



Student Inquiry and Research Student Handbook

Last Update: November 2019

General Overview

The goal of the SIR program is to teach IMSA students how to carry out authentic research. While IMSA is a STEM school and historically research programs at IMSA have focused on the natural sciences, Student Inquiry and Research is a program intended to instruct students in the methods of doing research across the disciplines, both inside and outside the sciences. Regardless of the discipline in which student learn these skills, they will be invaluable in developing the ability to extrapolate from the known to the unknown using a combination of logic and experimentation.

What happens at each stage of research will vary slightly depending on the student's proposed project and discipline. Although these have been listed as discrete stages, the work of a researcher often has them cycling back and forth through these four stages.

STAGE 1

Getting acquainted with the field. During this stage of research, the student learns about the field. Students read information from the authoritative text of the field texts whose work is well established by reading a variety of papers that enable them to understand their specific area of research in great detail. At this point, students generate an understanding of the skills that are needed to accomplish the research. They acquire requisite laboratory, computational, mathematical, scientific, or other skills through a set of hands-on activities including authentic calculations, laboratory work, learning of specialized theory and methods, and other subject-specific activities. The students also work with Research Mentors to acquire the skills to produce an annotated bibliography.

STAGE 2

Development of research plan. The student chooses a specific research question in cooperation with his/her Research Mentor. During this step, the student develops a research proposal or an introduction to the field describing the question to be examined and the method of investigating the question. Students writing a research proposal review the major relevant contributions of the field, define the chosen research question, and lay out all of the parts of the project.

STAGE 3

Execution of the research Regardless of whether or not the student is conducting an original research project, this stage of the research sees the student executing and analyzing the results of successive research activities. Each of the research activities involves taking specific actions that lead to a progressively improving understanding of the answer to the research question. Emphasis in this stage is on generating increasing autonomy of the student, both in terms of generating new plans for further work and for executing these plans. Students are expected to generate and turn in research progress reports.

STAGE 4

Communication of research results. Finally, all of the results of the previous stages are drawn together here in a final communication of the research that was undertaken during the entire

research program. Students will present at IMSAloquium and complete a research paper that should aspire to a publication-quality. The student will, in this paper, assimilate all of the previous parts into a single coherent report. At its most ambitious, such a paper may be successfully submitted to a peer-reviewed conference or journal. At a minimum, students will present their projects at IMSAloquium and submit a final report for passing credit.

Expectations of Students in the Program

Students interested in an SIR **must first make contact with the SIR office** and register so that they will be in the system. The office can also match students up to potential mentors when students do not know what precisely they want to research but are nonetheless interested in pursuing an SIR experience. So even before any of the research stages below are followed, the initial registration with the SIR office should be done.

On SIR days, students also should be sure to not only sign into SIR in the morning but to also sign back in when they return too. Students going off campus will be checking in multiple times: in and out with the SIR program and with the bus drivers. Failure to check back in at the end of the day will result in interim comments first and then ultimately may result in being dropped from the program if students are unwilling to sign out at the end of the day. We will require you to come and sign back in no matter what. So, it's better that you just come and sign in when you back to campus rather than being paged.

Students going off campus represent IMSA. As such, SIR students will be expected to dress professionally for their SIR experience. If you don't know what professional looks like please consult the SIR program. Do not show up to the bus in pajamas! You will be sent back to your room to change and if you miss the bus in the process it will count as an unexcused absence.

Expectations of Student Behavior

Students going off campus represent IMSA and the SIR program. This is an academic program and students should be showing off-campus advisers their best behavior. Do the work you have been tasked with. Dress like you're serious about the job. Do not do homework during your SIR, and do not abuse the resources you've been given. Not dressing professionally, doing homework instead of the SIR work, and any disrespectful behavior not only imperil student participation in the program they put at risk the entire SIR program's relationship with this adviser and institution.

