

Writing Guidelines

Organization and Content
Documenting Sources
Using Graphics
Writing in a Scholarly Manner

Organization and Content

Title of the Paper

The title of your paper should be brief but should adequately inform the reader of your general topic and the specific focus of your research. Keywords relating to parameters, population, and other specifics are useful.

Author(s)

All persons who contributed to the paper should be listed. If you have written the entire paper yourself, list your name first. Only those papers written entirely by the student will be considered for publication in the *Journal of Undergraduate Research*.

Abstract

The abstract is a brief summary of your paper in approximately 150-250 words. The purpose of your research and/or your hypothesis should be concisely stated in one to two sentences. For quantitative research, a statement regarding the methodology or the experimental design follows. The abstract ends with a summary of the primary results and conclusions. For papers in the humanities, which are often extended essays, include a statement regarding the major thesis and a sentence for each of the primary ideas explained in the paper.

Complete sentences should always be used. Verb tense should follow that of the paper (past for purpose, methods, and results, present for conclusions). Avoid use of first person (I, we), do not use abbreviations, and do not cite secondary sources.

The Body of the Paper

Headings serve to organize your paper and guide the reader through it. The use of headings is required for papers in the physical and social sciences and optional in the humanities.

In quantitative studies, functional headings (Introduction, Methods, Results, and Conclusion or Discussion) are generally used to divide the paper. Some physical sciences tend to favor a mix of functional and topical headings (Introduction or Background, Design of the Scattering Chamber, Calibration, Experimental Setup, Data, Discussion).

Though the use of headings is not required in humanities papers, headings can be helpful there too. Papers in the humanities often provide background information on the topic as an introduction and then divide the major areas of discussion or analysis with topical headings (Responsive and Responsible Users of Language, Defining English as Kept Alive by the Work of all its Users, Designing English Against the Grain of Fast Capitalism, Working with Dissonances in One's Discursive Resources).

Your mentor can suggest appropriate organization for your paper. Also, pay attention to the journals in your field and how the articles are sub-divided.

The Introduction

All papers should have an introduction that 1) provides background information on the topic, 2) reviews previous notable research on the topic, and 3) informs the reader of the purpose of your research. The extent of the historical review (2) varies from discipline to discipline. In the social sciences, this part of the introduction is quite long and comprehensive; it is briefer in the physical sciences and may not even be included in the humanities.

In all cases, sufficient background information should be given to orient the reader to the topic of your research. A good rule of thumb is to write so that someone with a broad knowledge in your field would understand your paper.

If you refer to (or *cite*) sources in your Introduction (or later in your paper), you must document

thesources properly. See Rules for [Documenting Sources](#) and Avoiding Plagiarism. The Introduction generally contains references to other papers, books, and journal articles on the topic. These and any other sources should be documented using the in-text citation format common in your field. Refer to Common Citation Formats in Documenting Sources for examples of in-text citations.

Finally, near the end of your introduction, make the purpose of your research clear to the reader. What are you attempting to do and why is it significant? If you are proposing a hypothesis, state it clearly.

Methodology or Experimental Design

For empirical research, a careful and complete description of the methods you used to carry out your research is required. In the social sciences, this section is usually divided into two subsections: Participants and Procedure. The physical sciences tend to use more topical subheadings to describe the content of each section in the Methodology (Voltammetry, Solution, Electrodes).

In the Method section, precise details about the research design are given. For example, provide the ages, gender, and other necessary demographic characteristics for participants in the study. Give precise measurements, times, and quantities used in the experiment. Specifically describe equipment, materials, and tests used. Procedures should be detailed in chronological order. The method section should be so complete and detailed that it could be replicated by the reader.

