand the relationship between technology and growth. Projects address policy issues of appropriate technology, technology transfer among countries and trade, among others.

**Division 50: *Social and Human Services.*** These projects address the problems and technologies involved in the provision of community services, broadly defined. Projects have addressed services for the mentally or physically disabled, for juveniles, seniors, consumers, and public school students.

**Division 51: *Education in a Technological Society.*** Many WPI students have helped design and test science and engineering curricula for students at all grade levels, from elementary to high school. Projects in this area have also addressed the design and testing of computer assisted learning environments and other applications of technology to learning.

**Division 53: *Law and Technology.*** Legal systems regulate technology in all aspects of life, from food safety to pollution control to intellectual property (patents, copyright). Projects in this division explore the role of courts, agency regulations and legislation in controlling the impacts and use of technology.

**Division 54: *Historic and Artistic Preservation Technology.*** The technologies of art conservation and restoration, combined with the policy and values issues involved in the preservation historic places and works of art, form the subject matter of IQPs completed in this division.

In addition to IQP and MQP opportunities on campus, through the Global Perspective Program, overseen by the Interdisciplinary and Global Studies Division, WPI students have many opportunities to complete a project for a term at one of WPI's residential project sites. Project work conducted at these sites provides teams of students with extraordinary opportunities to learn by solving problems provided by industrial, non-profit, non-governmental or government agencies.

Application for IQP work in these programs begins in the fall with the Global Opportunities Fair. At the Fair, IQP and exchange program directors will be available to talk with students about these opportunities. Students should apply in the fall of the year preceding the year in which they would like to participate. Further information is available at the Interdisciplinary and Global Studies Division in the Project Center.

All students accepted to an off-campus IQP Center will be registered for the preparation course ID 2050 in the term immediately preceding their time off campus. Students must also be making satisfactory progress in their academic program.

Prior to leaving campus for a project program site, each student is required to complete a project registration form as described on page 174.

## RESIDENTIAL PROGRAMS

All programs offer the students the opportunity to complete a project in one term of full-time work. Advance preparation is required. Faculty advisors are in residence at IQP and Humanities and Arts sites and some MQP sites.

	TERMS OFFERED				
	A	B	C	D	E
Limerick, Ireland*	<input type="checkbox"/>				
Ifrane, Morocco**	<input type="checkbox"/>				
Cape Town, South Africa		<input type="checkbox"/>			
Washington, D.C.		<input type="checkbox"/>			
Worcester, Massachusetts		<input type="checkbox"/>	<input type="checkbox"/>		
London, England**		<input type="checkbox"/>			<input type="checkbox"/>
Wall Street, NY*		<input type="checkbox"/>			
Nantucket Island, Massachusetts		<input type="checkbox"/>			
Venice, Italy		<input type="checkbox"/>			
San José, Costa Rica		<input type="checkbox"/>			
Bangkok, Thailand			<input type="checkbox"/>		
Budapest, Hungary			<input type="checkbox"/>		
Hong Kong, Peoples' Republic of China			<input type="checkbox"/>		
London, England				<input type="checkbox"/>	<input type="checkbox"/>
Nancy, France*			<input type="checkbox"/>		
Silicon Valley, California*			<input type="checkbox"/>		
Boston, Massachusetts				<input type="checkbox"/>	
Copenhagen, Denmark				<input type="checkbox"/>	
Melbourne, Australia				<input type="checkbox"/>	
San Juan, Puerto Rico				<input type="checkbox"/>	
Windhoek, Namibia				<input type="checkbox"/>	
Wuhan, Peoples Republic of China					<input type="checkbox"/>

\* MQP opportunities only.

\*\* Humanities and Arts opportunities only.

## PROGRAMS IN THE UNITED STATES

### WASHINGTON PROJECT CENTER - IQP

Director: Prof. D. DiBiasio, Goddard Hall 127

Students work on projects with prestigious sponsoring agencies while living in the heart of Washington, D.C., just blocks from the White House. The Washington Project Center is located in an attractive neighborhood near The Mall, shopping, businesses, embassies and international agencies. Take advantage of this ideal location and easy access to the subway to enjoy an endless supply of free museums, national monuments, and impressive buildings that house the seat of national government.

Past projects have been completed with such agencies as the Smithsonian, the Environmental Protection Agency, the U.S. Patent and Trademark Office, the National Science Foundation and the Consumer Product Safety Commission. This is an opportunity to examine the inner workings of government and the importance of national action in areas of the environment, science education, urban issues, and consumer protection.

### BOSTON PROJECT CENTER - IQP

Director: Prof. F. Carrera, Project Center

The Boston project site is a residential program with resident faculty advisors. This world-class city, featuring a wealth of cultural, educational, recreational, and tourist opportunities, is an exciting, vital and stimulating environment in which to live and work.

Projects focus on the improvement of the quality of life of the city for its inhabitants and visitors. Most projects will focus on environmental issues, as well as on urban maintenance, management and planning issues, and will include field work in the city's neighborhoods and in the greater Boston area. The data collected will usually be archived in databases and displayed on Geographical Information Systems, as a prelude to a careful analysis to produce insightful conclusions and recommendations. Past projects include: a plan for the reduction of neighborhood disruption during the work on the Big Dig (for the North End Neighborhood Association); an analysis of the impacts of Historic Districts on surrounding neighborhoods and a method of streamlining construction permits in those districts (for the Boston Landmark Commission); the creation of a computerized information system for the management and maintenance of street trees (for the city of Cambridge Department of Public Works); the collection and analysis of environmental data about Chelsea Creek (for the Environmental Protection Agency); the improvement of public safety through the inventory and mapping of all underground fuel tanks (for the Boston Fire Department), as well as projects for various departments of the cities of Boston, Cambridge, Brookline, Quincy and Newton.

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## NANTUCKET ISLAND PROJECT CENTER - IQP

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Director: Professor M. Elmes, Washburn Shops

The Nantucket Island project site is a residential program with resident faculty advisors. This historic island is 14 miles long with an average width of about 3.5 miles and has about 10,000 year round residents. It was once a booming whaling center but is now primarily a tourist destination, particularly during the summer months. It is a National Historic District and has changed little since the 17th century (with cobblestone streets, old shops and lamps, seaside cottages, and historical museums). It has excellent public beaches that extend around the island, and 40% of the island is protected conservation land.

The Nantucket Island Project Center will start in B'08, and students who are accepted will be pioneers in this exciting new venture. Nantucket is unique for a number of reasons: it is a high-end, tourist destination in the summer when approximately 40,000 tourists visit the island and draw on the island's limited resources; it is a historic site deeply committed to historic preservation and museum studies; and it is also an environmentally-sensitive site where much of the land is protected and where problems such as beach erosion and invasive species (such as white-tail deer) have created new challenges (such as overgrazing and Lyme disease). As such, projects will tend to focus on environmental challenges (e.g., waste management, tourism impacts, sustainability) and on museum studies (e.g., providing information and maps to tourists; making museum information more accessible to the public). Titles of potential projects include the following: Exploring Nantucket's Flora, Fauna and Features (Maria Mitchell Association), Recommending Updates to The Natural Science Museum and the Museum at the Vestal Street Observatory (Maria Mitchell Association), Creating an Interpretively-effective Audio Tour of the Town of Nantucket (Nantucket Historical Association), and Exploring the Feasibility of a Bus/Trolley System for Tourists on the Island (Egan Maritime Foundation).

