

## Instructions and Grading Rubric for Lab Reports

# Guidelines for Writing Data Reports

Your data report must be produced using Microsoft Word. You must turn in a "hard copy" (printed pages on paper) of the digitally produced paper, in addition to the version you email to morrison@lycoming.edu. All Figures and Tables that appear in your hard copy must be incorporated into the digital file as well—no separate files will be accepted. You should use the following format:

### I. Prepare a first page that begins with a title of the report, the name(s) of the author(s), date, and an abstract

**Title:** First impressions are strong impressions: the title should clearly and concisely communicate the content of the lab report. Because the title is a label, it does not have to be a complete sentence with the usual subject, verb, and object arrangement—but be careful with syntax. Most grammatical errors in titles are due to faulty word order. Avoid abbreviations, jargon, vague terms and personal pronouns in titles and in the body of the paper. The title should identify the chief techniques used, the species used (if applicable), and the molecules under study.

**Author(s):** List the names of all of the authors on the coversheet, with your name first—e.g. Mary E. Morrison, Jeffrey D. Newman, and Edward Gabriel

**Date:** List the date the report is due (not the date when you are working on it!).

**Abstract:** An abstract is a descriptive summary of the report. Figuratively speaking, an abstract can be thought of as a table of contents in paragraph form or a miniversion of the paper. The abstract should be a single paragraph, not to exceed 250 words, that provides a brief summary of each section of a journal-style article: Methods, Results, Discussion and Conclusion, and written in the past tense (because it summarizes work already done). The abstract should provide enough information so that the reader can tell the main results and conclusions from each study.

All of these parts together should fit onto one side of one page. If this information does not fill the first page, you may begin the rest of the report on the same page to save some trees.

Please insert page numbers at the bottom middle of each page using Insert/Page Number.

### II. The data report

There should be five sections to the report: (1) Methods, (2) Results, (3) Abbreviated Discussion and Conclusions, (4) References, and (5) Answers to the Summary Questions from the lab packet.

**In-text citations:** You should use in-text citations where appropriate to acknowledge information sources. Note that parenthetical in-text citations should be placed before the period ending the

sentence. Note that “et al.” is an abbreviation for “et alia,” meaning “and others,” and there is no period after the “et” because it is already a complete word.

From the Journal of Immunological Methods instructions to authors (<http://www.elsevier.com/journals/journal-of-immunological-methods/0022-1759/guide-for-authors#68000>):

*Text:* All citations in the text should refer to:

1. *Single author:* the author's name (without initials, unless there is ambiguity) and the year of publication;
2. *Two authors:* both authors' names and the year of publication;
3. *Three or more authors:* first author's name followed by 'et al.' and the year of publication.

Citations may be made directly (or parenthetically). Groups of references should be listed first alphabetically, then chronologically.

Examples: 'as demonstrated (Allan, 2000a, 2000b, 1999; Allan and Jones, 1999). Kramer et al. (2010) have recently shown ....'

**Methods:** Present the details of the methods employed, in the order in which they were done, in complete English sentences and paragraphs. The detail should be sufficient to allow another person to be able to follow your description and reproduce your results. Methods sections should be written in coherent English sentences, not lab manual-ese. Appropriate details include concentration and quantity of solutions used; time and temperatures of incubations; time and speed of centrifugations; voltage and time of electrophoresis; and Genus, species and strains of microorganisms.

This section is written in the past tense because you are describing methods you performed in the past.

Be careful not to report results of the methods in this section! Use sub-headings when it makes sense to do so.

Methods sections for this class usually only need to be a few sentences or a brief paragraph in length. You may refer to procedures detailed in the lab manual as follows: “Materials and procedures from pages 48 and 49 of the lab manual were used, with the following changes...(Morrison, 2018).” You do not need to reiterate every detail of the procedures if you did them exactly as they were described in the lab manual. But you should make certain to mention all deviations from the printed procedure.

**Results:** In this section you should present the results that were generated by the methods employed, but do not reiterate the methods in this section. The results should be reported in chronological order as were the methods. Report the result that was produced by each of the methods performed. Do not use redundancy, jargon, vague terms, or personal pronouns in reporting the results. For example do not say that “the results we got were good”, or “pretty much as expected.” Just objectively and precisely report the results that were obtained.

Results are to be presented in the past tense and should be “short and sweet”, without much verbage. Do not speculate about why the results came out the way they did or what went wrong with the experiment—that material belongs in the Discussion. You may use subheadings when it makes sense to do so.

