Style Manual and Standards for Submitting Academic Assignments to the College of Aeronautics and Engineering

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Abstract

This document provides a unified guide for generating and submitting academic assignments to the College of Aeronautics and Engineering. It is a work in progress, and will be updated as necessary.

Course instructors determine their own preference for submission of academic requirements in their particular courses. In the absence of instructor preference, students should refer to this document when submitting assignments for academic credit.

The goals of this document are to:

- Introduce, teach, and inform students of the importance of high quality writing to their discipline as well as their own professionalism.
- Supplement the assessment processes of the college's different program outcomes.
- Provide quality control measures encouraged by accreditation organizations.

This document lays out the elements of a technical document, preferred citation styles, with tips for technical writing. The document stresses the importance of quality.

Lastly, this guide provides examples and templates of different types of academic assignments:

- Homework example and considerations.
- Technical presentation template and guide.
- Technical report template.
- Non-technical report template.
- Sample business case study.
- Computer code example and considerations.

1 Introduction

The purpose of this document is to provide students with a standard guide for generating and submitting academic assignments to this college.

It is safe to say that almost every engineering college in the country has a published set of standards for submitting assignments for academic credit. Such guidelines serve three primary functions:

- Introduce, teach, and inform students of the importance of high-quality technical writing to their discipline as well as their own professionalism.
- Supplement the assessment processes of the college's different program outcomes.
- Provide quality control measures encouraged by accreditation organizations.

Writing in the science, technology, engineering, and mathematics fields (STEM) differs from writing for the social sciences, liberal arts, and humanities. In both academic and professional settings, the ability to convey technical information is a highly desirable "soft" skill. Soft skills are "people-based" skills that cross over various disciplines and enhance the technical capabilities of the STEM graduate. Soft skills directly translate into professional skills.

During a professional career, you can expect to produce many technical documents: reports, journal articles, articles for technical periodicals, memos, technical manuals, etc. The ability to generate high- quality technical documentation will directly affect your success, both within this college and in the professional world.

2 Quality and its characteristics

Quality has many definitions [1]. In technical applications, it generally represents the "superiority of something," or "fitness of purpose." It is a highly subjective attribute and means different things to different people. Nevertheless, three basic tenets consistently describe high-quality work:

- Neat: The document has a polished appearance. The author(s) has paid great attention to detail such that it "looks" like a professional document.
- Organized: The document has a logical flow to it from start to finish.
- Informative: The document informs the audience in a precise, concise, and specific manner. The information provided in the document is accurate and in the case of a technical report follows a well-defined standard of measurements.

3 Relevance – Why is this important?

You may ask, “Why is this standard important? What does it matter?” The answer is quite simple: “Technical documents are the strongest indicators of an author’s professionalism and effort.”

From a professional standpoint, the quality of one’s documentation efforts provides a powerful indicator of the author’s work ethic and competence. It is also a reflection of the organization or affiliation that the author(s) represents.

From the academic standpoint, quality is equally important. The quality of student submissions directly affects their grades. Grades affect a student’s ability to secure good internships and scholarships, to continue in a desired major, to explore job opportunities and find placement, etc.

Perhaps most importantly with respect to academics, high-quality submissions impress the grader. Organized, neat, and informative documents are easy to grade and generally result in higher scores than lower-quality counterparts. Errors are easier to identify. Partial credit is easier to assign.

4 Flow of this guide

The main layout of this text discusses the primary aspects of writing a technical document: purpose, planning, layout, visual design, and source documentation. It also provides some tips for technical writing in general. Lastly, the appendices provide guidance for several different types of submissions: technical report, technical presentations, computer scripts (code), and general homework. It also includes a format for a non-technical report: such as an argumentative paper.

The information presented here is a combination of original material combined with information cited from two primary writing resources. The first is “The Writer’s Handbook” from the University of Wisconsin-Madison. The second is the “Online Writing Lab” (OWL) from Purdue University [2, 3]. These are two powerful online writing resources. In addition to these, there are several more, and your course instructors may refer you to one or more of them.

- The writer’s handbook [Internet]. Madison (WI): University of Wisconsin – Madison c2014, [cited May 19, 2015]. Available from https://writing.wisc.edu/Handbook/index.html.
- Online writing lab [Internet]. Lafayette (IL): Purdue University c2015, [cited May 19, 2015]. Available from https://owl.english.purdue.edu/owl/.

5 Document planning and purpose

First and foremost, the fundamental purpose of a technical report is to convey technical information as precisely and concisely as possible. All other purposes are secondary. In most cases, a report describes research, the results of an experiment, or other technical work. The report generally consists of the following [4]:

- An explanation of the problem or issue under investigation.
- A discussion of the research method.
- A description of the data collected.
- A discussion of the research findings, analysis, and implications.

Anyone with writing experience will attest that generating a technical document is a lengthy process, requiring much preparation. Prior to even beginning the narrative, it is important to plan for the writing process itself. This is accomplished through certain considerations [4].

- Purpose: This explains the "why" behind the document. Why are you writing the paper? Why is it significant? Is the purpose informational? Is the purpose to support or seek a decision from a decision-making authority? Is the purpose to provide information in support of an investigative report? Is the purpose educational?
- Goal: This explains the end results. What do you want to achieve? What did the technical investigation accomplish? What background material is relevant? Is there more work to do? Did this complete a project? What is the relevance of the results? What further work needs to be performed?
- Audience: Who will receive the technical information? What is their level of expertise? Consider how you would craft the same topic presented to the following audiences: (1) a class of middle- school students, (2) a panel or conference of technical experts, (3) a congressional oversight committee, or (4) students in an introductory college course.
- Planning plays an important role in technical writing. These types of considerations ultimately determine the content, organization, and layout of the document itself.

6 Elements of a technical document

The elements of a technical document are fairly standard in nature, regardless of whether the document is a presentation, conference paper, laboratory report, thesis, dissertation, etc. A design report is somewhat different based upon the nature of the design process. This section discusses the basic elements and layout of a technical report.

The sections of a technical report include the following in their normal order:

- Abstract
- Introduction
- Background
- Methodology
- Results and discussion
- Conclusions and recommendations
- Acknowledgements
- Bibliography or References

Although these sections are generally present in all reports, the order is flexible. Sections can be combined or further subdivided as required. Most organizations, such as universities, professional organizations, government laboratories, etc. have their own formats for technical manuscripts.

6.1 Abstract

An abstract is a synopsis of the entire paper. It is the first section that follows the title area or title page in a report. It is brief. An abstract provides research highlights, including the following [4-6]:

- Describes the problem and main objective of the research
- Indicates the methodology used in the research
- Presents the main findings of the work
- Summarizes the main conclusions

Some style guides limit abstract size to 200 words or less. For academic work, the abstract is generally limited to one page of double-spaced text.

Although the abstract comes first in a technical document, it is written last.

6.2 Introduction

The introduction provides the objective, purpose, and end-state of the work. It introduces the topic of the work, the research problem, and its significance. For academic work, this includes the thesis or research statement.

The introduction lays out the course of the manuscript. The introduction presents the main points of the paper, and possibly the order of discussion. The introduction should leave no question about the intent and flow of the report.

6.3 Background

The background section provides additional material to familiarize the reader with the problem, the discipline area, and how the author's work fits into that area. This section is not designed to make the reader an expert, only to give them a better understanding of what the author(s) is trying to accomplish. Elements of this section include the following topics:

- Expanded explanation of the problem
- A brief discussion on the state-of-the-art (literature review)
- How the work presented advances the state-of-the-art.

The term, "state-of-the-art," invokes an understanding of the current technology or analysis capabilities associated with the research problem. This is most often demonstrated through the literature review. The "literature" refers to the published scholarly material in a discipline area. Scholarly material refers to publications that have had some type of peer or editorial review by external reviewers. Scholarly material includes books, patents, journal articles, and archived conference papers. The scrutiny-level of review increases the quality of the material. High-quality scholarly material is always better than other sources.

