

# Scientific Papers

- e.g., George Mason University:  
<http://classweb.gmu.edu/biologyresources/writingguide/Students.htm>
- General Information
  - A well-written scientific paper explains the scientist's motivation for doing an experiment, the experimental design and execution, and the meaning of the results.
  - Scientific papers are written in a style that is exceedingly clear and concise. Their purpose is to inform an audience of other scientists about an important issue and to document the particular approach they used to investigate that issue.
  - Please do not think that good English is not critical in science writing. In fact, scientists try to be so concise that their English should be better than that of workers in other disciplines! If English is not your first language, then proofreading by a native-speaker might be helpful.

# Scientific Papers

- Tense
  - Present tense to describe established facts
  - Past tense when describing experimental results
- Person
  - Third person
- Format
  - Consistency
    - Section identification
    - Figure identification
    - Table identification
    - References (numbers or alphabetically wrt last names)
    - Footnotes

# Scientific Papers

- **General organization**
- The following sections should be included in your report
  - (1) Abstract
  - (2) Introduction
  - (3) Methods
  - (4) Results
  - (5) Discussion
  - (6) Literature Cited
- Other sections can be included as necessary. It is important to understand the differences between sections and to put information in the appropriate location.
  - Students frequently begin discussing their results in the Results section or present some of their results in the Discussion section.

# Scientific Papers

- **Abstract:** An abstract is a shortened version of the paper and should contain all information necessary for the reader to determine:
  - (1) what the objectives of the study were;
  - (2) how the study was done;
  - (3) what results were obtained;
  - (4) and the significance of the results.
- Frequently, readers of a scientific journal will only read the abstract, choosing to read at length those papers that are most interesting to them. For this reason, and because abstracts are frequently made available to scientists by various computer abstracting services, this section should be written carefully and succinctly to have the greatest impact in as few words as possible.

# Scientific Papers

- **Introduction:** Why is this study of scientific interest and what is your objective?
  - This section discusses the results and conclusions of previously published studies, to help explain why the current study is of scientific interest.
  - The Introduction is organized to move from general information to specific information. This background must be summarized succinctly, but it should not be itemized. Take care not to go too far afield in providing background information; limit the introduction to studies that relate directly to the present study. Emphasize your specific contribution to the topic.
  - The last sentences of the introduction should be a statement of objectives and a statement of hypotheses. This will be a good transition to the next section, Methods, in which you will explain how you proceeded to meet your objectives and test your hypotheses.

# Scientific Papers

- **Methods**: This section provides all the methodological details necessary for another scientist to duplicate your work.
  - It should be a narrative of the steps you took in your experiment or study, not a list of instructions such as you might find in a cookbook.
  - You should assume that the other scientist has the same basic skills that you have, but does not know the specific details of your experiment.
  - This assignment is based on literature searches
    - specify the process used to obtain the reference material  
e.g. search criteria

# Scientific Papers

- **Results:** This section presents the results of the experiment but does not attempt to interpret their meaning.
  - As with the Methods section, the trick to writing a good Results section is knowing what information to include or exclude.
  - You will not present the raw data that you collected, but rather you will summarize the data with text, tables and/or figures.
  - Use the text of the paper to state the results of your study, then refer the reader to a table or figure where they can see the data for themselves

# Scientific Papers

- **Discussion:** In this section, you are free to explain what the results mean or why they differ from what other workers have found.
  - You should interpret your results in light of other published results, by adding additional information from sources you cited in the Introduction section as well as by introducing new sources. Make sure you provide accurate citations.
  - Relate your discussion back to the objectives and questions you raised in the Introduction section. However, do not simply re-state the objectives. Make statements that synthesize all the evidence (including previous work and the current work).
  - Do not make statements that are too broad!

# Scientific Papers

- **Literature Cited:** This is the last section of the paper. Here you should provide an alphabetical listing of all the published work you cited in the text of the paper.
  - A standard format is used both to cite literature in the text and to list these studies in the Literature Cited section:
  - Journal Articles
    - A.B. Smith and C.D. Jones, “The Care and Feeding of Materials Scientists,” Trans. Am. Humane Soc. **197**[6] 190-1 (1987).
  - Books
    - J. Kuhl, “How to Succeed in Materials Science without Trying,” pp. 693-702, John Wiley and Sons, New York, NY, 1975.
  - Numbered references can also be used
  - **CONSISTENCY!!!**