



Writing Lab Reports

Concepts and lecture design adapted from CONS 330 writing tutorials by
Dr. Suzie Lavalley, 2018

What to include in your paper

- Title
- Introduction
- Materials & Methods
- Results
- Discussion & Conclusions
- Literature cited

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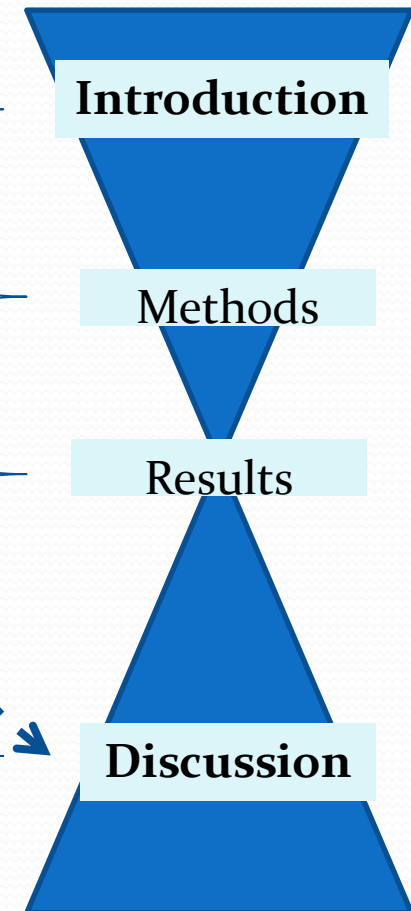
Science is storytelling!

- Very broad background (foreshadow the Discussion)
- Focus towards the Question
- Very specific Hypothesis

- More focused
- Include details necessary to repeat the study
- Narrative form (like you're talking to a friend)

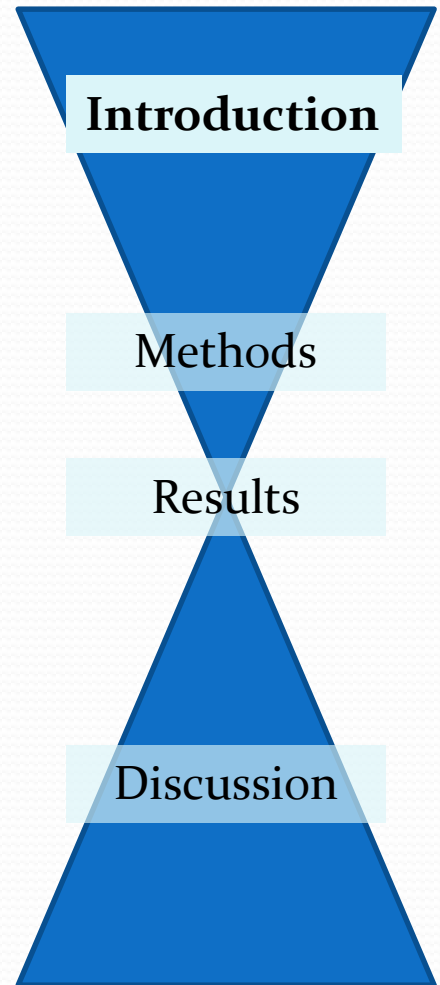
- Very succinct
- Describe patterns/trends

- Restate & answer the Hypothesis
- Discuss how *all* results relate to the hypothesis
- Relate your observations to the “bigger picture” you described in the Introduction



Introduction

- Provide context that will help your reader understand your question
 - Use scientific literature (peer reviewed)
- Identify your Research Question
 - Avoid normative terms (good/bad, better, etc.)
 - Establish a link between cause and effect
- Hypothesis (or hypotheses) must come at the end
 - Clear link between mechanism (independent variable) and the response (dependent variable)



Introduction: order of ideas

1. Identify a problem area and state its importance
 - What is the interesting/exciting potential discovery, and why should we care? How is this information useful?
 - Remember to avoid normative language!
2. Review the relevant research literature
 - Describe what people have already done in the problem area you described
3. Identify your research question
 - What new information needs to be learned?
4. State your hypothesis with your prediction.

What is a research question?

- Characteristics of a good question:
 - Begins with an observation
 - Has a defined study system / organism
 - Able to answer with empirical evidence and/or sound logic
 - Within realistic temporal and spatial scope
- A very specific, refined question should easily provide a *testable* hypothesis (we will cover this soon).

