

Fall 2006

Dear Prospective IMSA Advisor:

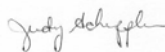
Thank you for considering working with an IMSA student(s) on a Student Inquiry and Research (SIR) investigation. This opportunity is highly valued by our students and the real-world experiences will serve them well as they move forward to pursue their chosen careers. As a result of this program and the generous gift of time from people like you, IMSA students have made presentations at national and international conferences and participate in many science fairs and other competitions. You'll find a brief summary of student accomplishments and abstracts of past student work on our web site at: <http://www.imsa.edu/learning/inquiry/OutcomesOfSIR/>.

The information that accompanies this letter contains a synopsis of key program information. In it you will find a schedule of the dates students will be on-site, a summary of program requirements, mentor responsibilities, and SIR standards. We want all SIR investigations to be a great experience for mentors and students, so it is helpful for the student to work on an investigation of substance, have clear expectations and timelines, understand how the specific project fits into the larger context, and be directed to relevant literature.

We believe providing our students with a chance to work alongside professionals, like you, is the best way to teach them how to create new knowledge for the world. These experiences spark student passion and inspire our future leaders.

If you are interested in working with an IMSA student and/or have questions, please contact me by email (quella@imsa.edu) or phone (630-907-5899).

Sincerely,



Judith A. Scheppler, Ph.D.
Coordinator of Student Inquiry
Director, Grainger Center for Imagination and Inquiry



Illinois Mathematics and Science Academy
A Pioneering Educational Community

2006-2007 Student Inquiry and Research Schedule – REVISED

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Please note that we have changed the Oct. 18 I-day to Oct. 11 because PSAT exams are scheduled nationwide for Oct. 18.

Mentor site visits are requested on the following dates:

Fall Semester	Spring Semester
August	January
Wednesday Aug. 30	Wednesday Jan. 24
September	Wednesday Jan. 31
Wednesday Sept. 13	February
Wednesday Sept. 20	Wednesday Feb. 7
Wednesday Sept. 27	Wednesday Feb. 21
October	Wednesday Feb. 28
Wednesday Oct. 4	March
Wednesday Oct. 11	Wednesday Mar. 7
Wednesday Oct. 25	Wednesday Mar. 14
November	Wednesday Mar. 21
Wednesday Nov. 1	Wednesday Mar. 28
Wednesday Nov. 8	April
Wednesday Nov. 15	Wednesday Apr. 11
Wednesday Nov. 29	
December	
Wednesday Dec. 6	

Assignment Due Dates

Safety Form	first visit
Research Proposal	September 20 or 27, 2006*
Progress Report	December 6, 2006
Abstract	February 28, 2007
Draft Research Report	March 28, 2007
Final Research Report	May 11, 2007
Final Summary and Evaluation	May 25, 2007
Project Journal	ongoing – checked at will
Presentation Day practice	Wednesday April 18
Presentation Day	Thursday April 26
Winter Break	December 23 - January 7
Intersession	January 8 - January 12
Spring Break	March 31- April 8

* date may be adjusted based on start date

Student Inquiry and Research Program Requirements

Summary of the Inquiry requirements for students to be eligible for participation in Student Inquiry and Research to be included on the student transcript. Failure to complete any part of these requirements to the satisfaction of the advisor/mentor and/or program coordinator may result in an incomplete Inquiry project, and no recognition on the student transcript. The program coordinator will make final determination.

Proposal

- 1) Students must submit a completed **proposal** form. The completed proposal must be reviewed and approved by the advisor/mentor and the program coordinator. The proposal includes a **thorough description, plan of work, bibliography**, and must address use of hazardous materials and human use.

Date/Comments

Due: September 20 or 27, 2006 (depends on start date)

Ethical Implications

- 2) Students must submit a short paper addressing the **ethical implications** of the project. Occasionally this requirement may be waived upon consultation of the advisor and the program coordinator.

Due: September 20 or 27, 2006 (depends on start date)

Progress Report and Abstract

- 3) A **progress report** is required, once each semester. This is turned in to the Inquiry office, with sign-off of the advisor/mentor. The Presentation Day **abstract** will serve as the spring progress report.