The method section, as well as the Results, often contains graphics (tables and figures). Refer to [Rules for Using Graphics](#) when constructing and placing your tables and figures in your paper. **Refer to each table and figure by number (Table 1; Figure 3) in the narrative (text) of your paper.**

Results

As the name implies, this section contains the findings of your research. Carefully report all the data you have collected, explaining it in narrative form as well as using graphics, especially to illuminate large quantities of data and to point out significant trends and characteristics of the data. When using graphics, choose the graphic best suited to the data. See Rules for Using Graphics for suggestions on choosing the most appropriate type. **Refer to each table and figure by number (Table 1; Figure 3) in the narrative of your paper.**

Conclusion (Discussion)

In this section, you interpret or analyze the data you have just reported in the section above. What do these results mean? How can they be used? What are the implications for your field? What other questions arise as a result of your research? What should future research focus on?

The conclusion often returns to the issues raised in the introduction. If you stated a hypothesis, was it proven or disproven? How was your initial purpose fulfilled by your research? How do your results compare to the results of the other studies you cited in your introduction? While all these questions may not be pertinent to your research, answering as many as possible will contribute to a well designed and well written paper.

References (Works Cited)

All sources referred to (or cited) in your paper must be listed at the end. The format used for this listing varies from discipline to discipline. Refer to [Common Citation Formats in Documenting Sources](#) for the correct form to use.

Sample Student Papers

WARNING: Selected student papers published in *The Journal of Undergraduate Research* are listed below. Use them only as examples; they are not perfect. Refer to rules for documentation included in this website and the style guide in your field for correct examples of in-text citations and references.

Social Sciences

- [A Secondary Analysis of Parent-Child Play Behaviors in Children with Autism](#)
- [Effects of Economic Integration on Estonia's Economy](#)

Physical Sciences

- [Effects of Dietary Restriction of Animal-Based Products on Vitamin B12 Intake and Status](#)
- [Native Florida Crustacean Predators' Preferences Regarding the Non-Indigenous Green Mussel, *Perna viridis* \(Linnaeus 1758\)](#)

Engineering

- [An Approach to Improving Informal Mathematics Education Through Aesthetic Computing and Dance-based Representation](#)

Humanities and Fine Arts

- [Testament to Torture: The Gangrene Affair](#)
 - [Representing the French King of Spain: Philip V and Questions of Gender, National, and Cultural Identity](#)
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Documenting Sources

Avoiding Plagiarism

When you write a paper, you must acknowledge any ideas or information that came from another source, whether this information is from a book, a journal article, a newspaper, a website, a lecture, etc. To fail to acknowledge, or cite, such information is plagiarism and is a serious academic offense.

Plagiarism generally occurs in one of the following ways:

1. Writers fail to cite information, ideas, or quotes.
2. Writers fail to put quotation marks around direct quotes.
3. Writers fail to put summaries or paraphrases in their own words (they treat quoted material as a paraphrase or summary).

In academic papers, most citations occur in the introduction, in the historical review, when past research on the topic is discussed. Often, these sources will also be cited in the discussion section of the paper. No matter where in your paper you use borrowed information, you must acknowledge the source.

Borrowed information can be incorporated into your paper in one of three ways:

1. Summary
2. Paraphrase
3. Direct quote

Most of your citations should be in the form of summary or paraphrase. Little or no quoting appears in most academic writing.

Summary

When you write a summary, you restate the author's main ideas in your own words. Summaries of long passages or even an entire article are commonly used in research writing. A summary of an experimental research study might be three or four sentences long and include the purpose, methods, results, and significance of the study.

Paraphrasing

A paraphrase is also written in your own words, but the paraphrase contains all the ideas in the passage, not just the main ideas. Your paraphrase of an author's passage would be approximately the same length as the original, unlike a summary which would be much shorter.

Writers must exercise extreme caution when presenting information as paraphrase. If phrases are lifted word for word, or if synonyms are simply substituted for the original wording, the writer has committed plagiarism.

Quotes

If you use direct quotes in your paper, be sure to follow these rules:

1. Enclose the quoted material in quotation marks.
2. Attach the quote to a signal phrase (some of your own words).
3. Make the signal phrase and quote flow together to make a grammatically correct sentence.
4. Include the page number of the quote in your citation information.

Common Citation Formats

- [Social Sciences](#)
- [Physical Sciences](#)
- [Humanities and Fine Arts](#)

Social Sciences

Most academic fields in the social sciences, as well as business and journalism, follow the documentation rules of the American Psychological Association (APA). This format uses an author/year of publication arrangement for in-text citations and an alphabetical listing by author for references at the end of the paper.

