Writing for ELEC 3040/3050

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Do Engineers Really Write Much?

• Sources we regularly poll:
  – ECE Industrial Advisory Board
  – Companies that hire YOU

• They consistently say:
  “Effective communication is equally important to technical know-how.”
Some Forms of Technical Writing

• Email: dominant form of professional correspondence
• Letters: becoming less common, feels more “formal”
• Memos: common before email age, still in use
• Resumés
• Reports: design, laboratory, progress, proposals, instructions, theses
• Lab notebooks: archive of ideas and raw data
Writing assignments this term

• Memos: three (two graded)
• Design report: a draft, plus a revision
• Proposal: your solution to an engineering ethics problem
• Lab notebook: evaluated six times (five for grade)
Online resources

Michael Alley, Penn State Univ
https://www.craftofscientificwriting.com

Miller Writing Center, Auburn Univ
Writing in the Sciences
Memo guidelines
Memos

• Memo audience: within the place of work
• Letter audience: outside the place of work
• Often serve as short (progress) reports
• Subject line: Readers often decide “read” or “trash” based on the words here.
• People directly affected should be cc’d
3040/3050 memo guidelines

• First lines  (heading block, single spaced)
  To:       John Hung, Victor Nelson
  From:     My name and my teammate’s name
  Section:  Thursday, 12:30 p.m.
  Date:     19 January 2019
  Subject:  Remember, this line is important!

• Body     (double spaced, see Syllabus for length guideline)

• Supporting materials  (start new page, single spaced)

• “Poor” vs “better” samples  (at course homepage)
More about the memo Body

• Consider using headings and subheadings
• Open with description of goals (2-5 sentences)
• Then, present:
  – results
  – ongoing issues
  – Conclusions
• Figures and tables can be effective
  – If inserted, then be sure to discuss it
  – Each need a label and a caption
Supporting materials

• “One picture is worth a thousand words”
  – only if it is well-designed

• Computer programs
  – Single space
  – Add explanatory comments
    • Above blocks of instructions
    • Adjacent to key instructions
  – Number each line, then refer to line numbers
  – Is the complete listing necessary?
Figure examples

Less effective
Fig. 1. Keypad interface

More effective
Fig. 1. Keypad controller schematic
Memo grading

• Two numbers:
  – Writing (4 point scale), assigned to memo author
  – Progress (4 point scale), assigned to both teammates

• Grading rubric (at course website)
Design report guidelines
Objectives of Design reports

- Detailed description of a design
- Present evidence that the features work
- Concise presentation of data
- Highlight important features in data
3040/3050 Design report structure

• First lines (same heading block as for memos)
• Executive summary
• Problem description, desired performance
• Design description
• Testing methods
• Experimental results
• Concluding remarks, references
• Supporting materials (appendices)
The executive summary

• Describe contents of the report
• Summarize the report structure
Problem summary

• Open with description of problem that is solved, using layman’s terminology

• Present specific (detailed, quantifiable) performance expectations and constraints
  – Tables and figures may be appropriate
Design description

• Describe device, circuit, algorithm, program, etc. that solve the problem
• Explain implementation of the design
• Describe how parameters are designed, e.g., circuit component values, software values
• Give sufficient detail to enable design reproduction
Testing methods

• Describe the desired data that must be collected
• Describe equipment and procedures used to collect the data
Experimental results

• Use graphs, tables, and figures to concisely present data
• Include labels and descriptive captions
• Try to present “desired” and “actual” results in ways that are easy to comprehend
Concluding remarks

• Draw conclusions from reproducible data
• Avoid vague, subjective comments
  – Not, “The design works great...”
  – Rather, “The design produces a signal whose amplitude is within 2% of the desired values...”
References

• Use established bibliographic styles, e.g.
  
  

• Cite references in the report by using their labels [1], or (Nelson, 2019).
3040/3050 Design report grading

• Drafts are assessed in three areas (see rubrics)
  – Ability to design
  – Ability to design and conduct experiments
  – Ability to communicate in writing

• Revised reports are re-assessed
Lab notebook guidelines

Notebook grading rubric
(used by the TAs)
Why a notebook?

• Primary record of work
• Record-keeping
• Helps organize ideas and data
• Legal proof of work
Typical notebook characteristics

- Permanent binding (no loose sheets)
- May be graph paper ruled
- Contains “all” work
  - Hypotheses, ideas, sketches
  - Experimental materials and setups
  - Calculations, raw data, preliminary analysis
  - Signatures of witnesses
  - Some companies permit only ink (no pencil)
- Neatness and grammar are secondary