MAE 171A

Laboratory Report Writing

Selected Lecture Notes

Writing as one of a team

- If different people are writing different sections
  - One person should edit the final draft (a good report may come after many drafts) (**examples of great writers**)
- Team writing needs careful planning
- Groups should agree on the outline of the report before drafting starts
- **All the authors should read and approve the final version, each of them is responsible for the entire document (bad examples)**

The writing process

- Pre-writing
  - Generate ideas and organizing them via outlining, free writing and/or concept maps (personal approach is OK, handwriting is desirable, may be not well organized)
- Writing
  - Prepare draft to be compiled with the rest of the report for team members to review
- Revising
  - Each team member should have recommendations for changes in content, organization, language and format
- Editing
  - Reviewing the document for mechanical errors, unclear sentences, language that is not concise or is ungrammatical

The writing process - outline

First thing to do - outline your report

- Write each heading
- Write all the points you can think of under each heading
- Find all your notes, figures, tables
  - It is very important to write every detail of the experiment which **others may need to repeat your experiment (negative example of paper on cold fusion)**
- Sort these out and put then with relevant section

Structure of your laboratory report

- All pages must be numbered
- All figures and tables must have legends that describe them
  - ***You should be able to look at a figure and table and understand what is being shown without having to refer to the text***.
- All references must be fully cited in reference sections
- As a rule no verbatim quotes allowed
  - Such as: Arnez stated in 1998 that “Fracture mechanics is a method for predicting failure of a structure containing a crack. It uses methods of analytical solid mechanics to calculate the driving force on a crack and those of experimental solid mechanics to characterize the material's resistance to fracture.”

Title page example

Rain Barrel Design for Stormwater Treatment at UCSD

(no words can be removed!)

Presented to the
University of California, San Diego
Department of Mechanical and Aerospace Engineering
MAE 126B
Date

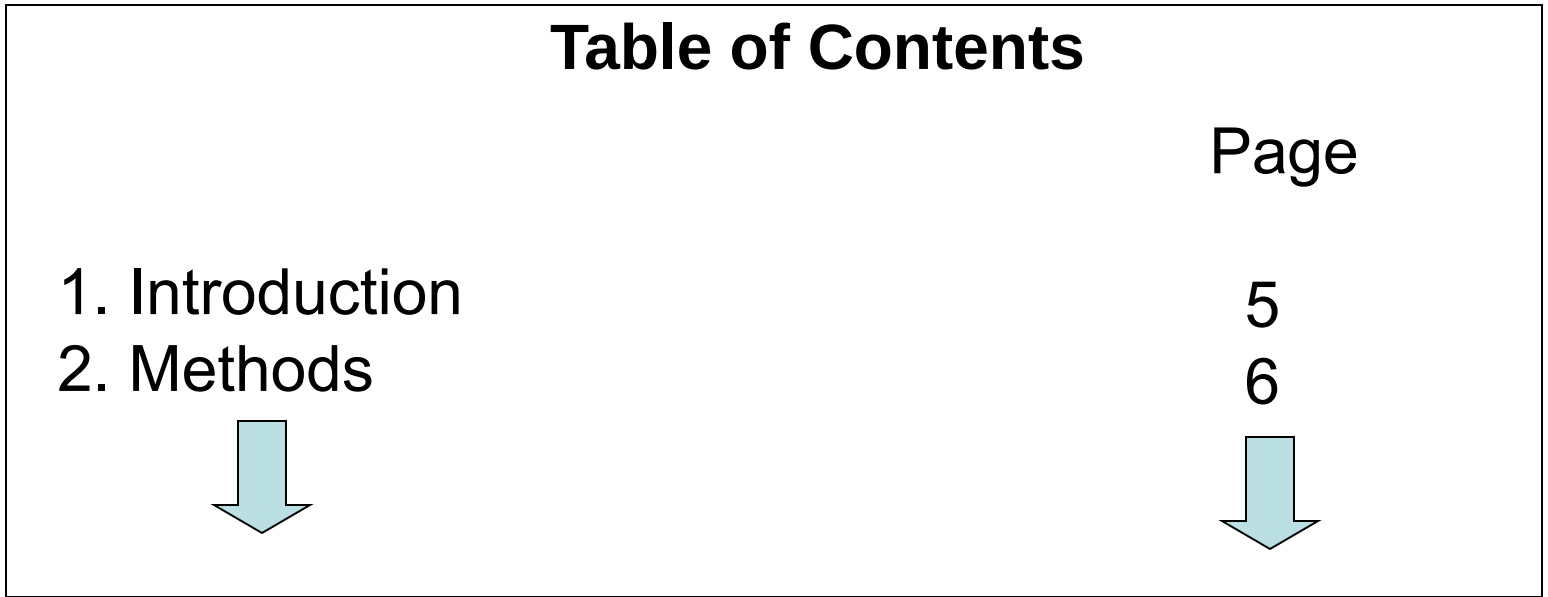
Prepared by:
Group EX
Names of group members

Abstract

- Is an abbreviated, accurate representation of the content of the report
  - Usually one paragraph
    - Why the experiment was done
    - How the experiment was performed
    - What pertinent results were obtained
    - Conclusion obtained from data analysis
      - Informative, quantitative, short, concisely written
- Do not refer in the abstract to information that is not in the report
- Use the third person
- Write this first section LAST!