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## WORCESTER COMMUNITY PROJECT CENTER - IQP

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Director: Prof. R. Krueger, Project Center

Students will work in offices in the central Worcester -region and commute daily from their residences.

The Worcester Community Project Center (WCPC) - develops projects around five core competencies: 1) planning for community sustainability, 2) green building design, 3) economic development, 4) historic, cultural, and environmental preservation and outreach, and 5) environmental justice. The WCPC has been recognized around the City and the region as a valuable community resource. As a result, students have the opportunity to work on a number of "high profile" community projects. Typically, these projects make significant contributions to improving the city we live in. Project sponsors range from municipal government, the Mayor's Office, the Broad Meadow Brook Audubon Sanctuary, the Regional Environmental Council, the Greater Worcester Land Trust, the Worcester Art Museum, Centro Las Americas and various community development corporations.

Recent projects include a historical analysis of Institute Park (sponsored by Benoit Reardon Architects and the Worcester Art Museum); green building design for Friendly House (sponsored by WPI and Friendly House); brownfield redevelopment in Worcester (sponsored by the Honorable Timothy P. Murray, Mayor, City of Worcester); "Sustained Planning for a Sustainable Worcester" (sponsored by WPI and the City Office of Neighborhood Services); mapping of Worcester's open spaces (sponsored by Broad Meadow Brook Audubon Sanctuary); developing an on-line artist database (sponsored by Arts Worcester and the City Manager's Office).

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## SILICON VALLEY PROJECT CENTER - MQP

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Co-Directors: Prof. D. Finkel, Fuller Labs 231

Prof. J. Orr, Boynton Hall

Silicon Valley, California, is home to many of the most dynamic companies in the computer industry and in other related high-technology industries. Long-established companies such as Sun, Intel and Hewlett-Packard, and research centers such as SRI International and NASA Ames Research Center, mix with recent successes such as eBay and small start-ups to provide a dynamic and exciting atmosphere. The projects will expose students to both the cutting-edge technology and the dynamic entrepreneurship of Silicon Valley.

Students participating in the Silicon Valley Project Center will participate in a Preliminary Qualifying Project (PQP) during B-Term 2007. During this PQP, the students will perform background research in the area of their project, learn about the company and the industry where they will be performing their project, and hold discussions with their company mentor about their project work.

The projects will be conducted during C-Term 2008 in Silicon Valley. The students will work full-time at the sponsor's site for approximately nine weeks, from early January through early March. They will work with a mentor from the sponsoring company and with a WPI faculty advisor. The project work will include the completion of an MQP report and presentation on the project to the sponsoring organization. Admission to the Silicon Valley Project Center is based on academic standing and performance, essay response, evidence of maturity and independence, availability of projects in a specific area, qualifications relevant to the project offered, and results of an interview.

Projects may be available in Computer Science, in -Electrical and Computer Engineering, and in Interactive Media and Game Development.

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## WALL ST. PROJECT CENTER - MQP

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Directors: Prof. A. Gerstenfeld, Washburn Shops 212

Prof. R. Brown, Atwater Kent 307

New York is one of the world's most exciting cities. Some of the best theater and museums are found there. Wall Street is known as the world center of investments and banking and is seen as the capital of business and technology. It has proved to be a training ground for the leaders of the future. New York is a place where people both work and play hard. It is fast moving and allows the opportunity to apply many of the skills learned at WPI.

At the Wall Street Project Center, students complete MQP's while working with a wide variety of agencies, such as Morgan Stanley, Deutsche Bank, Lehman Brothers, and J.P. Morgan. Wall Street, now much more than investments, is the center of world commerce; there is a need for WPI projects involving computer science, management, industrial engineering, and mathematical sciences. Some of our projects include work-flow analysis, risk analysis (country risk limits), system usability, and data-base corruption issues. Other projects include user on-line functionality, and user help functions for global settlement systems. The projects are challenging and important to the clients as well as to the students.

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## PROGRAMS IN EUROPE

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### BUDAPEST PROJECT CENTER - MQP

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Director: Prof. G. Sarkozy, Fuller Labs

Hungary has gone through a deep-rooted transformation during the past 15 years, and today it is a free and democratic country with a smoothly working market economy. The country has enjoyed a steady GDP growth, a bullish stock market and a decreasing inflation rate as well. As a result of these changes Hungary became a full member of the European Union on May 1, 2004. Hungary is a link between Eastern and Western Europe. New investment is revitalizing the country, and grand old Budapest is being restored. It's the country's cultural, political, intellectual, and commercial heart - and it teems with cafés, restaurants, markets, and bars. Budapest offers breathtaking Old World grandeur and thriving cultural life. Situated on both banks of the Danube River, the city unites the colorful hills of Buda and the wide, businesslike boulevards of Pest. The city is simultaneously peaceful and bustling, a big metropolis and yet friendly, it treasures the old and embraces the new. These days with all the changes happening, Budapest is one of the most exciting places in Europe.

These CS MQPs will be at the Computer and Automation Research Institute in Budapest. This Institute is the national research center in Hungary for information technology, computer science and their related fields. In addition to pursuing basic and applied research, system design and system integration, consulting and software development are also among the activities of the Institute. The Institute puts a special emphasis on education related activities; it is closely affiliated with several Hungarian and European universities, including the Budapest University of Technology and Economics (BME) and the Eotvos Lorand University of Sciences, Budapest (ELTE).

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### DENMARK PROJECT CENTER - IQP

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Directors: Prof. P. C. Pedersen, Atwater Kent 205  
T. H. Thomsen, International House

The IQP project sites are in or near Copenhagen, the capital of Denmark, located on the island of Zealand. The Danish population numbers 5.3 million and inhabits an area of 16,630 sq. miles. In addition to farming, Denmark has a diverse and highly technological industry, with emphasis on electronics, pharmaceuticals, shipbuilding, furniture craft and alternative energy sources. The Danish culture is very open to interdisci-

plinary academic questioning, the foundation of every IQP. Danes are brought up to question and debate the impact of technology on the quality of life and is a leader in utilizing the positive aspects of modern technology while trying to lessen its negative impacts.

IQP projects in Denmark span a wide range of topics, with an emphasis on environmental issues and technology for people with disabilities. Alternative transportation, food quality, technology to assist visually impaired people with disabilities are all topics of great interest to both the public and private sector. Not-for-profit agencies are also expected to sponsor several future projects.

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### LIMERICK PROJECT CENTER - MQP

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Directors: Prof. R. Vaz, Project Center  
Prof. R. Brown, Atwater Kent 307

Visitors to Ireland encounter spectacular scenery including 3,500 miles of coastline, a rich cultural and literary heritage, vibrant cities and villages, and a warm and friendly populace eager to help visitors feel at home. Ireland also enjoys one of the fastest-growing economies in the EU. Limerick is Ireland's third largest city, and a center for both tourism and business, yet it retains the charm and feel of a small community in many ways. Limerick's center is located on the River Shannon, and features both medieval and Georgian influences; the outskirts of the city are home to a number of high-technology business parks and a major university. The areas surrounding Limerick are famous for their natural beauty and historical significance; the Republic of Ireland is small enough so that it can be explored from end to end in a series of weekend excursions.

