A Guide to Effective Communications: A Handbook for Forest Engineering Students

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As an engineering professional, you will be expected to communicate your ideas effectively to a wide variety of audiences. We have prepared this guide to provide you with our ideas and expectations on this important subject. We will expect you to refer to the guidelines in this document as you practice your communications skills while a student in our program.

Version 2.1, Summer, 2005

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1.0 Introduction

1.1 Background

As engineering educators, we know how important it is for engineering professionals to communicate their ideas and concepts effectively. In fact, we have identified 'effective communications' as our first program outcome. Recently, a group of employers - people who have hired graduates from our forest engineering program - reinforced to us the importance of communications skills in our engineering graduates.

We recognize that communications should be incorporated throughout our four year program, and that skill development requires practice. We further recognize that the ability to communication effectively is far too important to relegate to one or two courses. We therefore decided to create this handbook to document our commitment to this important component of your education.

1.2 Scope

This document is about the *how* to communicate, not the *what*. The *what* is easy - as an engineer you have special knowledge and skills. As an engineering student, you will develop your knowledge throughout your education and after graduation as you advance in your career. We have found the *what* will therefore take care of itself. However, we have observed numerous examples of students struggling with the *how* of communications.

1.3 Purpose

We created this document for five reasons:

1. To articulate our expectations as to attributes of effective communications and to communicate those expectations to our engineering students,
2. To provide a reference for forest engineering students as they practice their communications skills,
3. To formalize the communication experiences and training forest engineering students will encounter throughout our curriculum,
4. To document which examples of our students' communications efforts will be recorded and maintained in each student's digital portfolio, and
5. To demonstrate to our external constituents our commitment to produce engineering graduates who recognize the importance of effective communications and who have practiced communications skills throughout their program.

1.4 Attributes of Effective Communication:

We begin with a general statement of what factors should be considered in thinking about professional communications. Later, we will provide specific examples, both good and bad, of different forms of communications appropriate for engineering professionals, and some guidelines for each form of communication.

1.4.1 Audience analysis

The first step in any communications effort is to think about the person or group to whom the communications is directed. Here are some questions that should be answered.

1. Is the communication to an expert or a general audience?
2. How formal should the communication be?
3. What level of detail is expected, or required?
4. What is the importance of the communication to the recipient(s)?
5. What is the time available for this communication?
6. Is a reply required or expected?

1.4.2 Selection of media to convey message

After the audience analysis, the next step is to select the format for the message. In the context of the engineering profession, these are most likely to be

1. Written, as in electronic mail, memoranda, letters, and engineering reports,
2. Oral, as in telephone calls, informal talks, and formal presentations, or
3. Graphic, as in tables, graphs, and maps, all of which portray data.

Of course, written and oral forms frequently include graphics.

Engineering professionals are expected to be proficient with various means to produce reports and presentations, such as word processing programs (e.g., Microsoft Word, Corel WordPerfect), page layout software (e.g., Adobe FrameMaker), presentation programs (Microsoft PowerPoint), and programs to generate graphics (e.g., Microsoft Excel, Adobe Illustrator, AutoDesk AutoCAD).

It would be unrealistic to expect that you could become proficient with all the features in all of these programs. However, we can expect that you would use some of these programs (or their equivalents) to gain some experience with tools to create professional reports, presentations, and graphics.

1.4.3 Template for message

General rules apply to all form of professional communication, as noted in the following list.

1. The purpose of the communication should be clearly stated, and obvious to the recipient.
2. The communication should be direct and to the point. In professional communications, conciseness is more than a virtue, it is a necessity.
3. In a professional environment, it is expected that communications have been edited, refined, and practiced, as appropriate.
4. The communication should be complete in that it contains all the information required for that report or presentation.
5. The professional should select an organizational format appropriate for the communication.
6. The generation of the report or presentation should be documented by notes, in the event the communication has to be revised at some time in the future.

2.0 Written Communications

2.1 Introduction

Written communications take several forms. We will provide a rationale for each type of written communication you'll be likely to create, and guidelines and examples for each. Of course, we assume you have a clear idea of what you want to communicate, and the audience to whom you will be writing.

Students frequently experience difficulties in writing. In the last section of this report, we refer to several documents that we have found useful in our careers, and that previous forest engineering students have used to advantage. These documents cover topics in grammar, usage, and often have examples of common mistakes to avoid. You should refer to these if you feel you need to review any of these topics.

2.2 Documentation

You should get in the habit of documenting your work efforts so that you can retrace your work at some later date. For example, if you are working with a spreadsheet or a complex computer program, you should document the changes you make in the code and input files as you work through a problem or design. A systematic approach to internal and external documentation will allow you to work more productively, and save time if you have to revisit the project. It will also allow others to understand your work in the event someone else assumes your tasks.

2.3 Electronic Mail

Electronic mail (e-mail from now on) is appropriate for short, rapid communications, e.g., a request for a meeting, a short question, a request for a letter of recommendation, etc. E-mail is not appropriate as a means to transmit more complex information, or to send information that is privileged or business confidential.

E-mail is rapid, and that sometimes leads people to think it can be informal. E-mail to your friends can be as informal as you wish. However, when E-mail is used as a means of communication between professionals, you should apply the same standards as you would in writing a business memo, letter, or report. Specifically, your professional e-mail communications should

1. Have a short, informative subject line,
2. Have a greeting appropriate to the addressee,
3. Use correct English in the body, with correct spelling and complete sentences, and

4. Have the equivalent of a signature, with information as to how you can be reached by telephone, fax, and mail, in addition to your e-mail address.

FIGURE 1.

First Example of Professional E-mail

From: EsfStud01@syr.edu

To: jhassett@esf.edu

will you please allow me to use you as a refernce in my job search? i wanted to ask you in person, but i wasn't sure when you'd around your office in the summer. i'd be happy to come in and meet with you to further discuss my plans or any questions you may have. or, if email is easier for you, just write back and let me know what you'd like to know.

FIGURE 2.

Example of Professional E-Mail

From: EsfStud01@syr.edu

To: jhassett@esf.edu

Subject: Request for Reference

Dear Dr. Hassett,

I'm writing to ask a favor of you. Will you please allow me to use you as a reference in my job search? I haven't sent anything out yet, but plan to do so this week. I have my resume all done, and most of my cover letters. I'm starting by sending things out to about 5 companies in the local area. I'd be happy to come in and meet with you to further discuss my plans or any questions you may have. If email is easier for you, just write back and let me know what you'd like to know.

