

# Style Guide for 16.62X Experimental Projects

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This document offers guidelines for writing, formatting, and citing sources for deliverables required in 16.62X experimental projects lab. Students in other courses may use it as their professors direct. It covers key points.

## **Executive Summary**

**(Required in the 16.621 design proposal)**

The executive summary contains the key points of a document. It is written for a non-expert reader(s) and thus uses more general language than found in the main body of the document. It should be double-spaced on a separate page that usually precedes the table of contents. An executive summary is generally no more than one page long although longer proposals or reports may require longer executive summaries.

An executive summary is a very compressed version of the entire proposal or report. It could be read in place of the proposal or report by a general reader who wanted to understand the project but didn't have time to read the detailed version. Thus, an executive summary covers the significance of the work; summarizes the background and previous work in this area; describes the immediate project; may sketch out the experimental design; may summarize methods and materials; and ends with conclusions and discussions.

<or>

## **Informative Abstract**

**(Required in the 16.622 final report)**

An informative abstract is single-spaced and 100-250 words. It includes the following information: project, method, results, and conclusions. It does NOT include citations, acronyms, equations, abbreviations, background or discussions of future research. It stands alone; a reader should be able to grasp the key results of the entire project from reading the abstract. Abstracts are written for an expert audience; thus they use more technical language. Abstracts are placed at the beginning of a document. Sometimes they precede the table of contents; at other times, they are placed just before the main text.

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## 1.0 Document Structure

### 1.1 Cover Sheet

Reports and proposals have cover sheets. For example, all 16.62x submissions should have a coversheets like the one illustrated in Figure 1.

<p style="text-align: center;">&lt;Title&gt;</p> <p style="text-align: center;">&lt;Paper Type, i.e."Final Proposal"&gt;</p> <p style="text-align: center;">16.xxx</p> <p style="text-align: center;">Author(s): &lt;Your Name(s)&gt;</p> <p style="text-align: center;">Advisor: &lt;Name&gt;    Partner:&lt;Name&gt;</p> <p style="text-align: center;">Date: &lt;Date Submitted&gt;</p>
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**Figure 1: Cover Sheet Format**

### 1.2 Sections and Subsections

Technical documents have sections and subsections to organize information. Give each section or subsection a brief, informative heading, and use a modest emphasis technique (underlining, italics, bolding or slightly larger font size) to help the reader locate the section.

### 1.3 Page Numbers

Technical documents have page numbers as navigational devices. PowerPoint slides have numbers. It doesn't matter so much where you put them, but they must be there.

### 1.4 Table of Contents; List of Tables and Figures

Professional documents longer than 5 pages usually have a Table of Contents that allows a reader to find sections easily. In addition, professional documents also list tables and figures separately from the Table of Contents so that readers may have independent access to those graphics. Please see the Table of Contents and the Lists of Tables and Figures in this guide for an example.

### 1.5 Spacing and Fonts

Technical reports and proposals are usually double spaced or space-and-a-half with conventional margins.

There are two styles re: indentation and spacing. If you indent your paragraphs, you do not have to put space between them or between the first paragraph and the heading. If you do not indent your paragraphs, then the convention is to put space between them and between the first line and the heading.

Technical documents generally are in a conventional font and use 12 pt font size. Sometimes a smaller font is acceptable but never smaller than 10.

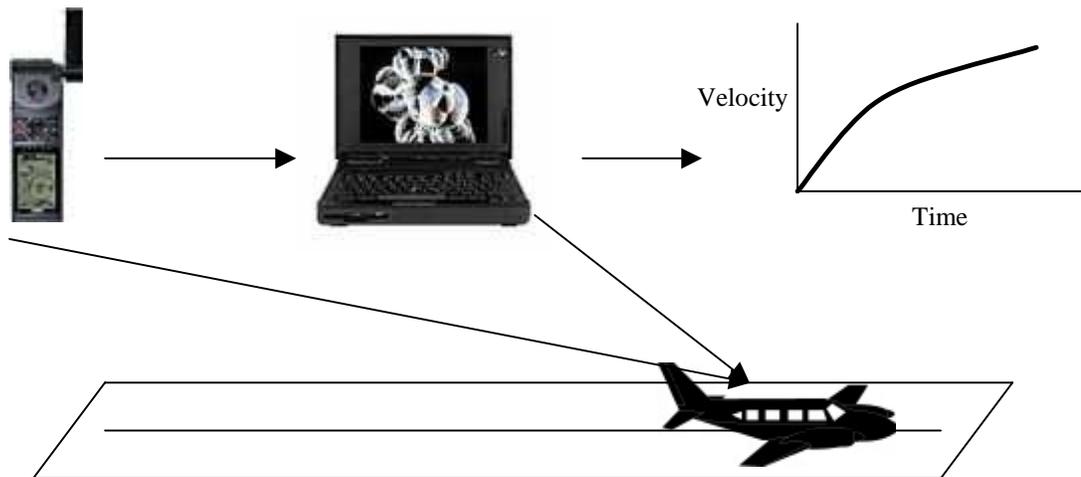
### 1.6 Acronyms

Acronyms should be spelled out the first time they are used and the acronym included in parentheses that follow. (e.g. *The Trade Analysis and Requirements Review (TARR) is scheduled for . . .*) Some acronyms are so familiar that they are practically

words themselves (USA, NASA), but most need to be written out the first time. Try not to begin a sentence with an acronym. Reduce the number of acronyms when possible.