MQPs in the Limerick area involve working at local electronics firms and research facilities. Students spend 10 weeks in Limerick, working fulltime in collaboration with local engineers on the projects. MQPs in Limerick typically focus on analog and mixed-signal hardware design, digital design and embedded systems, signal processing and communications, and software engineering. Specific project descriptions are not available until the beginning of the projects, as project sponsors typically provide the opportunity for students to work on cutting-edge problems of immediate interest to the sponsors.

Admission to the ECE MQP Program in Limerick is based on the following criteria: academic standing and performance, evidence of maturity and independence, qualifications relevant to the anticipated projects, faculty references, and the results of an interview.

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### LONDON PROJECT CENTER - IQP

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Director: Prof. P. Davis, Stratton Hall

Students at the London Project Center spend seven weeks in one of the world's finest capital cities. Some of the best theater and museums are found here, as well as neighborhood pubs where relaxation, music and conversation are an age-old tradition. A vibrant city, which has undergone rapid change, today London is known for its diverse cultures and interests - truly a city for everyone. This juxtaposition of past and present, tradition and modernity makes London a city with much to offer.

At the London Project Center, students complete IQPs while working with a wide variety of agencies. Recent or current project sponsors include Her Majesty's Tower of London, the Victoria and Albert Museum, the Museum of Science and Industry, the Association of Chief Executives of National Voluntary Organizations, and the London Boroughs of Merton, Lewisham and Brent.

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## **LONDON HUMANITIES PROGRAMS**

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Coordinator: Prof. J. Delorey, Alden Hall 205

WPI offers Humanities and Arts Projects in London in Terms B and E. London Humanities and Arts Projects are interdisciplinary and intended for students with many backgrounds in the humanities and arts. London was once the center of a global empire and its influence continues to radiate throughout the British Isles and well beyond. Humanities and Arts students in London study topics that might include history, literature, music, theatre, or culture, and work on projects that build on at least three previous courses in humanities and arts. As an interdisciplinary program, the London Humanities and Arts experience is not limited to the history or literature of Britain, but all projects take advantage of the unique resources available in London. These include some of the world's most vibrant theatre and the arts, outstanding museums, ambitious architecture, the libraries of the University of London, collections of film or sound recordings, and much more. London Humanities and Arts Projects are appropriate for students with a background in art history/architecture, drama/theatre, history, literature, music, philosophy, religion, or writing/rhetoric. Students planning a minor or major in International Studies, Humanities and Arts, or Technical Scientific, and Professional Communication, also may study in London in conjunction with this program.

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## **NANCY PROJECT CENTER - MQP**

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Director: Prof. T. Camesano, Goddard Hall 218B

Nancy, France is a medieval city of about 350,000, located in the heart of the beautiful Lorraine region. The city is well connected by train to Paris, Frankfurt, and Brussels (each about 200 miles), and Luxemburg (75 miles). The "vielle ville" (old city) region of Nancy is known for its small streets, beautiful mansions, museums, and historic walks. There is a large student population, as well, and Nancy offers plenty of sports, concerts, movies, shopping, and eating places that are of interest to students.

The projects will be done in collaboration with the chemical engineering school of the Institut National Polytechnic de Lorraine (INPL), and l'Ecole Nationale Supérieure des Industries Chimiques (ENSIC). The projects will take place in one or more of the following: Laboratoire de Chimie Physique Macromoléculaire (LPCM, Physical Chemistry of Macromolecules), Département de Chimie Physique des Réactions (DPCR, Physical Chemistry of Reactions), Laboratoire de Thermo-dynamique des Séparations (LTS, Thermodynamics and Separation Processes), or Laboratoire des Sciences du Génie Chimique (LSCG, Chemical Engineering Sciences). Projects are anticipated in testing a polymeric drug -delivery system, image analysis of bacteria from a wastewater treatment process, bacterial biofilm formation in bioreactors, and possibly in fuel cells.

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## **VENICE PROJECT CENTER - IQP**

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Director: Prof. F. Carrera, Project Center

Called the most beautiful city in the world, Venice features a haunting atmosphere which exudes the splendor of its past. A city without cars, yet with an outstanding historical, artistic, and architectural heritage, much of its uniqueness comes from its symbiotic relationship with the sea and the lagoon. Yet, despite its millenary history, the historic city of Venice is so trying to adapt to our XXI century lifestyles, while preserving its environmental, artistic and cultural heritage. The rising cost of living in Venice has led to a dramatic exodus of its population which decreased since WWII from about 200,000 to around 60,000, while tourism has ballooned to 12 million visitors per year. Venice is a microcosm that reflects and magnifies many of the issues confronting the rest of the world, and at the same time it is a place that will allow you to experience a unique - more relaxed - pace of living.

Since the founding of the VPC in 1988, the IQPs in Venice provide an opportunity for students to see the implementation of their projects for the benefit of an entire city. Projects are conducted for Venetian, American and international organizations and include environmental, socioeconomic, artistic, cultural, and technical concerns important to the revitalization of this historic city. The over 120 projects completed in Venice include: studies on aspects of the Canals of Venice; which resulted in the publication of a book under the auspices of UNESCO; a number of projects on the preservation of Venetian art; several environmental studies on the lagoon ecosystem, which are contributing to the creation of a Lagoon Park; a variety of projects for the improvement of the urban quality of life in the city and the lagoon islands, which have resulted among other things, in the re-engineering of the Venetian cargo delivery system and the design of a vacuum sewer system to prevent discharges in the city's canals.

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## **PROGRAMS IN AFRICA**

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### **CAPE TOWN PROJECT CENTER - IQP**

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Director: Prof. S. Justo, Project Center

Cape Town is located at the southern tip of South Africa. It is a city of many flavors, encompassing both developed nation aspects and developing nation characteristics. It is accessible to some of the loveliest and most interesting terrain that Southern Africa has to offer. Students will be able to visit the African bush (to see wild animals in well maintained and controlled parks), experience a cosmopolitan African city, and work on projects in some of the poorest and neediest areas of the region. Cape Town has wonderful resources and climate.

South Africa has the infrastructure of a developed nation but very limited resources for those areas that were neglected under apartheid. There will be a focus on energy resources, water conservation and the provision of housing, health care and other issues of sustainability to under-developed areas. The projects will be sponsored by government and non-governmental organizations (NGO's) and will focus on issues of sustainable development for the region. Students will have opportunities to

work in informal housing settlements, in semi-rural areas, under the guidance of local experts.

The preparation for these projects will require no prior knowledge of Africa and will focus on the specific projects the students will undertake as well as the historical context.

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## NAMIBIA PROJECT CENTER - IQP

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Director: Prof. C. Peet, Project Center

Namibia is a southern African nation of extensive national parks, deserts, seaside ports, livestock farms, and towns, with an excellent infrastructure of maintained roads, clean water, and good services. Students will live in Windhoek, the modern capital city, on the campus of the Polytechnic of Namibia, WPI's partner university in Namibia. They will work in the city as well as other parts of the country. There will be an opportunity to visit national parks and other tourist attractions and a limited opportunity to become familiar with African rural life.