A literature review presents the literature used for a certain study. It may provide a critical review of the strengths and weaknesses of previous work, as well as how that literature has contributed to the author's understanding and approach to the problem [4].

The background section of the report is a highly appropriate place to insert visual documentation such as photos or images that will increases audience understanding of the work.

6.4 Methodology

The STEM disciplines often use the term, "methodology," in technical work. According to the Merriam-Webster online dictionary, methodology describes a "body of methods, rules, and postulates employed by a discipline," or "the analysis of principles of procedures of inquiry in a particular field [7]."

In simplest terms, the methodology is the procedure or process used in the investigation. The methodology can be analytical, computational, or experimental in nature.

Sources differ as to the level of information presented in this section. This should

ultimately be determined by the type of document and its intended audience (presentation *versus* thesis, dissertation, or report). A detailed methodology may not be necessary for a conference presentation or technical report. However, it is necessary for a journal publication, book, or academic thesis. The following are appropriate for the methodology section.

- For analytical work:
  - Fundamental approach from first principles (Newton's laws of motion, etc.)
  - Pertinent equations
  - Application of these principles and equations to the current problem
  - Parameters of interest
- For computational work:
  - Fundamental approach from first principles (Newton's laws of motion, etc.)
  - Pertinent equations
  - Application of these principles and equations to the current problem
  - Parameters of interest
  - Computational software used in the method
- For experimental work:
  - Fundamental approach from first principles (Newton's laws of motion, etc.)
  - Pertinent equations
  - Description of the experimental setup. Include a description of the materials and supplies used, the parameters being measured and the instrumentation used to measure them (i.e., load cell, thermocouple, accelerometer, etc.).
  - Description of the test specimens
  - Description of the experimental test matrix
- List assumptions used in the methodology
- For experimental methodologies in particular, provide visual aids when discussing experimental apparatus, test specimens, and other equipment. Photos and images are necessary to convey this information.
- Quantify when possible: temperatures, running conditions, speeds, pressure, etc.
- Do not use the present tense. The past tense is recommended [5, 6]. Passive voice is acceptable and preferred.
- The author(s) should provide enough detail for others to repeat the work.

6.5 Results and discussion

The results and discussion section is the most important of the report. It provides the evidence that supports or refutes the research question or thesis statement.

6.5.1 Results

The results section presents results. In the STEM fields, it is essential to present data in the form of tables, charts, or graphs. It is also highly appropriate to present post-

experimental images of specimens used. If the work involves the construction of a prototype or test-flight, images of the events must be provided. Text narratives alone are insufficient to verify the results.

Other considerations include [5]:

- Listing results from most important to least important
- Reporting most common results
- Reporting best results and other outlying or unexpected results

6.5.2 Discussion

The discussion section provides interpretation of the results and major conclusions drawn from them. Depending upon the research, this may be a lengthy or a brief section. Discussion encompasses some or all of the following [5, 6]:

- Patterns, trends, correlations, or relationships represented by the results
- Expectations of the results, based upon the literature
- Validity of the author's assumptions
- Limitations of the data
- Possible faults in the results or interpretation
- Practical applications of the results

Additionally, the context and flow of the discussion is important:

- Begin the discussion with the specific results, then move the conversation into more general findings.
- Compare the results obtained with those obtained from previous works. How does the present investigation differ or provide additional information about the subject?
- Discuss specifically how the results achieve or do not achieve the author's goals.
- Provide complete explanations. This includes evidence for each observation or interpretation, a discussion of unexpected, questionable, or outlying results, and the possible reasons for those unexpected results.

6.6 Conclusions and recommendations

This section of the report accomplishes three things:

- It summarizes the work and whether it accomplishes the author's goals.
- It provides the significance and contribution of the work.
- It provides the author's opinion for future research.

6.6.1 Conclusions

The conclusion presents a summary of the important findings from the author's work. In

many technical works, the authors provide the conclusions as a numbered list. The most important consideration is that the conclusion section provides no new information that has not been presented previously in the report.

6.6.2 Recommendations

The recommendations section provides a series of suggestions for continuing the technical work. These are generally considered the “next steps” in gaining additional knowledge. Recommendations can range from suggesting new experimental methods for achieving better results to suggesting that the research phase of a particular technology is complete.

6.7 Reference section and avoiding plagiarism

The references section should begin on a new page. This section provides a listing of the sources consulted by the author(s) during the investigation. It is necessary to identify the source of the author’s information in order to avoid plagiarism.

Kent State University provides a wealth of online resources dedicated to identifying and avoiding plagiarism. University Policy 3-01.8 defines plagiarism as the following [8]:

“’Plagiarize’ means to take and present as one's own a material portion of the ideas or words of another or to present as one's own an idea or work derived from an existing source without full and proper credit to the source of the ideas, words, or works. As defined, plagiarize includes, but is not limited to:

a) “the copying of words, sentences and paragraphs directly from the work of another without proper credit;
b) “the copying of illustrations, figures, photographs, drawings, models, or other visual and nonverbal materials, including recordings, of another without proper credit; and
c) “the presentation of work prepared by another in final or draft form as one's own without citing the source, such as the use of purchased research papers”

The section titled “Source documentation styles” will discuss the styles of citing documents.

NOTE: The online encyclopedia, “Wikipedia,” http://www.wikipedia.org, should not be used as an academic or professional reference. While the website enjoys widespread use, the open-source nature of the website reduces the academic quality of its information. Anyone can update the information contained in any Wikipedia article, with either correct or incorrect information. Wikipedia does have a reference system, which can be useful in determining the sources of information it presents. The website itself does not have the rigorous review or editorial process required of scholarly or even periodical literature. It is not acceptable for submissions to this college.

6.8 Appendices

Appendices supplement the text in the main body. They contain information that enhances the main body effort and provides information that the reader may or may not wish to see. The main body must be able to stand on its own. Each appendix should begin on a new page. Items that belong in appendices can include:

- Sample calculations: For any sequence of calculations used in the research, an appendix should include one iteration of sample calculations from start to finish. This provides the sequence of calculations to the reader and ensures that the series of calculations is correct. Sample calculations are generally present in academic submissions. They are not present in professional publications such as journal articles, conference papers, etc.
- Methodology derivations: For a new application of physical principles, it may be necessary to provide the derivation from “first principles” to the equation(s) being used in the research.
- Experimental data sheets: It is proper to provide the test matrix and recorded data in an appendix, especially if the data is too large to include in the main body of the report.
- Computer code: A copy of the computer script used in the work may be appropriate to attach as an appendix.
- Correspondence: Some correspondence may be appropriate, such as an endorsement or letter of support from external organizations.

7 Source documentation styles

7.1 Overview

Documentation is essential! In academic and non-technical settings, the style used is equally as important. The two main style guides introduced in academic settings are the American Psychological Association (APA) style and the Modern Language Association (MLA) style. These are primarily used for non-technical papers.

The APA style governs manuscripts in social science fields such as psychology, linguistics, sociology, economics, and criminology; as well as the fields of business and nursing [9]. The MLA style governs the liberal arts and humanities: language and literature, foreign language and literatures, literary criticism, comparative literature, and cultural studies [10].

Technical writing does not have one unifying style, such as APA or MLA, but many based upon the discipline, venue, publication, etc. In technical writing, the important consideration is capturing the source information correctly, not necessarily having a unifying style. However, Kent State University Libraries do provide a discussion of the

7.2 Council of Science Editors (CSE) style

Pathways for technical publications often provide their own styles. The following list provides examples of these pathways with organic manuscript guidelines:

- American Institute of Aeronautics & Astronautics (AIAA)
- American Society of Engineering Education (ASEE)
- American Society of Mechanical Engineers (ASME)
- Association of Technology, Management, & Applied Engineering (ATMAE)
- Institute of Electrical and Electronics Engineers (IEEE)
- Journals such as the Journal of Intelligent Manufacturing or the Journal of Sound and Vibration
- The Elsevier Publishing Co provides a style for all of the technical journals that they publish

In providing paper submissions to this college, students should consider the following guidelines:

- As required by the course instructor
- CSE style when writing technical papers (design reports, lab reports, research symposia, etc.)
- APA style when writing non-technical papers (writing-intensive argumentative papers, seminar papers, etc.)