Finally, a reminder that the Rules in the Student Handbook still apply to students at the academy. SIR is an IMSA program and any violations of the Student Handbook will be dealt with accordingly. Infractions are actually more serious because they also imperil the SIR program by undermining the goodwill of the mentors who offer their time to our students.

Tardiness and Absences

As an authentic research experience your research team and/or mentor is counting on students to be present. Therefore, students will be permitted **one unexcused absence**. A second unexcused absence will result in being dropped from the program.

The program managers must check in all students and then get an attendance list to the bus drivers. If this process becomes delayed due to students arriving late, it affects everyone including the mentors who are waiting for students to arrive. Therefore, students who are late in arriving after the designated check-in time more than three times will be given an unexcused absence. That is, three unexcused tardies is equivalent to an unexcused absence. Please review the above requirements about absences.

STAGE 1

Before You Start Your SIR

STEP 1

Your first step is to contact the SIR Office. Let us know that you intend to pursue an SIR so that you can be registered in the system and receive all of the communications. Before even beginning students must enroll in Google Classroom for the year or summer in question. It is the only way students can officially appear in the program and so without this preliminary step taking action the next four are largely irrelevant.

STEP 2

There are a list of opportunities in Google Classroom. Regardless of who you intend to conduct your research with, you must let us know who you are considering. They may be from this list, but if they are not we also need to know.

STEP 3

If you want to pursue research with someone not on our list, you must submit to Google Classroom a draft letter to the potential mentor. Once we approve it you may send it out. You may only send ONE letter at a time. You cannot be sending out e-mails to multiple people because if several of them say yes you must then reject them. This will not be permitted.

PLEASE NOTE: Everything goes through the SIR office. Failure to follow these required steps will result in not getting credit for SIR and/or not having transportation to the site. Once a student is enrolled in an SIR it is effectively a course. Students cannot switch out for some other SIR opportunity. So, make a commitment and stick with it.

Once students complete these steps, they can move onto the four stages of research. Please see the **DEADLINES** on page 12.

Draft Letters to Mentors

More on this can be found in Google Classroom. Letters should open with a one sentence introduction of yourself as an IMSA student. Then lead into your interest in the specific research of the specific potential mentor you are reaching out to. Show that you are familiar with what they've done. The SIR program should be mentioned at the end and your desire to work with this person. The overall letter should be as short as possible but also show both that you understand their work and have a genuine interest in it. If you have written more than a half page single- spaced, it is too long.

Age Restrictions

Please note that some off-campus sites may have age restrictions. Students who are not yet 16 years of age may not be able to get their preferred options. This is a legal matter and not one in which the SIR program can make exceptions.

Prior to undertaking any investigation, students must acquire basic skills or knowledge necessary for their investigations. These may include the development of competence using equipment, instrumentation, utilizing resources in libraries, gaining familiarity with various pieces of literature, or learning skills such as programming or welding.

Additionally, students must become familiar with the body of work associated with their area of investigation. This could include learning about painting techniques of varied painters, reading about the body of literature surrounding stellar dynamics, reading about the latest techniques and materials in additive manufacturing, or understanding the approaches taken to mathematically solving a particular type of problem. Throughout the research experience, students will generate a progressively greater competency on what is going on in the area of investigation today as a precursor to answering the following questions:

1. What is known in this field?
2. What kinds of questions are being asked now and why?
3. What questions represent the limit of what is currently known?

Once students cannot only answer these questions but can describe what is known and unknown and why the questions are important today, they will have acquired a sufficient background in the area.

The skills that may be acquired in this stage include:

1. The ability to identify the safety issues involved with doing work in a laboratory
2. An understanding of the state of the field, and /or
3. Varied laboratory skills including knowledge of equipment, procedures, and techniques specific to an area of investigation.

Beware the Need for an IRB Approval

Students whose research will deal with human subjects in any capacity should make sure to tell the SIR's member of the IRB as soon as possible. This will avoid surprises and delays later on. Preparing the next stage of research will also go more smoothly if this path is determined at the outset.

