Instructions to Authors

Follow these instructions or your paper will be rejected IMMEDIATELY upon receipt and will incur late penalties.

One of the learning objectives of your research project in the course is to develop your scientific writing skills. In science, writing is the most important means of communicating research findings. Major scientific findings are never kept secret. Instead, scientists share their ideas and results with other scientists, encouraging critical review and alternate interpretations from colleagues and the entire scientific community. In most cases, scientists report the results of their research activities in scientific journals in a standard written format. In this course, you will practice writing using standard scientific format and style.

A scientific paper usually includes the following parts: a TITLE (statement of the question or problem), an ABSTRACT (short summary of the paper), an INTRODUCTION (background and significance of the problem), a METHODS section (report of exactly what you did), a RESULTS section (presentation of data), a DISCUSSION section (interpretation and discussion of your results), and REFERENCES (books and periodicals used).

Throughout the laboratory, you will practice scientific research and writing. Your papers will be reviewed by the course professor, TAs, and your peers in order to point out your areas of weakness and make suggestions for future improvements. By the time you have completed the course, you will have submitted the equivalent of two full scientific papers. If you are not certain about the level of independence and what constitutes plagiarism in this program, ask your instructor to clarify the class policy. Plagiarism will not be taken lightly.

Submission Format Rules

1. Page one is the Title Page (<100 characters)
2. Page two will have ONLY the Abstract (≤250 words)
3. Page three will start with the Introduction. The Methods, Results, and Discussion sections can follow without starting a new page for each one (although you may start a new page if you are near the bottom of the current page). Clearly label each section with a centered section heading (ex. Introduction, Results, Methods etc.) and who authored it (Written by Jill Sanders, revised by Bob Roberts).
4. Methods section will list materials used (Bought White eyed Potatoes from Meijer 324 E. Grand River East Lansing MI) how stock solutions were prepared and explain exactly what you did in your research. Refer the reader to the procedures in the laboratory investigation guide and identify how any parts were changed in the procedure.
5. The Discussion section will be followed by starting a new page for the References section.
6. Starting a new page with the **Figures** section will follow references. **Figures** will be sequentially numbered in the order that they were cited in the **Results** section (figures are most always cited ONLY in the Results section, not in Methods, not in Discussion). One figure per page with extensive figure legend ONLY at the bottom of the figure. The first sentence of a figure legend is its title. Follow the title with sentences explaining the figure as if someone did not have the **Results** section available as a reference.

7. **The Tables section will follow the figures** section. Tables get a title ONLY on the top with some explanation which is called a caption. Tables will be sequentially numbered in the order that they were cited in the **Results** section (Tables are most always cited ONLY in the Results). One table per page.

8. Figures and tables MUST be created on a computer unless otherwise instructed.

9. After the **Tables** section, a single white page will follow entitled, **Appendix**. Then append any laboratory notebook pages that indicated signed data for all members (photocopies from your notebook) and a photocopy of the first page of any articles cited and referenced in report.

10. Double space or 1.5 space typeface is required. Preferred font size is 12 point.

*Once returned, rejected papers (like late papers) lose 1, 4, 9, 16, etc points per day until resubmitted.*

*A more detailed description of each section of a scientific paper follows. As you write your paper, clearly label each section (except the title page), placing the title of the section on a separate line, centered, bold, but not underlined (like shown below).*

**Title Page and Title**

The title page is the first page of the paper and includes the title of the paper, your name, the course title, your lab section, your lab instructors’ names, and the due date for the paper. The title itself should be as short as possible and as long as necessary to communicate to the reader the question being answered in the paper. For example, if you are asking a question about the inheritance patterns of the gene for aldehyde oxidase production in *Drosophila melanogaster*, a possible title might be “Inheritance of the Gene for Aldehyde Oxidase in *Drosophila melanogaster*.” Something like “Inheritance in Fruit Flies” is too general, and “A Study of the Inheritance of the Enzyme Aldehyde Oxidase in the Fruit Fly *Drosophila melanogaster*” is too wordy. The words “A Study of the” are superfluous, and “Enzyme” and “Fruit Fly” are redundant. The suffix –ase indicates that aldehyde oxidase is an enzyme, and most scientists know that *Drosophila melanogaster* is the scientific name of a common fruit fly species. However, it is appropriate to include in the title both common and scientific names of lesser-known species. A scientific name is nice but should also be used with common names. Try to avoid a title that nobody understands.
Place the title about 7 cm from the top of the title page. Place “by” and your name(s) in the center of the page, and place the course name, lab section, instructors’ names, and due date, each on a separate centered line, at the bottom of the page. Leave about 5 cm below this information.

**Abstract**

The abstract is placed at the beginning of the second page of the paper, after the title page. The abstract summarizes the question being investigated in the paper, the methods used in the experiment, the results, and the conclusions drawn. It is a mini paper and includes data. The reader should be able to determine the major topics and findings without reading the entire paper. Compose the abstract after the paper is completed.