Namibia's well-developed government agencies at both the national and municipal levels will sponsor many of the projects, and these projects will generally focus around issues of sustainable development. In particular, projects typically investigate alternative energy sources, improved water and sanitation management, improved preventive health education, low-income housing, micro-level income generating activities and tourism development. Local towns and peri-urban informal settlements will be the venue of some of the projects. No prior knowledge of Africa is needed, but the preparation will include a heavy commitment to learning about the culture of Namibia in addition to preparing specifically for the projects.

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## MOROCCO HUMANITIES PROGRAM

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Coordinator: Prof. W.A. Addison, Salisbury Labs 238

Students will study at Al Akhawayn University (AUI), located in Ifrane, Morocco. Ifrane is 120 miles east of Morocco's capital Rabat and 35 miles from the historic imperial cities of Fes and Meknes-cities famous for their revered mosques and colorful Berber migrants. With a population of about 15,000, Ifrane is a peaceful resort and recreational village in the foothills of the Atlas Mountains, known for its French colonial architecture as well as a royal palace. Al Akhawayn University is a semi-private, English-speaking university founded by King Hassan II of Morocco and King Fahd of Saudi Arabia. Since about half the faculty hold American graduate degrees, AUI resembles in some respects an American university. Throughout Morocco, cous cous is the favorite meal in local restaurants and traditional pastries and fresh mint tea are typical snacks at sidewalk cafés.

Two-thirds unit of AUI courses will be devoted to the history of the Arab World, Islamic Civilization, and contemporary issues in North Africa. One-third unit will be an independent study project based upon course work and upon tours to Moroccan historic and cultural sites under the supervision of the on-site advisor. These projects may focus upon a variety of areas, including history, religion, art and architecture, as well as contemporary socio-political issues, with the goal of providing greater understanding of Arab and Muslim peoples. The unit of work will either conclude the sufficiency or can be credit toward a Humanities and Arts or International Studies minor or major.

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## PROGRAMS IN ASIA

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### BANGKOK PROJECT CENTER - IQP

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Directors: Prof. C. Demetry, Washburn Shops  
Prof. R. Vaz, Project Center

Situated in the heart of Southeast Asia, Thailand presents many of the opportunities and challenges common to developing nations. Students at the Bangkok Project Center have a unique opportunity to become acquainted with the people of Thailand and to help address local problems by working on a variety of social and environmental projects. Some projects provide the opportunity to work with underserved communities, and some give students the opportunity to experience life in the countryside. Despite its challenges, Thailand is intensely beautiful: a land of gilded temples and golden beaches. The Thai people are among the friendliest and most hospitable in the world and have a great talent for enjoying life. Accommodations on the prestigious Chulalongkorn University campus position WPI students to meet Thai students and to explore the city's many attractions.

WPI students work in project teams on IQPs sponsored by local nonprofit organizations, universities, governmental and non-governmental organizations. Projects are conducted on a wide variety of topics and are arranged in advance through resident coordinators in Bangkok. Project themes often center on health and human services, community development, sustainable development and appropriate technology, and environmental issues.

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### HONG KONG PROJECT CENTER - IQP

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Director: Prof. C. Peet, Project Center

Hong Kong provides a gateway to the most dynamic and important region on the planet. The wealth of the world has moved to Asia, and Hong Kong plays a crucial role in the development of China-currently the most significant economy in Asia. This city radiates energy as it rapidly modernizes and takes the lead in economic development, hi-rise building, efficient transportation, artistic expression, educational reform and environmental conservation. Students will live in furnished apartments with small kitchens, with 2-3 students in each apartment, in a typical Chinese residential neighborhood, somewhat different from typical tourist areas of Hong Kong.

In Hong Kong WPI works with a number of educational, social service and environmental organizations and institutions. Hong Kong University, Hong Kong Polytechnic University and Hong Kong University of Science and Technology have sponsored projects, while other sponsors include Friends of the Earth, Hong Kong Council of Social Service, St. James Settlement and Caritas. New sponsors are sought on a regular basis. In addition, WPI has a Memorandum of Understanding with Hong Kong Polytechnic University (HKPU), giving WPI students access to library and other facilities on the conveniently located campus in TsimShaTsui, Kowloon, as well as enabling some HKPU students to work with WPI students on their projects, especially in the first half of January.

IQPs will deal with urban planning, a greener environment, sustainable resource use, education reform and innovation, economic and social issues, and other topics as appropriate.

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## WUHAN PROJECT CENTER - MQP

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Director: Prof. Y. Rong, Washburn Shops 307T

As manufacturing industry becomes more and more global, many research, design, and manufacturing activities go to China. To experience working with professionals from different backgrounds and in a different cultural environment, 10 ME students from WPI will be selected to work with 10 students from Huazhong University of Science and Technology (HUST), Wuhan, China. Five projects defining problems and providing solutions with social constraints will be completed. HUST is a major university in China with excellent engineering programs. The mechanical engineering major has been consistently ranked among the top major in China. Wuhan is a large and industrialized city in central China, with a rich cultural heritage and easy access to Beijing and Shanghai, as well as other cities, by train or airplane. Students will stay on HUST's campus, but may travel to other cities based on the project requirements. Students will have a chance to merge into Chinese culture and experience people's daily life in China. The projects will be completed within 7-8 weeks.

These ME MQPs will be conducted at HUST, with 2-3 trips to other cities. The WPI students will work with HUST students in mixed teams, with co-advisors from both WPI and HUST. The projects are real world problems and sponsored by local companies (some of them are foreign invested) and institutions, in the area of mechanical product and system design, the manufacturing processes, and lean manufacturing implementations.

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## PROGRAMS IN LATIN AMERICA

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### COSTA RICA PROJECT CENTER - IQP

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Director: Prof. S. Vernon-Gerstenfeld, Project Center

Costa Rica is a land of contrasts: banana plantations, flaming volcanoes, misty black sand beaches and a thriving modern capitalist economy. A remarkably stable country, politically and economically, Costa Rica offers an opportunity for students to become immersed in a Central American culture where democracy, economic development, and concern for the environment are a permanent part of the landscape. Students stay in the capital city of San José, but ample opportunity is found to visit the country's attractions. Many projects have fieldwork associated with them.

Costa Rica's unique environment provides students opportunities to focus on environmental conservation and sustainable development by working with government agencies dedicated to those issues and with selected museums and private organizations. Prior knowledge of Spanish language is not required for participation. All students, however, must complete a two-week intensive language program on site.

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## PUERTO RICO PROJECT CENTER - IQP

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Director: Prof. S. Vernon-Gerstenfeld, Project Center

The Puerto Rico Project Center offers an opportunity to be immersed in a Caribbean culture that is a unique and harmonious blend of Spanish and North American influences found nowhere else in the world. Located in San Juan, the Center offers the attractions of a large metropolitan area within easy reach of El Yunque national rain forest, white sand beaches, historic El Morro Spanish fortress, Arcibo Observatory, and many other sites of interest.

Projects are completed in teams and span a wide variety of topics including the environment, public health, housing, social welfare, transportation, and land use. Sponsoring agencies have included many offices of the government of the commonwealth as well as local industries.