Due: December 6, 2006
Abstract Due: February 28, 2007

Project Research

- 4) The student must be **engaged** in the investigation and meet with the advisor/mentor to assess progress. Evidence for this is provided by regular journal entries, the progress report, submission of an abstract for Presentation Day, group discussion, and final summary and evaluation.

Inquiry days are provided throughout the school year for work. Students are expected to meet with mentor/advisor *at least* every Inquiry day.

Journal check: To be arranged, at least once each semester.

Project Journal

- 5) Students will maintain a **journal** documenting the investigation, progress, thoughts, discussions, resources, and so forth. At least once each semester students will discuss their journal entries with the program coordinator and will be ongoing with advisor/mentor.

Presentation

- 6) The student must **present** the Inquiry work on presentation day. This includes an **oral presentation** on Presentation Day. All students are required to **practice** their presentation on the designated day.

Practice Day: April 18, 2007

Presentation Day: April 26, 2007

Final Report

- 7) Students prepare a **written report**, beginning with the abstract and detailing the inquiry project. Products of the inquiry may be included with documentation of scholarly work. Embedded references and/or footnotes are required.

First Draft: March 28, 2007

Final Version: May 11, 2007

Final Summary and Evaluation

- 8) The students and advisor/mentor, together, will discuss and reflect on the investigation and make a recommendation for final transcripting.

Due: May 25, 2007



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Student Inquiry and Research

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Inquiry Standards – Plan, Investigate, Analyze, Communicate

For the purposes of developing standards, an Inquiry investigation was broken down into planning, investigating, analyzing, and communicating. One should note, however, that Inquiry is not a linear process. As the Inquiry progresses, you will return to primary and secondary sources, looking for new connections or newly produced research by others. You will move back and forth between investigation and analysis as you progress in your work, using what you have done to refine your focus and your work, and to move forward. You will continually plan, work safely, and determine whether you need more materials. Discussion and communication with your advisor and colleagues is ongoing.

Planning

A. Students engaged in inquiry construct viable inquiry questions

SSL I.B

- The question exhibits a focus for the student's curiosity
- The question is compelling and complex for the student

B. Students engaged in inquiry conduct scholarly background research

SSL I.A, I.D, II. A., II B, III. B, IV A.

- The student uses multiple and appropriate primary and secondary sources
- The student evaluates the credibility of the source material
- The student creates a bibliography

C. Students engaged in inquiry organize and plan their investigation

SSL I.C, IV.A

- The student states potential outcomes
- The student schedules and plans work
- The student addresses safety issues where appropriate
- The student acquires all necessary materials

D. Students engaged in inquiry address implications of the investigation

SSL V.A, V.B

- The student addresses ethical implications of the investigation
- The student discusses societal implications of the content of the investigation

Investigation

E. Students engaged in inquiry use appropriate procedures and methods

SSL I.C, III. A

- The student assesses risk of the procedures and works in a safe manner
- The student makes multiple observations/examines varied evidence
- The student selects variables/critical parameters
- The student develops controls/calibrate instruments, where appropriate

F. Students engaged in inquiry document the inquiry in a journal

SSL I. C., II. A, IV.B

- The journal contains a record of data and observations

- The journal contains a detailed record of the methods used
- The journal contains a record of sources and an annotated bibliography
- The journal documents discussions of the inquiry with advisor and others
- The journal documents the student's thinking

G. Students engaged in inquiry meet face-to-face, at least weekly with the inquiry advisor
SSL V A

- The student discusses and demonstrates progress
- The student discusses difficulties and possible solutions

Analysis

H. Students consider relationships among components of the inquiry
SSL I. D, II A., III C., IV.A

- The student identifies the components
- The student organizes the components into coherent and cohesive form
- The student averages and graphs data if appropriate
- The student performs statistical analysis where appropriate
- The student conjectures relationships where appropriate
- The student constructs arguments based on information
- The student compares the inquiry to work by others
- The student builds systematic arguments or synthesis