Preparation

Prior to your joining the lab, Research Mentors may identify a set of papers, chapters, texts, or other training material that describe salient parts of science, techniques, and/or skills necessary to equip the student with basic knowledge of the research area. Students will also need to see IMSA's research librarian in the IRC. You will be required to submit a signed form from the librarian showing that you have completed this step. You will get this from the research librarian. DO NOT just Google and cite the first things that show up. Research Librarians are trained specifically to assist in this endeavor. This step is not an option regardless of whether or not a mentor has provided literature to you.

Understanding what others have done in the field is essential to pursuing an inquiry. Students will write a coherent and credible narrative in response to the question: "What do you and others know that academically grounds and supports my inquiry work?" Knowing the literature of a field is not something that happens with a few readings. Every research field has a history which can be dozens of articles to hundreds. The field will also have a present and future. Your annotated bibliography, then should reflect an initial look at the literature and as your work progresses (e.g. second year) you will have an even deeper understanding of the history of the research as well as what is currently happening. Develop research both in terms of the broader topic area and with sources more specific to the inquiry project.

Draw from appropriate, credible sources, using a minimum of five. Create an annotated bibliography that includes a brief paragraph about each source used to develop a background understanding. An annotated bibliography is a document that describes a set of references – the main point behind each of the references, the complete reference bibliographic record and any issues raised by the reference. There should be no fewer than ten references to begin with. Start with more general information, then narrow and focus your writing to include specific details about your topic. Synthesize source materials together. Initially your responses will be limited.

Examples of Annotated Bibliographies can be found here:

https://owl.purdue.edu/owl/general_writing/common_writing_assignments/annotated_bibliographies/an_notated_bibliography_samples.html and here:

http://sites.umuc.edu/library/libhow/bibliography_tutorial.cfm

Continuing Students

Students continuing their projects who have already submitted an annotated bibliography still continue to learn more about their field and should add to their original bibliography. No fewer than three new sources should appear in the annotated bibliography. Continuing students are

encouraged to see the reference librarian for assistance in expanding their reading but are not required to submit a reference librarian form. They still need to submit the expanded bibliography.

Assignments

- Annotated bibliography to the SIR office
- Research librarian records your visit and forwards to the SIR office

STAGE 2

Development of a Research Plan

Description of the Investigation and Likely Outcomes

Having determined the parameters of the field and a research question or having now become familiar with the project the student is working on, students now need to explain what they are going to do in their investigations, and how, for successful completion in the available time. Students will describe specific methods, protocols, processes, materials and so forth, and demonstrate understanding of these. Processes vary by discipline and may include readings, surveys, interviews, experimentation, observation, or design. Likewise, materials also vary and can include a body of literature, existing database, chemicals, and so on.

Students who are pursuing their own investigation will use this step to write-up a proposal that gets submitted to SIR for approval.

All other students will complete some variation on this plan. Regardless of discipline, students will be writing what is likely to become the general structure for the introduction to their final research report. This step will draw on the annotated bibliography to develop a thesis and explanation of what is known as well as any possible primary resources that might be available and are appropriate to the project. Because investigations will develop over time, needs that cannot be anticipated will be documented later in the progress report.

How will the student assess the extent to which the focusing question is resolved? As the anticipated outcomes of your investigation are described, the student (in consultation with the mentor) should document what is realistic to accomplish. These should be stated as open-ended statements. These may be bullet points with brief explanations. Students working together with a partner, specify the anticipated individual contributions of each student member of the group, ensuring that all members are participating fully and equitably. How will tasks be shared or divided? Note that every collaborator is individually accountable and also shares full responsibility for all aspects of the investigation. Clear and specific documentation can help prevent misunderstandings later; consider this section a contract for what each student will pursue and how they will work together. Any problems resulting from this process should be

brought to the attention of SIR staff promptly so they can be addressed. Don't wait until all the work has been done by one person before complaining about it.