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## PROGRAM IN THE SOUTH PACIFIC

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### AUSTRALIA PROJECT CENTER - IQP

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Directors: Prof. H. Ault, Higgins Labs 207

Melbourne, situated along Australia's southeast coast, is the country's second largest city. A city of parks and gardens, specializing in arts festivals, sporting events, and fine dining, it was voted "the world's most livable city" in an international survey. Melbourne, Boston's sister city, is also a fine place from which to explore the diversity of Australian life; only a short distance from mountains, deserts, beaches, mining towns, and extensive parklands and wildlife reserves.

IQPs involve outreach to the Australian public on issues or topics regarding science, technology and society. The projects usually focus on disabilities, fire protection or the environment.

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## INDIVIDUALLY SPONSORED RESIDENTIAL PROJECTS (ISRP<sub>s</sub>)

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Many students and faculty augment the educational opportunities available at WPI's formal project centers and programs with individually sponsored residential, off-campus projects. All such programs must adhere to common, carefully structured risk management protocols such as those developed and implemented at established project centers. Otherwise, students, faculty, and WPI are exposed to unnecessary risk.

Hence, the Provost requires completion of the following risk management protocol by all faculty intending to advise students who will earn academic credit while in residence off-campus in individually sponsored projects.

1. Two terms in advance of the off-campus activity: Faculty advisor sends a letter of intent to the Provost's office. The letter describes the scope of the anticipated project, where it will happen, how many students will participate, and the term that the students will be off-campus.

2. Ten weeks prior to departure: Faculty advisor completes and submits a completed ISRP form to the IGSD (with a copy sent to Natalie Mello in the IGSD). The ISRP form is co-signed by the academic department head (MQP or Sufficiency) or Dean of IGSD (IQP). At this time a signed Transcript and Judicial Release Form must be submitted for each potential student participant.
3. Eight weeks prior to departure: All students expecting to participate in an ISRP should be in good academic standing at this time. WPI reserves the right to withdraw acceptance to students who are subsequently placed on academic warning. Students placed on academic probation are not eligible to participate. Upon review of academic and judicial records for each student the IGSD will inform the advisor of students who may be disqualified due to poor academic performance or judicial history at WPI.

4. Six weeks prior to departure: Student participant(s) submit the following forms to the faculty advisor: the Acknowledgement of Voluntary Participation, the Off-Campus Students' Health Update and Records Release Form, and the WPI Off-Campus Travel Information Form.
5. Five weeks prior to departure: The advisor submits these completed forms (item 3) to the IGSD. Please note that all forms can be found at the IGSD Web Page.

Please note that all forms can be located on the Web at <http://www.wpi.edu/Academics/Depts/IGSD/>  
 Project registration will not be complete until the conditions of this protocol are met.

At the completion of step 2, WPI's risk managers will review the information provided and make a recommendation to the Dean of IGSD, who will assist the Provost in making a final decision to approve or disapprove the activity based on considerations of risk management. The faculty advisor will learn of this decision no later than the first day of the term preceding the proposed activity.

	E Term Away	A Term Away	B Term Away	C Term Away	D Term Away
Proposal made to Provost's Office	By January 10th	By March 10th	By May 10th	By September 10th	By November 10th
Completed ISRP form submitted to Provost's Office	By March 15th	By June 20th	By August 25th	By October 25th	By January 5th
Completed Health & Safety Forms for each student submitted to the IGSD	By April 20th	By July 25th	By September 25th	By December 5th	By February 5th

## ON-CAMPUS IQP PROGRAMS

### LIVING MUSEUMS PROGRAM

The Living Museums Program provides students with unusual opportunities to carry out IQP projects at various culturally rich museums of New England. Museums synthesize knowledge and combine artifacts with primary and secondary documents, often to create an entire social and physical environment. Thus, as students work with professional staff, documents, and artifacts at museum sites, they gain an understanding of the past and present, and begin to see how distinct aspects of human life fit together to form a specific culture. At the outstanding museums participating in the program, students can select projects from a varied list of areas ranging from medieval warfare at the Higgins Armory Museum in Worcester to the rich history and literary culture of Concord, MA, at the Concord Museum and the Thoreau Lyceum.

Special projects are available each summer in Term E at several museums and historical institutions such as : Mechanics Hall, Worcester, MA; the Worcester Historical Museum; Fruitlands Museum in Harvard, MA, Martha's Vineyard, and Higgins Armory Museum.

## GENDER, RACE, AND TECHNOLOGY

Prof. S. Vernon-Gerstenfeld, IGSD

Student projects in this program research issues in two general areas: (a) the participation of women and people of color in engineering and science education and in engineering professions, and (b) the effects of particular technologies on women, African Americans, Hispanics, Native Americans, and other specific racial or ethnic groups.

Projects are often coadvised, with one advisor from humanities or social science, and one advisor from science, engineering, or computer science disciplines.

Past and ongoing project topic areas include:

- effects of automation on office workers
- women in science and engineering professions
- underrepresented groups in science and engineering professions
- sex differences in learning styles in technical subjects
- ethics and reproductive technologies
- science and math education for precollege Native Americans, Hispanics and African Americans.

Project ideas in these or other areas related to gender, race, and technology can be initiated by students or faculty. For more information, contact Prof. Susan Vernon- Gerstenfeld, Project Center 216.

## RECENT CHANGES IN THIS REQUIREMENT

Effective with the class entering in the fall of 2007 the requirements in the Humanities and Arts have changed. The set of requirements previously referred to as the “Sufficiency” has been modified, and this new set of requirements will no longer be referred to as the Sufficiency. Students entering prior to A term of 2007 may elect to follow either the previous (“Sufficiency”) or new Humanities and Arts Requirements. Students entering for A term, 2007 or later must follow the new requirements. In this catalog, the term “Sufficiency” will still appear as the transition to the new requirements proceeds.

## OVERVIEW

The Humanities and Arts Requirement empowers students to meet the broad educational goals of WPI. The balance between technological and humanistic education and the emphasis on inquiry-based approaches to student learning have been and remain hallmarks of a WPI education. In concert with WPI's other degree requirements, the humanities and arts requirement embodies the institute's definition of an educated person. The humanities and arts requirement engages students with theory and practice - *Lehr und Kunst* - through the following educational goals.

### GOALS OF THE HUMANITIES AND ARTS REQUIREMENT

- to introduce students to the breadth, diversity, and creativity of human experience as expressed in the humanities and arts;
- to develop students' ability to think critically and independently about the world;
- to enhance students' ability to communicate effectively with others in a spirit of openness and cooperation;
- to enrich students' understanding of themselves;
- to deepen students' ability to apply concepts and skills in a focused thematic area through sustained critical inquiry;
- to encourage students to reflect on their responsibilities to others in local, national and global communities;
- to kindle in students a life-long interest in the humanities and arts.

### MEETING THE REQUIREMENT

Students fulfill the humanities and arts degree requirement by completing two units of work consisting of six student-selected courses. In selecting these courses, students complete breadth and depth components of the requirement. To ensure breadth, students select at least one course each from two of three different intellectual clusters. To ensure depth, students complete one unit of thematically-related work which must include at least one course at the 2000-level or above and culminate in an inquiry seminar or practicum (HU3900 or equivalent). Students may take six courses in a foreign language as an exception to the breadth component, but their sequence of foreign language courses must culminate in a seminar or practicum. At the end of the seminar or practicum, every student will submit documentation to certify completion of the requirement.