## 1.7 Tables and Figures

Graphics are either tables or figures. Tables are columns and rows, so a test matrix is a table even when it is 3-D. All other graphics are figures (photo, sketch, graph, chart, etc). An example of a figure is shown in Figure 2.



**Figure 2: Schematic of Experimental Setup \***

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\* Craig, Danny. 16.622 Final Report, Fall 2002, unpublished material

Figures are labeled on the bottom. Tables are labeled at the top. Labeling means that the graphic has a number and an informative caption or title. An example of a table is shown in Table 1.

**Table 1: Test Matrix with Two Independent Variables**

X var Y var	$X_1$	$X_2$	$X_3$
$Y_1$			
$Y_2$			

Place the figure or table close to where you refer to it in the text. In the text, refer to the graphic, give the number, and explain briefly what it is. Size the graphic to fit into the text. As seen in technical papers, almost all figures and tables can be reduced to less than a page without impairing readability. However, a full page graphic is acceptable if you really need all that space to display the information. It's conventional to place very large or multi-page graphics and unrefined data sets in the appendices to allow readers access to that information without interrupting the flow of the text.

## 1.8 Equations

Equations should be labeled at the right side of the page and centered on the page. For example, Equation 1 shows that given drag coefficient  $C_D$ , air density  $\rho_\infty$ , planform area  $S$ , and airspeed  $V$ , drag  $D$  can be computed using

$$D = C_D \frac{1}{2} \rho_\infty S V^2. \quad (\text{Eq. 1})$$

Equations can be either punctuated or not punctuated. In 16.62X, it is recommended that equations be punctuated. This means adding a period when the equation is at the end of a sentence and a comma if the equation is in the middle of a sentence.

## **2.0 Citation Styles**

### **2.1 AIAA vs. Other Styles**

Citation styles are the way in which the writer acknowledges the ideas of others. Course 16 uses the American Institute of Aeronautics and Astronautics (AIAA) style as the standard. There ARE other citation styles, and your professor or advisor may use one of them or you may see them in other books. However, for most purposes, the AIAA style is preferred. If a student plans to submit work to a conference or a journal that follows a different style, s/he may use this style if the course faculty approves this ahead of time.

### **2.2 Types of Sources**

There are two kinds of sources: those that any reader could retrieve from a library or an online source and those that are non-retrievable (conversations, e-mail, unpublished notes or writing). The retrievable source is cited in the text and listed in the “List of References” section at the end of the text; these citations follow specific guidelines. Examples of these can be seen at the end of this guide.

Sources are cited in the order that they appear in the text and listed at the end of the document. If you cite the same source more than once, use the number it had in the first instance of citation. For instance, this sentence will make reference to a website by Preston.<sup>1</sup>

The superscript number appears in the sentence when the author's name is mentioned or, if the author is mentioned at the end of the sentence, the superscript number appears after the period. Superscript numbers are not in brackets in the AIAA style.

### 2.2.1 *Websites*

Web sites must have the date the writer accessed it. If the site has a name or specifies the institution sponsoring it, put that in, too.

### 2.2.2 *Presented vs. Published Papers*

When papers are both presented and later published in a journal, give the journal citation first as it is the more recent. However, you could insert a semicolon after the pages referenced and write "also AIAA Paper XX-XXXX, Month, Year".

### 2.2.3 *Non-retrievable Sources*

If a source is non-retrievable, it is listed in a footnote at the bottom of a page: References to personal communication, telephone calls, interviews, or e-mail go in a footnote. In AIAA style, footnotes are indicated by symbol, not by number.

(e.g. \*, \*\*, †, ‡, §) For example, to reference an email from Professor Murman, it is footnoted as so.<sup>\*\*</sup>

### 2.2.4 *Unpublished Material*

Handling material that you believe is unpublished is tricky. The first step is to search library databases/journal databases to see if perhaps it has been published subsequently. If so, use that source. If it remains unpublished or you can't document it, then include it in a footnote.

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<sup>\*\*</sup> Murman, Earl. Email correspondence. Jan 15, 2003.

