

PREPARING YOUR FINAL REPORT FOR ECE 445, SENIOR DESIGN

By

The staffs of
ECE 445
and
ECE Editorial Services

September 2019

Abstract

This guide exemplifies and explains the preparation of final reports for ECE 445 (Senior Design), from formatting and organization to writing style. While this document is generated from the template “ECE 445 Template.dotx” (downloadable from the ECE 445 web site), the format and style requirements outlined are independent of any software or template. LaTeX, OpenOffice, and other packages can produce the required results—provided the user has the necessary skill.

Contents

1. Introduction	1
2. Outline of Subject Matter	2
2.1 Introduction	2
2.2 Design.....	2
2.2.1 Design procedure	2
2.2.2 Design details	2
2.3 Verification	2
2.4 Costs.....	3
2.5 Conclusions	3
2.6 References	3
3. Format.....	4
4. Technical Style.....	5
4.1 Units of Measure.....	5
4.2 Numbers.....	5
4.3 Mathematics	5
4.4 Abbreviations	6
5. Figures and Tables.....	7
5.1 Quality.....	7
5.2 Numbering, Citation, and Placement.....	7
6. Conclusion and Further Resources	9
References	10
Appendix A Recommended Abbreviations	11
Appendix B Checklist for ECE 445 Final Report Authors	14

1. Introduction

The final report presents your project at the demonstration stage. You need to describe the motivation for the project: either a problem to be solved or a goal to be achieved. Relate your solution to that problem in broad terms and then describe in detail the specific design. Write to an imagined audience of company managers who are knowledgeable in your field. They need to see that your design is reliable, economical, and thoroughly tested to meet the specifications in your proposal. If you appear not to understand the engineering principles of your work, have left out important tests, or try to cover with a “sales pitch,” your efforts will not impress them. Write as concisely as you can while conveying the necessary information.

Each member of the project team contributes a proportional share of the actual written material. All reports must be submitted electronically as Word or PDF (LaTeX users should not submit .tex files). Reports will be graded for language and format by the ECE Editorial Services staff who review ECE MS and PhD theses, and for technical adequacy by your instructor.

The report must receive a passing grade for you to pass the course. Rewrites are allowed until a passing grade is achieved, but once passed, rewritten reports will not be accepted for grade improvement.

This guide describes all the components of a successful final report. Chapter 2 introduces the most reliable outline for your subject matter, along with some possible variations. Chapter 3 specifies the final report format. Chapter 4 addresses the main points of good technical style for writing, and Chapter 5 covers the all-important topic of figures and tables. Chapter 6 offers final words of advice and points to further resources for authors. Appendices A and B contain, respectively, a guide to symbols and abbreviations, and a handy checklist.

2. Outline of Subject Matter

2.1 Introduction

Briefly review and update the material from your proposal, presentation, and individual reports. Describe the function, and show the block diagram (which will most likely be your Figure 1 or Figure 1.1), being sure to cite the figure directly in the text (see Section 5.2). Describe briefly the blocks into which the project has been divided. Give the performance requirements as they appear in the final version of your proposal. Describe any block-level changes made to the design during the semester. Show that you understand the key factors in the performance of your project. Be quantitative if possible. If in doubt, seek advice.

2.2 Design

2.2.1 Design procedure

Discuss your design decisions for each block at the most general level: What alternative approaches to the design are possible, which was chosen, and why is it desirable?

Introduce the major design equations or other design tools used; show the *general* form of the circuits and describe their functions.

2.2.2 Design details

Present the detailed design, with diagrams and component values. Show how the design equations were applied. Give equations and diagrams with specific design values and data. Place large data tables in an appendix. Circuit diagrams that are too large to be readable on a single page should be broken into pieces for presentation. The full diagram may be included in an appendix. Use photographs only as necessary and treat them, along with all other graphics except tables, as *figures*.

2.3 Verification

Discuss the testing of the completed project and its major blocks. Provide solid technical data, and present it in an easily grasped manner, using graphs where necessary. Include any standard tests for your type of circuit and all specific ones you feel are needed to prove that the design goals were met.

Discuss the Requirement and Verification Table from your design review. Including the table in an appendix will help avoid lengthy and tedious narrative description in the main text, which may not be of immediate interest to your imagined audience of managers. Do not discuss low-level requirements unless they failed to verify, or you found that they were critical in some unexpected way, or you need to make changes—for instance, to the tolerances or acceptable ranges of quantitative results. It is important to hit the main points and explain any requirement that is not verified, but keep the discussion concise and refer interested readers to the appendix for details.

