Soft Interfaces IGERT Program of Study

Key features of the Syracuse Soft Interfaces IGERT program are:
- early engagement in research
- interdisciplinary courses
- training in science policy and science communication

The table below outlines the program of studies for the first two years. It is expected that after that the students will be mainly engaged in research and supported on various research projects.

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<tr>
<th>Fall (Year 1)</th>
<th>Spring (Year 1)</th>
<th>Summer (Year 1)</th>
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<tbody>
<tr>
<td>1-3 courses in home</td>
<td>1-2 courses in home</td>
<td>Internship option</td>
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<tr>
<td>Department</td>
<td>Department</td>
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<tr>
<td>Physical Cell Biology</td>
<td>Science Policy course**</td>
<td>Science Communication</td>
</tr>
<tr>
<td>BEN/BIO/CEN/CHE/PHY</td>
<td></td>
<td>Course (Summer 1)</td>
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<tr>
<td>635*</td>
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<td>COM 600#</td>
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<tr>
<td>Lab rotation</td>
<td>Open Problems in Soft</td>
<td>IGERT Retreat##</td>
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<tr>
<td>Interfaces BEN/BIO/CEN/CHE/PHY</td>
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<td>600#</td>
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<thead>
<tr>
<th>Fall (Year 2)</th>
<th>Spring (Year 2)</th>
<th>Summer (Year 2)</th>
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<tr>
<td>Core and/or advanced</td>
<td>Core and/or advanced</td>
<td>Internship option</td>
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<tr>
<td>course in home</td>
<td>course in home</td>
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<td>department or other</td>
<td>department or other</td>
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<td>participating department</td>
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<tr>
<td>Soft Matter at Interfaces</td>
<td>Monthly ethics seminar</td>
<td>IGERT Retreat##</td>
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*Register using the prefix appropriate to your program of study.
** Recommended course is PAI 772. Other courses may be available. Please consult your advisor.
#Temporary number.
##May be held during the academic year. Date to be announced annually.

Note: As Fellows, IGERT Trainees have 30 hours of tuition credits per year (12+12+6). Although they are not required to use all hours in any given semester, they are encouraged to make wise use of the tuition credit to ensure that by the end of the second year they have accumulated the minimum credit hours required by their program for a doctoral degree. The total credit requirements for each degree are as follows:
Biology ................................. 48 (24 from formal courses)
Biomedical Engineering ...... 42
Chemical Engineering ........ 42 (24 in CEN courses)
Chemistry ............................. 48 (18 of required CHE courses)
Physics ............................... 51

BEN/BIO/CEN/CHE/PHY 635 - Physical Cell Biology – This central IGERT course will emphasize current quantitative advances in cell biology and cover topics such as the structure and dynamics of cell membranes, the dynamics of the cytoskeleton and molecular motors, DNA replication and repair, genome packing, gene regulation, and signaling pathways. The course will be co-taught by biology and physics faculty.

Open Problems in Soft Interfaces – This is a seminar-style course on the critical analysis of the current literature on interfaces, where the students will define the frontiers of interface research by identifying unsolved problems. Small interdisciplinary groups will scour online databases for "hot" articles or research groups associated with a particular research topic (e.g., biomaterial interfaces relevant to a particular disease or injury; fundamental interface problems in soft matter physics; techniques for patterning surfaces; mechanisms for bacterial biofilm control; novel mechanisms for drug delivery) ultimately selecting a single paper to be pitched to the entire class for in-depth consideration by all. Following this selection, several students will lead the discussion of the article. This course may be taken more than once, if so desired.

Polymers, Biomolecules and Soft Matter at Interfaces – This modular course will focus on the properties of polymers and colloids at interfaces. It will give the students an understanding of the properties of both soft complex materials which compose interfaces (polymers, cell membranes, liquid crystalline materials, gels) and that are confined to those interfaces (lipids, biomolecules, trapped particles, surfactants, etc.).

Science Policy Course – The students will take a course in science policy at the Maxwell School. An IGERT scientist will work alongside Maxwell faculty to ensure the course is relevant and accessible to IGERT students. The goal of this requirement is to provide the students with a perspective on how science affects policy and how policy affects science, at a deep enough level that it may help guide their careers and promote positive involvement in policy.

Ethics Seminar – Monthly two-hour meetings will focus on the deep and diverse issues of ethics in the conduct of science, with an emphasis on a case-study approach. Local experts and one IGERT scientist will jointly lead discussions.

Science Communication Course – Faculty from the Newhouse School of Public Communication will teach a 5-week modular course in science, engineering and technology communication. The course will teach the principles, practices, and
processes of public communication in the context of public understanding of science. Students will learn to produce content for public distribution—text, pictures, video and audio—and how to reach their intended audiences.

**Lab Rotation** – Lab rotation is used here to refer to a one-semester experience designed to facilitate students’ early engagement in research. It may take one of several forms listed below, after consultation of the student with his/her departmental academic advisor and the IGERT advisor.

1. The student works on a project in research labs (or single lab) for 11-12 weeks, for a number of hours roughly corresponding to what expected for a 3-credit course. Students may do this informally or by registering for an Independent Study course (BIO/BEN/CEN/CHE/PHY 690) and get credit for their work, if allowed by departmental rules. At the end of the semester each student will be asked to give a brief presentation at the IGERT Seminar and Social. In the choice of research projects, it should be kept in mind that a central goal of the IGERT is to seed collaborative projects among local researchers. For this reason chosen projects must at least have the potential of becoming collaborative, if they are not so already.

2. The student visits at least 8 different faculty members who are IGERT participants (with at least half of these being in departments different from the student’s home department) and their labs and lab members, as applicable, to learn about their research. The student should pay 1-2 visits to each chosen labs to observe what people do and ask questions. At the first visit, the student will be assigned a reading on the topic of the research carried out in the lab. The academic advisor will discuss the reading with the student, keep track of the labs visited and verify that the student has done the work. At the end of the semester the student will be asked to give a brief presentation at the IGERT Seminar and Social to report on what he/she has learned about the various labs to the rest of the class.

3. Other mechanisms for satisfying this requirement may be developed jointly by the advisors and the student and must be approved by the IGERT Program Director.

The chosen plan on how each student will satisfy the lab rotation requirement must be finalized and communicated to Erin Borchik, IGERT coordinator, no later than the first day of the second week of classes.

**IGERT Seminar & Social** – IGERT Fellows and Associates are required to participate in this informal meeting held once every two weeks. Dates and times, as well as location, will be communicated at the start of each semester.

**IGERT Retreat** – This is an annual one-day meeting of the Syracuse Soft Interface IGERT community. It will generally be held on campus on a date to be announced every year. Members of the IGERT External Advisory Board will attend the meeting and participate in the sessions. Students will have the opportunity to give posters and oral presentations on their research. All IGERT participants (Fellows, Associates and faculty) are expected to participate in the annual IGERT Retreat.