Thanks so much for considering my request.

EsfStud01FirstName EsfStud01LastName

PS. I can be reached at home at (315) 555-1212.

A comparison of Figures 1 and 2 should show that the second example is an appropriate professional e-mail communication. The first e-mail does not use correct English, has not been spell-checked, and has neither a greeting nor a signature line.

It should go without saying that, in a professional environment, it is not appropriate to forward jokes, images, or other frivolous messages. You should also be aware that professional e-mail communications represent a record of professional activity, and can, under certain circumstances, be reviewed at the request of clients or other interested parties.

The following statements concerning email etiquette have been adapted from the Radcliffe College website (http://www.radcliffe.edu). The guidelines are broad enough to apply to other forms of written communication.

- E- mail cannot replace personal contact. There is a tendency to be less formal or careful, which can sometimes provoke anger. Remember that direct, person-to-person contact is best for handling sensitive, difficult, complex, or emotional issues.
- Assume the messages you send and receive are permanent and public. Don't say anything in e-mail that you would not want to be made public or forwarded to others.
- Double check the list of recipients. If you are replying to a message, did you choose “reply to all” recipients when you intended to respond only to the sender?
- Try to acknowledge receipt of a message promptly, especially if it is going to take considerable time to reply fully. Let the sender know that you will answer.
- When replying to a message sent to multiple addressees it is usual to respond to the sender only. That person then collates replies for the group as a whole.
- Don't rush writing your electronic messages. To organize your thoughts you might want to draft a particularly important message in a word processor. Use the automated spell check to make sure your text is error- free.
- Keep your message focused. If a new topic is introduced it should be under a separate message with a new subject heading.
- Try to keep in mind that writing styles may cause some messages to come across as sounding abrupt or even antagonistic when that is not the intention of the sender.
- Take time to read and fully comprehend what has been written before you reply, especially if the message provokes a strong emotional response. If you don't understand a particular item, ask the sender for clarification before replying to an incorrect conclusion.
- Be considerate with length. Too much information in one message is a burden on recipients. Bear in mind that screens are harder to read than words on paper.
- Breaking up text using short lines and paragraphs and spaces is helpful in keeping your message readable. Using lists and indentation helps make your points stand out clearly.

- In a reply, include the relevant parts of the original message for clarity, but keep the quotations to a minimum. Otherwise, simply attach the original message.
- Cite your information clearly and correctly, even if you are paraphrasing. If you are sending information from another source, pay attention to whether the material is copyrighted. Copyright laws apply to electronic mail as well as to printed media.
- Pay attention to the distribution list before forwarding received mail to someone else. The recipient might have a copy of that item already.
- It is important to balance informing those who need to know with sending information to too many people. Send a carbon copy (CC:) to those who may be affected by your message or who may have information or suggestions to add.
- Do not forward or edit an e-mail message without the original sender's consent. This is particularly important in the case where the sender may consider the contents sensitive.

2.4 Memoranda

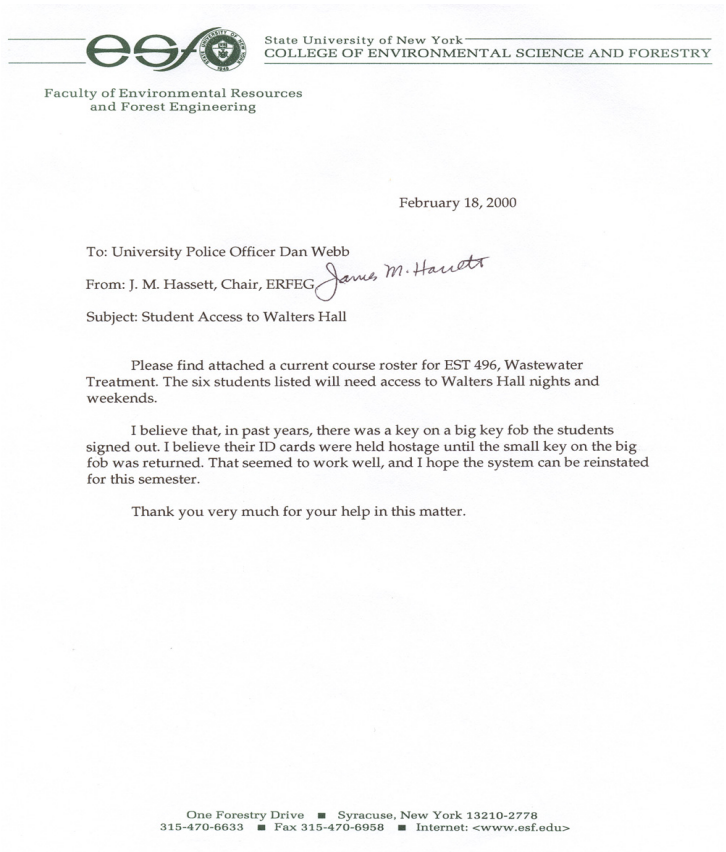
A memorandum (memo from now on) is similar to an e-mail message in that it should be used to communicate relatively simple information. A memo should communicate a specific question, answer to a question, or other piece of information, and thus is usually no more than one page in length. In general, memos are used for communications within an organization.

Here are some guidelines to consider in generating a memo.

1. The memo should contain To, From, and Subject lines, and be dated and signed.
2. The body should be written in a concise manner, with correct English usage.
3. If a reply or some other action is required, that should be clearly stated.
4. The memo should be printed on a formal letterhead.
5. Use subheadings to break content into logical subsections.

Many word processing packages have templates that can be used to generate memos and other forms of communications. See Figure 3 for an example of a business memo.

FIGURE 3. **Example of a Business Memorandum**



State University of New York
COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY

Faculty of Environmental Resources
and Forest Engineering

February 18, 2000

To: University Police Officer Dan Webb

From: J. M. Hassett, Chair, ERFEG James M. Hassett

Subject: Student Access to Walters Hall

Please find attached a current course roster for EST 496, Wastewater Treatment. The six students listed will need access to Walters Hall nights and weekends.

I believe that, in past years, there was a key on a big key fob the students signed out. I believe their ID cards were held hostage until the small key on the big fob was returned. That seemed to work well, and I hope the system can be reinstated for this semester.

