Excellence

Center for Excellence in Education

# Research Science Institute

**RSI 2008**

## Mentor's Handbook

massachusetts institute of technology

## Important RSI Dates

**26 July (Thursday)** 7:15 PM, Room 6-120, MIT
***"Meet-Your-Mentor Night"***

Meet Your Mentor Night is an important time for students, mentors, and RSI staff to get to know one another. Students appreciate the reassurance of meeting someone from their lab, and they often ask about logistics (efficient use of public transit, building access, time to report) as well as the nature of their academic project. Many labs send the graduate student or post-doc who will be working most directly with the student, but we would welcome any other representative of your research group. Please let us know if you need directions.

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| **27 June (Friday)** | **First Day of Mentorship** |
| **5 July (Saturday)** | **Students Present Project Statement to RSI Staff** |
| **9 July (Wednesday)** | **Students Submit First Paper Milestone to RSI Staff** |
| **12 July (Saturday)** | **Hiking Trip (Students off-campus)** |
| **13 July (Sunday)** | |
| **18 July (Friday)** | **Student Submit Second Paper Milestone to RSI Staff** |
| **26 July (Saturday)** | **Draft Paper Due to RSI Staff** |
| **28 July (Monday)** | **Final Paper Due to RSI Staff** |
| | **Last Day of Mentorship** |
| **30 July (Wednesday)** | **Mentors Submit Intern Evaluations** |
| | **Presentation Materials Due to RSI Staff** |

**31 July & 1 August**
**Student Presentations**
Students will deliver their oral presentations to RSI students and staff. Your student will provide a form for you to indicate your time preference so that your student's presentation can be scheduled for a time when you can attend. You are also welcome to view other students' presentations.

**Welcome to the**

**2008**

**Research Science Institute**

The Center for Excellence in Education (CEE), in collaboration with MIT, would like to thank you for agreeing to mentor a student in the center's twenty-fifth annual Research Science Institute (RSI). CEE is deeply appreciative of your contribution and wishes you a rewarding and fulfilling summer as a mentor.

Mr. Cliff Bowman, RSI Director, and Dr. Amy Szczepanski, Assistant Director are always available to assist you should you have any questions or concerns. You are encouraged to be in contact with the RSI staff about your student and the mentorship whenever necessary.

During the Institute (22 June – 2 August) please use this number and e-mail address to contact the Director and Assistant Director.

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| RSI Office at MIT | (617) 225-9618 |
| RSI Director | hcbowman@mit.edu |
| RSI Assistant Director | aszczepa@mit.edu |

A listing of the RSI academic staff and further contact information appears toward the back of this booklet.

To reach CEE prior to June 22 or after August 2, please contact Ms. Maite Ballestero, Vice President of Programs at the Center for Excellence in Education, by phone at (703) 448-9062 or by e-mail at maite@cee.org.

With this handbook we welcome you to the program and invite you to participate in any events of the Institute. Our staff is always available to assist you in case you have any problems with your RSI summer. This handbook briefly describes the program, students and staff, and the role of the mentor. It is designed to assist you during your work with our students.

## ABOUT THE PROGRAM

The Research Science Institute was started in 1984 by Admiral H. G. Rickover and Joann P. DiGennaro, the founders of what is now the Center for Excellence in Education. Admiral Rickover had long been concerned about American education, and particularly about the training of future scientists. To address this problem, Admiral Rickover arranged to search out talented young mathematicians and scientists from high schools across the United States and from other nations around the world and bring them together every summer at the Research Science Institute.

Their idea was to create, for six weeks, a community of scholars, including these students, noted high school teachers, university professors, and working research scientists. RSI is now in its twenty-fifth year, attended this summer by 80 students from 37 states and 13 foreign countries. These nations include Australia, Bulgaria, China, Greece, Israel, Kuwait, Lebanon, Poland, Saudi Arabia, Singapore, South Korea, Sweden, and Turkey.

The Institute begins with four days of formal classes. Professors of physics, biology, engineering, chemistry and mathematics give lectures on important aspects of their field and of their own research. Students thus get an overview, as well as a first-hand account, of scientific research. They also participate in sessions on philosophy, ethics, and humanities. Finally, the students participate in ongoing classes to learn the MIT computing environment.

The internships that follow these classes comprise the main component of the Institute. Students work in their mentors' research laboratories weekdays Friday, June 27 through Wednesday, July 30, except July 4. At the conclusion of this internship they write a paper summarizing their achievements, and give an oral presentation of their work to their peers and mentors at the RSI symposium.

A program of guest lectures, weekend trips, and recreational activities rounds out the students' experience.

## ABOUT THE STUDENTS

This year the RSI selection committee reviewed approximately 900 applications to select 47 domestic students. An additional 3 students represent all DoDEA schools worldwide, and our 30 international students are among their nations' top scorers on science and mathematics competitions. Typically, the successful candidate has standardized test scores that place her or him in the top 1% of each country's population.