Note that the design procedure, design details, and design verification can be organized in different ways. The Word template provided by the ECE 445 staff puts the first two in one chapter and the second in another; however, a separate chapter for each is also common, with chapter sections reiterating the main project components. If you do the latter, avoid unnecessary repetition of component descriptions.

Another option, though rarely used, is to organize the report according to components or blocks, with each chapter describing the design procedure, details, and verification for a single component or block.

2.4 Costs

Labor cost estimates should use the following formula for each partner:

$$\text{ideal salary (hourly rate)} \times \text{actual hours spent} \times 2.5$$

Include estimates for electronics and machine shop hours, as applicable. For parts, use real values when you know them; make realistic estimates otherwise. List both the retail cost and what you or the department paid (in this case you may list lab-owned pieces as free). If the project might be commercially viable, estimate the cost of mass-production by listing bulk-purchase costs. Make sure any tables are numbered appropriately, given titles, and cited directly in the text.

2.5 Conclusions

Bring together, concisely, the conclusions to be drawn. It may be appropriate, depending on the nature of the project, to begin or end with a two- or three-sentence executive summary. The reader needs to be convinced that the design will work. Summarize your accomplishments. If uncertainties remain, they should be pointed out, and alternatives, such as modifying performance specifications, should be spelled out to deal with foreseeable outcomes. Use words, not equations or diagrams. Devote a section to ethical considerations with reference to the IEEE Code of Ethics and any other applicable code (e.g., the AMA Code of Medical Ethics for certain bioengineering projects). Either here or in the background discussion of your introduction, provide a paragraph addressing the broader impacts of your project in terms of global, economic, environmental and/or societal contexts.

2.6 References

Follow the IEEE reference styles provided in this document for various kinds of sources. If you need to cite something for which there is no example, simply use common sense and provide—in a neat and orderly manner emulating the IEEE reference style—the information necessary for another researcher to find that source.

References [1]–[3] are examples of a manual, datasheet, and web page, respectively. References [4]–[7] are more standard, scholarly sources: a book, chapter in an edited book, journal article, and conference proceedings. Reference [8] is a technical report, and reference [9] is class notes. Cite all references consecutively in the text, as is done here. (ECE Editorial Services provides a more detailed description of IEEE reference style on its wiki: <http://go.illinois.edu/ecethesis>.)

3. Format

Specific styles for text, chapter titles, section headings, figure captions, and other format features may vary from those on exhibit in this document (the default styles of the provided Word template).

Whatever software you use, and whatever styles you establish, make sure your output meets the following requirements:

- Preliminary pages are numbered with small roman, except title page, which has no page number.
- Table of contents (TOC) is neat, accurate, and consistent in the depth (level of headings) represented for each chapter. Use the automatic TOC feature provided by whatever software you use, and be sure to update the automated content.
- Chapter 1 starts on Arabic page number 1, and the rest of the report, including appendices, follows from that. (Do not use independent page numbering for appendices.)
- Each chapter starts on a new page.
- Preliminary sections (abstract, contents) have chapter status graphically, but are **not** included in the TOC.
- Numbering of chapters and sections is logical, and their style (e.g., capitalization, font size) is consistent.
- References and appendices have chapter status graphically and are included in the TOC, but they are not numbered as chapters.
- Margins are at least one inch on all sides. Watch margins when you insert figures, tables, and equations!
- Maximum number of pages in main text is 20. (Appendices may exceed this.)

Use the checklist in Appendix B!

4. Technical Style

Write in a formal style and neutral tone without letting your writing become dull and lifeless. Use active voice as much as possible, and employ variety in sentence structure. Avoid wordiness, affectation, awkwardness, and gobbledygook. Intensifiers (adverbs modifying adjectives) and other modifiers should be used very sparingly (though subtle grammatical jokes are welcome). Be quantitative when possible. Use past tense to report transitory results and completed actions (“The resistance was 10 Ω until we replaced R1”) and present tense to report final results and discussion (“The trigger fall-time is 15 ms, which is well within the design specifications”). Avoid frequent and arbitrary changes in verb tense.