**Introduction**

Start the introduction on page three. The introduction has two functions: (1) to provide the context for your investigations and (2) to state the question asked and the hypothesis tested in the study. Begin the introduction by reviewing background information that will enable the reader to understand the objective of the study and the significance of the problem, relating the problem to the larger issues in the field. Include only information that directly prepares the reader to understand the question investigated. Most ideas in the introduction will come from outside sources, such as scientific journals or books dealing with the topic you are investigating. All sources of information must be referenced and included in the References section of the paper, but the introduction must be in your own words. No quotations are permitted in any part of the paper. Refer to the references when appropriate. Unless otherwise instructed, place the author of the reference cited and the year of publication in parentheses at the end of the sentence or paragraph relating the idea, for example, “(Finnerty, 1992).”

As you describe your investigation, include only the question and hypothesis that you finally investigated. Briefly describe the experiment performed and the outcome predicted for the experiment. Although these items are usually presented after the background information near the end of the introduction, you should have each clearly in mind before you begin writing the introduction. It is a good idea to write down each item (question, hypothesis, prediction) before you begin to write your introduction.

Write the introduction in past tense when referring to your experimental investigation; but when relating the background information, use present tense when referring to another investigator’s published work.

**Methods**

The Methods section describes your experiment in such a way that it may be repeated exactly. The majority of the information in this section comes from the Procedures section of the Laboratory Manual and in your paper, this information should not be a list of steps. Write the Methods section in a paragraph format in past tense. Start with a Materials paragraph to list what specimens you studied, where they were obtained and how the stock solutions were prepared. During the proceeding paragraphs explain exactly how you did your experiments. Be sure to include levels of treatment, numbers of replications, and control of treatments. If you are working with living organisms, include
the species and the sex of the research organism. Do not include failed attempts unless other investigators may try the technique used. Do not try to justify your procedures in this section of the report. Write this in the style that cookbooks use, include temp., time, speed etc. Pretend an LBS-144 student is your audience and they want to replicate your experiments exactly.

If you describe an experiment from the lab manual, unless instructed otherwise, you may simply refer to the procedures listed in the lab manual and page numbers (be sure to cite the lab manual as a reference each time). Under those circumstances, your Methods section should point out changes in procedure that are not indicated in the Lab Manual. If you are asked to write a full Methods section (with no reference to the Lab Manual), write these procedures concisely, but in paragraph form. The difficulty comes as you decide the level of detail to include in your paragraphs. You must determine which details are essential for the investigator to repeat the experiment. For example, if in your experiment you incubated potato pieces in different concentrations of sucrose solution, it would not be necessary to explain that the pieces were incubated in plastic cups labeled with a wax marking pencil. In this case, the molarity of the sucrose solutions, the size of the potato pieces and how they were obtained, and the amount of incubation solution are important items to include. If you have performed a statistical analysis of your data, like student T-test, include an explanation of what tests you performed and with what software etc in a Statistics paragraph at the end of the Methods section.

Results

The Results section consists of at least three components: (1) one or more paragraphs that describe the results, (2) reference to figures (graphs, diagrams, pictures), and (3) reference to tables.

Remember to number figures and tables consecutively in the order that they are mentioned in this section. Refer to figures and tables within the paragraph as you describe your results, using the word Figure or Table in parentheses, followed by its number, for example, “(Figure 1).” DO NOT place each figure or table at the end of each paragraph in which it is cited. Place figures and tables after the References section. Avoid citing a figure with a full sentence or statement such as, “please see figure 1 for graphed data points” or even just “please see table 2.” If you have performed a statistical analysis of your data, such as chi-squared, include this data in the Results section. Explain what calculations you did and the result and direct the reader to the Methods section for more details. Then show an example of the results and refer the reader to a table with all the data.

Report your data as accurately as possible in the order that they happened. Do not report what you expected to happen in the experiment. Do not discuss the meaning of your results in this section. Do use a topic sentence at the beginning of each paragraph that introduces the reader to the topic and use transitions between paragraphs.

Discussion

The Discussion section is where you will analyze and interpret the results of your experiment. You should state your conclusions in this section. Do not use the word
prove in your conclusions. Your results will support, verify, or confirm your hypothesis, or they will negate, refute, or contradict your hypothesis; but the word prove is not appropriate in scientific writing.

Complete your Introduction and Results sections before you begin writing the Discussion section. The figures and tables referred to in your Results section will be particularly important as you begin to think about your discussion (although you won’t cite them again here). The tables allow you to present your results clearly to the reader, and graphs allow you to visualize the effects that the independent variable has had on the dependent variables in your experiment. Studying these data will be one of the first steps in interpreting your results. As you study the information in the Introduction section and your data in the Results section, write down relationships and integrate these relationships into a rough draft of your Discussion.

The following steps may be helpful as you begin to organize the Discussion.

Restate your question, hypothesis and prediction.

Answer the question.

Write down the specific data, including the results of statistical tests.

State whether the results did or did not confirm your prediction and support or negate your hypothesis.

Write down what you know about the biology involved in your experiment. How do your results fit in with what you know? What is the significance of the results?

List weaknesses you have identified in your experimental design. You will need to tell the reader how these imperfections may have affected your results.