If the source was presented at a meeting but not published in the proceedings, give the complete date of the presentation, the title of the paper in quotation marks followed by “presented at” and the name of the conference and its location and date.

### **3.0 Grammar, Punctuation, Spelling, Style, and Tone**

The use of first person (*I, me*) is uncommon in technical papers and oral presentations at technical meetings in this field. It is also uncommon to make the reader a participant. (Ex. *You can see that this project would be. . . .*)

Often this results in the use of passive voice and a slightly formal style. This is acceptable. It takes a while to become comfortable writing in this professional voice without sounding stuffy. Reading a few published papers is helpful in finding a professional style.

All technical document standards of excellence include the ability to write complete sentences, punctuate properly, use the appropriate words, and spell words correctly. *The Mayfield Handbook for Scientific and Technical Writing* is a useful guide.<sup>2</sup>

### **4.0 Conventions for Using Numbers**

In technical documents, use numeric figures for all quantifiable units of measure, no matter how small, be they nanometers or light-years. Also, use a figure when you abbreviate the measure. (Ex. *2m, 0.3 cm, 1.4 in*) If two units of measure come together in a sentence, spell out one and use figures for the other. (Ex. *Ten 4 cm sections of pipe were cut.*) When using numerals, set decimal fractions of less than 1.0 with an initial zero. (Ex. *0.05 cm*) Don’t begin a sentence with a numeric figure. You can either spell it out or revise the sentence. Also, use consistent systems of measurements. Describe it in either inches or centimeters, but not both.

## 5.0 List of References

**Note:** Lists of references have numbered entries that correspond to the superscript numbers in the document. Here, there are two citations, the Web site and the handbook. The rest of the entries give the appropriate citation methods for each kind of source.

1. Web sites: Preston, R., "Reducing Induced Drag." October 10, 2002.

2. Perelman, L., Paradis, J., and Barrett, E., *The Mayfield Handbook of Scientific and Technical Writing*, Mayfield Publishing, Mountainview CA, 1998.

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.

Books: Turner, M. J., Martin, H. C., and Leible, R. C., "Further Development and Applications of Stiffness Method," *Matrix Methods of Structural Analysis*, 1<sup>st</sup> ed., Vol. 1, Wiley, New York, 1963, pp. 6-10.

Reports: Book, E., and Bratman, H., "Using Compilers to Build Compilers," Systems Development Corp., SP-176, Santa Monica, CA, Aug. 1960.

Transactions/Proceedings: Soo, S. L., "Boundary-Layer Motion of a Gas-Solid Suspension," *Proceedings of the Symposium on Interaction Between Fluid and Particles*, Vol. 1, Inst. of Chemical Engineers, New York, 1962, pp. 50-63.

Unpublished thesis or dissertation: Glazer, Frederick G., "Hierarchical Motion Detection," Ph.D. diss., University of Massachusetts, 1987.

(**Note:** Unpublished dissertations are usually archived in the library of the institution that granted the degree. They aren't distributed as a paper or a book would be, but they are retrievable by the general public with some effort.)

## **Appendix (or Appendices)**

Appendices are placed at the end of the document. They contain material that the reader of the document may find very useful in using the report or proposal but that s/he doesn't actually need in order to read the document. Examples of content placed in appendices include unrefined data, human subjects permission forms, materials lists, drawings or other large graphics, detailed calculations or theoretical development, sample interviews, and/or resumes.

*Some tips for Drawings and Parts List Appendices:*

Dimensions of drawings and specifications should be in decimal units. Systems of measurement should be clearly shown and consistent with the main section of the report.

List of required materials. For example, this might include fiberglass, carbon fiber, wood, foam, metal, plastic, and/or glue.

List of test equipment. For example, in .62X, include any devices necessary for the project. Model or part numbers aren't necessary unless the device is of a specific nature. Examples of test equipment include oscilloscopes, signal generators, power supplies, amplifiers, signal conditioners, cameras, and/or computers/AD board.

List of electronic components. For example, in .62X, this list should include items that may not normally be kept in stock and would have to be specially ordered. Omit resistors and capacitors and wire but include integrated circuits by type and numbers. Sensors should be listed and specified by what they measure (forces, moments, pressure, stroke, acceleration, and sensitivity.)

List of necessary mechanical parts. In .62X, this could include bearings, gears, and couplings listed by size and type but not by part number. Specify motors by the type

(AC, DC, servo, gear head), shaft speed in rpm, expected loads in pound/feet, ounce/inch, special features (optical encoder, tachometer, etc.)

List of the necessary laboratory test facilities In .62X, for example, facilities include Wright Brothers Wind Tunnel, the 1' x 1', or the Super Sonic Wind Tunnel as well as the manufacturing facilities: Gelb machine shop, electronic fabrication room, composite fabrication room, TELAC, welding shop, central machine shop.