Thank you very much for your help in this matter.

One Forestry Drive ■ Syracuse, New York 13210-2778
315-470-6633 ■ Fax 315-470-6958 ■ Internet: <www.esf.edu>

2.5 Letters

Letters are used to communicate with external audiences. In most cases, a letter should be brief, and cover one or two points. If there is a need for more detail, the information should be conveyed via a report of suitable length. In that case, a transmittal letter would accompany the report. Occasionally, an engineering professional has to write a lengthy letter to cover several points raised by a client or other interested party.

In any case, a letter is a record of professional activity and should be drafted with care. A formal business letter should contain

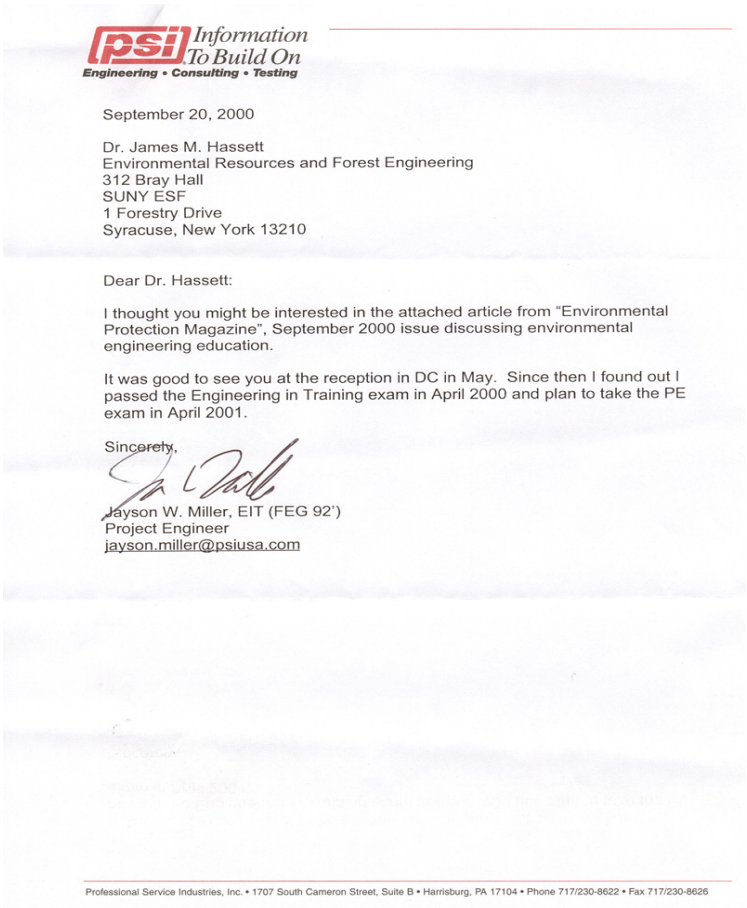
1. The complete address of the recipient, written as the inside address,
2. An appropriate salutation,
3. A subject line,

4. A concise, informative body, usually ending with information as to how the author can be contacted, and
5. An appropriate closing.

The letter should be printed on company letterhead. A copy of the letter is placed in the project file for future reference, a fact which further reinforces the importance of crafting the letter with care.

Word processing packages usually have templates or so-called 'wizards' to help format a formal business letter. See Figure 4 for an example of a formal business letter.

FIGURE 4. **Example of a formal business letter**



psi Information To Build On
Engineering • Consulting • Testing

September 20, 2000

Dr. James M. Hassett
Environmental Resources and Forest Engineering
312 Bray Hall
SUNY ESF
1 Forestry Drive
Syracuse, New York 13210

Dear Dr. Hassett:

I thought you might be interested in the attached article from "Environmental Protection Magazine", September 2000 issue discussing environmental engineering education.

It was good to see you at the reception in DC in May. Since then I found out I passed the Engineering in Training exam in April 2000 and plan to take the PE exam in April 2001.

Sincerely,

Jayson W. Miller, EIT (FEG 92')
Project Engineer
jayson.miller@psiusa.com

Professional Service Industries, Inc. • 1707 South Cameron Street, Suite B • Harrisburg, PA 17104 • Phone 717/230-8622 • Fax 717/230-8626

2.6 Reports

2.6.1 General Considerations

You will undoubtedly contribute to and author many reports during your engineering career. The format for a given report might be dictated by the needs of the client to whom the report is intended. More typically, the engineer decides upon the format and content of the report. We provide here some general guidelines for typical reports. We caution you, however, to consider these as guidance; you should modify these as the situation dictates.

A formal engineering report will most likely contain the following items.

1. A title page, with an informative title, and the name of the entity responsible for the report,
2. An executive summary
3. A table of contents
4. The report body, organized in a logical manner, including headings and subheadings
5. A list of references (See Table 1 for examples of reference styles).
6. An appendix, or appendices, which contain data supporting the findings in the report body.

Most word-processing software packages have features to help generate reports, including built-in formats for headings, pagination, table of content generation, paragraph formats, etc. In fact, this document was created in Adobe FrameMaker by use of a template entitled ReportNumeric. You may have noticed that this document has many of the features of an engineering report.

2.6.2 Specific Considerations

You can find report templates on the internet. For example, see <http://www.asae.org/pubs/authguide.html> and click under Manuscript Templates for one set of templates you can download into Microsoft Word.

Moon Library has resources available for you to use in deciding upon an appropriate referencing style for the work you cite. Here are some examples of one method for citing various sources. You should use the style indicated in Table 1 unless otherwise directed.

Advanced researchers often use software tools to help collect and format bibliographic entries for a list of references. EndNote (from Thomson ResearchSoft, see www.endnote.com) is one such program.