Students should take special note of the following as documents are constructed:

- Literature cited properly lists all references cited.
- Draw upon at least ten credible sources. In STEM fields this is usually but not exclusively primary sources. In the humanities, secondary documents and available primary sources should go here, as appropriate. The first step was to speak with the research librarian in the IRC to get help locating the best sources. General references such as dictionaries and encyclopedias or Google searches are not adequate.
- Writing in English should use the MLA reference style. Writing in history should use Chicago style (each source noted as a footnote citation should be listed). Use APA style for all other areas of study.

In order to identify a question that the student can carry out in one to two years, consider each of the following elements:

- What contribution would answering the question make to the state of the field?
- What procedures might one use in order to answer the question?
- What skills/equipment/supplies would be needed in order to examine the question? Are these available?
- How long will the study likely take?
- If the procedures that are proposed fail to produce the desired data, what course of action might bring the project back on track?

Proposals

Students submitting proposals at this stage should include the following:

1. Cover sheet (Students' name, project title, mentor's name, affiliation of mentor)
2. Introduction This section is meant to convince the reader that the study is important by reviewing the state of the field. The state of the field will be apparent from the annotated bibliography. The introduction lays out what is known and develops, in the reader, an understanding of why the current study logically stems from those described. This section must include adequate citation of the literature to be able to support each argument or fact presented. Each of the citations must be in the bibliography. The bibliography may include reference not referenced in the introduction, those indicated in the knowledge map should be referenced in the introduction.
3. Description of planned investigation
 - a. The investigation's central question is described in the first subsection. The student should also describe the rationale for asking the central question. This rationale should include the question's placement in the knowledge map and the importance of obtaining its answer.
 - b. The student will describe the intended methodology to be used to answer the central question. This will be an list of experimental steps along with the knowledge gained from applying these steps. This includes all methods, protocols, and processes. Each of these steps should specify the materials,

supplies, and equipment to be used. With each of the methods should be an explanation of what aspect of the central question is being answered, what data is expected, and what this means for the question's answer.

- c. The proposal will include a list of any the supplies and equipment needed.
 - d. The proposal must include, in this section, the expected contributions of each member of the research team.
4. Bibliography This should include all references cited in the text. It should at least contain the sources in the annotated bibliography the student has produced.

TIPS: This is a writing step, requiring significant insight and care. Avoid explanations that are vague, incomplete, or even factually incorrect. Be prepared to revise! It may be easier to write one section at a time, working through that section with your Research Mentor before moving on to the next section. Be prepared to go through multiple iterations!

Assignments

- Introduction/Proposal to the research

STAGE 3

Execution of the Research

At this point, students know what they're working on, how it fits into the field, and it is really time to get to work.

Research Mentors should guide students through the daily grind of carrying out the research. This consists of specific, well thought out steps that are meant to collect data or information and use this data/evidence to answer the research question. Each time a student is in the research setting he or she should come prepared to carry out experimental, theoretical, or investigatory work that is well thought out and yields data that contributes to the answer to the question.

The things that students must do during the research phase are:

- Each day that students are in the research environment, the day should begin by defining what is going to get done. This can be done individually or with your Research Mentor at a morning meeting.
- Record in great detail what you're doing throughout the day. This is crucial, as it will be important to be able to reproduce what you're doing.
- Keep good records! Record findings in a notebook, by taking pictures, videos, sound recordings, etc. Store it in a nonvolatile media which could be a log book, a computer, on a disk, etc.

- Take time to analyze the results of each experiment you undertake. Ask whether the experiment answers the question you needed to answer or not. Support your answer with data.
- Remember that one measurement has little meaning by itself. Your experiment must be replicable in order to be meaningful. Therefore, whatever procedure you choose should be able to be done multiple times.
- Listen to your Research Mentor(s)! Research Mentors are the experts in their field. Listen to what they're saying and think about it.
- Keep in mind that lots of things happen behind the scenes that you don't have to deal with. Being in a lab isn't just coming in one morning and doing an experiment. Sometimes support for your part of a longer experiment can take days. Be respectful of people's time and effort and do whatever you can to make each interaction meaningful.