In-text Citations

APA uses the author/date format for in-text citations. The author and date can appear in several arrangements:

Rogers (1994) compared reaction times. . . .

In a recent study of reaction times (Rogers, 1994),

In 1994 Rogers compared reaction times. . . .

Once you have given the date for a single source in a paragraph, do not repeat the date if you cite the source again in that paragraph. If you cite the source in a later paragraph, repeat the date the first time you cite it in the later paragraph. (One date per source per paragraph).

If a source has one author, cite that author's name every time you cite the source in your paper:

Rogers (1994) or (Rogers, 1994)

If a source has two authors, cite both authors' names every time you cite that source in your paper:

Rogers and Johnston (1997) or (Rogers & Johnston, 1997)

If a source has three, four, or five authors, cite all authors' names the first time you cite the source in the paper. For all other citations of that source in your paper, use the first author's name and the et al. abbreviation.

Rogers, Johnston, and Smith (2001) or (Rogers, Johnston, & Smith, 2001) (first citation in paper)

Rogers et al. (2001) or (Rogers et al., 2001) (second and subsequent citations in paper)

If a source has six or more authors, use the *et al.* abbreviation for **all** citations, including the first.

References

When typing your reference list using the APA format, include the sources you actually cited in the paper. When determining the alphabetical order of a source, use the first author's last name. Type the list single-spaced, with a double space between each source. Indent the first line of each source.

While the APA Manual contains examples of all types of bibliographic record formats, the most commonly used types are shown below:

Periodicals (journals, magazines, scholarly newsletters)

Bekerian, D. A. (1993). In search of the typical eyewitness. *American Psychologist*, 48, 574-576.

Nonperiodicals (books):

Cone, J. D., & Foster, S. L. (1994). *Dissertations and theses from start to finish: Psychology and related fields*. Washington, DC: American Psychological Association.

Part of a nonperiodical (chapter in a book)

Kernis, M. H., Cornell, D. P., Sun, C. R., & Berry, A. (1996). There's more to self-esteem than whether it is high or low. In H. L. Roediger & F. I. Craik (Eds.), *Varieties of memory and consciousness* (pp. 309-330). Hillsdale, NJ: Erlbaum.

Note: Italics may be used in place of underlining in APA format. Be consistent in your use within your paper.

Links to on-line style guides in the social sciences

- [Link to on-line APA style guide](#)
- [Link to on-line APSA style guide](#)

Physical Sciences

In-text Citations

The physical sciences, as well as engineering and medicine, use a numerical system for in-text citations. The first source used in the paper is given the numeral 1, and subsequent citations to other sources are numbered *in ascending order*. If a source is cited a second time in the paper, the original numeral is used again. Many fields use the *superscript* numeral format, while others include the numeral *in parentheses* at the end of the citation. Check with your faculty mentor about the format used in your field.

Often, author names will also be mentioned when citations are used. While it is not necessary to use author names, you certainly may do so. Most science fields allow the use of *et al.* or *and others* for sources with co-authors.

References

The numerals you assign to citations in the text of your paper are used to organize the reference list at the end of your paper. List all sources used, beginning with the citation given the numeral 1. List the remaining sources in ascending order.

The format for the references varies from one field to another in the physical sciences. Refer to the style guide used in your field or check the format used in leading journals in your field. Links to several of the on-line guides appear below.

Links to on-line style guides in the physical sciences

- [CSE-Council of Science Editors](#)
- [IEEE-Engineering](#)
- [ACS-Chemistry](#)
- [AIP-Physics](#)
- [Physical Review-Physics](#)
- [AMA-Medicine](#)

Humanities and Fine Arts

In the humanities and fine arts, the style guide of the Modern Language Association (MLA) is used most often. This format uses the author name/page number arrangement for citations in the body of the paper, with an alphabetical listing of sources at the end of the paper.