TABLE 1. Example of a Referencing Style

Source of Information	Example of Citation
Journal article	Anderson, G. T., C. V Renard, L. M. Strein, E. C. Cayo, and M. M. Mervin. 1998. A new technique for rapid deployment of rollover protective structures. Applied Eng. in Agric. 23(2): 34-42.
Journal article, "in press"	Turusov, V, V Rakitsky, and L. Tomatis. In press. Dichlorodiphenyltrichloroethane (DDT); ubiquity, persistence, and risks. Environ Health Perspect.
Magazine article.	Grant M. 1997. The cell from hell. People, 19 May: 101-103.
Newspaper article	Clabby C. 2001. Study details how centuries of fishing depleted sea life. News and Observer (Raleigh, NC) 27 July: B 1.
Chapter in edited book	Stratmeyer, H. A. 1965. Chapter 3: The goal of effective systems design. In Systems Design: Principles and Practices, 87-109.W. H. Pierre, ed. Chicago, Ill.: Graphics Publishing.
Chapter in edited series	Burkholder, J. M., H. B. Glasgow and A. 1. Lewitus. 1998. Physiological ecology of Ptiesteria piscicida with general comments of "ambush-predator" dinoflagellates. In: Physiological Ecology of Harmful Algae (Anderson, D. M., A. Cembella and G. M. Hallegraeff, eds). NATO ASI Series G: Ecological Sciences, Vol 41. Berlin: Springer-Verlag, 175-191.
Book	Coombs, T. R., and F. C. Watson. 1997. Computational Fluid Dynamics. 3rd ed. Wageningen, The Netherlands: Elsevier Science.
Book, edited	Gross, T. L., P. J. Ihrke and E. J. Walder, eds. 1992. Veterinary Dermatopathology. St. Louis, MO: Mosby Year Book.
Proceedings	Tiran, B, E. Rossipa,A.Tiran and O. Lorenz. 1993. Selenium and iodine concentration in human milk and milk formulas in Styria, Austria. In: Proceedings of the Conference on Trace Elements in Man and Animals: TEMA 8, 16-21 May 1993, Dresden, Germany. Gersdorf, Germany: Verlag Media Touristik,1058-1061.
Dissertation/thesis	Workman, S. R. 1990. Development and application of a preferential flow model. Ph.D. diss. Raleigh, N.C.: North Carolina State University, Department of Biological and Agricultural Engineering
Software manual	SAS. 1990. SAS User's Guide: Statistics. Ver. 6a. Cary, N.C.: SAS Institute, Inc.
Website	USDA. 1999. Wheat Production in the Upper Plains: 1998-1999. National Agricultural Statistics Database. Washington, D.C.: USDA National Agricultural Statistics Service. Available at: www.nass.usda.gov. Accessed 23 April 2000.
Federal regulation	U.S. EPA. 1998. National Primary Drinking Water Regulations: Interim Enhanced Surface Water Treatment; Final Rule. Fed Reg 63:69477-69521.
U. S. government document	U.S. EPA. 1999. What You Should Know about Fish Lesions. CBP/TRS2291 99. Washington, DC:U.S. Environmental Protection Agency.
Law	Food Quality Protection Act of 19%. 1996. Public Law 104-170.

2.6.3 Plagiarism

The issue of *when* to cite work is as important as *how* to cite it. You must cite all sources of information in your work. To not properly cite others' work is plagarism.

Plagiarism is presenting someone else's ideas, work, or words as if they were your own. Plagiarism includes copying from a source without citing it, using the same words without using quotation marks (even with a citation), or improperly paraphrasing (re-wording) another's work.

Here are four links to help you understand the issue of plagiarism, and the potential consequences for not properly attributing the work of others.

Avoiding Plagiarism. Purdue University Online Writing Lab. http://owl.english.purdue.edu/handouts/research/r_plagiar.html

Avoiding Plagiarism: Mastering the Art of Scholarship. University of California – Davis, Student Judicial Affairs. http://sja.ucdavis.edu/avoid.htm

SUNY- ESF Student and Judicial Handbooks. http://www.esf.edu/students/handbook/

Plagiarism: What It is and How to Recognize and Avoid It. Indiana University Bloomington, Writing Tutorial Services. http://www.indiana.edu/%7Ewts/pamphlets/plagiarism.shtml#wwwplagiarism

You must always cite sources you consult. You must attribute words, ideas, interpretations, information, and knowledge that is not your own to the appropriate author or source.

2.7 Resume/CV

Resources for creating a professional resume are available at Moon Library and other sources.

3.0 Oral Communications

3.1 General Considerations

Oral communications include simple telephone calls, short, informal presentations within a work group, or formal presentations to clients or professional audiences. The secret in any of these forms of communication is to have a clear idea of what you want to say, and how you want to say it. That takes forethought, and then practice.

3.2 Telephone Communications

A telephone call is often the first contact an engineer has with a client, and for that reason alone telephone protocol and etiquette are important. Indeed, in every telephone call you make, you are representing yourself and your organization, and you should therefore consider carefully the purpose of the call, and organize your thoughts before you call.

Begin every telephone message by introducing yourself, and stating clearly the purpose of the call. If necessary, have your questions written beforehand, to make sure you get the necessary information. Be ready to take notes, and always end by thanking the person you talked with.

Here is a transcript of an engineering student requesting help with a senior design project.

FIGURE 5.

Example Telephone Call

STUDENT: Hello, my name is Josephine Scholar, and I am a senior engineering student at the College of Environmental Science and Forestry in Syracuse. If you have time, I'd like to ask you some questions pertaining to your product line and how it might relate to our senior engineering design project.

SALES REPRESENTATIVE: Ok, I've got a few minutes. Go ahead.

STUDENT: We need to specify a pump, and I wonder how we can obtain pump characteristic curves and other performance data for your products.

SALES REPRESENTATIVE: We have all our technical data posted on our web site. Try that and if you need more help call me back. The web address is *www.pumpsgalore.com*.

STUDENT: We'll try that. Thank you very much for your time and help.

You should be aware that telephone calls are an important form of professional communication, and most organizations have forms to log the information obtained or transmitted during the course of a telephone conversation.

You should also know that, on average, only one in three business calls is successfully completed on the first attempt. You should therefore be ready to leave a lucid message on an answering machine or voice mail system. In this case, speak slowly and clearly,. Repeat your contact information (i.e., phone number) to make sure you are understood.

3.3 Presentations

3.3.1 Introduction

Engineers make presentations for many purposes, and a well designed and skillfully delivered presentation makes a very positive impression. The ability to make effective presentations, like any other skill, requires practice. We provide here some general guidelines for effective presentations; see Section 7 for other sources of help.

3.3.2 Informal presentations

Even informal presentations to your classmates should have a structure. At the very least, an oral report for class should

1. Begin with an introduction, as in 'Good Afternoon, my name is _____ and I will be talking about _____ today.'
2. Be based on an outline.
3. Include visual aids, if appropriate.
4. Come to a definite conclusion. Don't end by saying something like 'Well, that is all I have.'