Assignments

- Progress report turned into the SIR office

STAGE 4

Communicating Your Research

This final step is where students wrap up the whole project by writing a research report that communicates the salient details of the research to the greater community and presenting at IMSAloquium. Writing can be quite difficult because it's hard to communicate exactly what one is thinking. Moreover, the process is long and laborious and requires many rewrites. One can easily write a whole passage at one time and then read it at a later time and decide that it's all wrong.

Yet from the point of view of the research enterprise this difficult step is the most important. It's what makes a study a significant undertaking. Without this one step, all the hard work that one does is lost. Despite the endless work, the tedious attention to detail, and the leaps of understanding that one might encounter, without this step the greater human community cannot benefit from the hard work. Without that, the endeavor has meaning only to the individual undertaking it and this knowledge and meaning are eventually lost. This is the single reason that this step is so important.

As a result, students must write a research report that communicates the details of your study, methodology, data, and conclusions. You will do this in partnership with your Research Mentor and the entire research team that you are part of. Only one paper needs to be written for each research project, even if it's undertaken by a team. Each participant in the study must contribute to the paper in order to obtain authorship and credit for the SIR. The contribution can be the development of a material part of the study, data that was generated through some application

of the methodology, or words written about the study. However, students who do not make a significant contribution will not get credit for the work. The good news is that much of the paper is already written. Each student has already completed an annotated bibliography, an intro/proposal, and progress report. If the methodology has changed, it has been documented. These sections may be copied into the new paper, but will require modification to reflect the actual work accomplished.

The format of the paper should reflect the format used by researchers in this subject area. As a result, the specific format of the paper will not be consistent across different specializations. Each paper must be written as it might appear in a research publication. That is, the format, language, and style must be consistent with the same in use in publications from the discipline. Mentors should be consulted. For help in developing good writing habits, one may consult the book entitled *The Craft of Scientific Writing* by Michael Alley or for the humanities *Strunk and White's Elements of Style*. Mentors may have additional suggestions.

Plagiarism and Reference to Prior Work

Building on previous work in an area is essential. When students draw from others' work, they must cite that work and sources to avoid plagiarism. Direct quotes should be used only if the author's exact words are required for impact, and should be kept to a minimum. Paraphrase the information to demonstrate your understanding, using good and proper paraphrasing techniques; simply changing words is not paraphrasing. If a student cannot state the author's ideas and information in your own words, most likely it's because the student does not understand the material well. If the student draws from work that you have done in a class, a previous SIR, or your SIR proposal, it must be cited appropriately in subsequent documents. Previous work may be used as a starting point for a new SIR, but the new investigation must address a significantly new or expanded focusing question. All sources must be cited in your reference section and/or bibliography.

NOTICE: Infractions of academic integrity will be referred for disciplinary action.

Consequences may include a failing grade for the assignment, and, as a result, perhaps for SIR. Resolve any uncertainties about academic integrity well before written work is due.

Participation in IMSAloqium

Each spring all current SIR students will be expected to participate in IMSAloqium. How you participate depends upon the status of your investigation. All students will need to submit an abstract for IMSAloqium. Students who have completed their investigation with a published work will do oral presentations. Engineering investigations may opt to do a demo in place of a traditional powerpoint presentation. Student investigations that are still in progress will do a progress report. SIR staff will talk to their advisers and ask if they would prefer an open-door presentation or a closed-door presentation. An appropriate format for progress report could be to present a poster.

Final Paper

The final paper should be an attempt at a publishable quality research paper. At a minimum in order to earn a passing grade, the paper must include full citations, pull together all of the materials submitted to date, and lay out the full methodology and findings in accordance with the discipline to which it corresponds.