Example

- Observation: agricultural streams have periodic algal blooms and incidents of high mortality of organisms.



- Observation: streams with more shade have less frequent algae blooms.

Research Question Example

- **Needs work** : Is shade *good* for streams?
 - (normative language!)
- **Better**: How does shading affect stream algae and fish?
 - (evidence hard to define)
- **Best**: Does shading from riparian forests prevent algal blooms in streams with increased nutrients by limiting sunlight?

Anatomy of a good hypothesis

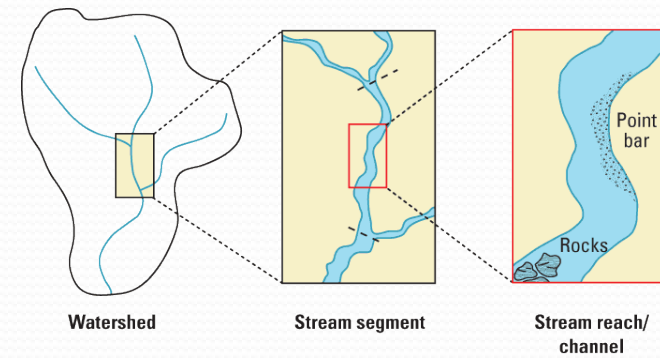
- **Should have:**
 - **Subject** (system or organism)
 - **Response** (dependent variable, you look for the response)
 - **Treatment Factor** (independent variable, you get to control/manipulate)
 - **Prediction**
 - **Mechanism**
- Needs to be *testable* and *falsifiable*
 - Never *proven*!
- Try sketching the expected results as figures you would generate

Hypothesis example

Our question: Does shading from riparian forests prevent algal blooms in streams with increased nutrients by limiting sunlight?

Examples:

- **Needs work:** Streams that have forests are less affected by nutrients
- **GOOD:** Stream reaches under heavy agriculture pressure have lower algal biomass production when riparian canopy is present compared to no riparian canopy
- **Where is the** Subject? Response? Treatment Factor? Prediction?
Mechanism?