These styles can be found at the university libraries website (http://www.library.kent.edu). On the website click on the "Research Tools" drop-down menu directly underneath the "University Libraries" title, and click "Citation Tools." Examples are provided for citing different types of sources: books, journals, electronic sources, periodicals, dissertations, non-published material, etc.

7.3 CSE citation styles

There are three CSE citation styles [5]. All are acceptable for this college. The course instructor may prefer or require one over the others.

- Citation-sequence. In the citation-sequence style, the sources in the references section are listed in the order that they are cited in the main body of the text. In this way, the citations within the text proceed in numerical order. In many technical formatting guides, this is the required format.
- Citation-name. In this style, the sources are listed alphabetically in the references section by the first author's last name. Within the main body of the text, the citation number refers to the number of the source in the reference list. The number 1 refers to the first source in the reference list, the number 2, the second

source in the reference list, and so on. The citation numbers within the main body will most likely not proceed in order.

- Name-year. In this style, the sources are listed alphabetically in the reference list. Within the main body of the text, they are cited by giving the first author's name and year of publication in parentheses.

This document uses the citation-sequence method with the citation numbers provided in brackets i.e. [1], [2], [3], etc.

7.4 APA citation style

The APA citation style in the text of a document is the "Name-year" style. In this style, the sources are listed alphabetically in the reference list. Within the main body of the text, they are cited by giving the first author's name and year of publication in parentheses.

8 Technical writing tips

Several manuals and websites provide technical writing tips. Some important distinctions between technical and non-technical writing are the following:

- Technical writing should be objective in its entirety. Non-technical writing may be either objective or subjective. The object is ALWAYS the technical work.
- Objectivity often requires the use of the passive voice. It is perfectly acceptable to use the passive voice in technical writing. Active voice is appropriate as long as it maintains objectivity.
- Preferred: The experiment was conducted using a modal impact hammer and 12 kHz accelerometer (focus is on the experiment).
- Not preferred: I conducted the experiment using a modal hammer and 12 kHz accelerometer (focus is on the researcher).
- Short sentences are better. Convey the technical information as succinctly as possible.
- Highly descriptive "literary" words are unnecessary and will detract from a technical report.
- Do not use acronyms without defining the full title first. There are some exceptions for entities that are universally known: NASA, USA, EU, etc.

Example: "The American Foundry Society (AFS) is a non-profit association serving members of the metalcasting industry. AFS provides members with advocacy in Washington [11]."

9 Visual layout tips

A polished look is a professional look. This section summarizes considerations for text, images, and data elements of a report.

9.1 Text considerations

Reports should be easy to read. There are visual ways to accomplish this:

- Use a conventional font such as Calibri, Times New Roman, or Arial with no less than a 12-point font. There is a reason that these are conventional fonts. Many manuscript guidelines dictate the use of a particular font and size.
- Double-space and left-justify paragraphs.
- Use headings to divide the content of the paper.
- Use lists where appropriate. Highlight visually with automated bullets, numbers, or letters.
- Make use of “white space.” Some manuscripts formats can make this difficult. However, the ability to break larger paragraphs into smaller paragraphs with additional spaces in between can make a tremendous difference in the reader’s ability to process and understand the material.

9.2 Non-text object considerations

Non-text considerations include photos, charts, graphs, tables, clip art, equations, or other images. The use of non-text items in technical writing is absolutely essential. Without visual documentation, there is no proof that the work actually took place.

Guidelines for these include:

- A non-text object should be as clear as possible and identify the item of interest.
- A photo or image should always have a border, at least 1.5 points wide and of an appropriate color. See the example image in Figure 1.

Figure 1 Example image with border

- Use Microsoft Equation® (in Word® and PowerPoint®), or Design Science Math Type®, or similar equation editor to insert equations into the text. Do not create equations simply by typing them with text into the document. Number the equations, beginning with Equation 1. Define the variables in the equation the first time each is introduced. See the example in EQN. 1 below.

EQN. 1

$$L = \frac{1}{2}\rho V^2 S C_L$$

Where

L=lift (lbf)

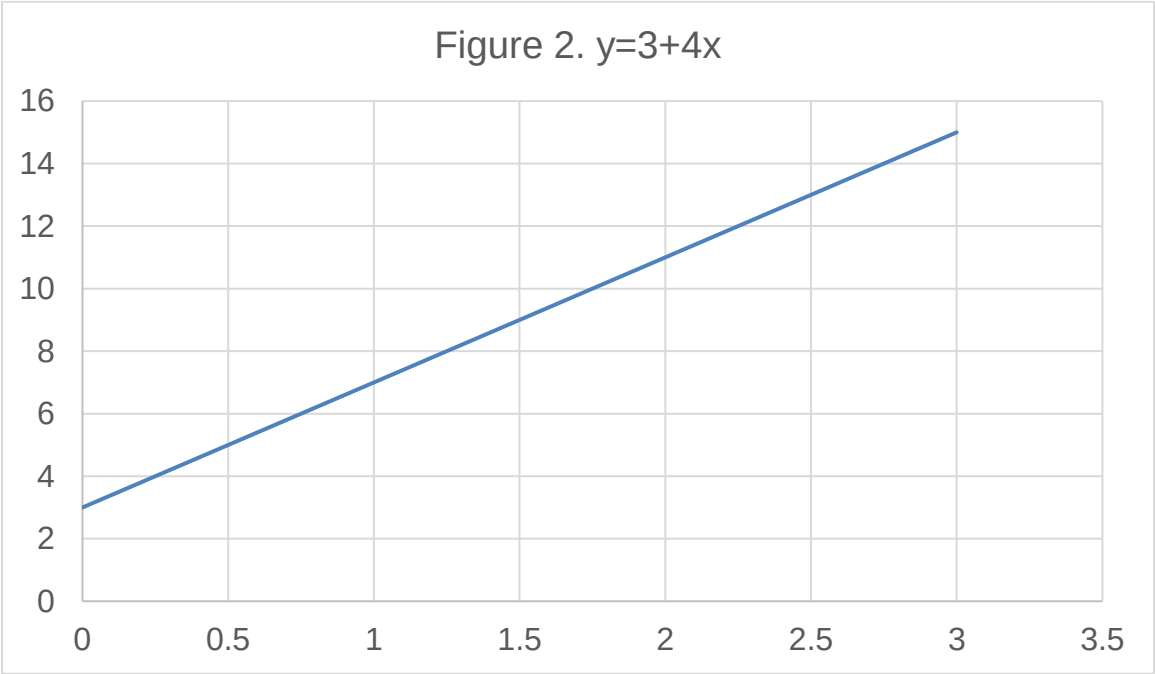
ρ=density (slugs/ft^3)

V=speed (ft/sec)

S=wing area (ft^2)

C_L=coefficient of lift (dimensionless)

- A graph or a chart generally will not have a border unless the formatting guidelines call for one. An example chart follows in Figure 2.



- The text in a chart or graph must have a clearly readable font.

- Tables should be clearly readable. For multiple tables, be consistent in the layout. See the example in Table 1.

Table 1: Example data table [12]. The lowercase m signifies a gear-mesh frequency harmonic.

Model (Hz)	**Experimental Data (Hz)**	**Difference (%)**	**Model (Hz)**	**Experimental Data (Hz)**	**Difference (%)**
483	475	1.64	2627	2600m	1.03
486	475	2.28	3198	325	1.60
1035	1050	1.40	3286	325	1.10
1400	1450	3.44	3417	335	2.00
1405	1450	3.08	3635	3740	1.76
1754	1720m	1.97	3656	370	1.18
1754	1720m	2.01	3977	4014m	0.93
1797	1720m	4.49	3993	4014m	0.52
2150	2125	1.19	4010	4014m	0.11
2166	2125	1.92	5108	5160m	1.01

Clip-art is generally not appropriate for technical work and should be used sparingly. If used, clip-art should not have borders.

