# State of Science Project

For this project, you will research a life science topic of your choice and then report, in both written and oral formats, on your findings. This project has several scaffold elements that are meant to support you through the writing process. Here is the breakdown of the project:

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| **State of Science (SoS) Project** | **Weight** | **Length** | **Due Date** |
| [Annotated Bibliography](#_Annotated_Bibliography) | 10% | 750-1000 words | Feb. 5 |
| DRAFT SoS Report & Peer Review x2 | 5% | Min. 500 words | Feb. 24 (Draft) Feb. 26 (PR) |
| [FINAL SoS Report](#_State_of_Science) | 20% | 1250-1500 words | March 5 |
| Peer Review of Oral Presentation & Peer Review x2 | 5% | 5 min | Mar. 17 (Video) Mar. 19 (PR) |
| [FINAL Oral Presentation](#_Oral_Presentation_on) | 15% | 5 mins | March 16 |

This project will develop skills in the following areas:

* finding and assessing sources
* synthesizing research
* summarizing, paraphrasing, and quoting
* creating clear, audience-sensitive communication in both written and oral formats
* writing as an iterative process that involves practice, drafting, and feedback

## Getting Started

Always begin any communication task by evaluating the **rhetorical situation**: your *purpose,* your *audience*, and the expectations of the *genre.* For this project, your audience will be first year science undergraduate students—this is usually a good demographic to use when imagining a “general audience.”

##### Decide on a topic.

Begin with a subject you are already interested in or curious about. There is a good chance your initial topic will be too broad, so keep the 1250-1500 word limit in mind as you think about your scope and area of focus. As you do your research, you will come across facts, common knowledge, or aspects of your topic that are well established. While this can be part of what you talk about, you want to find interesting questions to guide your research. *But what is an “interesting” question?* **Consider what is new, unexpected, controversial, or unsettled about your research question. Interesting content will also be *relevant* to your audience; you should be able to show your audience how your topic impacts their lives and ultimately, why they should care.**

**A note about COVID-19 topics:** Given the amount of coronavirus-related information we encounter daily, we might all appreciate a break from this subject. While I’m not enforcing this as a hard rule, and we will certainly talk about COVID-19 communication in other aspects of this course, consider picking a science topic unrelated to COVID-19 for this project.

##### Do your research.

Now that you’ve decided on your topic, and probably already done some preliminary research, it is time to get *serious* about researching your topic.

For this assignment you are required to pick **at least five good sources published in the last five years, three of which should be research articles**. A research article is a paper that has gone through the peer review process; sometimes these are referred to as academic or scholarly articles/papers.

At least **two of the research articles** must have performed an experiment of some kind (IMRAD format is usually a sign you are reading a paper based on the results of an experiment). The third article may be a [review article](https://guides.lib.lsu.edu/c.php?g=376856&p=2550574). A review article is peer reviewed and usually has a methodology but does not run a traditional experiment; instead, it summarizes the current state of research on a specific topic.

The final two sources can be any “good” source. *What’s considered good?*  Use your [RADAR](https://subjectguides.uwaterloo.ca/infosources) or ask your Instructor, TA, or librarian. Your sources can be more research articles, reports published by reputable organizations/governments, or popular content such as magazines, news articles, podcasts, blogs, research talks, books etc. Remember, credible, trustworthy, and relevant content is what you are looking for!

Finally, avoid sources that say essentially the same thing. Strive for a diversity of voices, even voices that challenge or contradict. This is how you find more interesting ideas to pursue.

In summary, you must use a minimum of **five** sources that meet the following criteria:

* **Three** should be a peer reviewed research article
  + **One** may be a review article
* **Two** can be any other “good” source
* Must be published in the last 5 years (2016+)

##### As Where to find sources

a UWaterloo student, you have access to top tier science journals. Just remember to use the “[get access from anywhere](https://login.proxy.lib.uwaterloo.ca/login)” link on the UWaterloo library homepage. You can also use the library’s subject guides, such as [this one for biology](https://subjectguides.uwaterloo.ca/biology).