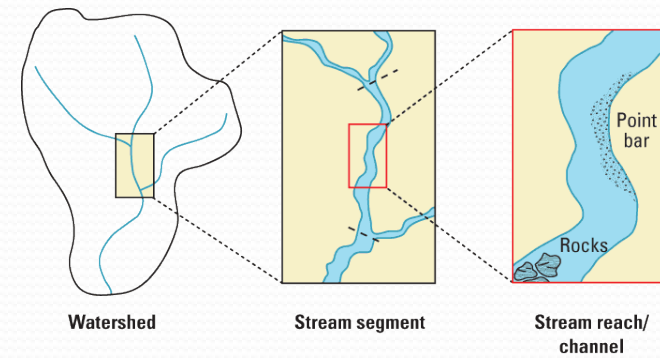


Hypothesis example

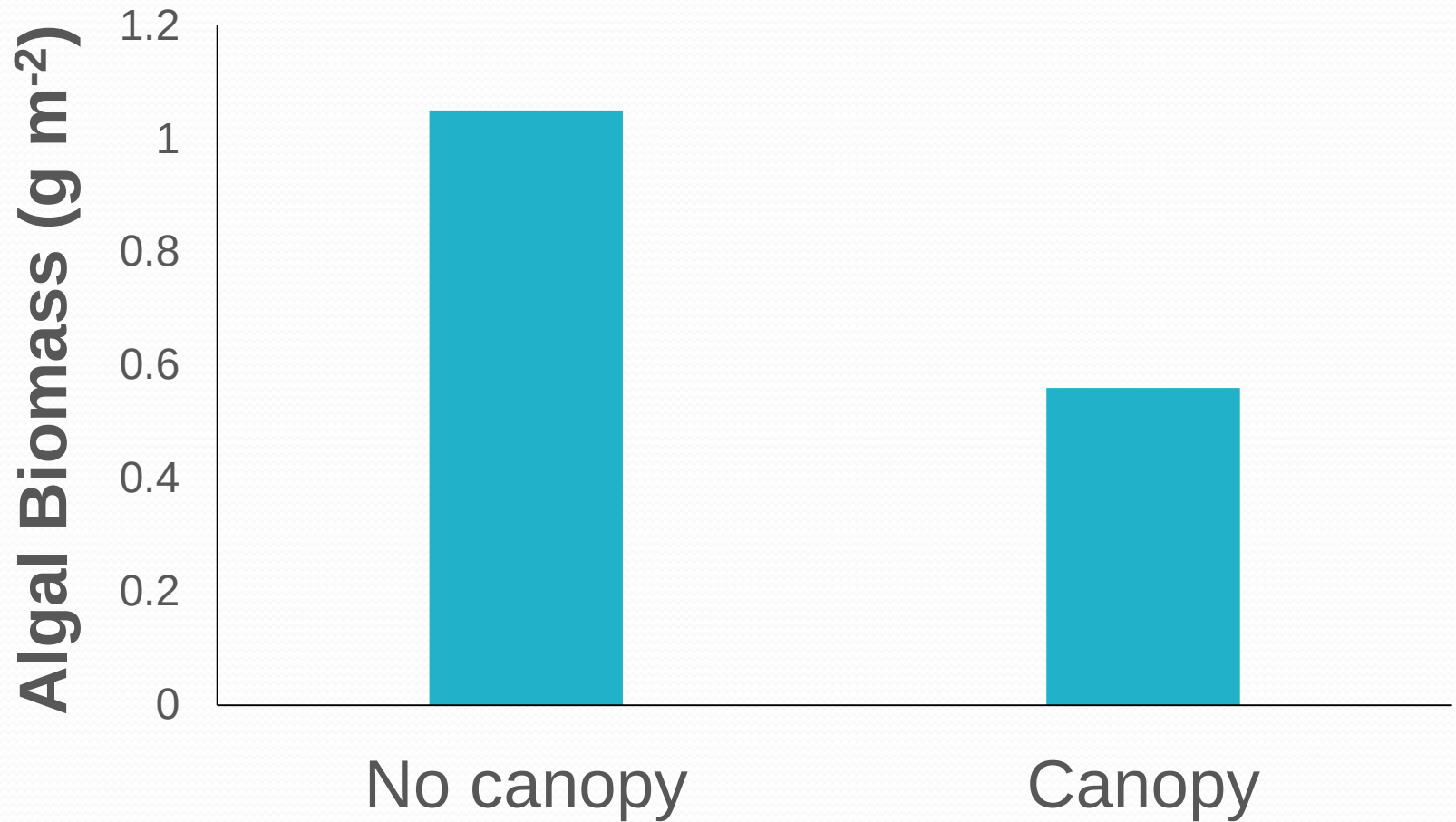
Our question: Does shading from riparian forests prevent algal blooms in streams with increased nutrients by limiting sunlight?

Examples:

- **Needs work:** Streams that have forests are less affected by agriculture
- **GOOD:** Stream reaches under heavy agriculture fertilizer runoff have lower algal biomass production when riparian canopy is present compared to no riparian canopy
- **Where is the Subject? Response? Treatment Factor? Prediction? Mechanism?**



What do we expect?



What is relevant context?

Stream reaches under heavy agriculture
fertilizer runoff have lower algal biomass
production when riparian canopy is
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Stream reaches under heavy agriculture
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Subject streams