### BREADTH COMPONENT:

To ensure intellectual breadth, students must select at least one course from at least two of the following three intellectual clusters:

- art/art history, drama/theatre, and music (AR, MU, TH);
- languages, literature, and writing/rhetoric (EN, WR, RH, SP, GN);
- history, philosophy and religion (HI, HU, PY, RE).

WPI offers a flexible curriculum to entrust students with a significant amount of choice and responsibility for planning their own course of study. At the same time, WPI requires students to take at least one course each in at least two of three intellectual clusters to provide exposure to the creativity of the fine and performing arts, modes of communication in languages and literature, and the cultural analysis of the past and present. Students are encouraged to experiment and to take courses beyond the minimum requirement of one course in two different areas. By providing exposure to multiple areas, the breadth component encourages students to appreciate the fundamental unity of knowledge and the interconnections between and among diverse disciplinary fields.

The one exception to this breadth requirement is that students may take all six courses in a foreign language. Development of proficiency in a foreign language necessitates sustained engagement in the language beyond the elementary and intermediate level. Foreign language instruction is broadly interdisciplinary and includes elements of the history, literature, and culture of a particular language area. A student in foreign languages must still meet the depth component of the requirement through completion of a practicum or seminar in the language. A student who begins foreign language study is not compelled to remain in that subject, but could choose to switch to another subject of study and complete the depth component in another thematic area.

### DEPTH COMPONENT:

To ensure depth, students complete at least one unit (three courses) in a focused thematic area that includes and culminates with an inquiry seminar or practicum. At least one of the two thematically-related courses that precede the seminar or practicum must be at the 2000-level or above.

The WPI Plan calls for students to develop a meaningful grasp of a thematic area of the humanities and arts. After taking courses in at least two different areas of the humanities and arts, students pursue deeper study by choosing at least two courses in a focused thematic area that leads to an inquiry seminar or practicum. Students are strongly encouraged to take 2000-level courses and one 3000-level course in a focused thematic area prior to a culminating activity. To ensure that students develop a program of increasing complexity, the depth component requires that students take at least one course at the 2000-level or above before the seminar or practicum. The structure of the requirement remains flexible so that students will become intentional learners as they select their own sequence of thematically-related courses.

In most areas, students complete the depth component of the requirement by taking an Inquiry Seminar. In areas such as drama/theatre, music, the visual arts, or foreign languages, it

may be appropriate for students to complete the depth component of the requirement with a Practicum. In either format, the combination of courses and seminar or practicum provides a deeper engagement with sustained critical inquiry and the integration of theory and practice in an area of the humanities and arts.

The Humanities and Arts department defines specific materials that each student submits at the end of the seminar or practicum to document completion of the breadth and depth components of the requirement. For example, a Humanities and Arts Requirement Portfolio could include a list of the courses taken to fulfill the breadth and depth components and a selection of each student's individual work from the culminating seminar or practicum. Such a portfolio would not include material from all courses, nor would it include all material from the culminating seminar or practicum. Rather, a portfolio would enable each student to demonstrate that they have met the goals of the Humanities and Arts Requirement and to reflect on their progress toward achieving the overall learning outcomes of WPI.

It is expected that in most cases the final grade of the seminar or practicum will be used as the overall evaluation for the Completion of Degree Requirement (CDR) for the Humanities and Arts Requirement.

### INQUIRY SEMINAR OR PRACTICUM

The culmination of the depth component of the humanities and arts requirement is an inquiry seminar or practicum. The educational goals for the seminar or practicum are the same regardless of the format.

#### GOALS OF THE INQUIRY SEMINAR OR PRACTICUM:

- *Critical inquiry*: to develop each student's ability to apply concepts and skills learned in the humanities and arts, the seminar/practicum offers opportunities to engage in sustained critical inquiry, analysis, or problem-solving in a focused thematic area.
- *Research and investigation*: to engage students in research, discovery, creativity, or investigation, the seminar/practicum provides opportunities for students actively and critically to seek and evaluate new information and insights using multiple sources. These opportunities need not necessarily be research papers.
- *Communication and writing*: to develop each student's ability to communicate effectively both orally and in writing, the seminar/practicum includes discussion of appropriate communications skills and provides opportunities to revise written work after receiving feedback from the instructor.
- *Intellectual independence*: to foster independence of thought, the seminar/practicum offers significant opportunities for individual, self-directed work.
- *Conversation and dialogue*: to promote individual reflection and the appreciation of diverse perspectives, the seminar/practicum consists of classroom activities other than traditional lecture to encourage discussion and collaborative learning in a spirit of openness, cooperation, and dialogue with peers. The thematic focus, structure, and assignments for each seminar or practicum are to be determined by each individual instructor to achieve these goals.

### INQUIRY SEMINAR

The Inquiry Seminar, usually taken in the sophomore year, represents the culmination of the Humanities and Arts Requirement. The Seminar provides an opportunity for students to explore a particular topic or theme in the humanities in greater depth. The Seminar has two primary goals. The first is to foster independence of student thought, typically through some form of self-directed activity. The second is to encourage a cooperative, dialogic approach to inquiry, through open exchanges with peers in a small, intensive classroom setting (typically 12 students or fewer). Students learn how to frame questions in the context of a particular discipline or field of study, and to explore or investigate problems using methods appropriate to work in the humanities and arts.

As the student's capstone experience in the humanities and arts, the Inquiry Seminar is intended to help students take their knowledge of the humanities to a higher level. The purpose of the Inquiry Seminar, therefore, is not to provide a broad survey or general introduction to a given discipline, but to provide a structured forum in which students might approach a specific humanities-related problem or theme at a deeper, more sustained level of intellectual engagement than would normally be possible within a traditional course setting. The pedagogical idea behind the Inquiry Seminar is that work in the humanities and arts is at once an intensely personal enterprise, in which the individual freely draws on her or his own particular interests, abilities, passions, and commitments, and at the same time a form of ethical community in which the practitioner is always in conversation with and accountable to others.

While the specific content and requirements of the Inquiry Seminar vary from instructor to instructor, all Inquiry Seminars incorporate self-directed learning as a significant part of the curriculum. It is the department's expectation, therefore, that by the time they enroll in the Seminar, students should have sufficient background in the humanities and arts to be able to work independently and to pose questions of their own. Students will be asked to research and write a term paper, to assemble a portfolio of writings or exercises, or otherwise to demonstrate their ability to pose a question of relevance to humanities inquiry, and to answer it. At the same time, the Seminars are designed to foster an atmosphere of intellectual collaboration and discovery. Students are required to participate fully in seminar discussion, to share the results of their own research or activities, and to engage the ideas and interests of their peers in a constructive and collegial way.