4.1 Units of Measure

Express quantities with an Arabic number, followed by a space, followed by an IEEE-recommended abbreviation for the unit of measure (see Appendix A). IEEE takes its lead from the International System of Units, which provides a single, coherent measurement system for researchers worldwide. Examples:

0.2 pA, 127 μm , $0.574 \times 10^{-3} \text{ mm}^2$, 10 k Ω , 120 A, \$5500.00

Note that units of measure are *not* italicized. (The only exception is μ , which may be italicized; e.g., 127 μm .)

When discussing units without quantities, use words not symbols (“A millimeter-scale device”).

4.2 Numbers

In general, use words for numbers up to 10 (e.g., one, two, three), and use numerals for numbers 10 and up. Exceptions:

- Always use a word at the beginning of a sentence: “Forty trials were run.” (You may wish to recast as “We ran 40 trials.”)
- Unless at the beginning of a sentence, quantities with units of measure are always numerals: 3 mm, 5 V.
- Numbers used as nouns are usually set as numerals: Chapter 3, sample 16, device 2.
- When comparing, within a paragraph, numbers that are above and below 10, make them all numerals: “In trials 1 and 2, we completed 8 and 15 runs, respectively.”
- If two numbers that would normally be set as numerals appear next to each other, it may be best to change the lowest number to words: “We completed sixteen 45 min trials.”
- In some cases it may be clearer to spell out zero and one than to use numerals 0 and 1.

4.3 Mathematics

Mathematical expressions that are referenced later in the text should be displayed (not in-line) and numbered according to the same system as, but in a sequence independent of, figures and tables. Displayed expressions should be centered (preferred) or indented, with numbers (if used) in parentheses flush right. Insert any punctuation after the equation, not the number. (Such terminal punctuation is not required, but if used it must be applied consistently. The easiest style is simply to

Among the rubidium states involved in the quantum beat detection, the largest transition dipole moment is that of the $5^2D_{5/2} - 6^2P_{3/2}$ transition. At the minimum mean internuclear separation noted above, the dipole-dipole force between an atom in the $5^2D_{5/2}$ state and one in the $6^2P_{3/2}$ state would cause a perturbation of 2.5 GHz.

Collisions between atoms in the vapor also affect the observed signal by reducing the coherence time, and thus broadening the observed spectral line. To determine the collision frequency, first we need to find the mean speed and the mean free path, which are both quantities that depend on the temperature of the vapor. The mean speed of the atoms in the vapor is

$$\langle |v| \rangle = \sqrt{\frac{8kT}{\pi m}} \quad (2.11)$$

where k is the Boltzmann constant, T is the absolute temperature of the vapor, and m is the mass of the atom. Comparing Equations (2.10) and (2.11) ...

Figure 1. Well formatted passage of running text, in-line math, displayed equation with number, "where" list, and equation references.

have no punctuation after equations.) Text references to numbered equations should be capitalized, with parentheses preceded by a space: "Equation (2.1) shows ...".

A mathematical symbol should be rendered with the same typography (e.g., font, italics, bold, upper/lower case) whether it occurs in display or in-line, and it should always denote the same thing. A sentence should not begin with a mathematical symbol—especially a lowercase one, and especially when the previous sentence ends with a mathematical symbol.

Figure 1 depicts correctly formatted math. Pay close attention to italics (for variables) and bold (for vectors and matrices). For easier reading, very long "where" lists can be formatted as ordered lists (indented and aligned).

4.4 Abbreviations

Abbreviations should be defined the first time they appear in both the abstract and the main text. After that, only the abbreviation is necessary, though you may choose to repeat the definition for a new chapter or after an extended period of disuse of the abbreviation. Many standard abbreviations are given in Appendix A. References to figures and equations may be abbreviated using "Fig." and "Eq." as long as the abbreviations are used consistently. The exception is at beginnings of sentences, where words should always be spelled out: "Equation (3.2) gives the formula for"

5. Figures and Tables

Figures and tables must be (1) neat and readable, (2) numbered with descriptive, concise captions (for figures) or titles (for tables), (3) cited directly in the text, and (4) well placed in relation to the textual discussion.

5.1 Quality

Figures should be readable within the one-inch required margins. Label axes using standard symbols for units of measure. Employ color and shading strategically to convey important distinctions, not for the sake of variety or show.