My go-to search engine for research papers is [Google Scholar](https://scholar.google.ca/). Use [this guide](https://libanswers.uwaterloo.ca/faq/194683) to make sure you get access through UWaterloo, otherwise you will encounter paywalls. There are also open access journals like[PLOS ONE](https://journals.plos.org/plosone/) and the [Royal Society Open Science](http://rsos.royalsocietypublishing.org/) that are accessible from anywhere

Many science journals such as [PLOS ONE](https://journals.plos.org/plosone/), [Nature](https://www.nature.com/), and [The New England Journal of Medicine](https://www.nejm.org/) have blogs, podcasts, opinion pieces, multimedia/video content, and news reports that geared to a less specialized audience.

If you need help, reach out to a librarian or your Instructor.

##### an example of how to think through your Research idea

1. *I’m curious about bumble bees.* Great! Now, try to find more specific and interesting questions to guide your research.
2. *Um…I want to know if bumble bees help the environment*. Okay, so you do a little research, and the answer is, unequivocally, yes. However, this is more of a well-established fact and not a topic that invites interesting and diverse perspectives. Maybe you’ll find more ideas if you look at *how* bumble bees help the environment.
3. *I came across something interesting: Bumble bees shiver to stay warm.* Okay, this is a cool fact, but is it new or controversial? Can you build an entire research paper on this? How would you make this relevant to your audience?
4. *I came across a study that found that* [*bumble bees do better in urban environments*](https://phys.org/news/2018-06-bumblebees-urban-agricultural-areas.html#:~:text=Bumblebees%20found%20to%20do%20better%20in%20urban%20settings%20than%20in%20agricultural%20areas,-by%20Bob%20Yirka&text=A%20team%20of%20researchers%20with,urban%20environments%20than%20agricultural%20environments.). Okay, this is a more recent finding, and it is kind of unexpected. Most of my peers probably live in cities, so they might be interested on why this is the case. And isn’t there this whole urban bee keeping scene? My audience might also be interested in things they can do to encourage pollinators in their urban environments.

And now, you are on the right track! You still have more research to do, but your research area is more focused and interesting because addresses the *conversation* about the topic rather than the established facts of the topic.

Here are a few other takeaways from this bumble bee example:

* The topic is not too scientifically complex—you want to be able to understand most of what you read and be able to explain it to others.
* The topic is current.
* The topic is covered in both research and popular sources (magazines, blogs, podcasts, etc.)
* The topic is relevant and accessible to a general audience.

While you are encouraged to pick a topic that you are truly excited about and that challenges you, being smart about your choice will make this assignment more enjoyable!

## Annotated Bibliography (10%)

Annotated bibliographies help the writer evaluate the usefulness of their sources and draw connections between them in preparation for writing a paper. In this way, annotated bibliographies also help the writer understand the conversation around their research topic.

To begin, decide on the five sources you will use for your literature review. Review the criteria for your sources outlined in the [Do Your Research section](#_Do_your_research.).

For each of your five sources, you will need to create an **annotated list of references**. If you haven’t written an annotated bibliography before, here are some resources to help you understand the genre and format:

* [Concordia Library](https://library.concordia.ca/help/writing/annotated-bibliography.php)
* [University of West Florida Library](https://libguides.uwf.edu/c.php?g=436278&p=3891645) (their example does not use a hanging indent, which is incorrect)
* [SFU Library](https://www.lib.sfu.ca/help/cite-write/citation-style-guides/annotated-bibliography)

Note the format! Standard APA citation is first, followed by the annotation. Citations are in alphabetical order and use hanging indent.