Your presentations will undoubtedly include tables, graphs, and perhaps equations. The following guidelines for their use in presentations were adapted from the website of the Institute of Transportation Engineers (http://www.ite.org).

- Limit each slide or overhead to one idea and a maximum of 15 words. You want the audience listening, not reading.
- Keep the format of the visual aids the same throughout your presentation. Don't switch from horizontal to vertical layouts. Be consistent in your format, color, and style.
- Use large letters and numbers - the larger the better. Remember, you want your visual aids to be able to be read by all members of the audience - including those with less-than-perfect eyesight and those in the back rows. As a rule-of-thumb, if you can read a 35-mm slide when held at arm's length in front of you, it will be readable by the audience in a normal-size room. A typesize rule-of-thumb: Make heads 20% bigger than text. Consider using all bold type so it will more easily stand out from the dark background.

- If you must use a table in a visual aid, show only those figures you specifically mention in your table (don't photocopy or photograph entire tables from reports).
- Limit line charts to no more than 5 lines for readability.
- Include only those data that illustrate the point you want to make - don't overdo it in one chart.

3.3.3 Formal Presentations

You will undoubtedly make many formal presentations during your career, and you will have opportunities to practice during your time in our program. We have observed that some students (and professionals) feel anxiety over the prospect of giving a formal presentation, and so we share these guideline for your use.

TABLE 2. General Guidelines for Oral Presentations

Topic	Guidance	Comments
The talk	Know your audience	Always keep in mind what will interest your listeners --- the #1 priority when planning your talk. Identify your major point (theme) and stay with it, don't wander into other areas. Even if your audience is mostly technical people, limit jargon and simplify technical details. Avoid acronyms.
	Remember, you are the communicator	Your slides are supporting your message; they aren't telling the story for you; i.e, don't read them.
	Use nervousness to your advantage	“Butterflies” only mean you want to give a good talk; use five second eye contact with individuals in the audience; convert your nervous energy into positive, even exaggerated movements, which will tend to relax you, as well as exhibit confidence. Speak clearly and do not drop volume at the end of your sentences.
	Practice your talk several times with your visuals	The visuals enable you to remember your story line. Each time gets easier. If possible rehearse in front of friends. Contact the program coordinator if you want to set up a practice session or discuss technique.

TABLE 2. **General Guidelines for Oral Presentations**

Topic	Guidance	Comments
Visual aids	Use slides, overheads or similar medium	
	Keep it simple	Slides should have a uniform look, with a title on each For text slides, maximum 3-4 words per line/box; maximum 10-15 words per slide including your title Use active verbs and edit out all extraneous words Use one slide for every minute of your talk. If you vary the time you spend presenting each visual, then the maximum number of slides for a 15-minute talk should still be 15.
	Use graphics	Visual images increase audience interest, and enable you to remember better. Try to use a graphic element on at least every other slide. Graphics Software - Graphics files with predesigned graphic elements are widely available. Drawings - Simplify complicated drawings and diagrams, if necessary, as they may be too "busy" when projected. For example, have a complex process flow diagram simplified and redrawn.

An effective presentation will certainly include an effective opening and a succinct summary and closing. Table 3 gives advice on these components of an effective oral presentation.

TABLE 3. Guidelines for Beginning and Ending a Presentation

Part of Talk	Guidelines
Opening	Begin with a dramatic or startling statement. Ask a rhetorical question and then answer it. Ask a real question - and then ask for a show of hands. Tell a brief, factual anecdote that illustrates your topic. Immediately raise a problem or a need. Comment on the immediate speaking situation itself - perhaps complimenting the audience or referring to the previous speaker. Use suspense or surprise. Offer an imaginative, or hypothetical illustration. Challenge the audience. Begin with an actual demonstration.
Closing	Negative illustration showing consequences of not accepting the speech content. Request specific action from the audience. Indicate your personal intentions. Appeal to the audience's emotions. Use a pithy or humorous quotation. Give a very quick demonstration. Refer to the opening (i.e. bring the presentation full-circle). Ask a rhetorical question and leave it for the audience to answer. Reinforce the need for what you talked about and the benefits to your audience of knowing and accepting your speech. Point to the future (further development; implications).

An effective speaker relates to his/her audience. Table 4 provides guidance on how to achieve this.

TABLE 4. **Relating to Your Audience**

Component of Presentation	Guidelines
Responding to questions	Remember to use the five A's when responding to questions from the audience. It's as simple as AAAAA. Anticipate questions. If you know you are going to be under fire from a hostile audience when presenting a new idea, procedure or product, know your facts - all the facts, not just the ones that you use in your presentation. Place yourself in your audience's shoes and write down every tough, challenging, embarrassing query you can think of. Practice answering each out loud until you feel secure. If possible, have an associate grill you. Acknowledge questions. Concentrate on the individual asking the question. Show complete interest by nodding or saying "Urn humm." Listen between the lines for the tone of the person's voice as a clue to their underlying feelings. Answer questions succinctly. Don't tell the audience more than they need to know. Be ready to corroborate the evidence you need to support your answer. Ask questions. If a question asked of you is not clear, ask for clarification. You should also check with the audience if you are clear in your response. Admit what you do not know. No one expects you to be omniscient. You are better off saying that you do not know the answer than give an incorrect response. You can promise to get back to the person with the correction information on a certain date. Be sure to make good on your promise
Taboos for question and answer sessions	Don't argue with anyone. State your response and end it there. You only loose ground when you argue. Don't grade questions by telling the questioner, "Oh, that's a good question," but not telling all others that theirs are too. Simply answer the question. Don't allow one person to keep asking question after question. One or two questions from the same person is enough. Simply say, "Many others have questions. I'll get back to you if there's time." Or, after you've answered the questions, look away and acknowledge someone else quickly. Don't begin your answer to a question with something similar to "Anyone should know the answer to that." It is a "put down" phrase and may unintentionally insult or embarrass the questioner. Don't put your hands on your hips while you are speaking. This may be interpreted by the audience as talking down to them.

4.0 Graphics Communications

4.1 General Considerations

Engineers use various forms of graphics to assist in communicating their ideas and concepts. We present here some guidelines to consider in preparing graphics for your written and oral communications. In every case, a good general rule is that the table, graph, or map, should have enough information to be understood if removed from the larger report.

