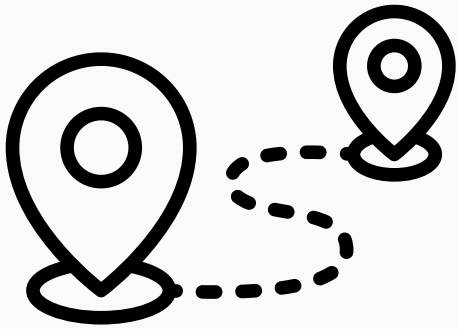
OTTAWA SCIENCE INNOVATION CHALLENGE

Student Guide



2024/25

OSIC

Ottawa Science Innovation Challenge

Greetings
Welcome to the Ottawa Science Innovation Challenge!

In this document, you will find all the details and instructions you need to create an excellent proposal to submit for the competition. Although it might seem intimidating to read through scientific literature and to be judged by graduate students and professors at the university level, this student guide will help you through the entire process. We hope you have a lot of fun creating your research proposals and find this entire competition an enriching experience. We cannot wait to see what kind of creative and innovative ideas you will all come up with!

- The OSIC Organizing Team

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Important Dates

Date	Event
Novemeber 1st	Round 1 begins: Case Reveal
December 10th	Round 1 ends: Written submission deadline
*January 15th	Round 1 finalist announced
Mid-February	Final round

*Approximate date

Submission Information

Your written research proposals are due at **11:59 pm** on **December 10th, 2024** in PDF format. Please submit it by email to osic.uottawa@gmail.com. Submit with only one email per team and make sure the email appears in your "sent" mailbox. You will receive a submission confirmation via email within 24 hours.

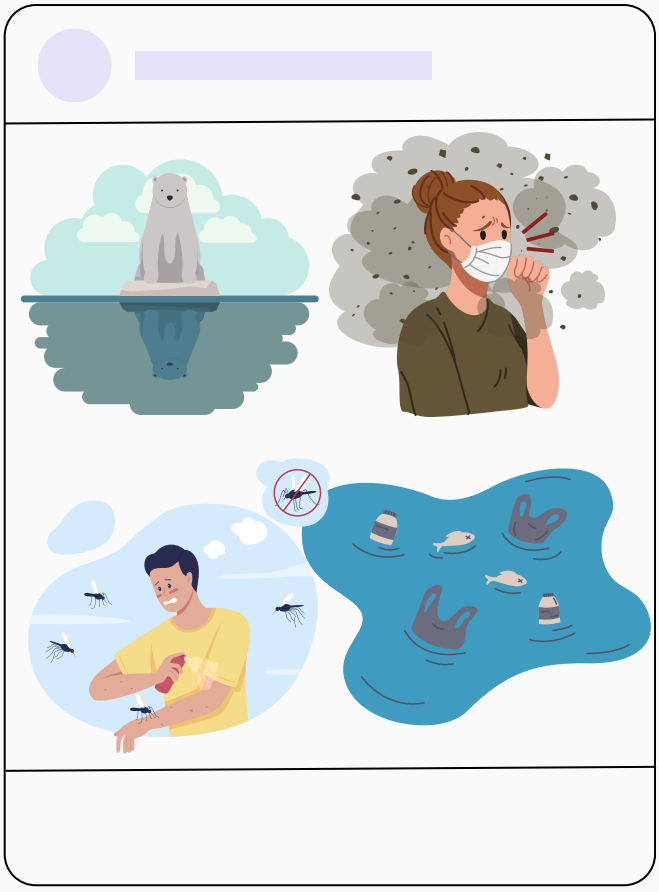
Submission Guidelines

- Submit two copies of your written proposal in PDF format
  - The first should contain a title page with your school name, team number and members' names along with your project title
    - Name the first PDF file: team number_your project title.pdf (abbreviations may be used)
    - Ex: E24_ROSGlycMitosis.pdf (Where E24 is the team's number)
  - The second should contain a title page with **only** your team number along with your project title (Should **not** contain any other identifying information)
    - Name the second PDF file: team number.pdf
    - Ex: E24.pdf (Where E24 is the team's number)

*Please note that any violation of the above-mentioned guidelines such as the submission of a non-PDF file will result in penalties and possible disqualification.

This year's theme: Environmental Determinants of Health!

We have provided you with a case study to contextualize this year's theme. However, note that the cases presented were purely designed for inspirational purposes; you do not need to limit your research proposal to the topics explored in the case. You can choose to write your research proposal on any topic related to the environmental determinants of health!



IMPORTANT: Please note that you are not permitted to propose a clinical trial (humans cannot be the test subjects).

We've created the following resources to help you learn more about current topics in research related to the theme.