Table titles should be short and appear *above* tables. Align decimal points in columns so that quantities are meaningfully conveyed. Use the title and/or column heads to identify units of measure, rather than repeating them in every cell. Simplicity is best.

5.2 Numbering, Citation, and Placement

Number figures, tables, and displayed equations in *independent* sequences according to one of two systems: whole number (1, 2, 3 ...) or single-decimal (1.1, 1.2 ... 2.1, 2.2, etc., where the number to the left of the decimal corresponds to the chapter number). Use the same system for all three, but do not integrate them in one sequence. Do not create a multiple-decimal numbering system!

In the text, cite every figure and table *directly* (e.g., “Figure 1 shows ...” not “the following figure shows ...”). Citing (and numbering) equations is optional.

Pick one of three placement schemes for figures and tables and stick with it throughout the report:

1. Place figure or table on the page where it is first cited in text (preferably at top or bottom of page), or on the first possible page after it is cited in text (which may be some pages later if several figures are cited in a short passage).
2. Place figures and tables in a separate section at the end of the chapter.
3. Place figures and tables in a separate chapter (not an appendix) after the conclusion and before the references.

Schemes 2 and 3 require a numbered section or chapter entitled “Figures and Tables” with a table of contents entry. When you cite the first figure or table in the text, notify the reader with a comment such as “All figures and tables are in Section X.X” or “All figures and tables are in Chapter X.” Figure 2 and Table 1 provide examples of scheme 1.

Do not (as has been popular recently in ECE 445 final reports) create independent series of schematics, photographs, block diagrams, etc. *These are all figures*, part of one sequence of figures. If helpful, you may specify the kind of figure in the caption or textual discussion, but it is usually obvious. Large

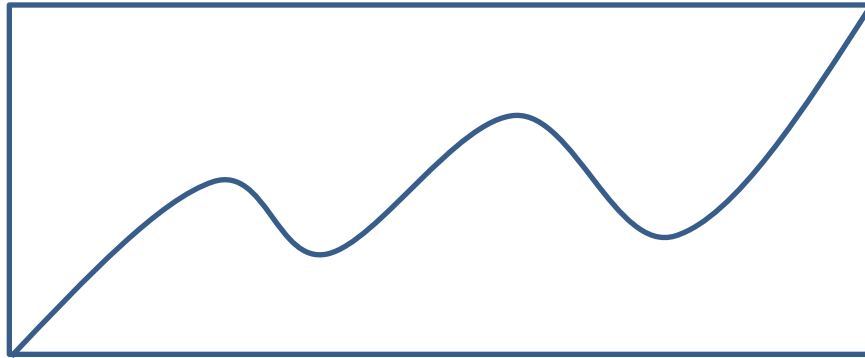


Figure 2. Figure placed according to scheme 1.

schematics (such as circuit diagrams) that are presented in pieces in the main text may be included intact in an appendix, but they are still cited, captioned, and numbered (e.g., A.1, A.2 ..., if using the decimal system) as figures.

You may place figures and tables according to scheme 2 or 3 in the main text while using scheme 1 in an appendix; otherwise, however, *do not mix* the three placement schemes.

Do not scatter figures among short passages of text as if narrating a slide show. Rather, write in unified, coherent, complete paragraphs, and try to hold blocks of text together on the page. This is why top or bottom of the page is best for figure and table location.

Large figures and tables may be rotated 90 degrees counterclockwise along with the caption, but keep the page number at the bottom in “portrait” orientation. Multipage figures and tables should have an abbreviated caption or title such as “Figure 1 (continued)” on every page after the first. However, never split a figure or table (including its caption or title) across a page break when it will fit in one page; for example, do not start a short table at the bottom of one page and continue it on the next.

Table 1 Table placed according to scheme 1

Part	Manufacturer	Cost (\$)
Part A	Cisco	119.99
Part B	AMD	57.99

6. Conclusion and Further Resources

Even if it provides the necessary structure and formatting styles for a report, a template cannot guarantee a well-organized and formatted final document, much less a well-written one. The best way to ensure success is to start early, collaborate carefully, seek help when you get stuck, and revise, revise, revise! Use the checklist provided in Appendix B.

In addition to the ECE 445 staff and ECE Editorial Services (jhutchin@illinois.edu), you can get help with the writing process, including questions of style, grammar, and organization, through the Writer's Workshop with locations across campus including Grainger Library. See the web site at www.cws.illinois.edu/workshop/. (The link "Writer Resources" is extremely helpful, with a grammar handbook, ESL resources, and writing tips.)