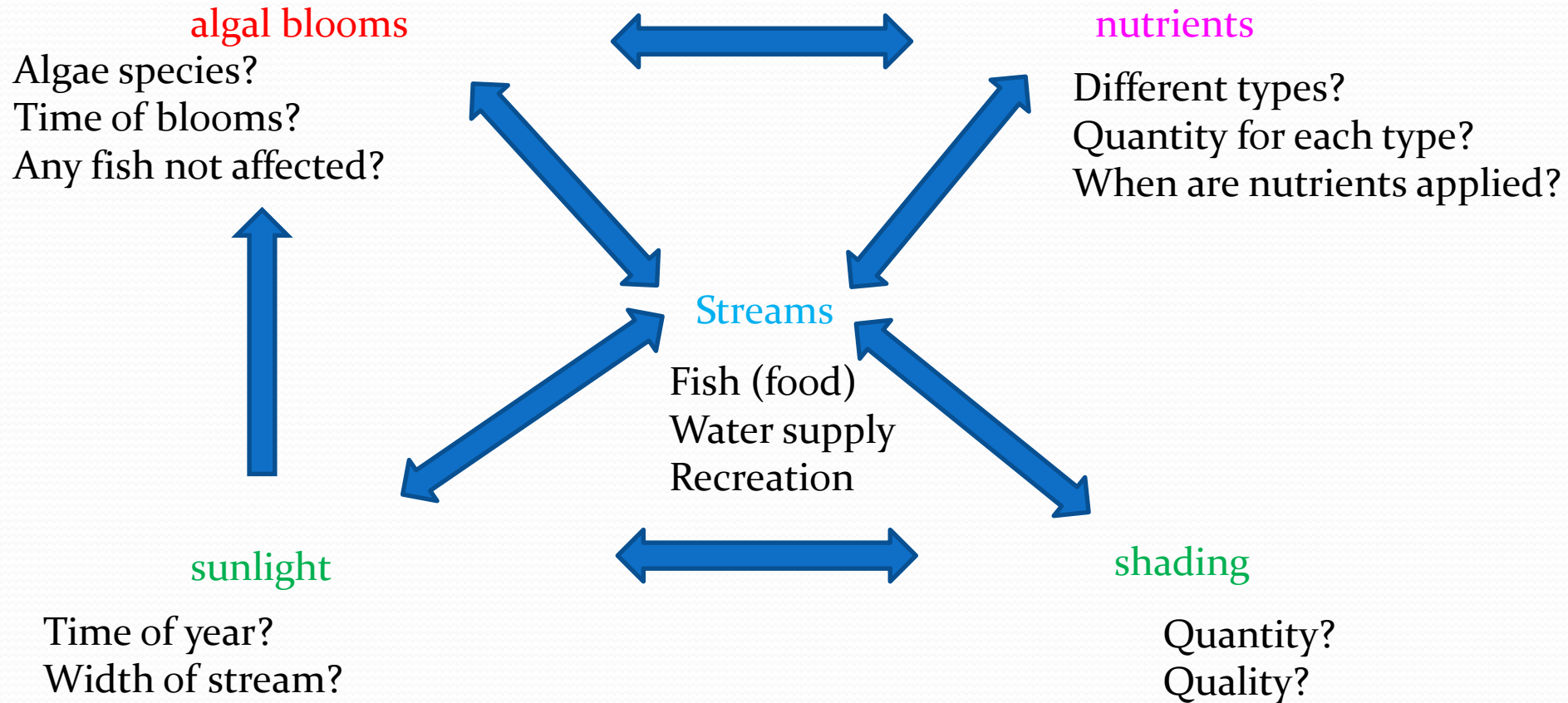
Response measuring algae blooms

Factor testing canopy over stream (shade vs. sun)

Mechanism high nutrients cause algae blooms

Prediction shady streams will have less algae

What is relevant context?



Google Scholar

☒ Articles ☐ Case law

Stand on the shoulders of giants

[Go to Google Scholar](#)

sunlight algae blooms nutrients - x +

← → ↻ 🔒 scholar.google.ca/scholar?hl=en&as_sdt=0%2C5&q=sunlight+algae+blooms+nutrients&btnG=

☰ Google Scholar sunlight algae blooms nutrients 🔍

📁 Articles About 26,700 results (0.17 sec)

Any time

Since 2019

Since 2018

Since 2015

Custom range...

Sort by relevance

Sort by date

☒ include patents

☒ include citations

☒ Create alert

[BOOK] **Algae blooms** in commercial fish production ponds

MW Brunson, CG Lutz, RM Durborow - 1994 - agrilife.org

... Phytoplankton **blooms** can prevent weed growth by shading the pond bottom and not allowing the weeds enough **sunlight** to grow ... Figure 2. Shading effect of **algae bloom** in fish pond ... For a profitable operation, develop the capability to monitor and detect **algal bloom** die-offs ...

☆ 🔍 Cited by 29 Related articles All 12 versions 🔍

[PDF] Influence of **sunlight** on the proliferation of cyanobacterial **blooms** and its potential applications in Lake Taihu, China

Q Zhou, W Chen, K Shan, L Zheng... - Journal of Environmental ..., 2014 - researchgate.net

... The occurrence of heavy cyanobacterial **blooms** in warm seasons has increased in frequency and intensity in ... Five shading rates of 0% (full **sunlight**, control group, CG), 10% (EG1), 25% (EG2), 50% (EG3) ... Water and **algae** samples were collected constantly (14:00–15:00) from both the ...