Distinguished Work

Besides the regular transcription of an SIR as a course on student transcripts, it is possible for students who go beyond the average to achieve the mark of Distinguished Fellow, which will also appear on the transcript. Students earning a passing grade with distinction on their transcripts will have achieved the status of Distinguished Fellows by several possible paths:

- Completing no fewer than 400 documented hours of work on their projects, meeting the minimum requirements for a passing grade, and the assessment of SIR staff.
- Completing no fewer than 400 documented hours of work on their projects and submission to peer review of an original piece of research or presenting at a conference, and the assessment of SIR staff.
- Completing no fewer than 400 documented hours of work on their projects, receiving a letter of distinguished work from an advisor in addition to meeting the minimum requirements for a passing grade, and the assessment of SIR staff.
- Acceptance for publication or conference presentation of an original piece of research.

Evaluation of Distinguished Work will be based on the following criteria:

1. Does the student meet the minimum criteria above?
2. Has the student shown exemplary behavior? (No unexcused absences, met all deadlines, no behavioral infractions in the program as outlined in this Student Handbook and the IMSA Student Handbook.)
3. Has the student written an exceptional final research paper based on the judgment of the SIR faculty?

Assignments and Due Dates

All deadlines are hard deadlines. Students who fail to meet the deadlines will bear the consequences (listed at the end).

1. Parent Permission Form Second Monday October 2.
2. Lab Safety Form Immediately upon first meeting with adviser
3. Annotated Bibliography October 15, 2019 except for late start
4. Reference Librarian form October 15, 2019 except for late start
5. Introduction/Proposal December 1
6. Progress Report December 15
7. Abstract March 15
8. Adviser approved poster April 13
9. Practice and then IMSAloquium April 16

10. Final Paper (upon completion of the project or in the second year of the project) submitted to Turnitin.com May 15

Summer SIRs Due Dates

Students continuing already existing SIRs in the summer have different deadlines. Students in a **new** SIR who begin in the summer must meet the following deadlines:

1. Parent Permission Form June 1
2. Lab Safety Form Immediately following first visit
3. Reference Librarian form June 1
4. Annotated Bibliography June 25
5. Self-report of hours and description of activities June 25, July 25, August 15
6. Introduction/Proposal October 15
7. Progress Report August 15 and January 15
8. Abstract March 1
9. Adviser approved poster April 13
10. Practice and then IMSAloquium April 16
11. Final Paper (upon completion of the project or in the second year of the project) submitted to Turnitin.com May 15

For continuing SIR students:

1. Parent Permission Form June 1
2. Lab Safety Form Immediately following first visit
3. Reference Librarian form June 1
4. Enhanced Annotated Bibliography June 25
5. Self-report of hours and description of activities June 25, July 25, August 15

IMSAloquium

Students will be assigned by SIR staff to workshops if they are at the early stages of their research or to present posters and presentations if they are at the end. This will be done one abstracts are graded.

IMSAloquium is intended to represent a formal conference setting. As such students will be expected to dress in appropriate formal attire. Please plan accordingly in making sure you have proper clothing on campus for the day of the event.

Dropping and Adding SIR

Please note that that NO NEW SIR's will be added after the FIRST MONDAY in OCTOBER. All students must be placed into a project by then or they will need to wait until the following academic year. Students who WITHDRAW from SIR after the SECOND MONDAY in NOVEMBER will receive a W on their transcripts. To avoid the mark appearing on the transcripts, all students must withdraw prior to that time.

Failure to Meet Deadlines

Students who do not meet the deadlines set by SIR will bear the following consequences. Any initial forms not submitted by the October 1 deadline will not be in the SIR program.