In-text citations

In-text citations in the humanities use the author's (or authors') last name(s) and the page number that the information is found on. The author name(s) can appear in a signal phrase with the page number in parentheses at the end of the sentence, or the name(s) and page number can both be placed in parentheses.

For sources with one, two, or three authors, all names must be used in the citations. For sources with four or more authors, list all author names the first time the source is cited in your paper. Subsequent references to the same source should have the *et al.* abbreviation. Examples of citation format can be found in the Link to MLA style guide below.

Works Cited

MLA uses the term *Works Cited* rather than *References* for the list of sources at the end of the paper. Only those sources actually cited in the paper should appear in the Works Cited. Alphabetize the list according to the last name of the first author listed on each source. The specific formats for books, journals, websites, dissertations, etc. can be found in the link below.

Link to on-line style guide in the Humanities

- [MLA Style Guide](#)

Using Graphics

1. All graphics should *serve* a purpose (i. e., They should illuminate and explain the information in the text of the paper.)
2. All graphics should be *numbered*, beginning with Table 1 and Figure 1.
3. Tables generally present large quantities of numerical data. Figures include anything that is not a table: (drawings, graphs, charts, photos).
4. Give each graphic a *functional and descriptive title*. Descriptive titles typically identify **all** the variables in the graphic.
5. *Introduce each graphic in the text* of your paper and explain key points about it ("Table 1 shows . . ."). In other words, don't assume that the graphic speaks for itself. Use present tense verbs when you refer to graphics.
6. Any graphic taken out of context should *make sense on its own*. The title, footnotes, and construction of the graphic should allow the reader to make sense of the graphic without reading the text. Use labels rather than keys or legends to identify elements of the graphic. If the graphic is not an original construction, cite the source you used to construct the graphic.
7. *Position* the graphic just after the first point of reference to the graphic in your text. This is typically after the first paragraph in which you refer to the graphic.

The example below demonstrates how the writer has introduced the figure in the text of the paper in the paragraph which **precedes** the figure:

Most algae are phototropic organisms that can fabricate their own food materials through photosynthesis by using sunlight, water, and carbon dioxide. Most algae contain chlorophyll *a*, a molecule that absorbs the light to enable photosynthesis. Chlorophyll *a* absorbs light in the blue (450 nm) and red (650 nm) wavelengths, as shown by the two peaks in **Figure 4**, and emits light in the green wavelength.²

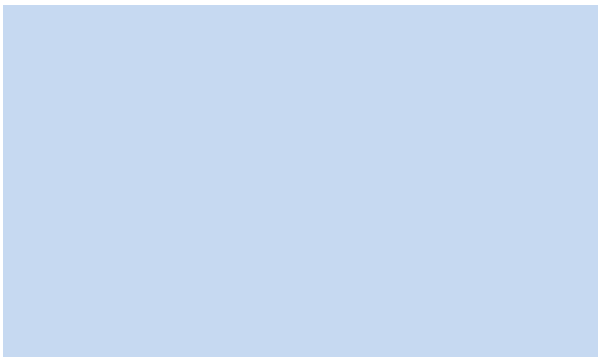


Figure 4. Absorption spectrum of chlorophyll a
Source: Steer, James. Structure and Reactions of Chlorophyll.

The example below demonstrates how the writer has introduced the table in the text of the paper in the paragraph which **precedes** the table:

The Forest Land Enhancement Program (FLEP), implemented by the Florida Division of Forestry, is the only cost-share assistance program directed at increasing the productivity of NIPFs in Florida. The goal of FLEP is to “enhance the health and productivity of the non-industrial private forest lands in the United States for timber, habitat for flora and fauna, soil, water, and air quality, wetlands, and riparian buffers.” (FDOF, 2005). These multiple objectives are evidenced by the types of activities funded by the program, which are listed in Table 3. The federally funded FLEP allocates money to the states, which are given the authority to tailor the program to address the state’s specific needs. In Florida, private landowners with possession of 10 to 10,000 acres of forested land and a forest management plan are eligible to apply for the program, which covers either 50% or 75% of the cost of specified activities (FDOF, 2005). NIPF owners must agree to partake of these activities for 10 years, may treat up to 1,000 acres of their forestland per year, and may receive no more than \$100,000 of the program’s total \$100 million in funds for the life of the Farm Bill (USDAFS, 2005; FDOF, 2005).