The students chosen for the Institute have demonstrated two additional qualities: they have already acquired a deep interest in a scientific field of inquiry, and they have found opportunities to acquire some form of field experience. The amount and quality of this experience will vary with the background and home location of the student, but you can expect that your intern will be eager to do

and learn as much as he or she can under your guidance.

Our students are long on ability and optimism, but short on experience. Most of them have taken a large number of college-level courses, and you can expect that they know as much about your field as a good college undergraduate. However, they may not have had the time or opportunity to learn specific laboratory techniques, and have not developed an intuition for what sorts of approaches to a problem might prove fruitful. They will therefore have to practice at specific experimental tasks, and may have a brute force approach to problem solving. To take advantage of their enthusiasm, as well as to enrich their background, you want to assign readings for them, including chapters from texts, selections from conference proceedings, or other materials that might be found in the MIT library or on the web.

## ABOUT THE MENTORSHIP

The mentorship experience is intended to take students through an abbreviated process of scientific research. While it might not necessarily be expected that students make deeply significant contributions, or to experience fully either the thrill or the tedium of scientific life, they do often make remarkable progress in this short time. Students who have completed an internship typically emerge with a renewed dedication to the pursuit of a scientific career and with a deeper appreciation for research.

As a mentor, you are asked to prepare for your intern a small project that fits in with the work of your laboratory, and which he or she can use as the subject of a short final paper and presentation. Sometimes such a project can be planned before the intern arrives. In other cases, the exact nature of the project is negotiated between the mentor and the intern in the first few days of the internship.

Many mentors have found it helpful to contact their interns before the program begins in order to suggest some preparatory reading for the summer. In any case, it is important to cultivate the sense that the intern's work is focused and valued. CEE would also like you to give your intern some guidance in preparing the final paper and presentation. The bulk of the technical guidance for the final paper will come from Institute staff who will work with the students throughout the summer.

CEE requests a brief written evaluation of your intern's work at the conclusion of the program. This evaluation can take the form of a letter or you can use an evaluation form which CEE will make available to you during the last week of the program. CEE kindly requests that these evaluations be turned in on the last day of the student's time in your lab. You may give the evaluation to the student in a sealed envelope for delivery to the RSI/MIT office. These evaluations are very important for future planning. **They are also extremely important to your intern, since CEE uses your comments as the basis for the recommendations to be submitted on behalf of each student applying for competitive college and university admissions and for scholarships.**

## THE RSI STAFF

Staff members at the Research Science Institute are prepared to support the students in any way possible. Throughout the summer, Institute staff will be working with the students to develop communication skills for their papers and presentations. The staff members can also assist students with aspects of their research, e.g. help students locate or interpret assigned readings, master a

particular quantitative technique, or review background material.

RSI is led by the Director and an Assistant Director. Each student is also assigned to one of our tutors, who will monitor and support the student's academic progress. This group is supplemented by eight teaching assistants and seven counselors. You are strongly encouraged to make regular contact with the RSI staff about your student and the mentorship. Please do not hesitate to contact CEE by phone or e-mail with any questions or concerns.

## THE ROLE OF YOUR OWN STAFF

It is crucial to the success of the mentorship experience that your intern be adequately supervised. On the one hand, an intern is quite likely to perform to your satisfaction any task he or she has been instructed to do. On the other hand, it is important to provide an intern with an adequate support system. In most laboratory situations, this support system involves staff members other than the head of the research group. It is important that these individuals feel part of the internship program. It may be helpful to speak to your staff about the responsibility that the laboratory is taking on before the arrival of the intern.

## ACADEMIC REQUIREMENTS

To help develop our students' scientific communication skills, the Institute requires that each student write a short paper and deliver a presentation detailing their summer's research.

So that you may know more about what CEE will be asking of the students: The papers are typically 10-20 pages in length, and follow a standard journal format for your field. Most students will be using LaTeX, and all will be writing toward an audience of scientists in the field, but not necessarily within the specialty area.

The presentations are approximately 15 minutes in length, using overhead transparencies, slides, or PowerPoint. The presentations are pitched at an audience of scientists, not all of whom will be in the student's discipline. Your intern will appreciate any help you can give him or her on the paper and presentation, especially concerning the scientific questions involved or particular conventions in your field.

To pace students' preparation of their presentations and papers, RSI staff have scheduled milestones throughout the program. These milestones are outlined on the inside front cover of this booklet. The RSI academic staff will be in contact with you during the summer to ensure that your student is progressing well.

**For you to be aware:**

The Center for Excellence in Education and the Research Science Institute do not condone conduct that inconsistent with CEE's and RSI's commitment to promoting and maintaining an ethical and respectful learning environment. CEE and RSI take seriously all allegations of misconduct and encourage students to report such conduct to the Director of the RSI or to Maite Ballestero, Vice President of Administration/Programs at CEE.