- **Pan American Health Organization:** https://www.paho.org/en/topics/environmental-determinants-health
- **University of North Carolina:** https://pmc.ncbi.nlm.nih.gov/articles/PMC7121497/
- **Government of Canada:** https://www.canada.ca/en/services/health/healthy-living/environment.html

How to Generate an Idea

Step 1 - Understand what kind of research is being conducted in the field:

- Research and look up keywords to gain a better understanding of what kind of research is currently being conducted in environmental determinants of health. The resources provided above are a great place to start.
- Use academic databases such as Pubmed and Google Scholar to find research papers on topics that interest you.
- If possible, we suggest reading **systematic review papers on topics that interest you**, as these research papers summarize the existing literature on a given topic and usually suggest areas of future research.
- Look for unsolved problems, issues or criticisms.
- Document all relevant articles and keep detailed notes of your findings.

Step 2 - Narrow your topic and brainstorm ideas

- Now that you have a broad knowledge base of the problem, narrow down your research topic.
- Conduct more in-depth research in this topic, looking for any gaps in the existing literature that you could fill with your proposal.
- Write down any ideas that come to mind (no idea is a bad one).
- Try to base your ideas on current scientific literature.

*The more you narrow down your topic/problem, the easier it will be to brainstorm ideas to address it.

Step 3 - Choose your idea and hypothesis.
Step 4 - Develop your research proposal.

Written Proposal Content Requirements - **1000 word limit**

- **Abstract** (not included in the word limit, but must not exceed 250 words)
- **Background Information/Introduction**
- **Research Idea/Hypothesis**
- **Rationale**
- **Significance of Research Idea**
- **Research Approach/Methodology**
- **Conclusion**
- **Definitions Sheet** (not included in the word limit)
- **References** (not included in the word limit)

Written Proposal Format

Abstract

The abstract is a clear and concise **summary** of your research proposal. It should include the issue it is trying to resolve, the methods you will use, your expected results, and a brief conclusion. Your abstract cannot exceed **250 words**.

Background Information/Introduction

This section is a complete ensemble of the information you have gathered that relates to the main ideas of your proposal. It is important that this section elaborates on why the said issue is relevant. You must refer to previous experiments pulled from scientific literature to explain why your idea has potential. It should be a summary of the problem for which you are proposing a solution. In this section, you must also refer to previous and/or current scientific research in relation to your topic and clearly indicate how your study will add to this pre-existing bank of information. Keep in mind that many who will be reviewing your research proposal will not necessarily have the specific knowledge to understand the intricacies of your idea and why it is relevant. It is therefore important to include pertinent details that will allow any reader to understand your message. **This section should only be written in the third person present tense.**

Use this section to walk your reader through the thought process that led you to your idea and why you think it will work.

- Identify the problem you chose and briefly discuss previous work that is relevant to your research.
- Start to connect ideas in a cohesive manner that demonstrates your train of thought leading to your research idea. This linking of thoughts should hint at your research idea, but not explicitly state it (you'll state your idea later). You must consider various factors that may affect your research proposal. The background information section is your chance to show off all of the cool research that fueled your ideas. **Remember to cite your sources.**

Research Idea/Hypothesis

Your research idea/hypothesis is a proposed explanation and prediction for the outcome of your elaborated research method. It must consolidate the theory and ideas mentioned in the background information. It should be clearly stated and well-researched. This idea must be based on facts and previous scientific research. Judges do not expect completely new research ideas, but rather that teams pull information from previous research and adapt it with the goal of improving or modifying it for a different purpose. It is not necessary to justify yourself in this section, as the reasoning behind your hypothesis should be in the section 'Rationale'. Avoid mentioning variables you cannot control as these will restrict you in your methodology. Try to be as creative as possible.

Rationale

A rationale presents the researcher's justification and reasoning for conducting research on a specific subject. As a researcher, you want to explain why you think your methodology will work. Your justification must be supported by existing literature. The rationale can be placed before or after the hypothesis.

Significance of Research Idea

What is the significance of your proposed research? What are the benefits and potential impact that it may have? How will it impact the field of interest, and what will be the outcome on the treatment of this particular disease? These are the questions you must ask yourself when writing this section of your proposal. It will demonstrate the importance of your research.

Research Approach/Methodology

The methodology section of your research proposal is not the classic "list your materials and methods". This section is one of the largest and most important ones of your proposal as it outlines the various scientific procedures, techniques and controls you will use. It should explain how you will test your hypothesis by using various scientific techniques.