4.2 Tables

A table is a convenient way to present data. Separate tables (numbered in the order of their first appearance) should be used for all but the simplest tabular material; they must have captions, which should make the tables intelligible without reference to the text. Every table should have an informative title, and the rows and columns should be clearly identified. Most word processing packages have utilities to construct tables, and with a little practice a table can be customized by merging cells, using a combination of no, regular, or bold lines, changing column widths, etc. See Table 1 for an example of a table generated for an engineering report we recently completed.

TABLE 5. **Examples of data collected by Canal Corporation to describe inflows to the Seneca River Section of the Canal System. The elevations, gate openings and precipitation are measured directly while the flows are calculated. This data is recorded daily but there are days when the data is not recorded. Note that the water surface elevations are relative to the Barge Canal Datum (BCD)**

		March 1996					
		Sun 10	Mon 11	Tues 12	Wed 13	Thur 14	Fri 15
Cayuga (Lock C&S-1)	Upstream Elevation (ft)	NR	379.9	379.7	379.6	379.7	379.8
	Downstream Elevation (ft)	NR	377.4	376.7	376.0	374.7	374.7
	Gates (ft) 6 Gates	NR	1@0.95 5@1.60	3@0.95 3@1.60	4@0.95 2@0.60	1@0.30	1@0.30
	Discharge (cfs)	NR	2612	2487	1716	134	136
	Precip. (in)	NR	0	0	0	0	0
Clyde (Lock E-26)	Upstream Elevation (ft)	NR	384.8	384.8	385.0	385.1	386.0
	Downstream Elevation (ft)	NR	378.2	378.0	378.0	378.0	378.2
	Gate (ft)	NR	1.2	1.2	1.2	1.2	2
	Discharge (cfs)	NR	925	939	952	959	1676
	Precip. (in)	NR	0.21	0	0	0	0.002
Brewerton (Lock E-23)	Upstream Elevation (ft)	NR	369.5	369.4	369.3	369.3	369.2
	Downstream Elevation (ft)	NR	364.2	364.2	364.2	364.1	364.1
	Gates (ft) 7 Gates	NR	7 @ 5 each	7 @ 5 each	7 @ 5 each	7 @ 5 each	7 @ 5 each
	Discharge (cfs)	NR	3400	3250	3100	3100	3000
	Precip. (in)	NR	0.63	0	0	0	0.02

4.3 Graphs

A graph is simply a device to present data. However, there are rules to ensure that graphs portray the data accurately. Consider the data set presented in the Table 6, and the example graphs that use the data. For purposes of illustration, assume the data was generated during a traffic survey, and represents the number of cyclists entering the ESF campus during a given time interval.

TABLE 6. Hypothetical Data for Examples of Graphs

Time Interval	Number of Cyclists
10:00-10:30	7
10:30-11:00	9
11:00-11:30	4
11:30-12:00	6
12:00-12:30	11
12:30-1:00	7

Now, consider the next figure.

FIGURE 6. First graph of data presented in Table 6.

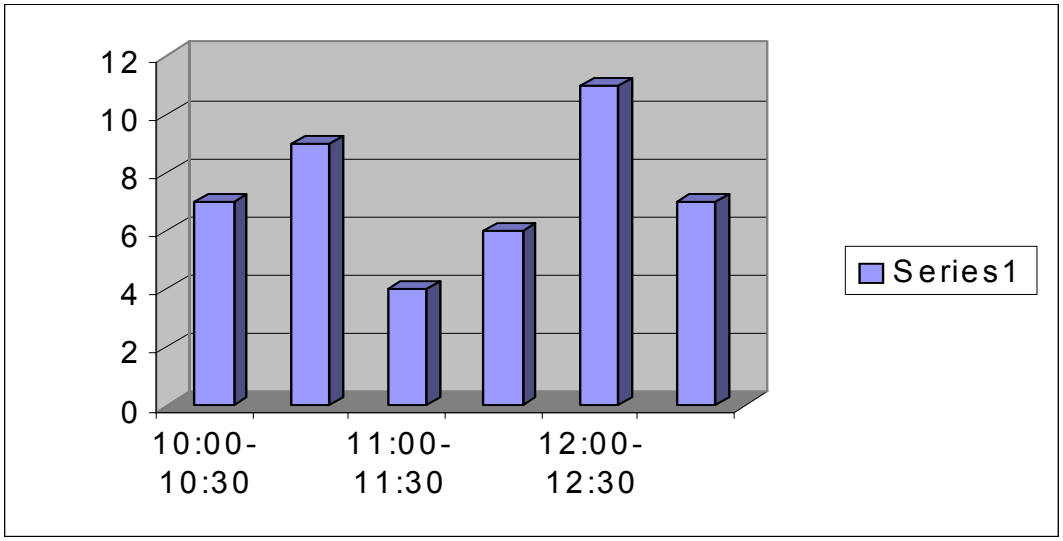


Figure 6 was generated in Microsoft Excel using default choices from the Chart Wizard feature. The graph may seem attractive, but is deficient for several reasons. First, the horizontal axis does not include all the intervals, and the Series 1 box is not necessary. These are corrected in the next figure.

FIGURE 7. **Second graph of data presented in Table 6.**

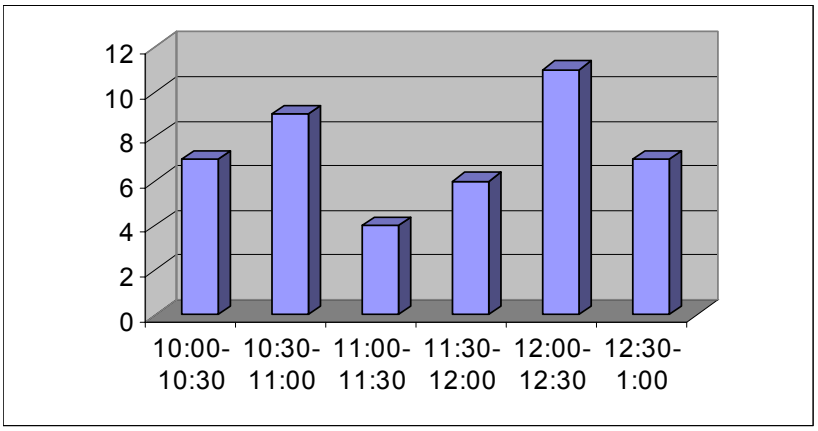


Figure 7 has all the intervals indicated. However, the format of the graph implies the existence of a third dimension to the data. This is corrected in Figure 8.

