Writing About Operations Research – Introduction and Conclusion

1 The introduction section

- The purpose of the **introduction** is to give your reader the big picture of your study:
  - What is your study about?
  - What analysis did you conduct?
  - Why is it important or interesting?

- Suggested outline:
  1. **Background and motivation.** (1-3 paragraphs)
     - Start by providing background on the system that you are studying.
     - Identify the issue with the system you are studying.
     - Convince the reader that addressing this issue is interesting or important.
  2. **Problem description and methodology.** (1 paragraph)
     - Briefly describe your decision or prediction problem.
       - Identify what you want to find out about the system you are studying.
         (e.g., a schedule that minimizes overtime, predict demand given market conditions)
     - Give a short overview of how you propose to solve your problem.
       - Describe what kind of model you are using to solve your problem.
       - Describe what kind of data you will use with your model.
       - Describe how you will use the model and data to generate results and recommendations.

- If appropriate, include **citations** to relevant background (e.g., facts and figures) and similar previous studies.
  - See Section 3 on page 2 for guidance on how to format your citations and references.

2 The conclusion section

- The purpose of the **conclusion** is to
  - briefly summarize your study,
  - provide recommendations based on your results, and
  - discuss the limitations of your study.

- Suggested outline:
  1. **Brief summary.** (1 paragraph)
     - Remind your reader of your decision or prediction problem.
     - Remind your reader of the kind of model you used to solve your problem.
  2. **Recommendations and limitations.** (1 paragraph)
     - Describe the key takeaways from your results.
     - Discuss the assumptions and limitations of your study.
     - Provide a recommendation for action based on your results, with a clear caveat that your conclusions are based on these assumptions and limitations.

3 APA citation and reference style

- There is no standard style for citations and references in the operations research literature.
- For this course, we will use the APA (American Psychological Association) style, which is similar to what many operations research journals use.
- Below, you'll find examples of common types of in-text citations and references.
- You can find a much more detailed guide on APA in-text citations and the reference list here: https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/index.html
- Use the citations tool in Google Docs: Tools > Citations

In-text citations

Summary or paraphrase. Include the author's last name and the date either in a signal phrase or in parentheses at the end.

> Saltzman (2009) asserts that integer programming significantly reduces the amount of time spent constructing what is to be considered a good, feasible schedule.
>
> The scheduling process often begins well in advance due to university planning requirements (Waterer 1995).

A work with two authors. Name both authors in the signal phrase or parentheses each time you cite the work. In the parentheses, use "&" between the authors' names; in the signal phrase, use "and."

> For example, Chen and Zhang (2009) discussed how to modify their allocation of expected cost into an allocation of realized cost.
>
> Another difficult, but common and beneficial set of constraints consistently implemented in more recent formulations is referred to as "room stability" (Lach & Lübbecke 2008).

A work with three to five authors. Identify all authors in the signal phrase or the parentheses the first time you cite the source.

> In particular, Kranich, Perea, and Peters (2005) studied the strong sequential core of a dynamic cooperative game, which we adapt to the setting we study here.

In subsequent citations, use the first author's name followed by "et al." in either the signal phrase or the parentheses.

> This set of constraints requires multi-period courses to be taught in consecutive periods and has been known to make the problem NP-hard (Daskalaki et al. 2004).

A work with six or more authors. Use only the first author's name followed by "et al." in all citations.

Reference list

General guidelines.

- Put your reference list in a separate section titled "References."
- Your references should be listed in alphabetical order, based on the first author's last name.
- Italicize titles and subtitles of books. Capitalize only the first word of the title and subtitle, as well as all proper nouns.

- Capitalize only the first word of the title and subtitle of articles.
- For each entry in your reference list, indent every line after the first line. This is called **hanging indentation**.
- Only include references you cite in your report. Do not include other references, even if you have read them.

Article in a journal paginated by volume.

Bertsimas, D. & Brown, D. B. (2009). Constructing uncertainty sets for robust linear optimization. *Operations Research, 57*, 1483-1495.

Article in a journal paginated by issue.

Martin, C. H. (2004). Ohio University's College of Business uses integer programming to schedule classes. *Interfaces, 34*(6), 460-465.

Conference proceedings.

Edmonds, J. (1970). Submodular functions, matroids, and certain polyhedra. In R. Guy, H. Hanani, N. Sauer, & J. Schönheim (Eds.), *Combinatorial Structures and Their Applications (Calgary International Conference on Combinatorial Structures and Their Applications)* (pp. 442-454). New York, NY: Gordon and Breach.

Government document.

United States Naval Academy. (2016). *Academic Dean and Provost Notice 5420.1: Periodic Program Review/Visiting Committee Additional Information*. Annapolis, MD: Author.

Report from a private organization.

American Psychiatric Association. (2000). *Practice guidelines for the treatment of patients with eating disorders* (2nd ed.). Washington, DC: Author.

Book.

Grötschel, M., Lovász, L., & Schrijver, A. (1993). *Geometric algorithms and combinatorial optimization.* Berlin: Springer.

References

Hacker, D. (1995). *A Writer's Reference.* (3rd ed.). New York: St. Martin's.

Purdue Online Writing Lab. (n.d.) *APA Style Workshop*. Purdue Online Writing Lab. https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/index.html