PREPARING YOUR FINAL REPORT FOR ECE 445, SENIOR DESIGN

By

The staffs of ECE 445

and

ECE Editorial Services

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**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.

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# 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.

# Outline of Subject Matter

## 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.

## Design

### 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.

### 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*.

## 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 makes 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.

## Costs

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

ideal salary (hourly rate)  actual hours spent  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.

## 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.

## 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> .)

# 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!

# 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.

## 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 × 10–3 mm2, 10 kΩ, 120 A, $5500.00

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

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

## 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.

## 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

displayed equation

in-line math

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

Among the rubidium states involved in the quantum beat detection, the

largest transition dipole moment is that of the 5 2*D*5/2 – 6 2*P*3/2 transition. At the minimum mean internuclear separation noted above, the dipole-dipole force between an atom in the 5 2*D*5/2 state and one in the 6 2*P*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

(2.11)

ۃȁ𝑣ȁۄ = ඨ

8𝑘𝑇

𝜋𝑚

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) ...

equation reference

“where” list

equation number

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).

## 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 ”

# 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.

## 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.

## 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 |

# 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](mailto: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/](http://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

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# 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/ft2 | henry | H |
| candela per square meter | cd/m2 | 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 | cm3 | infrared | IR |
| cubic foot per minute | ft3/min | inside diameter | ID |
| cubic meter | m3 | intermediate frequency | IF |
| cubic meter per second | m3/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/m2 |
| 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/ft2 | phase modulation | PM |
| lumen per square meter | lm/m2 | 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/in2 |
| 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 | *µ*A | pulse duration modulation | PDM |
| microfarad | *µ*F | pulse position modulation | PPM |
| microgram | *µ*g | pulse repetition frequency | PRF |
| microhenry | *µ*H | pulse-repetition rate | PRR |
| micrometer | *µ*m | pulse-time modulation | PTM |
| micron† | *µ* | pulse-width modulation | PWM |
| microsecond | *µ*s | radian | rad |
| microsiemens | *µ*S | radio frequency | RF |
| microwatt | *µ*W | 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 | ft2 |
| minute (plane angle) | …' | square inch | in2 |
| minute (time) | min | square meter | m2 |
| nanoampere | nA | square yard | yd2 |
| 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** |  | **Unit or Term** | **Symbol or**  **Abbreviation** |
| tesla  thin-film transistor transverse electric transverse electromagnetic transverse magnetic traveling-wave tube ultrahigh frequency ultraviolet  vacuum-tube voltmeter var  variable-frequency oscillator very-high frequency  very-low frequency | T  TFT TE TEM TM TWT UHF UV VTVM  var VFO VHF VLF |  | vestigial sideband  volt  voltage controlled oscillator voltage standing-wave ratio voltampere  volume unit watt watthour  watt per steradian  watt per steradian square meter weber  yard | VSB  V VCO VSWR VA  vu W  Wh W/sr  W/(sr•m2)  Wb 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