Insert a caption with the object.

- Place the object at an appropriate point, near to its first reference in the text. Place in line with text.
- Provide “alt text” for the object.
- The object must be referenced in the text i.e. Figure 1, Figure 2, Table 3, Equation 4, etc.
- If the non-text object is from another source, be sure to cite the reference appropriately.

10 References

The references should begin on a new page. These references are displayed using the CSE citation-sequence style. Note that the citations are single-spaced, not double-spaced.

[1] Quality [Internet]. Google; c2015 [cited May 13, 2015]. Available from https://www.google.com/webhp?sourceid=chromeinstant&rlz=1C1CHFX_enUS602US602&ion=1&espv=2&ie=UTF-8#q=quality.
[2] The writer's handbook [Internet]. Madison (WI): University of Wisconsin – Madison c2014, [cited May 19, 2015]. Available from https://writing.wisc.edu/Handbook/index.html.
[3] Online writing lab [Internet]. Lafayette (IL): Purdue University c2015, [cited May 19, 2015]. Available from https://owl.english.purdue.edu/owl/.
[4] Livengood N. Writing engineering reports [Internet]. Lafayette (IL): Purdue University c2005, [cited May 12, 2015]. Available from https://owl.english.purdue.edu/owl/resource/647/01/.
[5] Formatting science reports [Internet]. Madison (WI): University of Wisconsin – Madison c2014, [cited May 12, 2015]. Available from http://writing.wisc.edu/Handbook/ScienceReport.html.
[6] Handbook on report formats {Internet]. Lafayette (IN): Purdue University c2015 [cited May 12, 2015]. Available from https://owl.english.purdue.edu/owl/resource/726/01/.
[7] Methodology [Internet]. C2015, [cited May 5, 2015]. Available from http://www.merriam- webster.com/dictionary/methodology.
[8] Policy 3-01.8 Administrative policy regarding student cheating and plagiarism [Internet]. Kent (OH): Kent State University c2015, [cited May 18, 2015]. Available from http://www2.kent.edu/policyreg/policydetails.cfm?customel_datapageid_1976529=2037779.
[9] APA style workshop {Internet]. Lafayette (IN): Purdue University c2015 [cited May 25, 2015]. Available from https://owl.english.purdue.edu/owl/resource/664/01/.
[10] MLA overview and workshop {Internet]. Lafayette (IN): Purdue University c2015 [cited May 25, 2015]. Available from https://owl.english.purdue.edu/owl/resource/675/1/.
[11] What is AFS and the Institute [Internet]. American Foundry Society c2015, [cited May 19, 2015]. Available from http://www.afsinc.org/about/content.cfm?ItemNumber=13389&navItemNumber=13449.
[12] Stringer DB. Geared rotor dynamic methodologies for advancing prognostic modeling capabilities in rotary-wing transmission systems [dissertation]. University of Virginia. 2008.

Appendix A: Homework example

This appendix provides students an example homework problem and the recommended approach to solving them. The recommended approach includes:

- Given: A listing of the given information
- Find: The parameters of interest to the problem
- Solution: Always list the fundamental equations. Highlight the answer(s)
- Analysis: "Does the answer make sense?"

This approach provides a neat format that better enables both students and graders to assess the work and quickly identify mistakes or areas where additional effort is necessary.

This example problem is representative of the types of problems that students would encounter in AERN 45150: Applied Flight Dynamics I.

Sample Problem

Part One: A single-engine turbojet aircraft is flying at a speed of 300 kts. The mass flow of air through the engine is 12 slugs/sec. The exit velocity of the air is 906.4 ft/sec. Determine (1) the thrust provided by the engine, and (2) the propulsive efficiency of the engine (1 knot = 1.688 ft/sec).

Part Two: A twin-engine propeller aircraft is also traveling at 300 kts, and produces the same amount of thrust as the airplane in Part One. The exit velocity of the air is 556.4 ft/sec. Determine (1) the mass flow of air through the engine, and (2) the propulsive efficiency of the engine.

Part Three, Analysis: Compare and contrast the two engines, specifically in terms of mass flow, propulsive efficiency, and exit velocity.

<u>Part One</u>

Given: Single-engine turbojet

$V_1 = 300kts$

$V_2 = 906.4ft/sec$

$Q = 12slugs/sec$

Find: Thrust (T), propulsive efficiency ($\eta\rho$)

Solution: $T = Q(V_2 - V_1)$

Convert V_1 from kts to ft/sec

$$V_1 = (300kts)\left(\frac{1.688ft/\text{sec}}{knot}\right)$$

$$V_1 = 506.4ft/sec$$

$$T = (12slugs/sec)(906.4ft/sec - 506.4ft/sec)$$

$$T = 4800lbf$$

$$\eta\rho = \frac{2V_2}{(V_1 + V_2)}$$

$$\eta\rho = \frac{2(506.4\text{ft/sec})}{(506.4\text{ft/sec} + 906.4\text{ft/sec})}$$

$$\eta_\rho = 0.717 = 71.7\%$$

<u>Part Two</u>

Given: Twin-engine propeller engine

$$V_1 = 300kts$$

$$V_2 = 556.4ft/sec$$

$$T = 4800lbf$$

Find: Mass flow of air (Q), propulsive efficiency (η_p)

Solution:

$$T_{TOT} = 4800lbf$$

$$T_{per\ engine} = \frac{1}{2}(4800lbf) = 2400lbf$$

$$Q = \frac{T}{(V_2 - V_1)}$$

$$Q = \frac{2400lbf}{(556.4ft/sec - 506.4ft/sec)}$$

$$Q = 48slugs/sec$$

$$\eta\rho = \frac{2V_1}{(V_1 + V_2)}$$

$$\eta\rho = \frac{2(506.4\text{ft/sec})}{(506.4\text{ft/sec} + 556.4\text{ft/sec})}$$

$\eta_\rho = 0.953 = 95.3\%$

<u>Part Three, Analysis:</u> Compare and contrast the two engines, specifically in terms of mass flow, propulsive efficiency, and exit velocity.

Engine	**Q (slugs/sec)**	η_ρ	**V_1 (ft/sec)**	**V_2 (ft/sec)**
Turbojet	12	71.7%	506.4	906.4
Propeller	48	95.3%	506.4	556.4

The values in the table depict how differently the two power plants produce 4800 lbf of thrust. Since the propeller airplane is a twin-engine aircraft, each engine only needs to provide half the thrust (2400 lbf) during normal operation.

Comparing the two power plants, the turbojet produces thrust by providing a larger acceleration to a smaller amount of air. The propeller engine produces its thrust by moving a much larger amount of air, but with a much smaller acceleration.

While both power plants produce the thrust required to fly the airplane, the propeller has superior propulsive efficiency. This explains why propeller power plants are preferred for low-speed aircraft.

Appendix B: Guide to preparing technical presentations

This appendix provides students instructions for using the PowerPoint template when generating presentations within the college.

Title slide

The title slide should have a minimum amount of information on it. The necessities include:

- Title of presentation
- Author name(s)
- Author title: This is more appropriate for a single author. For multiple authors, this becomes burdensome and is not recommended. Instead, you may use a contributors slide (explained later in this document). If the authors are from multiple affiliations, it is appropriate to list all affiliations here.
- Presentation venue: The course, conference, event, etc. where the author is presenting.
- Date
- Photos or images: The use of a photo or image is acceptable on the title page.