I. Students engaged in inquiry draw and defend conclusions
SSL I.D, II.A, II. B, V.A, V.B

- The student considers the limitations of the methods
- The student discusses uncertainty, if appropriate
- The student considers the contribution to the field
- The student reconsiders ethical and societal implications

Communication

J. Students engaged in inquiry orally communicate their investigation to the public
SSL III.A, V

- The student uses good oratory and presentation skills
- The student conveys concise summary and significance
- The student uses appropriate visual aids
- The student balances evidence and discussion
- The student fields questions well

K. Students engaged in inquiry communicate their investigation in written format
SSL I. A, IV. B

- The paper is grammatically and mechanically correct and discipline appropriate
- The paper is complete and thorough – see discipline specific paper guidelines
- The paper contains an abstract
- The paper contains appropriate visual resources
- The paper contains complete appropriate bibliography, references, or footnotes
- The paper contains an appendix or addendum as needed

Student Characteristics and Expectations

Participants in SIR have reviewed, signed, and returned a Parent/Guardian Permission and Student Agreement; a copy is included for your information. Below is a summary of what we consider to be key student characteristics and expectations for a successful SIR investigation.

IMSA students are:

- Risk-takers, functioning well in unfamiliar situations.
- Inquisitive, flexible, and confident.
- Discrete; they may participate in meetings and research where they are asked to keep information or results confidential.
- Reliable; they arrive on time, perform work as arranged with their advisor/mentor, and make sure that other interests don't interfere.
- Respectful; students dress suitable, conform to the norms of the site, and interact with others appropriately.
- Self-starters and motivated, not waiting for assignments but contributing ideas and volunteering to assist with needed tasks.
- Safety conscious and respectful of facilities and equipment.
- Aware of and practice ethical behavior.
- Responsible, turning in well-done assignments on time and are open to critique and feedback.
- Accountable, communicating well with the advisor/mentor and the SIR office.
- Honest, courteous, and cooperative.
- Eager to learn appropriate techniques and methodologies, asking clarifying questions as needed.

Mentor/Advisor Characteristics and Responsibilities

A successful Student Inquiry and Research investigation is guided by a professional currently working at a laboratory, corporation, museum, field site, educational institution, or other site. This professional is known as the advisor or mentor. These individuals may work individually with a student, or a team of individuals may collaborate to guide student work. Because everyone has multiple responsibilities in addition to scholarly pursuits, a collaborative approach to guiding students can be an enriching experience for everyone. Colleagues, including graduate students, technicians, co-workers, and post-docs, often provide expertise and perspectives that deepen the students' experiences.

Participation in SIR is voluntary for IMSA students, but they must meet standards in order for the work to be documented on their transcripts. An SIR investigation is an educational experience and since you know the field in which the student is working best and will be working closely with the student, we ask that you help us in assessing and evaluating the students. Also, since most IMSA students are minors, are living away from home, and are the responsibility of IMSA, we need to be diligent about monitoring student whereabouts and attendance.

The role of the advisor/mentor is highly individualized to each investigation. There are, however, common characteristics and responsibilities.

Successful advisors and mentors:

- Have institutional support and clearance for having an IMSA student work in the laboratory or place of business.
- Have time available to guide the student's research, and to introduce the student to professional standards and processes acceptable to the discipline.
- Are involved in an investigation that interests the student.
- Are willing and committed to serve as a role model in teaching the rituals, language, and expectations of the field.
- Are enthusiastic and passionate about the investigation.
- Determine a deliverable learning experience in collaboration with the student and with IMSA.
- Maintain contact with IMSA SIR staff and communicate concerns in a timely fashion.
- Assist the student with learning and practicing the higher level tools of the trade.
- Understand the skill and knowledge level of the student and guide him or her appropriately.
- Communicate with the student and probe student knowledge and understanding.
- Explicitly deliver, model, and continually reinforce ethical and safe practices.
- Are willing to assist SIR staff with monitoring student attendance.
- Guide the student in completing written work by reading and commenting on it.
- Evaluate students using criteria provided by IMSA.

The Role of IMSA and the SIR Office

IMSA values an experiential approach to learning research. We believe providing our students with an opportunity to work alongside professionals, like you, is the best way to teach them how to create new knowledge for the world. We consider this a vital and necessary partnership in order for our students to be successful in the twenty-first century.