**Figures** should be clearly labeled with their own numbers, titles, and brief explanatory captioning immediately beneath each Figure. Figure legends should appear on the same page as the images they describe.

**Tables** should have a number and title at the top, and any necessary explanatory captioning at the bottom, keyed into superscripts within the table itself.

The Results section should contain both the data that were generated and a textual description of the data. Merely pasting in data figures is not enough: describe what you see in each picture;

point out which parts of a table represent the controls and which are the variables, etc. You may choose to insert arrowheads in any pictures to draw the reader's attention to features that you plan to describe in the Results and discuss in the Discussion. Insert Figure callouts in parentheses into the text as needed, placing them *before* the period that ends the sentence like this (Figure 3A).

All Figures and Tables must be part of the digital .doc file. This may mean that you need to scan your hand-drawn diagrams into a digital format for pasting into the Word document, or you may need to crop and adjust the resolution of digital photos to make them suitable for insertion into your Word document. This process can take time, so do not leave it for the last minute! I am happy to help you learn how to do this in individual appointments or during regularly scheduled office hours.

**Abbreviated Discussion and Conclusions:** In this section briefly describe the meaning of the results, do not simply restate the results. Present principles, relationships, and generalizations shown by the results. Relate the results back to previous work in the lab manual or in primary literature articles, using in-text citations where appropriate. Extra credit is given for the use of relevant primary literature articles to put the data into broader context.

Your own results should be described in the past tense.

Clearly state the conclusion(s) that can be made from the results, and summarize the evidence for each conclusion, including Figure or Table callouts. Example: "Omitting the primary antibody resulted in no colored product formed (Figure 1B)."

Explain unanticipated results or lack of correlation. Do not try to cover up or fudge data that do not quite fit. Some experiments are designed to show up inconsistencies in grand concepts, so if you gloss over these inconsistencies, you will be missing the point.

The final part of each Discussion section should include a few sentences suggesting future experiments or specific variations of the current experiment that could follow up on the current results—a road map for the next reader to follow.

**References:** For this class, you will use the reference format for the Journal of Immunological Methods. Lycoming College has a subscription to this journal, so you can easily look up information about the methods you will be learning in lab.

Your reference list should include all sources cited in the entire lab report, arranged in alphabetical order by the first author's last name. Please left-justify your list—no hanging indents are necessary. See examples below.

From the Journal of Immunological Methods instructions to authors:

(<http://www.elsevier.com/journals/journal-of-immunological-methods/0022-1759/guide-for-authors#68000>):

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- **References**

***Citation in text***

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

***Web references***

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

### **References in a special issue**

Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

### **Reference management software**

This journal has standard templates available in key reference management packages EndNote (<http://www.endnote.com/support/enstyles.asp>) and Reference Manager (<http://refman.com/support/rmstyles.asp>). Using plug-ins to wordprocessing packages, authors only need to select the appropriate journal template when preparing their article and the list of references and citations to these will be formatted according to the journal style which is described below.

### **Reference style**

*Text:* All citations in the text should refer to:

1. *Single author:* the author's name (without initials, unless there is ambiguity) and the year of publication;
2. *Two authors:* both authors' names and the year of publication;
3. *Three or more authors:* first author's name followed by 'et al.' and the year of publication.

Citations may be made directly (or parenthetically). Groups of references should be listed first alphabetically, then chronologically.

Examples: 'as demonstrated (Allan, 2000a, 2000b, 1999; Allan and Jones, 1999). Kramer et al. (2010) have recently shown ....'

*List:* References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

*Examples:*

Reference to a journal publication:

Van der Geer, J., Hanraads, J.A.J., Lupton, R.A., 2010. The art of writing a scientific article. J. Sci. Commun. 163, 51–59.

Reference to a book:

Strunk Jr., W., White, E.B., 2000. The Elements of Style, fourth ed. Longman, New York.

BUT for our class—please add the page numbers you are citing, e.g., pp. 62-63.

Reference to a chapter in an edited book:

Mettam, G.R., Adams, L.B., 2009. How to prepare an electronic version of your article, in: Jones, B.S., Smith, R.Z. (Eds.), Introduction to the Electronic Age. E-Publishing Inc., New York, pp. 281–304.

Please include specific page numbers for all book citations.

Reference entry for your lab manual:

Morrison, M.E., 2020. Bio 347 Immunology Lab Manual. pp. 1-9.