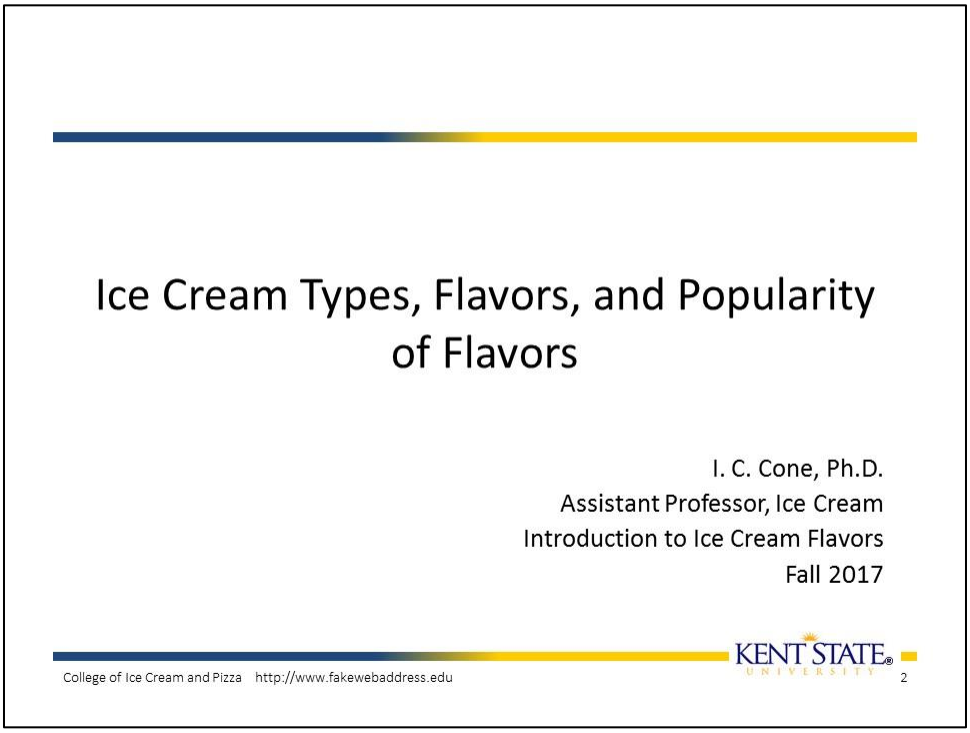


Figure 2 Example of technical presentation title slide

Outline/Agenda slide

An outline or agenda slide is always the second slide in the presentation. It serves as

the table of contents and lists the major sections the author(s) intends to cover.

What is the difference between outline and agenda?

- Outline: slides used for presentation to an audience. If the author(s) is presenting to a class, at a conference, or other venue with limited audience participation, this is an outline.
- Agenda: slides used in group discussion. If used to supplement a discussion between several participants such as a business, club, or collaboration meeting, etc., this is an agenda, outlining the topics to be covered during the course of the meeting.

The fundamental components or sections of a technical presentation include, but are not limited to:

- Introduction
- Background
- Methodology
- Results and Discussion
- Conclusion and Recommendations

More sections (or less) may be necessary depending upon complexity of the topic.

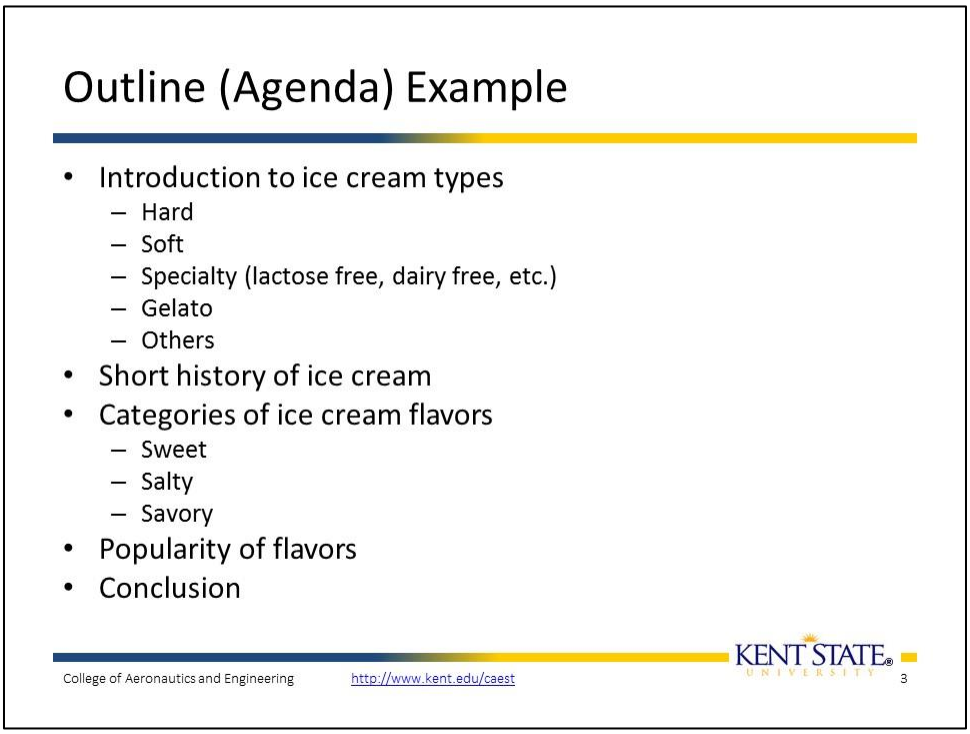


Figure 3 Example of technical presentation outline slide

Contributors slide

This slide is optional depending upon the number of authors or contributors to the work, and how they are listed in the presentation.

It is acceptable to do either of the following:

- List contributors and affiliations on the title page of the presentation. This becomes more difficult with a large number of contributors. If all on the title page, this slide becomes unnecessary.
- List the presenter(s), title(s), and affiliation(s) on the title page of the presentation only. List all other contributors, titles, and affiliations here. Sometimes, this slide follows at the end of the presentation.

Slide layout and design

During a recent personnel search, a candidate misspelled one of the key words in the title of the presentation, on the very first slide of the presentation. Was this a good first impression?

Like it or not, the documents you produce during your academic and professional careers are a direct reflection of your work ethic, credibility, and dependability.

Just as a high-quality document can significantly enhance your credibility, a mediocre or low-quality document can significantly damage it.

First and foremost, a technical presentation is not a substitute for a technical report. A presentation simply highlights important information from the more detailed technical narrative. Therefore, do not clutter the presentation trying to fit in every detail. It detracts from the presentation and will take too much time to present.

Remember, the purpose of a technical presentation is to convey technical information. Avoid those things in a presentation that detract from this primary purpose:

- White (or blank) space is desirable in a presentation. It presents a sense of openness.
- Avoid backgrounds that are overly artistic or dark. These detract from a technical presentation. Dark presentations are often difficult to read.
- Avoid artistic fonts.
    - The default fonts (Calibri or Arial) are probably the best choices.
    - There is a reason why these are the default fonts, because they work best on a large screen.
- Avoid overly large or small fonts. Small fonts are acceptable in footers or when referencing sources in the presentation.
- AVOID USING ALL CAPS IN PRESENTATIONS.

    - THIS IS DIFFICULT FOR THE AUDIENCE TO READ AND FOLLOW. IT PRESENTS A CLUTTERED APPEARANCE.
    - This is easy for the audience to read and follow. It does not present a cluttered appearance.

A slide has three distinct areas:

- Header area
    - Generally free of content except for the title of the slide
    - Some may insert an organizational logo in this area.
- Content area
    - Technical information goes here.
    - Text, charts, tables, photos, images, video, etc.
- Footer area
    - Other relevant organizational information, such as sub-organizations, web information, logo, etc.
    - May contain slide number

Note: Many organizations and corporations have their own templates that they encourage or require employees to use, especially in government or industry.

Citing references in a presentation:

- Citations should be placed at the bottom of the content area, above the footer area. This is sometimes necessary in a presentation, especially for a specific chart, table, definition, etc., drawn from another source.
- If a large number of sources are necessary for a presentation, it is often appropriate to compile these into a list and post them in a “References” slide at the end of the presentation.