☆ 🔍 Cited by 14 Related articles All 10 versions Web of Science: 8 🔍

[CITATION] **Algal** growth excitors

DS Kappe, SE Kappe - WATER AND SEWAGE WORKS, VOL 118, NO 8, P ..., 1971

☆ 🔍 Cited by 5 Related articles

[HTML] Effect of **algae** growth on aerobic granulation and **nutrients** removal from synthetic wastewater by using sequencing batch reactors

W Huang, B Li, C Zhang, Z Zhang, Z Lei, B Lu... - Bioresource ..., 2015 - Elsevier

... However, in this study it is still not clear whether and to what extent the **sunlight** impacted NOB in the granules, due to the fact that a temporary inhibited nitrataion was also detected ... After 19 days' operation, **algae** were clearly observed, forming **algal**-bacterial symbiosis ...

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sunlight algae blooms nutrients



About 26,700 results (0.17 s)



Cite

MLA Zhou, Qichao, et al. "Influence of sunlight on the proliferation of cyanobacterial blooms and its potential applications in Lake Taihu, China." *Journal of Environmental Sciences* 26.3 (2014): 626-635.

APA Zhou, Q., Chen, W., Shan, K., Zheng, L., & Song, L. (2014). Influence of sunlight on the proliferation of cyanobacterial blooms and its potential applications in Lake Taihu, China. *Journal of Environmental Sciences*, 26(3), 626-635.

Chicago Zhou, Qichao, Wei Chen, Kun Shan, Lingling Zheng, and Lirong Song. "Influence of sunlight on the proliferation of cyanobacterial blooms and its potential applications in Lake Taihu, China." *Journal of Environmental Sciences* 26, no. 3 (2014): 626-635.

Harvard Zhou, Q., Chen, W., Shan, K., Zheng, L. and Song, L., 2014. Influence of sunlight on the proliferation of cyanobacterial blooms and its potential applications in Lake Taihu, China. *Journal of Environmental Sciences*, 26(3), pp.626-635.

Vancouver Zhou Q, Chen W, Shan K, Zheng L, Song L. Influence of sunlight on the proliferation of cyanobacterial blooms and its potential applications in Lake Taihu, China. *Journal of Environmental Sciences*. 2014 Mar 1;26(3):626-35.

[BibTeX](#) [EndNote](#) [RefMan](#) [RefWorks](#)

[BOOK] **Algae blooms**

MW Brunson, CG Lutz, RM ... Phytoplankton blooms c the weeds enough sunlight profitable operation, develop ☆ 99 Cited by 29 Relat

[PDF] Influence of sunl potential applications

Q Zhou, W Chen, K Shan, L ... The occurrence of heavy and intensity in ... Five shad 50 ... Water and algae sam ☆ 99 Cited by 14 Relat

[CITATION] **Algal growth**

DS Kappe, SE Kappe - WAT ☆ 99 Cited by 5 Relat

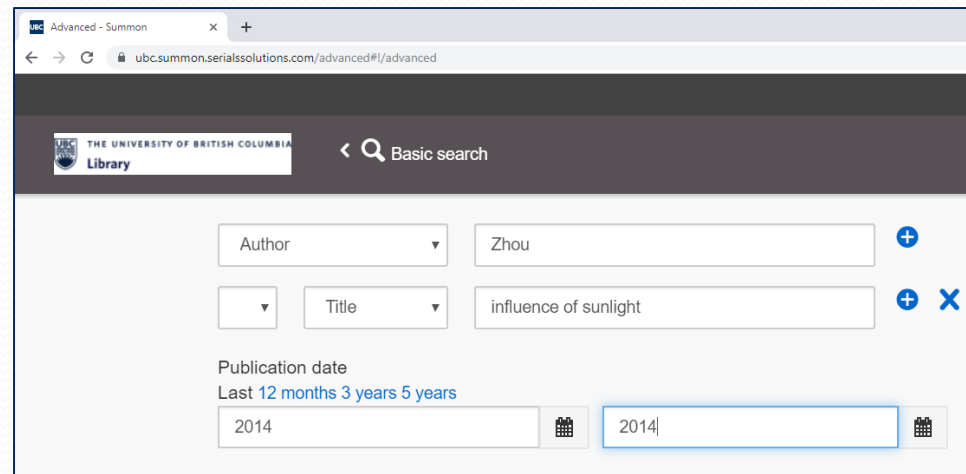
[HTML] Effect of algae synthetic wastewater