It is very important to:

1. **Outline the different groups that will be involved in your experiment** (experimental group(s) vs control group(s))
2. **Size of these groups.** The sizes of the groups you're using are key - they must be realistically large (you may need to research what is considered reasonable).
3. **Establish controls.** Aim to reduce the number of variables to increase the validity of your findings.
4. **Choose a model in which you will conduct your experiments**: either in vitro (on cells) or in vivo (on animals) and why you chose this model.

Please be aware that you are not permitted to propose clinical trials (i.e. humans as test subjects)

Conclusion

The conclusion section should be a short summary of the content and purpose of your proposal. You need to answer the questions "what, how, and why". The conclusion also allows you to either confirm or refute your proposed hypothesis by drawing key points from the proposal. You should link your proposal to a real-life application in this section. You should **reinforce that your research idea is feasible, worthwhile, and important in real-life applications.**

Definition Sheet

Your research proposal should include a definitions sheet. This section should be at the end of your proposal, right before your "References" section. In this section, you may define any complex terms or concepts mentioned in your proposal. The terms should appear in alphabetical order. You do not need to reword the definitions that you find online, but do make sure to **reference your sources** in your "References" section. Note that the Definitions sheet **will not** be counted in your total word count.

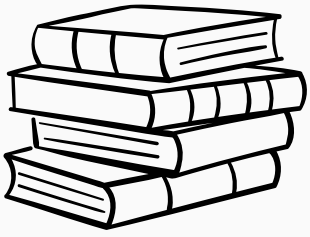
References

The "References" section will be at the very end of your proposal and will include a full list of all sources cited throughout your paper. It is essential that you cite any data, knowledge, or ideas that are not your own. Note that your "References" section **will not** be counted in your total word count.

Instructions for the References section

1. **Throughout your paper, put a superscript number after stating any information that you are citing** (fact, concept, idea...etc.).
2. Each superscript number in your paper must have a corresponding full citation in your "References" section.
3. The sources cited in your "References" section will appear in the same order as the corresponding superscript numbers appear in your proposal.
4. Use the formatting style of **APA 7th edition** in your "References" section.

See the "Definitions Sheet" and "References" section in the Sample Proposal for an example of how references should be cited.



How to find reliable and credible sources

- Whenever possible, reference peer-reviewed research articles
- Consult credible research databases such as PubMed and Google Scholar
- You may find an online news story about a study with valuable information. While it is acceptable to cite this news story, you can usually dig deeper and find the actual research paper they are referring to.
- When you come across a source, ask yourself if it is accurate, reliable, and relevant.
- If you come across a paper that is locked or costs money, simply email the OSIC team (osic.uottawa@gmail.com) and we can unlock the document for you free of charge. Please note that we will only unlock up to a maximum of 10 research articles per team.

Resources to help you build you "References" section

- Guide on how to find credible sources: https://www.scribbr.com/working-with-sources/credible-sources/
- APA 7th edition guidelines: https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/reference_list_basic_rules.html

Mendeley is an excellent program for compiling and creating a reference list. Please refer to the following link to access Mendeley: https://www.mendeley.com/reference-management/reference-manager/.

Rubric

Criteria	Level 1 (50-59%)	Level 2 (60-69%)	Level 3 (70-79%)	Level 4 (80-100%)
Research and knowledge of the subject (25%)	Less than 2 articles are cited. Very little basis for ideas presented. Background presented is not relevant to the question or hypothesis posed.	2-4 articles are cited in the background presented. Two or fewer ideas are supported. Background presented is only weakly relevant to the question or hypothesis posed.	5-6 articles are cited in the background presented. Most ideas are supported with research. Background presented is relevant to the question or hypothesis posed.	Research is thorough and ideas are well supported. Background presented is clearly relevant to the question or hypothesis posed.
Formulating a question or research hypothesis (30%)	Question or hypothesis is not stated or is a simple repetition of a hypothesis found in published research. Hypothesis is irrelevant to the field.	Question or hypothesis stated but unclear or is just a slight variation of the published research.	Question or hypothesis is stated, is clear and relevant.	Question or hypothesis is clearly stated, is well researched and relevant to the field.
Experimental design (25%)	Experimental design is unclear. Some steps are missing or not sequentially listed. No justification for the choice of experimental design is given. No mention of sample size and variables not explained or missing.	Experimental design is appropriate however still lacking some steps. Justification for the choice of experimental design is given. Sample size is inappropriate and variables are somewhat explained.	Experimental design is appropriate. Steps are listed in sequence. Justification for the choice of experimental design is given. Sample size is appropriate and variables are explained.	A clear, controlled experimental design is presented. All steps are listed. Clear, concise justification for the choice of experimental design is given. Sample size is appropriate and variables are clearly identified and explained.
Creativity and novelty (10%)	Research idea is not creative. Hypothesis and experimental design are closely replicated and bring no knowledge to the field.	Research idea is somewhat creative. Hypothesis and experimental design contain similarity with previous research and bring little knowledge to the field.	Research idea is creative. Hypothesis and experimental design are novel and provide knowledge to the field.	Research idea demonstrates great creativity. Hypothesis and experimental design are novel and bring insight to the field.
Expression, organization. written ideas and information in written form (10%)	Proposal lacks organization or logical structure. Overuse of technical jargon. No definitions of scientific terminology provided.	Proposal is somewhat organized but contains logical gaps. Overuse of technical jargon makes understanding challenging. An inadequate number of definitions were provided.	Proposal is organized. One or two logical gaps or unaddressed issues leave the reader with unanswered questions. A sufficient quantity of definitions were provided.	Proposal is well organized with logical arguments. References are written in proper format. Definitions are provided for scientific terminology.