Strunk and White [10] bears reading about once per year for anyone who must write effectively in his or her career. Williams [11] is more lengthy but very worthwhile. For technical writing in particular, Alley [12] remains a fresh, highly readable introduction, while Alred et al. [13] provide an exhaustive overview that is useful as a reference tool.

Finally, do not simply write mechanically. Keep in mind that the purpose of writing is to convey ideas. Focus on your ideas, make certain that they are clear to you, and work to make them clear to your reader.

References

- [1] *Motorola Semiconductor Data Manual*, Motorola Semiconductor Products, Inc., Phoenix, AZ, 2007.
- [2] *Double Data Rate (DDR) SDRAM*, datasheet, Micron Technology, Inc., 2003. Available at: http://www.micron.com/~/media/documents/products/data-sheet/dram/ddr1/256mb_ddr.pdf
- [3] Linx Technologies LT Series, web page. Available at: <https://www.linxtechnologies.com/en/products/modules>. Accessed May 2015.
- [4] J. A. Prufrock, *Lasers and Their Applications in Surface Science and Technology*, 2nd ed. New York, NY: McGraw-Hill, 2009.
- [5] W. P. Mondragon, "Principles of coherent light sources: Coherent lasers and pulsed lasers," in *Lasers and Their Applications in Surface Science and Technology*, 2nd ed., J. A. Prufrock, Ed. New York, NY: McGraw-Hill, 2009, pp. 117-132.
- [6] G. Liu, "TDM and TWDM de Bruijn nets and shufflenets for optical communications," *IEEE Transactions on Computers*, vol. 59, no. 1, pp. 695-701, June 2011.
- [7] S. Al Kuran, "The prospects for GaAs MESFET technology in dc-ac voltage conversion," in *Proceedings of the Fourteenth Annual Portable Design Conference*, 2010, pp. 137-142.
- [8] K. E. Elliott and C. M. Greene, "A local adaptive protocol," Argonne National Laboratory, Argonne, IL, Tech. Rep. 916-1010-BB, 2006.
- [9] J. Groeppelhaus, "Java 5.7 tutorial: Design of a full adder," class notes for ECE 290, Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, 2011.
- [10] W. Strunk Jr. and E. B. White, *The Elements of Style*, 4th ed. Needham Heights, MA: Allyn & Bacon, 2000.
- [11] J. M. Williams, *Style: Lessons in Clarity and Grace*, 9th ed. New York, NY: Pearson Education, 2007.
- [12] M. Alley, *The Craft of Scientific Writing*, 3rd ed. New York, NY: Springer, 1996.
- [13] G. J. Alred, C. T. Brusaw, and W. E. Oliu, *Handbook of Technical Writing*, 8th ed. New York, NY: St. Martin's Press, 2006.