Photos and images are critical to technical documentation.

Photos and images must support the topic of the slide in the presentation. Author(s) should avoid unnecessary, excessive, or frivolous imagery.

The axis labels of the figure should be readily visible to the audience, as well as any legends or other text used in the chart.

This is personal preference, but images generally look better with a clearly defined border of 1.5 points line width. The color of the line should compliment the color palette of the slide, as seen in the example in Figure 1.

Introduction slide

The introduction slide provides the objective, purpose, or end-state of the presentation.

Should leave no question as to the intent of the presentation. It introduces the topic and is nominally 1-2 slides in length. Here is an example of the information that would be used in an introduction slide when presenting this document.

- The purpose of this guide is to provide a basic template for preparing high-quality presentations both in this college and beyond.
- You can expect to make several presentations throughout a technical career.
- The quality of a presentation is often perceived as a direct reflection of the author's work ethic and competence.
- This guide will examine each component of a technical presentation, as well as provide formatting guidelines.

Background slide(s)

The background section provides the setting for the technical work, the motivation behind the work, and necessary background information.

As such, there is not a specific recommendation to the number of slides that are appropriate for this section. However, the author(s) must provide enough information such that the audience can gain at least a minimal understanding of the discipline area and how the author's work fits into that area.

Conversely, the author(s) must limit this section and be aware of other constraints (i.e., time limits), such that the focus of the presentation remains on the technical work of the author(s) and not what has been done previously.

Elements of this section include:

- An explanation of the problem
- A brief discussion of the state-of-the-art
- How the author(s) work contributes to solving the problem or advancing the state-of-the-art.

This is a highly appropriate place to insert photos, images, charts, tables, or other visual aids to increase audience understanding of the work.

Methodology slide(s)

The term, "methodology," is often used in the STEM disciplines. It means "a body of methods, rules, and postulates employed by a discipline: a particular procedure or set of procedures or, the analysis of the principles of procedures of inquiry in a particular field" [7].

The methodology is the procedure/process applied to the technical problem of interest.

Sometimes the methodology is a list of steps used by the author(s). Sometimes it is a particular use of engineering mathematics to solve the problem.

A key element of this section is a list of the assumptions used by the author(s) in their approach. It is critical that the author(s) provide these assumptions in both a technical report or presentation. The report must provide the rationale behind the assumptions.

The author(s) must be prepared to discuss the rationale for any assumptions as well as key decisions during the course of the presentation.

It is also necessary to provide pertinent equations used in the methodology. Often times, this may include the overarching equation from first principles, followed by the simplified equation based upon the assumptions used.

The last component of this section is a discussion of how the author(s) uses the methodology to analyze and interpret the results. An example of a methodology slide might include:

- Description of method used in the author(s) work
- List of assumptions used in the work
- Pertinent equations used in the work
- Discussion of how the author(s) analyzed the results

Results and discussion slide(s)

This section is generally considered the most important section of the entire presentation.

It provides the results of the author's work. Equally as important is the interpretation of these results and their relevance.

The most important consideration in the results and discussion section is the ability to provide verifiable and documentable results. In the context of a technical presentation, this includes tables, charts, images, photos, etc.

Without this documentation, it is as if the author(s) never performed the work.

Conclusions and recommendations slide(s)

In many technical documents, the conclusions section provides a summary list of the major conclusions from the work, numbered 1, 2, 3 and so on.

An important point is that the conclusions and recommendations section never introduces new information that has not been mentioned in a previous section. No new information should ever be presented in the conclusions section.

Lastly, the author(s) provides recommendations in order to continue or further the work. In some cases, the author(s) may recommend termination of the research.

Acknowledgements slide

Prior to ending the presentation, it is appropriate to acknowledge other people, organizations, or entities who assisted or enabled the content, but were not primary authors (university, government laboratory, manufacturer, etc.).

It is also appropriate to list the funding sources for the work conducted.

- Do not list the funding amounts.
- It is appropriate to list grant, research, or contract identification numbers.
- Example: “This research was conducted under Grant No. 1234567890, administered by X. The authors are also particularly grateful to Dr. Jane Smith for her insight into the nature of Y.”

Questions slide

The last slide in a presentation usually has one word: “Questions,” which raises a good question. How many slides do I need in my presentation? The short answer: “It depends.”

The most important consideration in answering this question is the amount of time available for the presentation.

General rule-of-thumb: One minute per slide. That means that someone giving a 30-min presentation would have approximately 30 slides. However, the presentation may require more or less slides to adequately convey the information.

Sometimes, it is appropriate to have back-up or “hide” slides that are not used in the formal presentation, but can provide back-up information if required. These “hide” slides can be designated in PowerPoint® by right-clicking on the slide in the left-hand slide pane and selecting “Hide Slide.” Hidden slides will not display in the slideshow.

The only way to adequately determine presentation length is to rehearse, rehearse, rehearse. Multiple rehearsals will greatly increase the quality of the presentation by:

- Determining the time required to give the presentation
- Enabling the author(s) to edit the presentation accordingly for length
- Allowing the author(s) to develop transitions from one topic to the next
- Enabling the author(s) to tweak their dialogue and become comfortable with what they are going to say during the presentation

Appendix C: A Guide to Preparing Technical Reports

This appendix provides students with instructions for generating technical reports. Students should use this template when preparing reports for academic credit. A Microsoft Word® template titled “technical report template” is available for download and provides all the styles and fonts for a technical report.

Use headings and subheadings to organize the sections of your paper. The first heading level is formatted with initial caps and is centered on the page. Do not start a new page for each heading. Microsoft Word® has a preset bank of heading styles. Be sure to use them and modify the settings as necessary. This will provide consistency and accessibility in your report.

Title page

The title page should include the following information, centered on the page.

- Title of Report in Arial, Calibri, or Calibri Light font, 18 point, boldface. No more than three lines.
- If appropriate, an image may be inserted here
- Your name
- College of Aeronautics and Engineering
- Kent State University
- Date
- Course number and title
- Instructor’s name

Abstract

This section should begin on a new page. The abstract is a one or two paragraph summary of the work. It stands alone with no reference to figures, charts, or tables in the text. The line spacing default is double-spacing for academic reports. Other manuscripts may require different line spacing options. The abstract should not exceed one page of double-spaced text.

Table of contents

This section should begin on a new page. Microsoft Word® has an automated table of contents (TOC) feature under the "References" menu. For this feature to work, you must use the preset heading styles (which you can modify). However, you can also generate a table of contents manually. The TOC is the last element of the report to be completed. If changes are made after the TOC is created, be sure to update to TOC as well.

List of figures

This section should begin on a new page. Microsoft Word® has an automated feature under the "References" menu called "Insert Table of Figures." For this feature to work, all figures must have a caption. This should be one of the last pages to be completed.

List of tables

This section should begin on a new page. Microsoft Word® has an automated feature under "Insert Table of Figures." Change the caption label from “figure” to “table.” For this feature to work, all tables must have a caption. This should be one of the last pages to be completed.

Introduction

This section should begin on a new page. The introduction provides the objective, purpose, or end-state of the presentation. It should leave no question as to the intent of the presentation. This should use "Heading 1" style font settings for the heading, then “Normal” style for the content.

Background

This section does not begin on a new page and should use "Heading 1" style font settings for the heading, then “Normal” style for the content.

Methodology

This section does not begin on a new page and should use "Heading 1" style font settings for the heading, then “Normal” style for the content.

Results and discussion

This section does not begin on a new page and should use "Heading 1" style font settings for the heading, then “Normal” style for the content.

Conclusions and recommendations

This section does not begin on a new page and should use "Heading 1" style font settings for the heading, then “Normal” style for the content.