##### Criteria

Your annotated bibliography must meet the following criteria:

* APA style (7th ed.) Consult a good reference guide such as [this one from Mt. Royal University](https://library.mtroyal.ca/ld.php?content_id=35491974).
* **Each** annotation should be between 150-200 words (750-1000 words total)
* **Summarize** and **Evaluate** each source
  + For research articles, try to touch on every aspect of IMRAD.
  + For popular articles, you may want to mention the target audience. Try to avoid general descriptors like “general audience” or “scientific audience.” Instead, you might say *New York Times* readers or those interested in backyard bee keeping.
  + **Critically evaluate the work**. What are the article’s strengths and weaknesses? How does it contribute to your broader research question/purpose?
    - Optional: Compare/synthesize the work with other sources you have cited—how does X study compare to Y?
  + Aim for an even split between summary and evaluation. While more evaluation is fine, you to lose marks for too much summary.
* Writing clearly and concisely.
* Do not quote or paraphrase—summary only.
* Do not repeat the author’s name, title of the article, or name of the journal in the annotations (all this information is found in the citation).

Annotated Bibliography RUBRIC (18 points)

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| **Quality of Sources /4**   * Min. 3 peer reviewed sources (1 can be LR) * Non-scholarly sources are credible. Evidence of RADAR. * Sources are diverse; sources establish a *conversation* around the central topic. * Sources are published within the last 5 years.   **Quality of Annotations /8**   * Summary: The audience gets the gist of the source. Summary is useful/meaningful. Touches on IMRAD, when appropriate. * Evaluation: Comments on its strengths & weaknesses. Explains how the work supports the RQ/research area * Even attention to Summary and Evaluation; avoids too much summary. * Synthesizes/compares work to other work (optional) * Meets word count guidelines. | **APA Citations /3**   * Correct APA (7th ed.) citations * Document is formatted correctly (annotation follows each APA citation) * Alphabetical order   **Writing Quality**  **/3**   * Writing is clear, concise, and well-organized. * Few mechanical/grammatical errors do not impede flow/ comprehension * Level of detail is appropriate for a “general” audience |

*Full marks indicate excellent work in the category; deductions indicate work that is good/competent/developing/unsatisfactory.*

## State of Science Report (20%)

Now that you’ve done some research and analyzed your sources, you are ready to write your SoS report. Essentially, this where you make sense of the research you’ve done and report on what you’ve found.

Your report must have a clear thesis/purpose. This report is not simply a summary of everything you’ve found but a well-organized *perspective* on what is important, relevant, or problematic in your research area. Go back to the question(s) that prompted your research:

* Did you find any answers to your RQ? What were they?
* What reoccurring ideas/theme across all the articles?
* What do different perspectives suggest about the topic?
* What conclusions can you draw from the diverse voices you have examined?
* What do you want to say about the state of research on your topic? What do you think the takeaway message is from your research? Scope is important—you can’t talk about *everything* you’ve researched, so decide what areas are the most important.
* How can you make sense of research that is *unsettled*, that is, does not have a clear cut “answer” or agreed upon perspective?

##### Criteria

* **Introduction follows the CARS model.** Begin with a broad overview of the subject and then narrow to a gap/problem/unknown or some area of complexity. With the “niche” established, introduce your RQ/purpose.
* Decide on one to three themes to organize the body of your paper. **Use descriptive headings and subheadings to organize your research**.
* Use good, credible sources to support your claims and move your position in a particular direction.
  + Use a min. of five good sources, three should be research papers. You may use the same sources from your annotated bibliography, or you may change it up/add to them.
  + Paraphrase and summarize your sources. Direct quotes should be used sparingly, and no block quotes should be used.
  + Use correct APA style for in-text citations and reference list. Consult a good reference guide such as [this one from Mt. Royal University](https://library.mtroyal.ca/ld.php?content_id=35491974).
* In your conclusion, summarize your research purpose and key findings/conclusions. Here you can go broad again, noting the implications of your research, impact on stakeholders, and areas of research that can build on what you’ve laid out in your report.
* Word count: 1250-1500 (excludes cover page and reference list). Double space.