### INQUIRY PRACTICUM

Students in the performing arts have the option to complete their Humanities and Arts sequence with an Inquiry Practicum in music or drama/theatre. A practicum shares the same goals and objectives of an inquiry seminar but provides students with a production/performance experience which emphasizes the hands-on, practical application of skills and knowledge gained from previous Humanities and Arts courses. Samples of practicums in music include composing, arranging, or performing a solo recital. Drama/Theatre students may choose to act, direct, or design for a campus production. In addition to weekly meetings, students may be required to attend rehearsals and performances. The design of the final project is determined through conversations between instructors and students. Due to the unique nature of the practicum, permission of the instructor is required to enroll in a practicum.

**FOREIGN LANGUAGES: PRACTICUM OR SEMINAR**

Students in foreign languages may complete the Humanities and Arts Requirement in one of the following three ways:

1. *practicum in the sixth and final course in a foreign language.*  
The practicum will include evaluative components or exams to demonstrate overall language skills in four areas: listening, speaking, reading, and writing. The practicum will require students to demonstrate breadth of cultural knowledge of the language area. (Examples of practicum courses: GN 3512, GN 3515; SP 3522; SP 3527)
2. *advanced language seminar after five previous courses in the foreign language.* The seminar will explore a thematic topic and provide opportunities for individual inquiry. (Seminar examples: GN 3513, GN 3514; SP 3523, SP 3524, SP 3525, SP 3526, SP 3528, SP 3529, SP 3530, SP 3531)
3. *advanced language seminar after advanced-level language courses combined with courses from other areas of study.*  
Students who demonstrate basic oral, written, and cultural knowledge of a foreign language in a placement test at the advanced level may combine courses from other areas for their requirement. (Seminar examples are the same as option 2.)

Option 1 and 2 require students to take six courses in a foreign language. For example, in option 1, a student without prior language training might begin with GN 1511 Elementary German I and conclude with a practicum in GN 3512 Advanced German II. In option 2, for example, a student might start with SP 2521 Intermediate Spanish I followed by five Spanish courses which culminate in one of the designated seminars. In option 3, students who demonstrate knowledge of the foreign language at the advanced level may mix courses from other areas in their course sequence. For example, a student might take two courses from history, philosophy, music, etc. along with four advanced Spanish courses which would culminate in a designated seminar. Students in all three options for foreign languages would be required to submit the same materials to demonstrate completion of the requirement as students whose culminating experience was an inquiry seminar or practicum in another area of the Humanities and Arts.

**TRANSITION IN DEGREE REQUIREMENTS**

As stated above, the new degree requirement in Humanities and Arts take effect for the class entering WPI in the fall of 2007. All current students, who have yet to complete their Sufficiency Requirement, may follow either of the following options:

1. Current students may complete their Humanities and Arts requirements by following the rules that were in effect at the time that they enrolled. Faculty will be available to advise individual students in ISP/Sufficiencies during the 2007-2008 academic year, but we anticipate that most students will enroll in either inquiry seminars or practicums. Students who wish to complete their Humanities and Arts requirement by enrolling in an ISP may only do so with the consent of the instructor. Students completing foreign language Sufficiency course sequences will continue to do so by completing 6 courses in language study.

**OR**

2. Current students may complete their Humanities and Arts requirement by completing courses in Humanities and Arts and then completing an inquiry seminar or practicum in place of the ISP. Before enrolling in the inquiry seminar or practicum, students need only complete 2 courses in the discipline of the inquiry seminar/practicum. (This is a relaxation of the five thematically related courses requirement of the past and does not impose any new requirements on current students). For clarity, students who have enrolled before the fall of 2007 will not be obligated to complete either the breadth requirement (at least one course in two of three disciplinary clusters) or the requirement that one course in the depth area be taken at the 2000 level or above. Advisors, however, should encourage students to select courses that will meet these requirements whenever possible.

Students who transfer less than six Humanities and Arts courses from another institution must complete an inquiry seminar or practicum to complete the Humanities and Arts requirement. Students who transfer six or more courses in Humanities and Arts will have the option of submitting a CDR form or engaging in additional work (or documentation of work) to earn an "A" on the CDR, in accordance with current transfer rules (see below).

All students, whether enrolled before or after the Fall of 2007, may have the option of completing their Humanities and Arts requirement while enrolled for 1 unit of coursework at an off-campus project center where one-third unit of the coursework shall include an inquiry seminar or practicum. Other than dropping the term "Sufficiency", there is no change to the Off-campus Humanities and Arts study option (See page 29 of the Catalog).

**TRANSFER STUDENTS AND THE HUMANITIES AND ARTS REQUIREMENT**

Transfer credit in the Humanities and Arts at WPI is granted on a course-for-course basis. All Transfer and 3-2 Program students entering WPI with *fewer than six courses or their equivalent of transfer credit in the Humanities and Arts* must complete work in the Humanities and Arts, including an Inquiry Seminar/Practicum to the extent that the overall Humanities and Arts credit totals two units.

No credit toward the Humanities and Arts requirement is given for introductory-level foreign-language courses unless the entire program is in that foreign language. Usually only one transfer course in Freshman English can be applied toward the requirement. In all cases, the professor for the Inquiry Seminar/Practicum has the final decision on what courses are acceptable within the student's sequence leading up to the project. Up to one unit (i.e. three courses) of transferred work in the Humanities and Arts that is not credited toward the Humanities and Arts Requirement can be credited toward the fifteen-unit graduation requirement; such courses shall receive credit under the category of EL 1000.

If a Transfer or 3-2 Program student *has completed two units of acceptable college-level work in the Humanities and Arts prior to entering WPI*, a Completion of Degree Requirement form will be submitted by the Humanities and Arts Department Coordinator for Transfer Students at the request of the student. The grade for such a Humanities and Arts Requirement met by transfer credit is normally a grade of "CR". Students whose grades on transferred courses average A can engage in additional work or submit samples of their previous work and may be awarded an A for the Humanities and Arts Requirement.

Alternately a transfer student may elect to undertake an Inquiry Seminar/Practicum in an effort to achieve an A grade. These evaluation options must be exercised prior to the Department's submission of the Completion of Degree Requirement form to the Registrar.

Decisions concerning credit toward the Humanities and Arts requirement are made by the Humanities and Arts Coordinator for Transfer Students, Professor James Hanlan. He can be contacted in room 28 of Salisbury Laboratories, or at extension 5438, or email [jphanlan@wpi.edu](mailto:jphanlan@wpi.edu).

## **GUIDELINES FOR GRANTING TRANSFER CREDIT TO U.S. STUDENTS FOR FOREIGN LANGUAGE STUDY**

### **A. Credit for study on the high school level:**

1. Transfer credit of 1/3 unit is given for Advanced Placement with a score of 4 or 5.
2. Students with three or more years of foreign-language study in high school, but who have not taken the Advanced Placement examination in that language, may receive 1/3 unit credit for their high school language study upon satisfactory completion of two courses in the same language on the intermediate level or above. (Note: Courses in German and Spanish in addition to those offered at WPI, as well as courses in other languages, are available at other colleges in the Consortium.)
3. In either case 1. or 2. above, in order to receive 1/3 unit credit, students must begin their WPI course sequence at the Elementary II level or above.