Sample reference entry for the Gale Encyclopedia of Medicine (substitute the authors, title, and page numbers for your specific article):

Laberge, M., Cataldo, L.J., 2011. Rheumatoid arthritis, in: Fundukian, L.J. (Ed.), Gale Encyclopedia of Medicine. Gale, Detroit, pp. 3787-3792. (accessed 04.02.16).

If you have other materials that you wish to cite but you're unsure of the correct format, come talk with Dr. M. for help with reference formatting BEFORE the date the lab report is due.

### **Additional notes on References:**

The additional examples below should address several questions about in-text citation style and reference list punctuation that were not completely clear in the journal's online instructions.

When the journal title is not abbreviated, no period is used between it and the volume number. See the first reference listed below for an example (Offerman et al., 2014). There is no period after the word “Acta” in the Mahler reference because “Acta” is a complete word, not an abbreviation.

The text above also demonstrates how to incorporate in-text citations with correct placement of parentheses and periods. The “al.” is an abbreviation for alia, followed by a comma, followed by the year of publication for a journal article. Also please notice that the in-text citation’s final parenthesis comes *before* the period that ends the sentence that refers to the information from that source.

Please note that the paragraphs above also avoid using the words “I” or “you,” in keeping with the lab report and final paper guidelines for Bio 347, and with common scientific practice.

The reference list below also includes a correctly-formatted web site citation.

## References

### Primary Literature Articles

Mahler, M., Radice, A., Yang, W., Bentow, C., Seaman, A., Bianchi, L., Sinico, R.A., 2012. Development and performance evaluation of novel chemiluminescence assays for detection of anti-PR3 and anti-MPO antibodies. Clin. Chim. Acta 413, 719.

Offermann, N., Conrad, K., Fritzler, M.J., Fooke Akterrath, M., 2014. Development and validation of a lateral flow assay (LFA) for the determination of IgG-antibodies to Pr3 (cANCA) and MPO (pANCA). J. Imm. Meth. 403, 1-6.

### Other

Journal of Immunological Methods reference citation formats:

<http://www.elsevier.com/journals/journal-of-immunological-methods/0022-1759/guide-for-authors#68000> Accessed 2/21/14.

**Answers to Summary Questions for each lab report:** Make sure you check through the entire lab packet and include answers to all summary questions that are asked for full credit.

### III. A note on scientific writing, quotations, and plagiarism:

Scientific writing seldom uses direct quotations. Research reports and journal articles usually summarize the results of a previously published work in the current writer’s own words, and use in-text citations to attribute the information to the original author(s). If you have any question about the proper way to cite previously published information, come talk with me about it BEFORE the due date for that report.

Plagiarism—whether intentional or accidental—is punishable by failure of the assignment, failure in this course, and/or expulsion from Lycoming College. Plagiarism is defined as representing another person’s ideas, data, or words as your own, without giving proper scholarly credit to the original author. Lycoming College subscribes to turnitin.com to help detect instances of plagiarism. Any and all papers you turn in may be checked for plagiarism using turnitin.com.

### IV. Some final generalizations to keep in mind when writing the paper:

(1) Write complete sentences observing the rules of grammar.

- (2) Avoid the use of personal pronouns (i.e., I, we, our, us, they, etc.).
- (3) Use the correct tense for each section, given above.
- (4) Avoid vague or judgmental terms (good, bad, as expected, straightforward, etc.).
- (5) Be organized - remember, present the methods in the order they were performed and present the results of the methods in the order obtained.
- (6) Be specific in descriptions of methods (i.e., time, temperatures, concentrations, volumes, etc.), but remember to write in full English sentences.
- (7) Take advantage of all the sources available to you for maximum credit. You may want to read what your textbook has to say about the phenomenon and methods you are writing about, for help with wording—but do not plagiarize—and be sure to cite this source if you use it.
- (8) The best data reports include some research into the scientific literature, with accompanying in-text citations and reference entries.
- (9) **Be proud of the report that you are submitting. This is your work, be the best that you can be. Reread all instructions before and after you draft each lab report and make adjustments as necessary for maximal credit.**
- (10) Many students arrange to have their groupmates help to proofread their lab reports before handing them in for grading. The Writing Center can also help with this: be sure to allow at least an hour for the writing tutor to work through the report with you, and bring a copy of these lab report instructions to guide your session.

**When you think your lab report is done, put it side-by-side with this set of instructions and make sure that your formatting, word choices, tenses, and content are in keeping with these guidelines.**