RUBRIC (24 points)

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| **Introduction /5**   * Application of CARS: Establishes the territory, establishes the niche, occupies the niche. * Effective use of signaling words. * Reader understands why this report matters. * Claims are supported with research.   **Body /10**   * Appropriate scope (1-3 themes) * Themes are addressed thoroughly; critically evaluates sources and perspectives; identifies gaps, controversies, and limitations. * Content is well-organized; organization supports the thesis established in the Intro. * Claims are supported with research. | **Conclusion /3**   * Summarizes research purpose and key findings. * Mentions the implications, stakeholders and/or areas of research that could add to understanding the problem.   **Writing Quality**  **/6**   * Writing is clear and concise; few mechanical or grammatical errors do not impede flow or comprehension. * Smooth integration of sources when paraphrasing or quoting * Writing style is appropriate for a “general” audience**.** * Correct APA citations (in-text and reference list) * Adheres to word count range. |

*Full marks indicate excellent work in the category; deductions indicate work that is good/competent/developing/unsatisfactory.*

## Oral Presentation on your State of Science Report (15%)

Now that you’ve completed your report, it is time to communicate your research findings to the class. Drawing from your report, you will adapt the content for a 5-minute oral presentation.

##### Consider Audience and Purpose

First, you will need to decide what aspect(s) of your report will most appeal to your audience. Think about these questions:

* What is particularly interesting or significant about what you found?
* What will your audience care about most? What matters most to *them*? What *should* matter most to them?
* What do you want them to do, think about, and feel after hearing your talk?
* What is the ONE big idea you want your audience to leave with, to remember?

Keep your central message simple and memorable!

##### Create an engaging and memorable presentation

Create an engaging, memorable presentation by applying a) narrative/storytelling techniques and  
b) the Assertion-Evidence model.

Narrative techniques can include things like anecdotes, metaphors, rich description, appeals to pathos/emotion etc. Include at least two distinct techniques.

Remember that the [Assertion-Evidence model](https://www.assertion-evidence.com/) emphasizes visual evidence (e.g. tables, graphs, diagrams, photographs, schematics, cartoons, gifs etc.). **Text is limited to descriptive headings and/or labels on graphics.** Avoid images that are pointless “filler” (e.g. clipart and/or stock photos). Instead, pick images that are compelling, memorable, and that support your research story. No embedded videos are allowed for this assignment.

Use conversational language and good presentation techniques (e.g. eye contact, voice fluctuations, gesturing, enthusiasm etc.) You may use notes but don’t read or constantly look at them.

Rubric (20 points)

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| **Introduction /5**   * Captures the audience’s attention * Introduces and contextualizes the issue * Provides the audience with a reason to care: *So what? What is at stake?* * Provides a brief outline   **Details /5**   * Audience appropriate (in language, complexity, & level of detail) * Focuses on 1-2 big ideas; key “take-aways” are emphasized/reinforced in different ways. * Claims are supported by credible sources and verbally signaled effectively * Logical flow and organization; uses transitional words effectively. * At least two distinct narrative strategies are used. * Maintains audience’s interest throughout. | **Delivery /5**   * Speaker comes across as confident and knowledgeable * Speaker gestures, maintains eye contact, and enthusiasm throughout. * Speaks loudly, clearly, slowly, and uses a conversational tone. * Presentation seems practiced, polished, & professional. * Stays within the 30 seconds of the 5 min time frame.   **Slides/Visuals /5**   * Follows the AE model (text for descriptive headings and labels ONLY) * Slides are neat, professional and clear. Avoid competing images. * Speaker introduces the visuals and helps the audience make sense of them. * Visuals appear on the screen at the point they are discussed. * Visuals are compelling evidence that support spoken content, not pointless “filler” (e.g. clipart and/or stock photos) |

*Full marks indicate excellent work in the category; deductions indicate work that is good/competent/developing/unsatisfactory*