Writing in a Scholarly Manner

General Principles

- **Clarity**
Communicate your ideas clearly and with precision.
- **Efficiency**

- Use as few words as possible to express ideas.
- **Simplicity**
Prefer the simpler to the more complex.
- **Coherence**
Link ideas to achieve “flow”

Clarity

Write in the Active Voice / Avoid Passive Constructions

- **Active:** The lawyer wrote the brief.
- **Passive:** The report was written.
- **More passive constructions:**
The motion was lost in the first phase of the trial.
The supervisor was seen by us, and we were ignored by her.

Sometimes, passive voice is appropriate when there is no actor or if the writer wishes to avoid blaming someone: :

- The bridge was torn down in 1992.
- Errors were made in the report. (rather than Our accountant made errors).

However, **prefer the active voice when you can:**

The authors stated. . . .

rather than

It was stated by the authors. . . .

Use sentence structure to your advantage

1. Use a variety of sentence structures:

Sentence Types	Characteristics
Simple sentence	1 independent clause
Compound sentence	2 independent clauses joined by a coordinating conjunction
Complex sentence	1 independent clause + 1 dependent clause
Compound/complex sentence	2 independent clauses; at least one of the independent clauses has a dependent clause attached

2. Use sentence structure to show relationships and to give emphasis.

Place your most important ideas in **simple sentences**:

Ex: The proposed framework addresses the problem of supply chain configuration

Use **compound sentences** to show equality between two ideas:

Ex: Parkinson’s Disease (PD) affects 1 in every 100 people over the age of 60, and it is the second most common neurodegenerative disease after Alzheimer’s.

Use **complex sentences** to emphasize one idea over the other:

Ex: Aside from the writing attributed to his first-person narrators, Salinger has his characters writing notes, letters, diaries, poetry, and stories.

In the example above, the independent clause (Salinger has his characters writing notes, letters, diaries, poetry, and stories) is given more importance.

Efficiency

Avoid Unnecessary Jargon and Inflated Diction

- Example:
The most recent discrepancy compilation demonstrates the origin of the dysfunction, resulting in the immediate implementation of corrective action.
- Revision:
The new list of errors shows where the breakdown begins. The errors must be corrected immediately.

Avoid Wordiness and Redundancy

Do Not Use	USE Instead
due to the fact that	because
based on the fact that	based on
along the lines of	similar to
at all times	always
until such time as	when
popular with the people	popular
eight a.m. in the morning	8:00 a.m.
past history	history
each individual	each
in my opinion	Avoid Using
it seems that	Avoid Using

Avoid Expletives (*there is* and *there are* constructions, including variations such as *there was/were*, *there has/have/had been*)

Example:

There is another module that tells the story of Charles Darwin and introduces the theory of evolution.

Better:

Another module tells the story of Charles Darwin and introduces the theory of evolution.

Simplicity

Avoid Nominalizations and Long Noun Strings

Nominalizations (turning verbs into nouns)

Use the simple verb rather than the nominalization

Decide - make a decision

Fail - experience a failure

Recall - recollection

Example: Failure of recollection is common.

Better: People often fail to recall.

Example: The author presented a discussion of her book.

Better: The author discussed her book.

Noun Strings

Unclear:
operator-initiated default-prevention technique

Clear:
a technique for preventing defaults that are initiated by the operator

Avoid Negatives and Double Negatives

Example: The problem cannot be solved without the aid of further research.
Better: The problem can be solved with research.

Example: Innocent mis-recollection is not uncommon.
Better: Innocent mis-recollection is common.

Coherence

Use these tactics to link information and ideas

Begin with the **general** before providing the specific **details**. Provide **familiar** information before introducing **new information**.