FIGURE 8. **Third graph of data presented in Table 6.**

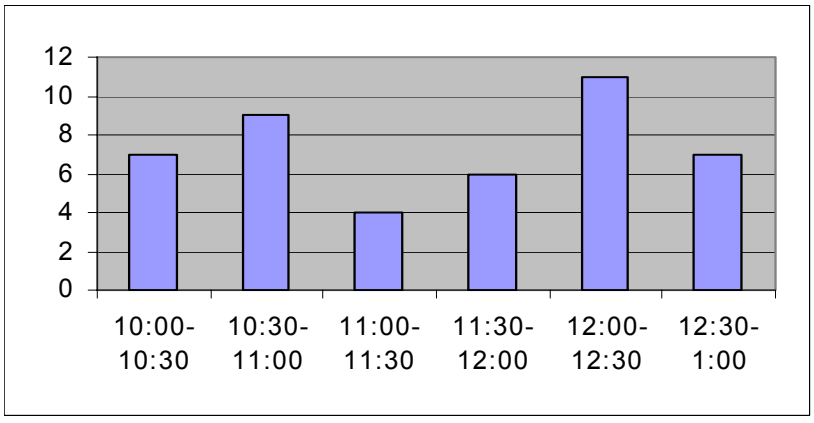
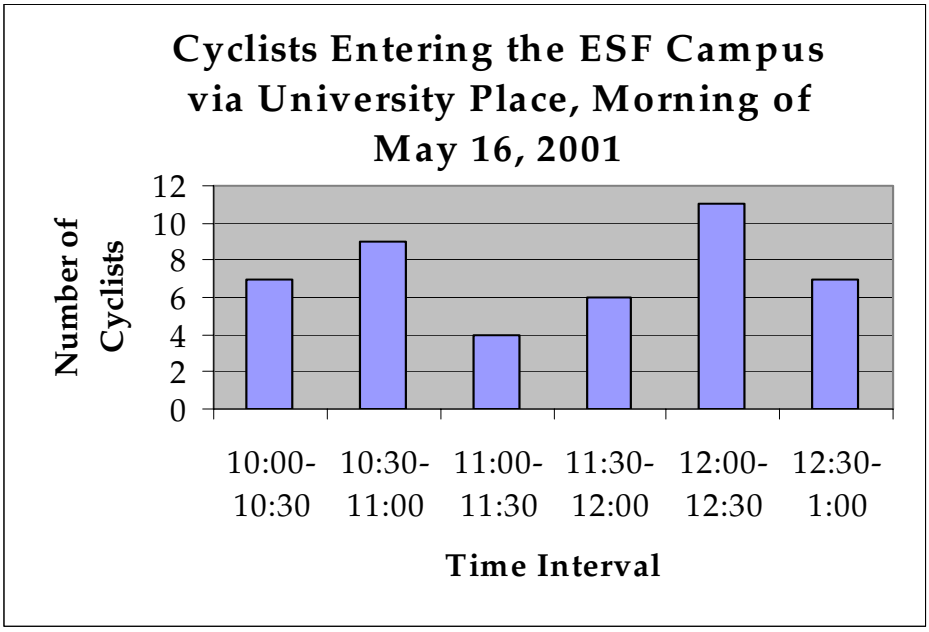


Figure 8 accurately portrays the two-dimensional data set, and is thus a more honest representation of the data than the two previous figures. However, there are still improvements to make, as shown in Figure 9.

FIGURE 9. **Final graph of data presented in Table 6.**



Note that this graph represents the data appropriately, is numbered, has a caption, an informative title, and labels for both axes.

This document was created using a template with default characteristics for features of the document. In most cases, a table caption appears above the table, and a figure caption below the figure. If a graph or table is placed on one page, in landscape mode, the graphic should be oriented so that a 90 degree clockwise rotation places the graphic correctly.

Tufte has written three books devoted to display of quantitative information (see Section 7). The following 'principles of graphical excellence' are adapted from his first volume.

- Graphical excellence is the well-designed presentation of interesting data - a matter of *substance*, of *statistics*, and of *design*.
- Graphical excellence consists of complex ideas communicated with clarity, precision, and efficiency.
- Graphical excellence is that which gives the viewer the greatest number of ideas in the shortest time with the least ink in the smallest space.
- Graphical excellence is nearly always multivariate.

- And graphical excellence requires telling the truth about the data.

4.4 Engineering Drawings

The craft of creating engineering drawings has a rich tradition, and the technology with which drawings are created is evolving rapidly. This topic is so important you will have one course (ERE 225) devoted to this area.

4.5 Maps

Engineers working on environmental issues frequently have to portray the location and extent of features of the environment, and so the ability to create and interpret maps is an important feature of this program. This will be covered in ERE 371, and applied in other courses.

5.0 Curriculum Plan

The matter of effective communications is important and may seem imposing. We have identified activities in courses to allow you to take a step by step approach to this area, as displayed in Table 3.

We feel that the best way to gain expertise in any subject matter is by active practice, and we therefore expect you to:

1. Recognize that the goal of effective communications is an important part of your professional education, and that you will practice the tenets of effective communications throughout your program, and
2. Demonstrate skills learned in earlier courses in follow-on courses. For example, we will expect you to use appropriate e-mail etiquette and formats when communicating with faculty. We will expect you to create graphics that reflect the knowledge you gained in earlier courses. For example, skills learned in Engineering Graphics should be demonstrated in subsequent courses where graphical presentation is required (FEG 300, FEG 340, etc.)

We will do our part as well. We will be consistent in our expectations, provide meaningful feedback, and otherwise help you attain skills and experience in this important area.

We have instituted an electronic portfolio for forest engineering students, and examples of your reports and presentations will be included in that portfolio. You will therefore be able to show potential employers examples of your writing and other communications skills.