Parent Permission Form Can't participate until submitted
Lab Safety Form Can't participate until submitted
Annotated Bibliography Student will not be permitted to apply for any conferences
Reference Librarian form Student will not be permitted to apply for any conferences
Introduction/Proposal F for the semester
Progress Report F for the semester
Abstract WF Mentor approved poster F for the semester unless an alternative arrangement has been made due to a conflict (e.g. college orientation)

Practice of presentation and IMSAloquium WF for the semester unless an alternative arrangement has been made due to a conflict (e.g. college orientation)
Final Paper (upon completion of the project F for the semester.)

The World's Leading Teaching and Learning Laboratory for Imagination and Inquiry

Student Inquiry and Research

Chemical, Biological, Physical, and Radiation Research Safety Review

Student Name(s)

Advisor Name(s) Site

Please discuss the safety aspects of your research with your advisor/mentor. If you may be exposed to any chemical, biological, physical, or radiation hazards during your investigation please specify what they are and identify any special precautions or training necessary.

My investigation does NOT involve chemical, biological, radiation, or physical hazards. My investigation may expose me to the chemical, biological, physical or radiation hazards:

- Hazardous chemicals, including carcinogens and reproductive toxins
Biological materials or microorganisms classified biosafety level 3
Biological materials or microorganisms classified biosafety level 1
Biological materials or organisms requiring biosafety level 2 or above containment:
- Human-derived materials (blood products, bodily fluids)
Cell/tissue culture, including established cell lines
Biological agents for which vaccination is required
Recombinant DNA technology or materials
Animals requiring anesthesia
Ether used as an anesthetic
Respirators used for protection against hazardous or nuisance materials
Radioactive materials (sealed or unsealed sources):
- Ionizing radiation
- X-rays (analytical, medical, dental, veterinary, or industrial)
Physical hazards (electric shock, cryogenic materials, noise, burns, physical impact)
- Highly reactive materials

- Lasers
- High-pressure reactions Vacuum systems Compressed gas Please explain the above in detail, including special precautions or training for the student. Write on the back of this sheet and/or add more pages as necessary.

I HAVE DISCUSSED SAFETY CONCERNS, including environmental hazards, use of research equipment and procedures with my advisor. I know the location of safety equipment and understand the procedures to follow in case of spill, injury, or exposure to a potentially harmful substance. I understand that although every effort is made to minimize exposure, there is risk involved in research.

Student Signature Date

Advisor Signature Date

Abstract

Each year, IMSA publishes an IMSAloquium abstract book. Individuals attending presentations at IMSAloquium use the abstract to determine which talks they would like to attend. The abstract, therefore, should provide a summary of the key accomplishments and information that the listener will hear about in the presentation. The IMSA abstract guidelines suggest an abstract of two hundred words in length. The abstract should put the work in context with one or two sentences setting the stage for the background and rationale, then providing a succinct summary of the key points and accomplishments of the project. An abstract does not go into in-depth background research. If the work is a technical and procedural project, then details of protocols are included; otherwise the procedures used may only be mentioned by name or not listed at all. Someone reading your abstract should get a complete picture of what you have accomplished and why, and be enticed to come to your talk or poster because they want greater depth of understanding of the project and implications of the work.

Think of your abstract in the terms of the following sections, but don't explicitly label these sections:

- **Introduction** - 1-2 sentences, maximum, to set the context.
- **Methods** - 1-2 sentences, unless developing new methodology (literature review is a method).
- **Results** - What have you learned and accomplished? Preliminary results or where you are currently at in your investigation is fine. This is the major portion of your abstract. What did you do? What did you find?
- **Conclusion** - 1-2 sentences about the implications of your results.
- **You get about 200 words** - use them wisely and succinctly.

More detailed instructions are provided in the annual IMSAloquium "Call for Abstracts" document. These instructions may include submission of your abstract into the IMSAloquium database, may require inclusion of presentation equipment needs, and so forth.

The SIR advisor is required to approve abstracts for inclusion in the IMSAloquium abstract book.