IMSA will:

- Develop, establish, and assess partnerships.
- Establish lines of communication with students, parents/guardians, IMSA staff, and advisors/mentors in a regular and timely fashion.
- Obtain parent/guardian permissions for students to participate in SIR.
- Visit students while they are working on- and off-site.
- Determine safety practices and considerations.
- Provide student transportation to off-campus sites.
- Monitor attendance and participation.
- Assist students with learning necessary inquiry skills – planning, investigating, analyzing, and communicating.
- Ensure that students meet program requirements.
- Assist students and advisors/mentors with developing student potential.
- Create evaluation rubrics for student work.

References:

- E. Steinkraus and J. Stevens. 2004. Mentoring Student Research. In *Guiding Student Research: Making Research Happen in Your School*. M.J. Shapiro, editor. Lynchburg, VA: National Consortium of Specialized Schools of Mathematics, Science, and Technology.
- National Academy of Science, National Academy of Engineering, Institute of Medicine. 1997. *Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering*. Washington, DC: National Academy Press.



Student Inquiry and Research

Parent/Guardian Permission Student Agreement

I, _____, a student at the Illinois Mathematics and Science Academy (IMSA) would like to participate in the Student Inquiry and Research (SIR) program. The SIR program will provide the structure and resources I need to pursue compelling questions of interest which may include conducting original research, bringing ideas to the marketplace, developing businesses, and sharing my work through presentation and publications. I have discussed participation with my parents/guardians and, if accepted into the program, I agree to participate fully.

Participation

- Participation in SIR activities on designated Inquiry Days is mandatory. College visits, except those scheduled by the college are considered unexcused absences. If students are too ill to attend SIR, the SIR office must be notified by the parent/guardian if the student is at home or the IMSA nurse prior to the designated time of departure for the absence to be excused. Two unexcused absences will result in dismissal from the program. IMSA offers many extraordinary opportunities, and students often have to choose among them. Because advisors/mentors make a significant commitment to our students and dedicate substantial resources to the Program, it must be a priority, and students may not participate in activities that interfere with SIR on designated days.

Requirements

- Program requirements (proposal, ethical analysis, progress report, abstract, paper, final summary and evaluation, Presentation Day participation) will be completed in a satisfactory manner by the assignment deadlines. Details may be found on the SIR web site and in the SIR office.

Safety Review

- Students will complete a safety review with their advisor/mentor during the initial meeting. Occasionally students may encounter or work more frequently with chemical, biological, physical, and/or radiation hazards that they don't normally during coursework at IMSA. Safety training and these hazards will be documented and information will be sent home to parents/guardians in the first report card mailing.

Transportation

- Some students may participate in off-campus SIR activities. IMSA provides transportation for students to prearranged drop-off and pick-up point at off-campus sites. Students are responsible for being on time for the bus to and from and IMSA. If students miss IMSA-provided transportation, they will be responsible for their transportation arrangements and the cost. Under special

circumstances, with prior approval of the program director and written parental consent, alternative transportation arrangements may be made. It is expected that students will take IMSA-provided transportation unless special arrangements are made at least 3 days in advance of Inquiry Wednesdays.

Supervision

- All students participating in SIR are subject to the joint supervision of IMSA and their advisor(s)/mentor(s). Students are expected to behave in accordance with all IMSA student discipline policies, SIR expectations, and rules of behavior established by the institutions they are visiting. Students will be dropped from the program if conduct is inappropriate.

Health Emergencies

- In the event that accident, injury, or illness occurs during participation in SIR, IMSA will secure treatment at a proper facility where emergency medical treatment would normally be administered, including, but not limited to the emergency room of a hospital, doctor’s office, or medical clinic.

Each report card mailing will contain specific and pertinent information about SIR such as student placement, safety review, progress report, investigation abstract, final evaluation, and so forth.

Signed: _____ Date: _____
(student)

I, _____, have read and discussed with my child the guidelines for participation in Student Inquiry and Research.

Signed: _____ Date: _____
(parent/guardian)

Questions and Inquiries

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