

Intro to Technical Writing



Science is built up with facts, as a house is with stones. But a collection of facts is no more a science than a heap of stones is a house.

- J. H. Poincaré

Summer 2016 Writing Assignment

- In the final project, you will be using a robot called the DE2Bot.
- The first writing assignment (covered in detail next week) will introduce you to specific information you will need for the project.



ECE 2031 Writing Assignments

All UPCP assignments in 2031 have:

- **In-class lecture:** Overview of the assignment
- **Assignment sheet:** Details of the assignment
- **Template:** Microsoft Word template with formatting
- **Evaluation Sheet:** Used by GTAs to grade the paper
- **Example documents:** To show you writing style
- All of these resources will be on the UPCP site:
upcp.ece.gatech.edu

Engineers are Communicators

- *“Professional engineers will spend 40-60% of their working time writing and giving presentations.”*
- *“Ironically, most engineering programs devote less than 5% of their curriculum to communication skills.”*

--David Beer, *A Guide to Writing as an Engineer*, 1996, 2006

- Your value as an engineer is your knowledge, and knowledge is only useful when shared.
- Technical communication competency is a highly desirable trait in the professional world.

Technical vs Prosaic Writing

- Prosaic writing tries to complicate things.
- Technical writing works to simplify things.
- Focus on accuracy, clarity, and efficiency
 - Concise, unambiguous sentences
 - Clear wording and phrasing
 - Emphasis on organization
 - No embellishment or fluff



Cater to the Audience

- Every technical document has an audience. Always keep them in mind
- Different audiences can require substantially different information
 - Type of information
 - Depth of information
 - Even minor things like whether or not you need to define acronyms before use

Writing Style



- Data is quantified
 - *How fast, how accurate, how reliable.*
 - Avoid vague language: ‘somewhat’, ‘very’, ‘several’, etc.
- Passive voice is acceptable
 - “An ASM chart is shown in Figure 3.”
- Technical documents tend to be “dry.”
 - And that’s fine; writing to inform, not to entertain

Avoid Monotony



- “Dry” does not mean monotonous
- Avoid repeating the same sentence structure over and over; vary your sentences
- Example sentence openers:

subject-verb	Pulse-width modulation is a technique ...
prepositional phrase	By varying the duty cycle, PWM can ...
dependent clause	Although PWM generates a digital output, a simple passive filter can ...
adverb	Often, the load itself provides adequate ...
infinitive phrase	To avoid dangerous voltage spikes, a diode ...

Efficient Wording

- Your goal is to transfer information, not to sound smart or technical.
- Unless a more complicated word or phrase adds required meaning, use the simpler form

Verbiage	Efficient
commence	start
endeavor	try
in the majority of instances	usually
connected together	connected

Be Straightforward and Clear

- The goal of every technical document is information transfer
- Overly prosaic text distracts and confuses, and has no place in technical writing:
 - Innuendo, euphemism, hyperbole, sarcasm, word-play, dramatic imagery, suspense
- Give all the information up front, as clearly and concisely as possible

Passive vs Active Voice



- While passive voice is acceptable, active voice is still often preferred.
- “A new control method was explored in the summer 2015 project.”
- “The summer 2015 project explored a new control method.”

Wording Examples



- Same information, simpler wording:
 - In the majority of failed cases, poor lighting conditions were found to be the cause.
 - Most of the failures were caused by poor lighting.
- Less information but more accessible:
 - Operations at the plant stopped momentarily because the thermal storage charging system's desuperheater attemperator valve was replaced.
 - Operations at the plant were stopped for 1.5 hours to replace a valve in the thermal storage system.

Avoid Ambiguity



- If a sentence can be interpreted in more than one way, it must be rephrased

“Reductions of up to 80% in heat and mass transfer coefficients were measured due to outgassing.”

- Were the reductions caused by outgassing?
- Is the heat and mass transfer from outgassing?
- Was it measured because of outgassing?

Things to Avoid



- No personal pronouns
 - “We did [something]” → “[Something] was done”
- No contractions
- No slang or conversational speech
 - “Hook up the circuit” -> “connect”, “attach”
 - “Deal with the problem” -> “investigate”, “solve”
- **No fluff**
 - “The findings are extremely important...”
 - “In today’s society, robots are ubiquitous...”

Spelling and Grammar



- Spelling and grammar are even more important in technical writing than in prose
- Mistakes can change the meaning of a sentence, causing costly errors
- Even if the meaning can be deciphered, your credibility will be damaged
- Proofread for proper grammar, punctuation, word-usage, and sentence- and paragraph-level coherence

Grammar Rules to Watch For

- Numbers:
 - Zero-nine, spell the number out; 10+, use numerals.
 - Exceptions:
 - Numbers with units or decimals: 3V, 9%, factor of 6.5
 - Enumeration: Figure 5, Samples 1-4
 - Start of sentence: “Sixty-one gates were used.”
(re-word sentence to avoid, if possible)
- Initialisms:
 - ‘A’ vs ‘An’ depends on sound, not letter.
 - an FPGA, a UART
- Symbols:
 - $\mu \neq u$; $m \neq M$

Large-scale Organization



- Technical documents usually have a clear introduction, body, and conclusion
 - **Introduction:** provides motivation and context; “big picture” information
 - **Body:** contains technical details
 - **Conclusion:** reemphasize main points and discuss “big picture”

Small-scale Organization



- Most technical writing makes heavy use of headings and subheadings
 - Should be descriptive enough to guide reader to appropriate section
- Paragraphs tend to be shorter than in other types of writing
- Goal is to make information as accessible and easy-to-find as possible

Using Visual Information

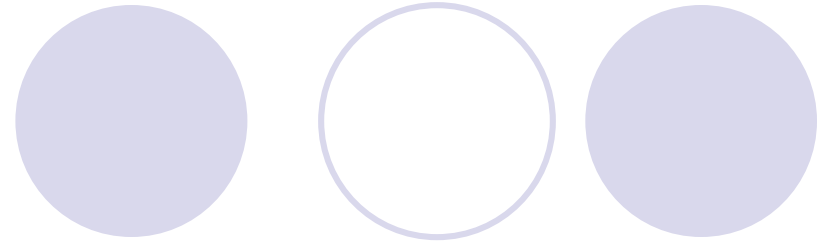
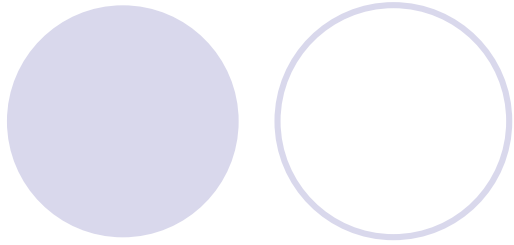


- Large paragraphs of text are the *least-accessible* form of information
- When possible, make use of lists, tables, charts, figures, and other graphics
 - Visual information is nearly always better
 - But don't shy away from using text to explain or give context to figures
 - And there are things that do work better as text. Use common sense.



Engineer Your Documents

- Creating a technical document follows many engineering practices:
 - Define the needs and requirements.
 - Create a prototype (draft)
 - **Test and iterate (review and edit)**
 - Finalize design (proofread)



- Remember: accuracy, clarity, and efficiency
 - Tailored to the audience
 - Concise, unambiguous sentences
 - Emphasis on organization
 - No fluff