Suggested Timeline

01 **Brainstorm ideas: Research keywords and issues related to the topic by November 8th**

02 **Finalize a research idea & hypothesis by November 13th**

03 **Read literature and past experiments related to your research idea & hypothesis by November 18th**

04 **Write your proposal by November 30th**

05 **Proofread and Edit (Make sure it meets all requirements) by December 6th**

06 **The last day to submit your application is December 10th**

First Round

Each submission is judged according to the given rubric by 3 or 4 judges who are either professors or graduate students. The scores from each judge will be standardized so that each judge's average score is approximately the same. The average of the scores will be the project's final score. The top teams will be invited to the final round.

*Number of teams in the final round varies from year to year.

Resources Available

1. Information Session Recording
We held a virtual information session on October 25th to help students with their proposal, addressing each section of the research proposal. A recording of the information session has been sent to all participants; we invite you to review the recording if you were unable to attend.

2. Email
Feel free to email us at osic.uottawa@gmail.com if you have any questions or concerns.

3. One-on-one mentorship sessions with a Student Advisor
From November 5th-30th, you will have the opportunity to book one 30-minute session with a member of our mentorship team. Please note that these sessions are not intended to help you find a research idea or write your proposal. Rather, these sessions are intended to answer all your inquiries with regard to your written proposal on a more personal level. Note that the mentorship sessions are **optional** and you will receive more information on how to schedule a session by early November.

4. Previous research proposals submitted to the OSIC competition
You can find pictures of the research proposals that made it to the final round of the previous OSIC competitions via this link: https://uri-irpc.ca/previous-competitions. We invite you to read through some of the past proposals as it may be helpful in drafting your own proposal.

5. Existing research papers
The research proposal is meant to mimic actual scientific research papers. This means that they can be used to guide you in how to organize, communicate and present the information in the proposal.

FAQs

If I submit my proposal one day late, will my submission still be accepted?
No, please keep in mind that the date set out is rigid. Any submissions submitted past the deadline will not be accepted.

I am not sure how to approach this case, how should I start?
The best place to start would be to read research articles and systematic reviews from credible sources. You can try PubMed, Google Scholar or any other credible database/search engine.

How do I know whether my research proposal is good?
There is no right or wrong idea. However, try your best to ensure that you have a focused research question. You should have a clear independent and dependent variable for your investigation as well as both positive and negative controls.

What constitutes a good methodology?
A good methodology should contain specific information on how you will be conducting the study, what data you will be collecting and how you will be controlling variables that may affect the credibility of your findings.

What do I do if there are no precedents for our experiment? If no one has ever done it before? What do we put in the Background Info section?
What makes you think your experiment will work? If your research led you to the conclusion that your idea may work, you have something to put in your Background Info section. It does not have to be an experiment or research project that is exactly the same, you must simply talk about what has been done in the past and what information is currently available that makes you believe it will work.

How many sources do I need?
There isn't a specific number that you should aim for. Ideally, try to aim for sources that are credible and peer-reviewed. When starting off, you can look at websites for general information but then look at academic journals when you have specified your topic.

How do I go about reading this very long research paper?
There are different sections in the paper. The abstract gives a general idea of their experimental goals. The background information provides more information about the field of your topic, to further reinforce your understanding. You can take note of the procedures used such as the software, ways of analyzing data, and materials. Keep in mind that you are creating an innovative proposal and shouldn't copy past experiments.

What's the difference between an abstract and the research idea/rationale?
The abstract provides an overview of your proposal, which includes your research idea, general procedure and significance of proposal. The abstract should also be concise (250 words max). You can go more in depth about your idea for the research idea/rationale.

Do I need to include a specific amount/dosage of X material in the protocol?
No, you only need to mention the materials required for the experiment.