Table of contents

- Each heading must be listed
- Each heading must have a page number



Introduction

- Statement of the problem
  - Why did you do this work?
  - What is it's purpose?
  - Why is it important?
- Tell the readers briefly what you examined
- Indicate your experimental / design approach
- Cite published work- demonstration of depth of your expertise
  - Who has studied this in the past and what results did they obtain?

Results

- You are answering the question
  - What did you find and see?
- Write this section so that it stands on it's own
- Emphasize results that answer the question(s) you are examining
- Put secondary results after primary ones
- Don't repeat the numbers that are presented in the tables and figures in the text
- Don't repeat the table and figure titles in the text

Discussion

- In this section you are answering the question
  - What do your findings mean?
- This section is where you answer specific question(s) you stated in the introduction
- Discuss errors in your methods and assumptions
- Avoid the temptation to refer to every detail of your work again

Discussion

- Restatement of significant results in a more general format, then
  - Citing agreement or disagreement with previous studies
  - Admitting difficulties in interpretation
  - Pointing out discrepancies
  - Try to explain anomalous results (*may lead to discovery!)*

  - Commentary on whether results are expected or unexpected
  - Commentary about the significance or implications of the results

Conclusions

- Some readers will only read the conclusions
- Conclusions should be succinct and are a statement of your main findings (not a discussion)
- Conclusions should contain strong verbs
  - Use ‘show’ and ‘indicate’
- Identify speculation by using ‘might’ with the verb
- After the conclusions
  - At the end, acknowledge briefly any substantial help

References

- Use the AIAA format for references
- References must be easily accessible in libraries or other public sources.
- They are to be numbered in the order in which they are cited in the text.
- Use references to ASTM standards, e.g.,
  - D 5045-99 (Reapproved 2007) – Standard Test Methods for Plane-Strain Fracture Toughness and Strain Energy Release Rate of Plastic Materials
  - D 2990-01 – Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

Reference formatting (all available information)

- ***Journals***
  - Walker, R. E., Stone, A.R., and Shandor, M., "Secondary Gas Injection in a Conical Rocket Nozzle," *AIAA Journal*, Vol. 1, No. 2, 1963, pp. 334-338.
    - Note: Title of article is in quotation marks and name of journal is italicized.
- ***Books***
  - Turner, M.J., Martin, H.C., and Leible, R.C., "Further Development and Applications of Stiffness Method," *Matrix Methods of Structural Analysis*, 1st ed., Vol. 1, Wiley, New York, 1963, pp. 6-10.
    - Note: This is an article published in a book containing a collection of articles. The title of the book is italicized, and the title of the article is given in quotation marks.

Reference formatting

- ***Proceedings Papers***
  - Bhutta, V.A., and Lewis, C.H., "Aerothermodynamic Performance of 3-D and Bent-Nose RVs under Hypersonic Conditions," AIAA Paper 90-3068, Aug. 1990.
- AIAA does not give a format for the citation of Web pages. The American Psychological Association publication manual, which is widely used in the social sciences, provides guidelines for citing Web pages. A modified version which you may find helpful is provided below.
- ***Web pages***
  - Author, I. (date). "Title of article." *Name of periodical* [Online]. Available: Specify path. Accessed on: date of access.

Appendix

- Lengthy material related to your report

- Include your raw data or links to it

Preparing effective figures and tables

- Readers often look at figures and tables to see what the report is about
- Each figure and table:
  - MUST BE CAPABLE OF STANDING ON ITS OWN WITHOUT REFERENCE TO THE TEXT!!
- Decide if you want to present your data in a figure or a table

Table size and format

- A table consists of a
  - Title
  - Column headings
  - Row or side headings
  - Explanatory notes
- Decide if the data presented in the table could be better presented in a graph
- Keep the structure as simple as possible, but not simpler!

Tables

- Decide what tables you need
- Design separate tables for separate topics
- Do not use tables to show off how much data you have collected
- Don’t repeat data in tables if you are using the data in the text or in a figure
- NEVER INCLUDE A TABLE THAT IS NOT REFERRED TO IN THE TEXT

Figures

- Figures are meant to demonstrate evidence vividly
- Figures must be simple and clear
  - Label axes simply and clearly
  - Number and identify the figure in the text

- NEVER INCLUDE A FIGURE THAT IS NOT REFERRED TO IN THE TEXT

Notes on language

- Make sentences more specific
  - Usually found during editing
  - Be sure to match the amount of detail with needs of audience
    - “During the test the sample was cooled.”
    - “During the test, the sample was placed in an ice bath.”
    - The information should be enough to repeat the experiment
- Keep your sentences to 10-20 words

Notes on language

- Use the third person
  - e.g. do not use “We found…” or “We measured”
- Do not use acronyms without first defining them
- Use SI units
  - kg, m, J, N etc.
- Write in the past tense
- Write in an active voice, rather than a passive one
  - Conveys more excitement and is more concise

Passive and active voice

The experiment was conducted so that the relationship between the two theories could be examined. First, the cultures were prepared and then were examined under the microscope to see if any impurities could be found. Once the purity of the samples could be established, they were used in six independent tests. (51 words)

The experiment examined the relationship between the two theories. First, microscopic examination for impurities isolated pure examples used in six independent tests. (22 words)