TABLE 7. Courses and Learning Activities in Support of Effective Communications for Forest Engineering Students

Semester	Course	Activities	Semester	Course	Activity
Fall Freshman	FEG 132	E-mail, memo, figures, tables	**Spring junior**	FEG 340	Oral presentation, design report
	CLL 190	Writing as a process, style and grammar, audience analysis, oral presentation		FEG 363	Poster, engineering drawings
				ERE 350	Written paper, informal presentation
Spring Freshman	APM 153	Documentation		ERE 351	Oral reports to different audiences
				APM 395	Engineering report
Fall Sophomore	ERE 225	Graphs, engineering drawings	**Fall senior**	FEG 430	Figures, tables, engineering report, writing critique
				CIE 337	Data documentation, figures, tables, engineering reports
Spring sophomore	CLL 290	Oral presentation, style manual, style and grammar	**Spring senior**	FEG 454	Formal oral presentation
Fall Junior	FEG 300	Oral presentation, engineering report		FEG 437	Figures, tables, drawings
	ERE 371	Data documentation, engineering drawings, maps, memos		FEG 489	Formal oral presentation, engineering report
	FOR 321	Figures. tables, maps, written reports			

6.0 Faculty Feedback

6.1 Rationale

We expect you to take the development of your communications skills seriously. We believe that your oral reports, written documents, and graphical products make your thinking about engineering visible, and therefore subject to our assistance in helping you learn both the course material and the basics of the effective communication of your ideas.

6.2 Feedback on Written Work

We are not grammarians. We do know clear thinking and writing when we see it, and have agreed to use the following notations on your written submissions to help you become independent in editing your own writing.

TABLE 8. Notations Used to Identify Common Errors in Written Work

Notation	Meaning	Example
AGR	agreement	Everyone who plays the lottery has their chance to win.
FRAG	fragment	If a dog whined for even thirty seconds.
MM	misplaced modifier	Concentrating on his studies, the music was not even heard.
CS	comma splices	Sports makes a person strong and brave, on the other hand, art makes a person gentle and sensitive.
REF	faulty pronoun reference	Chris sent Bill a letter every day he was in the hospital.
ILL	illogical predication	The double helix model of DNA is an example of hard work.
//STR	parallel structure	I like running, cycling, and to swim.
WORDY	in need of condensing	
CHOPPY	rough transitions from one idea to the next	
UNCLEAR	enough said	
AWKWARD	tortured syntax	
GOOD	enough said	

We will use certain symbols as well. These are listed in Table 9.

TABLE 9. **Symbols Used in Critique of Written Work**

Symbol	Meaning
circle	errors confined to one or two words
wavy underline	larger errors
checks	recognition of good word choices
straight underlines	highlighting of well-put phrases or sentences
arrows and question marks	identification of puzzling connection of words

Remember that the goal of our written feedback is to help you become independent in editing your won work. To that end, we may refer you to the Writing Resource Center in Moon Library and ask that you work with them on writing issues we identify in your work.

6.3 Feedback on Oral Reports

We and other member in your audience will provide feedback on your oral presentations by means of the rubric presented un Table 10.

TABLE 10. **Criteria for Evaluation of Oral Reports. Ratings in Each Subcomponent are from 5 (to a great extent) to 3 (somewhat) to 1 (not at all)**

Component	Subcomponent	Indicators
Content	Introduction	Gains attention, creates interest Identifies purpose, subject
		Is interesting
	Body	Is well organized
		Uses adequate transitions between ideas Is appropriate for audience
		Uses relevant and appropriate details/examples
	Conclusion	Has a distinct ending
		Summarizes main points
		Ends on a strong point
	Q & As	Remembers to ask for questions
		Handles questions confidently
	Length of Presentation	Is appropriate

TABLE 10. **Criteria for Evaluation of Oral Reports. Ratings in Each Subcomponent are from 5 (to a great extent) to 3 (somewhat) to 1 (not at all)**

Component	Subcomponent	Indicators
Delivery	Voice: The presenter	Has good volume
		Is well paced
		Is varied in tone
		Avoids verbal fillers ("ums") and has good pronunciation
		Seems at ease and in control
	Appearance: The presenter	Makes good eye contact
		Uses notes well, if notes are used
		Appears natural, comfortable
		Has good posture
	Visual Aids: The presenter	Uses appropriate graphics to support ideas
		Uses clear, visible graphics
		Has a consistent style with graphics
		Uses graphics that enhance, rather than interfere, with the presentation

7.0 Annotated Bibliography

Of the many books on effective writing, we especially like 'the little book.'

1. Strunk, William, and E. B. White. *The Elements of Style (4th Edition).* Allyn and Bacon, Boston, 2000.

The following text gives numerous examples of letters for many business and personal occasions.

1. Meyer, Harold E. *Lifetime Encyclopedia of Letters.* Prentice Hall, Paramus, New Jersey, 1998.

The two books listed below give advice and numerous examples for writing papers and reports.

1. Alley, Michael. *The Craft of Scientific Writing.* Prentice-Hall, Englewood Cliffs, New Jersey, 1987.
2. Michaelson, Herbert B. *How to Write and Publish Engineering Papers and Reports* (2nd Edition). ISI Press, Philadelphia, Pennsylvania, 1986.

Use any of the following references for guidance in preparing oral presentations.

1. Egan, Michael. *Would You Rather Die than Give a Talk?: The Comic-Book Guide to Brilliantly Surviving Your Next Business Presentation.* AMACOM, New York, New York, 1998.
2. Kalish, Karen. *How to Give a Terrific Presentation.* AMACOM, New York, New York, 1997.
3. Kleim, Ralph L. and Irwin S. Ludin. *Stand and Deliver: The Fine Art of Presentation.* Gower, Hampshire, England, 1995.
4. Kupsh, Joyce. *How to Give High-Impact Business Presentations.* NTC Publishing Group, Chicago, Illinois, 1992.
5. McLeary, Joseph, Richard Haasnoot, Joyce McLeary and Susan Drake. *By the Numbers: Using Facts and Figures to Get Your Projects, Plans and Ideas Approved.* AMACOM, New York, New York, 2000.

The following three books are a rich resource for issues concerning the visual display of data.

1. Tufte, Edwin. *The Visual Display of Quantitative Data*. Graphics Press, Cheshire, Connecticut, 1983.
2. Tufte, Edwin. *Envisioning Information*. Graphics Press, Cheshire, Connecticut, 1990.
3. Tufte, Edwin. *Visual Explanations*. Graphics Press, Cheshire, Connecticut, 1997.