### **B. Credit for study at other colleges and universities:**

1. Language study which is done at other universities and colleges prior to entering WPI, or done with the prior written permission of the student's Humanities and Arts Consultant (not the Department Head) as part of an agreed-upon Humanities and Arts sequence, transfers on a course-for-course basis.
2. Language study which is done at foreign universities, language institutes, cultural institutes, etc., prior to entering WPI, or done with the prior written permission of the student's Humanities and Arts Consultant (not the Department Head) as part of an agreed-upon Humanities and Arts sequence, is assessed by the Foreign Languages Consultant on the basis of matriculation papers and the level or work accomplished.

## **OTHER OPTIONS**

### **SOCIAL SCIENCE COURSES**

Humanities and Arts advisors may allow students to include one social science course in their Humanities and Arts sequence on the basis of that course's suitability to the development of students' particular humanities themes.

Such a course must be more than "related to" or "in support of" a given theme. It must be at the interface of humanities (normally history) and blend in with certain Humanities and Arts courses. A course in American government, for example, could logically be included in any number of American history sequences.

The inclusion of a social science course in the Humanities and Arts requirement of any student requires the written "advice and consent" of his or her Humanities and Arts advisor after the theme has been determined and before the student registers for the seminar.

One of the following social science courses (and no other) may be included in the Humanities and Arts sequence:

- GOV 1301 U.S. Government
- PSY 1402 Introduction to Social Psychology
- STS 2208 The Society - Technology Debate

### **INTERDISCIPLINARY STUDY AT THE AMERICAN ANTIQUARIAN SOCIETY**

A unique opportunity for interdisciplinary work in the humanities and arts is offered by the American Studies Seminar sponsored each fall by the American Antiquarian Society. Organized in collaboration with Worcester's five undergraduate colleges and universities, this seminar focuses on topics that allow students to investigate the Society's rich holdings in early American history, literature, and culture. The Society's unparalleled collection of documents is a short walk from the campus. Information on application deadlines and academic credit toward the Humanities and Arts requirement is available from the WPI Campus Representative to the American Antiquarian Society.

### **OFF-CAMPUS HUMANITIES AND ARTS OPTION**

WPI offers the option to complete the Humanities and Arts Requirement during one term of study at several Project Centers. Normally, students complete the requirement through at least six courses or independent-study projects on campus. However, the "Off-Campus" option allows students to combine at least three courses on campus with one term studying the humanities and arts at a Project Center. Since this one-term project is equivalent to three courses, students may use it to complete the requirement.

Off-campus projects are available in Germany for the study of foreign languages and in London and Morocco for other fields. These off-campus programs have a flexible format. Students devote themselves to one term studying the history, literature, language or culture at the project site with a WPI faculty advisor. The program might combine a thematic seminar in an area of the faculty advisor's expertise with visits to museums, the theatre, musical performances, or cultural excursions.

Although themes or areas of emphasis vary from year to year, all off-campus Humanities and Arts activities culminate in a written report in an area of interest to the student.

To be eligible for this one-unit activity, students must have already completed three courses in humanities and arts before they leave campus. Students may apply to the off-campus program before they have taken all three courses. However, students may not participate in the program unless they successfully complete one unit of work in humanities and arts before the term of the project. In addition, students going to any Project Center must complete all of the forms required by the Interdisciplinary and Global Studies Division.

Requirements:

- Students must have completed at least three courses in the Humanities and Arts at WPI, or have earned equivalent course credit approved by the Humanities and Arts Department, before the term of the off-campus activity. The Department may allow students to count transfer or advanced placement credits toward the three course minimum;

- Students must be accepted into the off-campus Humanities and Arts program by the Humanities and Arts Department, and complete all forms required by the Interdisciplinary and Global Studies Division, in order to register for these projects.
- Students might be required by the faculty advisor to complete a PQP or attend required meetings before the off-campus project;
- Students must submit a written report or paper at the end of the project. Students also may be required to submit written updates at various times in the course of the project. In all cases, the faculty advisor at the project site will determine the precise form of the written requirements.
- Students may be required to give an oral presentation at the end of the project;
- Under normal circumstances, students must complete the project within one term in order to receive the full unit of credit;
- Only members of the Humanities and Arts faculty at WPI may advise off-campus Humanities and Arts projects.

### OFF-CAMPUS RECOMMENDATIONS

All off-campus programs benefit from advance planning. Discuss the possibility of an off-campus activity with your academic advisor at the beginning of the freshman year. Consult with the WPI faculty who will advise these off-campus projects as early as possible, since they may be able to suggest useful courses or other background resources for the projects. Also keep in mind that three courses are the minimum required, but many students find it advantageous to take additional courses before going away.

The interdisciplinary London and Morocco programs are open to students with a background in areas of the humanities

and arts besides foreign languages, including art history and architecture, drama/theatre, history, literature, music, philosophy, religion, or writing/rhetoric. After taking at least three courses in any of these areas on campus, you could then go to London to complete your project. Some students also have gone to London with this program to study beyond the Humanities and Arts requirement for international studies, history, literature, music, theatre, or other areas.

WPI offers programs in the German language at Darmstadt. This program requires completion of foreign language courses through the level of intermediate II or above (2000-level or above) before going abroad. For students who have taken foreign language courses in high school, language placement exams are available during New Student Orientation. Some students with basic foreign language preparation have completed their arts projects in Germany. We welcome a creative approach to off-campus study.

More advanced students may participate in these off-campus programs by doing work toward a minor or major. A student who had already completed their Humanities and Arts requirement on campus, for example, might be able to work in the humanities and arts on an Independent Study Project that could count toward a minor. Or a student at one of these sites could work on a Major Qualifying Project in fields such as Humanities and Arts, International Studies, or Professional Writing.

The Humanities and Arts Department advertises upcoming project locations and application deadlines at the Global Opportunities Fair each September. Future project opportunities might include other foreign locations or projects that provide the context for an intensive study of humanistic themes associated with particular locales within the United States. Contact the Department of Humanities and Arts for more information.

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## THE SOCIAL SCIENCE REQUIREMENT

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Social science deals with the behavior of individuals and groups as well as the functioning of the economic and political systems and institutions that shape and control our lives. As such, it offers a perspective that is essential for anyone desiring a well-rounded education.

Therefore, WPI, in common with other colleges, requires some exposure to the social sciences for its graduates. In satisfying the two-course social science requirement, students are free to take courses in any of the traditional social sciences: economics, political science, sociology, and psychology. Courses with the following prefixes may be counted toward the social science requirement: ECON, GOV, PSY, SD, SOC, SS, STS. The social science courses offered at WPI are grouped into two broad categories. The first consists of core courses that introduce students to the social sciences and help them understand the scope and limits of social science approaches and how they

might be related to the design of Interactive Qualifying Projects. The second, more advanced, set of courses looks in depth at particular issues and problems, providing students with a more detailed understanding of social science disciplines and their use in social problem solving and interactive projects.

To obtain maximum benefit from their study of social science, students should choose courses that will provide knowledge and skills relevant to their Interactive Qualifying Project. These courses should be taken prior to or concurrent with undertaking the IQP and should be selected, if possible, after the student has identified the general topic area in which his or her interactive project work will be carried out.

More information on the alternatives available and the factors that should be considered in choosing courses to satisfy the social science requirement are available on the Social Science and Policy Studies department website at [www.wpi.edu/Academics/Depts/SSPS](http://www.wpi.edu/Academics/Depts/SSPS).