Appendix A Recommended Abbreviations

Unit or Term	Symbol or Abbreviation	Unit or Term	Symbol or Abbreviation
alternating current	ac	electromotive force	EMF
American wire gauge	AWG	electronvolt	eV
ampere	A	electrostatic unit	ESU
ampere-hour	Ah	erg	erg
amplitude modulation	AM	extra-high voltage	EHV
angstrom	Å	extremely high frequency	EHF
antilogarithm	antilog	extremely low frequency	ELF
atomic mass unit (unified)	u	farad	F
audio frequency	AF	field-effect transistor	FET
automatic frequency control	AFC	foot	ft
automatic gain control	AGC	footlambert	FL
automatic volume control	AVC	foot per minute	ft/min
average	avg	foot per second	ft/s
backward-wave oscillator	BWO	foot-poundal	ft•pdl
bar	bar	foot pound-force	ft•lbf
barn	b	frequency modulation	FM
beat-frequency oscillator	BFO	frequency-shift keying	FSK
bel	B	gallon	gal
billion electronvolts*	BeV	gallon per minute	gal/min
binary coded decimal	BCD	gauss	G
bit	b	gigacycle per second	Gc/s
British thermal unit	Btu	gigaelectronvolt	GeV
byte	B	gigahertz	GHz
calorie	cal	gilbert	Gb
candela	cd	gram	g
candela per square foot	cd/ft ²	henry	H
candela per square meter	cd/m ²	hertz	Hz
cathode-ray oscilloscope	CRO	high frequency	HF
cathode-ray tube	CRT	high voltage	HV
centimeter	cm	horsepower	hp
centimeter-gram-second	CGS	hour	h
circular mil	cmil	inch	in
continuous wave	CW	inch per second	in/s
coulomb	C	inductance-capacitance	LC
cubic centimeter	cm ³	infrared	IR
cubic foot per minute	ft ³ /min	inside diameter	ID
cubic meter	m ³	intermediate frequency	IF
cubic meter per second	m ³ /s	joule	J
curie	Ci	joule per degree	J/deg
cycle per second	Hz	joule per kelvin	J/K
decibel	dB	kilobit per second	kb/s
decibel referred to one milliwatt	dBm	kilobyte	kB
degree Celsius	°C	kilocycle per second	kHz/s
degree Fahrenheit	°F	kiloelectronvolt	keV
degree Kelvin**	K	kilogauss	kG
degree (plane angle)	...°	kilogram	kg
degree Rankine	°R	kilogram-force	kgf
degree (temperature interval or difference)	deg	kilohertz	kHz
diameter	diam	kilohm	kΩ
direct current	dc	kilojoule	kJ
double sideband	DSB	kilometer	km
dyne	dyn	kilometer per hour	km/h
electrocardiograph	EKG	kilovar	kvar
electroencephalograph	EEG	kilovolt	kV
electromagnetic compatibility	EMC	kilovoltampere	kVA
electromagnetic unit	EMU	kilowatt	kW

*Deprecated: use gigaelectronvolt (GeV).

**Preferably called simply *kelvin*.

Unit or Term	Symbol or Abbreviation	Unit or Term	Symbol or Abbreviation
kilowatthour	kWh	neper	Np
lambert	L	newton	N
liter	l	newton meter	N•m
liter per second	l/s	newton per square meter	N/m ²
logarithm	log	oersted	Oe
logarithm, natural	ln	ohm	Ω
low frequency	LF	ounce (avoirdupois)	oz
lumen	lm	outside diameter	OD
lumen per square foot	lm/ft ²	phase modulation	PM
lumen per square meter	lm/m ²	picoampere	pA
lumen per watt	lm/W	picofarad	pF
lumen-second	lm•s	picosecond	ps
lux	lx	picowatt	pW
magnetohydrodynamics	MHD	pound	lb
magnetomotive force	MMF	poundal	pdl
maxwell	Mx	pound-force	lbf
medium frequency	MF	pound-force foot	lbf-ft
megacycle per second	MHz/s	pound-force per square inch	lbf/in ²
megaelectronvolt	MeV	pound per square inch§	psi
megahertz	MHz	power factor	PF
megavolt	MV	private branch exchange	PBX
megohm	MΩ	pulse-amplitude modulation	PAM
metal-oxide semiconductor	MOS	pulse code modulation	PCM
meter	m	pulse count modulation	PCM
microampere	μA	pulse duration modulation	PDM
microfarad	μF	pulse position modulation	PPM
microgram	μg	pulse repetition frequency	PRF
microhenry	μH	pulse-repetition rate	PRR
micrometer	μm	pulse-time modulation	PTM
micron†	μ	pulse-width modulation	PWM
microsecond	μs	radian	rad
microsiemens	μS	radio frequency	RF
microwatt	μW	radio-frequency interference	RFI
mil	mil	resistance-capacitance	RC
mile per hour	mi/h	resistance-inductance-capacitance	RLC
mile (statute)	mi	revolution per minute	r/min
milliampere	mA	revolution per second	r/s
milligram	mg	roentgen	R
millihenry	mH	root-mean-square	rms
milliliter	ml	second (plane angle)	..."
millimeter	mm	second (time)	s
millimeter of mercury, conventional	mmHg	short wave	SW
millimicron‡	nm	siemens	S
millisecond	ms	signal-to-noise ratio	SNR
millisiemens	mS	silicon controlled rectifier	SCR
millivolt	mV	single sideband	SSB
milliwatt	mW	square foot	ft ²
minute (plane angle)	...'	square inch	in ²
minute (time)	min	square meter	m ²
nanoampere	nA	square yard	yd ²
nanofarad	nF	standing-wave ratio	SWR
nanometer	nm	steradian	sr
nanosecond	ns	superhigh frequency	SHF
nanowatt	nW	television	TV
nautical mile	nmi	television interference	TVI

†The name *micrometer* (μm) is preferred.