Abstract Rubric

The abstract is a synopsis of what you have accomplished in your investigation. Use this rubric to check your abstract and bring the completed form with you when you check your abstract with SIR staff. Since the abstract will be published, it needs to be perfect – no typographical or grammatical errors. Avoid including too much introductory information and too little of what was accomplished. All checkboxes should be marked before submitting your abstract to the database. For guidance, refer to the call for abstracts and the abstract guidelines on Moodle.

- **Title**
 - Evident
 - Up to 175 characters
 - In title case
- **Introduction**
 - Evident
 - 1-2 sentences in length
- **Methods**
 - Evident
 - 1-2 sentences in length (if appropriate)
- **Results**
 - Evident
 - Occupies the major portion of the abstract
- **Conclusion**
 - Evident
 - 1-2 sentences in length
- **Overall**
 - Written in NotePad
 - No spelling errors
 - No grammatical errors
 - No punctuation errors
 - 200 words or less
 - Special characters correct
- **Title Abstract**

Designing the SIR Poster

An effective poster tells the complete story of the work in a simple and visual way, with exhibit, limited text, graphs, drawings, photographs, and the like. To be visually appealing and readable, key points are presented in bulleted text. Poster displays of student investigations at IMSAloquium will be done electronically. ITMC will check student files to make sure they will display correctly. During the IMSAloquium poster session, students will be expected to give a short talk and be able to answer attendees questions.

Posters Need to Include the Following Information, as Applicable, for the Type of Investigation

- Title
- Your name and affiliation
- Your advisor(s) name(s) and affiliation (name of university, business, and so forth) - You do not need the logo!
- Focusing question/thesis statement
- Abstract, as you uploaded for the IMSAloquim abstract book, but it may be updated
- Introduction/background/rationale (bulleted text)
- Methods, if applicable (bulleted text)
- Results/data (usually visual such as diagrams, figures, or tables, all with captions), if applicable
- Creative work, if applicable
- Discussion/conclusion (bulleted text)
- Bibliography of your main research paper sources and of any figures/diagrams not your own. Terms for how to use and/or cite such sources may differ: some sources require written permission before reproducing images; other sources may require only that a reproduction contains a written citation of the source.
- Acknowledgments

Poster Design Do's

- Poster is visually appealing, neat and organized
- Poster has appropriate text and background colors
- Poster information should flow from beginning to end.
- Text is easily read from a distance of 4 feet - use a font size of 14 point or larger
- Information is contained in bulleted statements - no large paragraphs of text except for the abstract
- Poster contains no spelling errors
- Review the poster with your advisor at least one week in advance of your poster printing time

Poster Don'ts

- Don't use background colors that are difficult to look at
- Don't staple your PowerPoint slides to the wall

- Don't wait until the last minute to discuss the poster with your advisor

Some investigations, such as artistic visual arts, music, or creative writing projects, may not lend themselves to the traditional visual presentation. You will need to be creative in putting your visual display together, being sure to include some samples of your work, its evolution, plus an academic discussion of how you pursued your investigation and what you have learned. For help, please ask your advisor or the SIR staff.

Designing the SIR Poster

An effective poster tells the complete story of the work in a simple and visual way, with exhibit, limited text, graphs, drawings, photographs, and the like. To be visually appealing and readable, key points are presented in bulleted text. Poster displays of student investigations at IMSAloquium will be done electronically. ITMC will check student files to make sure they will display correctly. During the IMSAloquium poster session, students will be expected to give a short talk and be able to answer attendees' questions.

Posters Need to Include the Following Information, as Applicable, for the Type of Investigation

- Title
- Your name and affiliation
- Your advisor(s) name(s) and affiliation (name of university, business, and so forth) - You do not need the logo!
- Focusing question/thesis statement
- Abstract, as you uploaded for the IMSAloquim abstract book, but it may be updated
- Introduction/background/rationale (bulleted text)
- Methods, if applicable (bulleted text)
- Results/data (usually visual such as diagrams, figures, or tables, all with captions), if applicable
- Creative work, if applicable
- Discussion/conclusion (bulleted text)
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