List any problems that arose during the experiment itself. Unforeseen difficulties with the procedure may affect the data and should be described in the discussion.

Having completed this list, integrate all of this information into several simple, clear, and concise paragraphs.

### Tables

**Table 1.** DNA glycosylases in human cell nuclei

<table>
<thead>
<tr>
<th>Enzyme</th>
<th>Size (amino acid residues)</th>
<th>Gene location at chromosome</th>
<th>Altered base removed from DNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNG</td>
<td>313</td>
<td>12q23–q24</td>
<td>U and 5-hydroxouracil</td>
</tr>
<tr>
<td>TDG</td>
<td>400</td>
<td>12q24.1</td>
<td>U or T opposite G, ethenoctosine</td>
</tr>
<tr>
<td>hSMUG1</td>
<td>270</td>
<td>12q13.1–q14</td>
<td>U [preferentially from single-strand DNA]</td>
</tr>
<tr>
<td>MBD4</td>
<td>580</td>
<td>3q21</td>
<td>U or T opposite G at CpG sequences</td>
</tr>
<tr>
<td>hOGG1</td>
<td>345</td>
<td>3p25</td>
<td>8-oxo G opposite C, formamidopyrimidine</td>
</tr>
<tr>
<td>MYH</td>
<td>521</td>
<td>1p32.1–p34.3</td>
<td>A opposite 8-oxo G</td>
</tr>
<tr>
<td>hNTH1</td>
<td>312</td>
<td>16p13.2–p13.3</td>
<td>Thymine glycol, cytosine glycol, dihydrooracil, formamidopyrimidine</td>
</tr>
<tr>
<td>MPG</td>
<td>293</td>
<td>16p (near telomere)</td>
<td>3-MeA, ethenoadenine, hypoxanthine</td>
</tr>
</tbody>
</table>
Figures
Sample Legends Photography etc

Fig. 2. Confocal images of cell lines expressing CIC-3-GFP and CIC-5-GFP fusion proteins. Three representative confocal optical sections (top, middle, and bottom) taken along the z-axis of cells expressing short hCIC-3-GFP, short hCIC-3(N579K)-GFP, and hCIC-5-GFP. Green fluorescence corresponds to the GFP fusion proteins and red the propidium iodide staining of DNA. The majority of each of the GFP fusion proteins is localized to a large organelle close to the nucleus, presumably the Golgi, to small vesicles throughout the cytoplasm, and to the plasma membrane.

Fig. 3. Dose-response effect of glucose treatment on normalized acification responses of rat (HIT-T15) β islet cells. (A) Dose-response trace recording from four islets of HIT-T15 cells exposed to increasing concentrations of glucose (n = 16). HIT-T15 cells showed greatly increased extracellular acification rates in response to glucose per fusion treatment. The acification rate was normalized to 100% basal BCAK prior to exposure to elevated glucose. (B) Dose-response profile of HIT-T15 cells glucose-stimulated normalized ECAR in % (EG50 = 1.1 mM; n = 14). (C) Dose-response of HIT-T15 cells glucose-stimulated insulin secretion in μU/min×mg (EG50 = 1.1 mM; n = 3).

The subunit structure of ATP synthase. The portion of the F1 structure shown in solid view is extracted from the Protein Data Bank (PDB) coordinates of Abraham et al. [5]. One monomer of the F1 and F0 structures superimposed. Envelope structures in cartoon from the different subunits are labeled. During the translocation activity the upper (red) portion of the β subunit will bend 30° towards the lower (green) portion (see Figure 2).
References

A References section lists only those references cited in the paper and doesn’t list any not cited. You will cite all the references you read as you prepared to write your paper. In the text of the paper, cite the references using the author’s name and publication year. If there are two authors you must state both of their names, and if there are greater than two authors, state the first author’s name followed by et al.

For example:
The behavior of the male Siamese fighting fish has been widely studied (Simpson, 1968).
PCF is located in the mitochondrial cytosol (Johnson and Collins, 1988)
PCF is located in the mitochondrial cytosol (Johnson et al., 1988).

This means that if you use a website as a source you still must list the authors (people) and year that information was published. If you do not know the authors, that then citation becomes an “anonymous” one. If you can’t determine the year it was “published” on the website, the year is thus “unknown.” Hence it is not uncommon for your web citation to be mentioned in the text as “(anonymous, unknown)” and if you have more than one of them “(anonymous-2, unknown)” “(anonymous-3, unknown)” and so on.

When you clarify more details about the website in your References page while a proper published journal paper may look like this:


The full citation for a website may look like this:

Accessed 10/19/03.

When citing a web address be sure to include the full URL in the ref. section as well as the date it was accessed. Within the text, just cite the reference with author and date.

Appendix

An Appendix section includes only materials that are useful but actually not required in the paper and could be thrown away with no effect to the paper. Often special extra information is included here. In LBS-145 you were expected to place any laboratory notebook pages that indicated signed data for all members (photocopies from your notebook) and a photocopy of the first page of any articles cited and referenced in report.