‡The name *nanometer* is preferred.

§Although the use of the abbreviation psi is common, it is not recommended. See pound-force per square inch.

Unit or Term	Symbol or Abbreviation
tesla	T
thin-film transistor	TFT
transverse electric	TE
transverse electromagnetic	TEM
transverse magnetic	TM
traveling-wave tube	TWT
ultrahigh frequency	UHF
ultraviolet	UV
vacuum-tube voltmeter	VTVM
var	var
variable-frequency oscillator	VFO
very-high frequency	VHF
very-low frequency	VLF

Unit or Term	Symbol or Abbreviation
vestigial sideband	VSB
volt	V
voltage controlled oscillator	VCO
voltage standing-wave ratio	VSWR
voltampere	VA
volume unit	vu
watt	W
watthour	Wh
watt per steradian	W/sr
watt per steradian square meter	W/(sr•m ²)
weber	Wb
yard	yd

Appendix B Checklist for ECE 445 Final Report Authors

Note: Be sure to check even “automatic” features!

Pagination and margins

- _____ Title page unnumbered (counts as i)
- _____ Preliminary pages in lower case roman numerals
- _____ Chapter 1 starts on Arabic page 1; all pages numbered consecutively after that; each chapter begins on new page
- _____ Minimum one-inch margin on all sides of every page (page number falls slightly outside, which is OK)

Abstract

- _____ On page ii
- _____ Title same style as chapter titles, but unnumbered
- _____ Presents main findings concisely and that is all

Table of contents

Format

- _____ Preliminary material (abstract) *not* included
- _____ Consistent capitalization
- _____ Leader dots appear and page numbers aligned (automatic)

Agreement with text

- _____ Wording of chapter titles and subheadings matches text exactly (automatic)
- _____ Page numbers correct (automatic)
- _____ Update your automatically generated content!

Figures

Placement

- _____ Same page as first citation in text or first possible page after that
or
- _____ Separate section (with tables) at end of each chapter
or
- _____ Separate chapter (with tables) after Conclusion
- _____ **Not** scattered among short passages of text

Figures (continued)

Numbering and citations

- _____ Every figure cited directly in text (e.g., “Figure 1 shows ...”)
- _____ Figures numbered in order of their citation in text

Quality

- _____ Information conveyed economically
- _____ Neat, legible, and within margins
- _____ Axes labeled

Captions

- _____ Every figure has descriptive caption (not just “Figure 1”)
- _____ Caption below figure, use “Figure X (continued)” for multipage figures

Tables

Placement

- _____ Same page as first cited in text or first possible page after that
or
- _____ Separate section (with figures) at end of each chapter
or
- _____ Separate chapter (with figures) after Conclusion

Numbering and citations

- _____ Every table cited directly in text (e.g., “Table 1 shows ...”)
- _____ Tables numbered in order of their citation in text

Quality

- _____ Neat and legible
- _____ Decimals aligned
- _____ Column and row headers labeled, with unit symbols, if necessary

Titles

- _____ All tables have descriptive title (not just “Table 1”)
- _____ Title *above* table, use “Table X (continued)” for multipage figures

Equations

- _____ Neat and legible, with proper use of italics and bold
- _____ Centered or indented consistently
- _____ Numbered in sequence and according to same scheme (whole number or single-decimal) as figures and tables, but in a sequence independent of figures and tables
- _____ Use of parentheses both in display and in text citation
- _____ Numbers are flush right

Appendices

- _____ Appear before References *if* they contain reference citations
- _____ Figures and tables numbered, with captions/titles, and cited in the text

References

- _____ All references cited in the text, and every citation corresponds to an entry in References
- _____ Numbered in order of citation in text
- _____ Use of brackets and other IEEE style
- _____ Use the template, and proofread!

Writing and style

- _____ Quantities expressed with number, space, and correct unit symbol
- _____ Abbreviations defined at first use and used consistently afterward
- _____ Writing is neutral in tone, formal in style, and consistent from writer to writer
- _____ Active voice used as much as possible
- _____ Needless words omitted
- _____ Every sentence clear and readable
- _____ Read the paper aloud
- _____ Ask a friend unfamiliar with the subject matter to read and comment