Acknowledgements

This section allows authors to acknowledge contributors and other sources that are not appropriate to list in the references section. Example:

This work was conducted under Grant No. 12345, administered by X. The authors are also particularly grateful to Dr. Jane Smith for her insight into the nature of Y.

References

This is the last section of the report, prior to any appendices. The references should

single-spaced, not be double-spaced. For a technical report, use the CSE style:

[1] Reference 1 information.
[2] Reference 2 information.
[3] Reference 3 information.

Appendices

Provide appropriate appendices as necessary. Each appendix should begin on a new page.

Subheading

Subheadings are sections beneath headings. These sections should use "Heading 2" style font settings.

Subheadings and sub-subheadings are not mandatory. However, if there is one subheading, there must be at least a second subheading. Otherwise, there is no reason for the subdivisions under the primary headings.

Sub-subheading

Sub-subheadings are sections beneath subheadings. These sections should use "Heading 3" style font settings. If there is one sub-subheading, there must be at least a second sub-subheading. Otherwise, there is no reason for the subdivisions under the primary headings.

Avoid any further divisions under the sub-subheading. Otherwise, the number of divisions becomes distracting and difficult to follow.

Appendix D: Guide to preparing non-technical reports using APA style

This appendix provides students with information for using the APA style report template when generating non-technical reports. This type of report would be appropriate for an argumentative paper in a writing-intensive course. Students should use this template when preparing such reports for academic credit. The Microsoft Word® template titled "APA style report template" is available for download. You may type your paper in this template to save time in formatting a new document. This template is a modified version of the APA paper format from http://office.com.

Microsoft Word® has a preset bank of heading styles. Be sure to use them and modify the settings as necessary. This will provide consistency and accessibility in your report. If you use the "APA style report template," the headings are already properly set for you.

Header

A header with the short title of the paper and the page number should appear on most pages of this style document except where noted. The header should be set as follows:

- The short title should be less than 50 characters and left aligned.
- The page number i.e. Page 1 of 6 should be right aligned.
- Set a tab to right align the page number. Do not use the tab key to tab over. Example:

SHORT TITLE OF PAPER IN ALL CAPS Page X of Y

Title page

The title page should include the following:

- A header identifying the short title of the paper and the page number. Open the header and choose the option "Different First Page." You may now enter the header for the title page. This is where you identify the "running head" or short title of your paper. Example:

Running head: SHORT TITLE OF PAPER IN ALL CAPS Page X of Y

- The full title of the report
- Author
- Author affiliation

Abstract

This section should begin on a new page. Your abstract should be one paragraph and

should not exceed 120 words. It is a summary of the most important elements of your paper. It stands alone with no reference to figures, charts, or tables in the text. All numbers in the abstract, except those beginning a sentence, should be typed as digits rather than words. Microsoft Word® offers a word count feature to assist you.

Title of paper

Begin your paper with the introduction. The active voice, rather than passive voice, should be used in your writing.

The template is formatted according to APA Style guidelines, with one inch top, bottom, left, and right margins; Times New Roman font in 12 point; double-spaced; aligned flush left; and paragraphs indented 5-7 spaces. The page number appears one inch from the right edge on the first line of each page, excluding the Figures page.

Headings

Use headings and subheadings to organize the sections of your paper. The first heading level is formatted with initial caps and is centered on the page. Do not start a new page for each heading. Be sure to use the preset heading font settings

Subheadings

Subheadings are formatted with italics and are aligned flush left.

Citations

Source material must be documented in the body of the paper by citing the authors and dates of the sources. The full source citation will appear in the list of references that follows the body of the paper. When the names of the authors of a source are part of the formal structure of the sentence, the year of the publication appears in parenthesis following the identification of the authors, for example, Smith (2001). When the authors of a source are not part of the formal structure of the sentence, both the authors and years of publication appear in parentheses, separated by semicolons, for example (Smith and Jones, 2001; Anderson, Charles, & Johnson, 2003). When a source that has three, four, or five authors is cited, all authors are included the first time the source is cited. When that source is cited again, the first author's surname and "et al." are used. See the example in the following paragraph.

Use of this standard APA style "will result in a favorable impression on your instructor" (Smith, 2001). This was affirmed again in 2003 by Professor Anderson (Anderson, Charles & Johnson, 2003).

When a source has two authors cited, both authors are cited every time. If there are six or more authors to be cited, use the first author's surname and "et al." the first and each subsequent time it is cited. When a direct quotation is used, always include the author,

year, and page number as part of the citation. A quotation of fewer than 40 words should be enclosed in double quotation marks and should be incorporated into the formal structure of the sentence.[1] A longer quote of 40 or more words should appear (without quotes) in block format with each line indented five spaces from the left margin. The indent should be set as a tab. Do not use the space bar to indent.

References

This section begins on a new page. Microsoft Word® has an “insert page break” feature that can assure the section begins on a new page even if changes are made to the sections prior to it.

Entries are organized alphabetically by surnames of first authors and are formatted with a hanging indent. Most reference entries have three components:

1. Authors: Authors are listed in the same order as specified in the source, using surnames and initials. Commas separate all authors. When there are seven or more authors, list the first six and then use "et al." for remaining authors. If no author is identified, the title of the document begins the reference.
2. Year of Publication: In parenthesis following authors, with a period following the closing parenthesis. If no publication date is identified, use "n.d." in parenthesis following the authors.
3. Source Reference: Includes title, journal, volume, pages (for journal article) or title, city of publication, publisher (for book).

Examples:

Anderson, Charles & Johnson (2003). The impressive psychology paper. Chicago: Lucerne Publishing.

Smith, M. (2001). Writing a successful paper. The Trey Research Monthly, 53, 149-150.

Appendices

Each Appendix begins on a new page. Microsoft Word® has an “insert page break” feature that can assure the section begins on a new page even if changes are made to the sections prior to it.

Footnotes

[1]Complete APA style formatting information may be found in the Publication Manual.

Figure Captions

Figure 1. Caption of figure.

Figures

Note that this page does not have the manuscript header or page number.

Appendix E: Guide to preparing sample a sample business case study

This appendix provides students with an example template for generating non-technical reports. This type of report would be appropriate for a management course. Students should use this template when preparing such reports for academic credit. A Microsoft Word® template titled "sample case study and template" is available for download. The source for this case study format is from Ashford University https://awc.ashford.edu/tocw-guidelines-for-writing-a-case-study.html.

Microsoft Word® has a preset bank of heading styles. Be sure to use them and modify the settings as necessary. This will provide consistency and accessibility in your report.

Guidelines for writing a case study analysis

A case study analysis requires you to investigate a business problem, examine the alternative solutions, and propose the most effective solution using supporting evidence.

Preparing the case

Before you begin writing, follow these guidelines to help you prepare and understand the case study:

- Read and examine the case thoroughly.
    - Take notes
    - Highlight relevant facts
    - Underline key problems.
- Focus your analysis
    - Identify two to five key problems
        - Why do they exist?
        - How do they impact the organization?
        - Who is responsible for them?
- Uncover possible solutions.
    - Review course readings, discussions, outside research, your experience.

Select the best solution

Consider strong supporting evidence, pros, and cons: is this solution realistic?

Drafting the case

Once you have gathered the necessary information, a draft of your analysis should include these sections:

Introduction

- Identify the key problems and issues in the case study.

- Formulate and include a thesis statement, summarizing the outcome of your analysis in 1–2 sentences.

Background

- Set the scene: background information, relevant facts, and the most important issues.
- Demonstrate that you have researched the problems in this case study.

Alternatives

- Outline possible alternatives (not necessarily all of them)
- Explain why alternatives were rejected
- Constraints/reasons
- Why are alternatives not possible at this time?

Proposed Solution

- Provide one specific and realistic solution
- Explain why this solution was chosen
- Support this solution with solid evidence
- Concepts from class (text readings, discussions, lectures)
- Outside research
- Personal experience (anecdotes)

Recommendations

- Determine and discuss specific strategies for accomplishing the proposed solution.
- If applicable, recommend further action to resolve some of the issues.
- What should be done and who should do it?