W Huang, B Li, C Zhang, Z ... However, in this study it i in the granules, due to the fe days' operation, algae were ☆ 99 Cited by 68 Related articles All 10 versions Web of Science: 46

[HTML] Assessing biological and chemical signatures related to nutrient removal

Google Scholar tips:

- “exact phrase required”
- Genus+species
- Add pdf for free copies of the complete article
- Skim abstract BEFORE you use citation!
- Use citation tool to copy+paste citation
- Use UBC Library to search for complete article
- ubc.summon.serialssolutions.com/advanced#!/advanced



The screenshot shows the UBC Library Summon Advanced search interface. The browser address bar displays the URL ubc.summon.serialssolutions.com/advanced#!/advanced. The page header includes the UBC Library logo and a "Basic search" link. The search form contains the following fields and options:

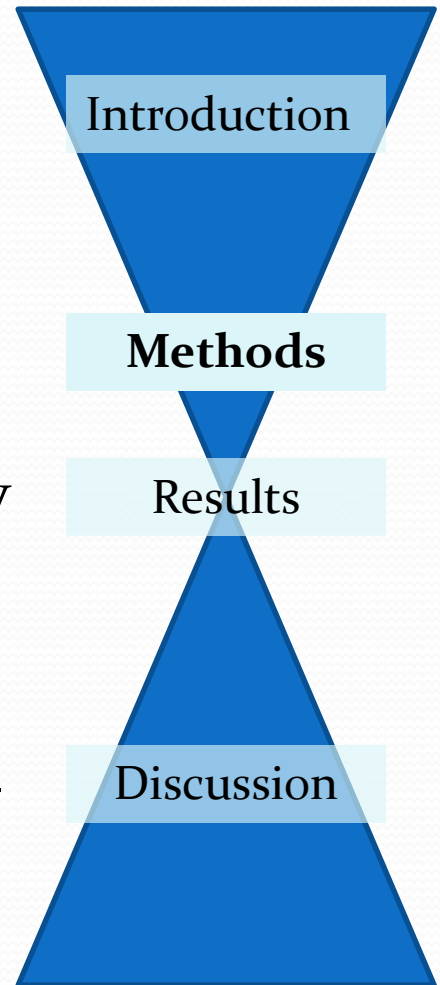
- Author:** A dropdown menu set to "Author" and a text input field containing "Zhou".
- Title:** A dropdown menu set to "Title" and a text input field containing "influence of sunlight".
- Publication date:** A section with the text "Last 12 months 3 years 5 years" and two date range input fields. The first field is set to "2014" and the second field is set to "2014".

There are plus (+) and minus (-) icons next to the Author and Title fields, and a plus (+) and minus (-) icon next to the Publication date section.

Methods

Should be repeatable by someone who has never been to FRST 200 lab before.

- Describe all steps taken to collect your data, and include materials in a narrative format – do not make lists!
- Define all terms that were not immediately obvious to you.
- Include your data processing (Average of data? Ratios?) and final statistical analyses (not required) paragraph at the end
- Cite any software used and its version



Hints and tips for better papers

Suggested writing flow (it's actually easiest to start your paper in the middle):

1. Methods
 - Write as soon as possible after you complete the lab!
2. Results
3. Discussion and conclusion
4. Introduction (should match all of the above parts)

Ask for help!!

- 1st week: get organized, write methods, make figures, think about what results & conclusions mean.
 - Ask for help if you don't recall a step, or you don't think Results look right.
- 1st weekend: write results, begin your search for relevant literature/context.
- Early 2nd week: draft your full report
 - Identify places where you think you need help.
- Mid 2nd week: ask for help!
 - Attend office hours
 - Book a writing consultation
- 2nd weekend: make revisions to finish your final draft.

Resources

- learningcommons.ubc.ca
- FREE in-person or online help with citations & writing skills:
learningcommons.ubc.ca/improve-your-writing/writing-consultations
 - Science Writing guides & tutorials: scwrl.ubc.ca/student-resources
 - See Canvas > Home > Syllabus & Course Info > Undergraduate Learning Resources
- Victoria McMillan, Writing Papers in the Biological Sciences (Woodward Library)
 - Literature search, figures, layout & organization
 - Examples of lab reports (good and bad)
- Strunk & White Elements of Style (Law Library)
 - Grammar, composition principles, and style