The implementation of Sharia law, or Islamic law, into many Nigerian legal systems has prevented the development of women's human rights in the social sphere of the nation (**GENERAL IDEA**). Sharia laws in nations like Nigeria allow for the devaluation of women's testimonies by treating them as a minor or as a person without the necessary legal capacity (**DETAIL**). This practice has allowed for the imposition of puritanical sexual codes as well as the denial of basic human rights in some northern Nigerian states (**DETAIL**). Under these laws, sex outside of wedlock is a crime punishable by death (**DETAIL**).

Use **transitions** to link ideas within paragraphs and to link one paragraph to the next one. Be sure to use a **variety** of transitions and use the **appropriate** transition to show the relationship between the ideas:

By using a scalogram, Rohde and Spaeth (1999) were able to rank the Justices according to their liberal number of votes. In 1986, **for example**, the scalogram shows Marshall, Brennan, and Stevens had the most liberal votes. Blackmun **also** voted more liberally than conservatively. **On the other hand**, Rehnquist, O'Connor, White, Scalia, and Powell had the most conservative votes.

Repeat key words or ideas when you move from one sentence to the next:

Timpone cites the **work** of **Merriam and Gosnell**, a **study** conducted nearly 80 years ago, as a springboard from which his study has progressed. In their **article**, **Merriam and Gosnell** implied that the **structural factors** surrounding those making electoral decisions could affect their patterns of voting. It is Timpone's goal to further study these **structural factors** to see if they do indeed make a difference in voting participation.

The **coup** of President Sukarno was backed by the United States CIA which hoped to eliminate the communist backing in the country. **This movement** allowed General Suharto to come to power. **General Suharto** used the **purge** to **turn in communist supporters from within the parliament, eliminate labor organizations, and increase media censorships**. **Suharto** call **these changes** the New Order and made himself the last step in all political decisions.

Samples of Effective Sentence Revisions

(Revision follows original sentence)

1. Americans need to *take into consideration* (nominalization) many issues while viewing the treatment of women in Iraq.

Americans should *consider* many issues while viewing the treatment of women in Iraq.

2. There are (expletive) two ways in which equality of opinion assignment can be examined.

Equality of opinion assignment can be examined two ways.

Or better: We can examine equality of opinion assignment two ways.

3. *There have been* (expletive) many methods employed to define important cases.

Many methods have been employed to define important cases.

Or better: Scholars employ many methods to define important cases.

4. Democrats put their recovery plan through the Senate Finance Committee **which** is a \$66.4 billion plan **which** has *an expansion of programs* (nominalization) to help the unemployed, a tax rebate for low income people, and tax breaks for some people. (overuse of subordinating clauses)

Democrats put their recovery plan through the Senate Finance Committee. The \$66.4 billion plan expands programs to help the unemployed and provides a tax rebate for low income people and tax breaks for some people.

5. Our intention is to implement the verification of the reliability of the system in the near future. (wordiness)

We will test the system's reliability soon.

6. Both methods may be utilized by recording several experimental data points and then calibrate the theoretical curve to fit them. (faulty parallel structure)

Both methods may be utilized by recording several experimental data points and then calibrating the theoretical curve to fit them.

7. We have developed a criterion to determine whether traps are distributed throughout the depletion region or are being concentrated near the surface. (faulty parallel structure)

We have developed a criterion to determine whether traps are distributed throughout the depletion region or are concentrated near the surface.

8. Palygorskite is known to form by hydrothermal alteration of mafic rocks in soil zones under arid conditions, in deep-sea sediments, and hypersaline playa lakes. (faulty parallel structure)

Palygorskite is known to form by hydrothermal alteration of mafic rocks in soil zones under arid conditions, in deep-sea sediments, and in hypersaline playa lakes.

9. The goal of future experiments is therefore to measure the properties of the top quark, compare them with the standard model, and to learn whether the top quark is indeed special. (faulty parallel structure)

The goal of future experiments is therefore to measure the properties of the top quark, compare them with the standard model, and learn whether the top quark is indeed special.

10. Not only will this research benefit cancer research in general, but the specific area of sarcoma. (faulty parallel structure)

This research will benefit not only cancer research in general but also the specific area of sarcoma.