Finalizing the Case

After you have composed the first draft of your case study analysis, read through it to check for any gaps or inconsistencies in content or structure: Is your thesis statement clear and direct? Have you provided solid evidence? Is any component from the analysis missing?

When you make the necessary revisions, proofread and edit your analysis before submitting the final draft.

Appendix F: Computer script example

This appendix provides students with an example of written computer codes. This particular script was created using Matlab®. Three different views are presented.

- The first is the script as it is written in the Matlab® editor.
- The second view shows a published view of the script and its output. This is the html format, using the “publish” feature of Matlab®.
- The third view is the script published in .doc format.

Matlab® editor sample output


```
%% Complex exponential plotter
%% Comments
% filename: complex_exponential_plotter

%%
% keywords: exponential function, complex exponential, complex
number
%%
% file created on 4/22/2015 by D. Blake Stringer

%%
% last updated on 5/26/2015 by D. Blake Stringer

%%
% primary purpose: To plot the complex exponential function
$z=e^{j \theta}$

%%
% primary input and output variables: The primary input
variable is the angle, theta.
The primary
% output variable is the complex variable, z.
% functions: N/A

%% Input section
close all; clear all; clc;

theta= [0:pi/12:2*pi];

%% Calculation section
z = exp(j.*theta);

%% Output section
set(0,'DefaultFigureColor',[1 1 1]);
jj = 1;

figure(jj);

plot(z,'-o');
xlim([-2 2]);ylim([-2 2]);

axis square;
jj = jj+1;
```

Matlab® html sample output

Complex exponential plotter

Contents

- Comments
- Input section
- Calculation section
- Output section

Comments

filename: complex_exponential_plotter

keywords: exponential function, complex exponential, complex number

file created on 4/22/2015 by D. Blake Stringer

last updated on 5/26/2015 by D. Blake Stringer

primary purpose: To plot the complex exponential function $z = e^{j\theta}$

primary input and output variables: The primary input variable is the angle, theta. The primary output variable is the complex variable, z. functions: N/A

Input section

close all; clear all; clc;

theta = (θ:pi/12:2*pi];

Calculation section

```
z = exp(j.*theta);
```

Output section

```
set(e,'DefaultFigureColor',[1 1 1]);
jj = 1;

figure(jj);
plot(z,'o');
xlim([-2 2]);ylim([-2 2]);
axis square;
jj = jj+1;
```

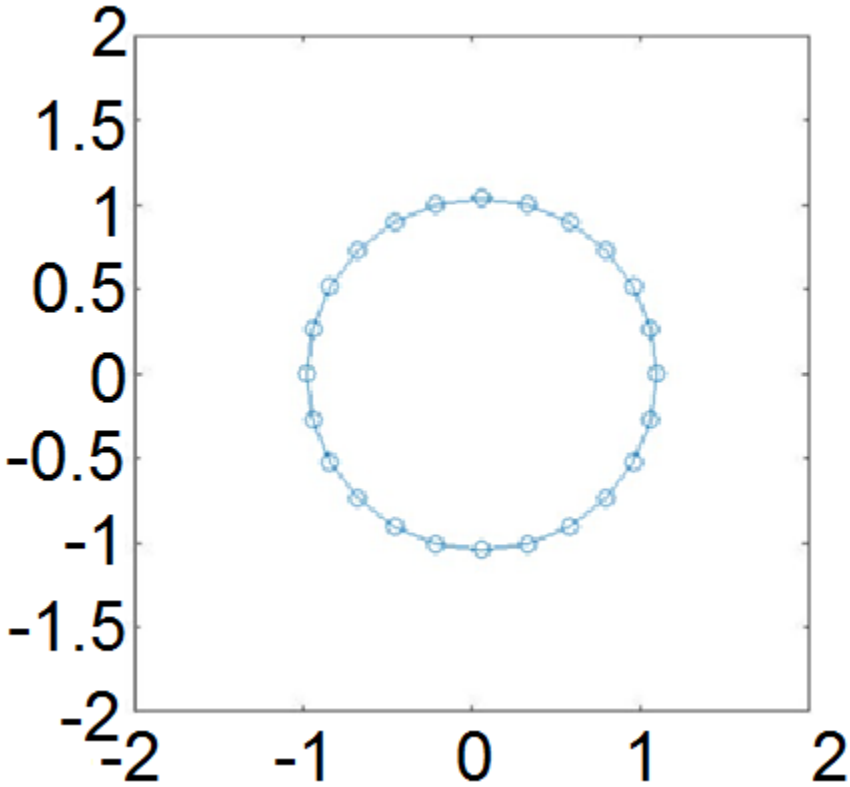


Figure 4 Published with MATLAB® R2015a

Matlab® .doc sample output

Complex exponential plotter

Comments 1

Input section 1

Calculation section 1

Output section 1

Comments

filename: complex_exponential_plotter

keywords: exponential function, complex exponential, complex number

file created on 4/22/2015 by D. Blake Stringer

last updated on 5/26/2015 by D. Blake Stringer

primary purpose: To plot the complex exponential function $z = e^{j\theta}$

primary input and output variables: The primary input variable is the angle, theta. The primary output variable is the complex variable, z. functions: N/A

Input section

close all; clear all; clc;

theta = (θ:pi/12:2*pi];

Calculation section

```
z = exp(j.*theta);
```

Output section

```
set(e,'DefaultFigureColor',[1 1 1]);
jj = 1;

figure(jj);
plot(z,'o');
xlim([-2 2]);ylim([-2 2]);
axis square;
jj = jj+1;
```

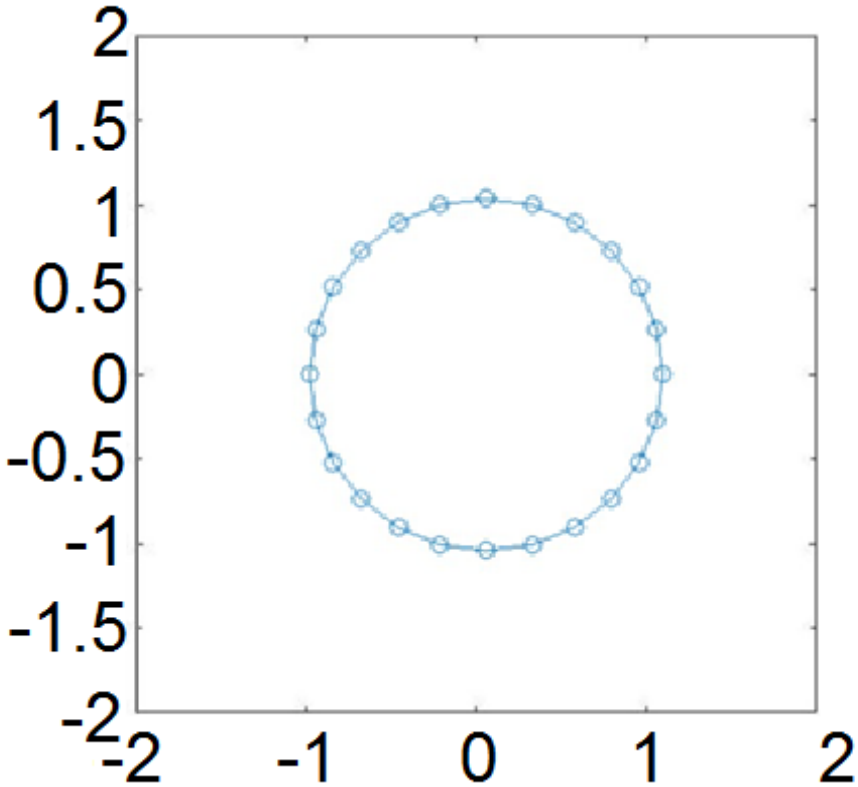


Figure 5 Published with MATLAB® R2015a