## TROUBLESHOOTING

The details of reality assert themselves despite the most well-made plan. There are bound to be wrinkles and knots in your work with an intern. Below are a few of the most common problems that arise, and some suggestions for anticipating or resolving them.

*My intern comes late. He seems sleepy. She is not focused on the work I've assigned.*

This one is easy: call the Director of the Institute at (617-225-9618) or email hcbowman@mit.edu. The problem will be corrected immediately.

*The task that I had set for my intern has proven too lengthy, too complicated, or in some other way has not worked out.*

This is not an uncommon problem, given the exigencies of laboratory life. Supplies may not arrive on time, a critical procedure may have to be repeated, a computer may crash, or unforeseen delays may hinder the work. While these things constitute a minor annoyance in most laboratory situations, they may loom very large to your student.

The problem that the intern will perceive is that she or he now has nothing to present as a project. It is almost always possible to extract a coherent paper from well done, but incomplete, laboratory work. Institute staff will work with the students on this. If a problem is detected early then it can be addressed early. Often, the problem is in the perception held by the student that his or her project will not be presentable. In this situation a little reassurance goes a long way.

*An unexpected opportunity calls me away from the lab.*

This is a more difficult problem than those discussed above. With any luck, your co-workers will have had some contact with the intern and can take up the slack. In the worst case, the intern can go ahead with the work he or she was assigned without your day-to-day counsel.

Of course, if your absence is anticipated, these same sorts of arrangements can be made in advance. It is to be expected that mentors may be absent from time to time, and the interns should be able to work somewhat independently.

*The range of projects available in my laboratory does not match the abilities or interests of my intern.*

The earlier this particular problem is identified, the better we can rectify the situation. In fact, it is worth a phone call even if you suspect that this problem may arise. Together, we can look at the situation from several perspectives and come to a solution.

Such solutions range from a simple discussion with the intern through a modification of the assigned project. In rare and extreme instances, the assignment of the intern to a particular laboratory may be changed. Every attempt is made to minimize these instances as it causes stress and disruption to both laboratories as well as to the intern.

*I have concerns about liability problems arising from high-school students working with potentially hazardous items, such as lasers, biological substances, etc.*

First, check about this with the appropriate official for your organization. For example, the Safety Office at MIT has prepared guidelines that CEE uses for RSI students working in potentially hazardous labs on campus. Often, a statement of informed consent from the student's parents is all that is required. The Institute Director can arrange for such a form.

*My intern is diligent and capable, but has a bit of trouble fitting in personally. How can I help him/her to fit better into the work of the laboratory?*

Institute staff can usually help with these sensitive situations. The skill of doing intensive work with a team, sometimes under pressure, is one which these students are still learning.

Please let the student's tutor or the Director know about the problem as soon as you perceive it. In

addressing this personal problem at an early stage, rather than letting it grow with the individual, you are doing your intern an important service.

## Center for Excellence in Education

The mission of the Center for Excellence in Education (CEE) is to nurture academically talented high school and college students for careers of excellence and leadership in science and technology. The late Admiral H.G. Rickover, with assistance from CEE President, Joann P. DiGennaro, founded CEE in 1983 to help keep the United States competitive in science and technology, and to further international understanding among the future leaders of the world. CEE challenges and assists students on a long-term basis to become creators, inventors, scientists and leaders of the 21st century.

Funding for the Center for Excellence in Education began with $250 received by Admiral Rickover for a university lecture. Rickover spoke across the United States and abroad to raise support, and the Research Science Institute (RSI) was launched in 1984.

CEE has received funds from the National Science Foundation, the National Security Agency, the Department of Defense, the DoD Education Activity, the United States Information Agency, the National Endowment for the Humanities, the Bureau of Indian Affairs, Department of Energy, U.S. Department of State, Department of Agriculture, the Small Business Administration, and the Commonwealth of Virginia. Most of CEE's funding, however, is contributed by private individuals and corporations. RSI alumni also bear responsibility for the continued funding of CEE's programs, and their contributions have continued to grow in recent years.

### RSI STAFF CONTACT INFORMATION

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| RSI Web Site with up-to-date schedule and contact information | http://web.mit.edu/rsi/www |
| RSI Office at MIT | (617) 225-9618 |
| Director e-mail | hcbowman@mit.edu |
| RSI Lead Tutor | jsendova@mit.edu |
| Director | Clifford Bowman |
| Assistant Director | Amy Szczepanski |
| Tutors | Allison Gilmore<br>Steve Hershman<br>John Rickert<br>Jenny Sendova<br>Zachary Wissner-Gross |

After the conclusion of the 2007 Institute, you may contact Ms. Maite Ballestero, Vice President of Programs at the Center for Excellence in Education by phone at (703) 448-9062 or by email at maite@cee.org.