Writing Research Papers

Quick tabs to parts of a research paper (this page)

Other resources

Writing is easy. All you do is stare at a blank sheet of paper until drops of blood form on your forehead. --- Gene Fowler

A major goal of this course is the development of effective technical writing skills. To help you become an accomplished writer, you will prepare several research papers based upon the studies completed in lab. Our research papers are not typical "lab reports." In a teaching lab a lab report might be nothing more than answers to a set of questions. Such an assignment hardly represents the kind of writing you might be doing in your eventual career.

Written and oral communications skills are probably the

- Common errors in student research papers
- Selected writing rules

most universal qualities sought by graduate and professional schools as well as by employers. You alone are responsible for developing such skills to a high level.

Resources for learning technical writing

Before you begin your first writing assignment, please consult all of the following resources, in order to gain the most benefit from the experience.

- General form of a typical research article
- Specific guidelines (if any) for the assignment – see the writeups on individual lab studies
- McMillan, VE. "Writing Papers in the Biological Sciences, Third Ed." New York: Bedford/St. Martin's, 2001. ISBN 0-312-25857-7 (REQUIRED for Bioc 211, 311, recommended for other science courses that include writing)
- Writing portfolio examples (pdf)

As you polish up your writing skills please make use of the following resources

- Instructor feedback on previous assignments
- Common errors in student research papers
- Selected writing rules (somewhat less serious than the other resources)

For Biosciences majors the general guidelines apply to future course work, as can be seen by examining the guidelines for the advanced experimental sciences research paper (Bioc 311).

General form of a research paper

An objective of organizing a research paper is to allow people to read your work selectively. When I research a topic, I may be interested in just the methods, a specific result, the interpretation, or perhaps I just want to see a summary of the paper to determine if it is relevant to my study. To this end, many journals require the following sections, submitted in the order listed, each section to start on a new page. There are variations of course. Some journals call for a combined results and discussion, for example, or

include materials and methods after the body of the paper. The well known journal *Science* does away with separate sections altogether, except for the abstract.

Your papers are to adhere to the form and style required for the Journal of Biological Chemistry, requirements that are shared by many journals in the life sciences.

General style

Specific editorial requirements for submission of a manuscript will always supercede instructions in these general guidelines.

To make a paper readable

- Print or type using a 12 point standard font, such as Times, Geneva, Bookman, Helvetica, etc.
- Text should be double spaced on 8 1/2" x 11" paper with 1 inch margins, single sided
- Number pages consecutively
- Start each new section on a new page
- Adhere to recommended page limits

Mistakes to avoid

- Placing a heading at the bottom of a page with the following text on the next page (insert a page break!)
- Dividing a table or figure - confine each figure/table to a single page
- Submitting a paper with pages out of order

In all sections of your paper

- Use normal prose including articles ("a", "the," etc.)
- Stay focused on the research topic of the paper
- Use paragraphs to separate each important point (except for the abstract)
- Indent the first line of each paragraph
- Present your points in logical order
- Use present tense to report well accepted facts - for example, 'the grass is green'
- Use past tense to describe specific results - for example, 'When weed killer was applied, the grass

was brown'
- Avoid informal wording, don't address the reader directly, and don't use jargon, slang terms, or superlatives
- Avoid use of superfluous pictures - include only those figures necessary to presenting results

Title Page

Select an informative title as illustrated in the examples in your writing portfolio example package. Include the name(s) and address(es) of all authors, and date submitted. "Biology lab #1" would not be an informative title, for example.

Abstract

The summary should be two hundred words or less. See the examples in the writing portfolio package.

General intent

An abstract is a concise single paragraph summary of completed work or work in progress. In a minute or less a reader can learn the rationale behind the study, general approach to the problem, pertinent results, and important conclusions or new questions.

Writing an abstract

Write your summary after the rest of the paper is completed. After all, how can you summarize something that is not yet written? Economy of words is important throughout any paper, but especially in an abstract. However, use complete sentences and do not sacrifice readability for brevity. You can keep it concise by wording sentences so that they serve more than one purpose. For example, "In order to learn the role of protein synthesis in early development of the sea urchin, newly fertilized embryos were pulse-labeled with tritiated leucine, to provide a time course of changes in synthetic rate, as measured by total counts per minute (cpm)." This sentence provides the overall question, methods, and type of analysis, all in one sentence. The writer can now go directly to summarizing the results.

Summarize the study, including the following elements in

any abstract. Try to keep the first two items to no more than one sentence each.

- Purpose of the study - hypothesis, overall question, objective
- Model organism or system and brief description of the experiment
- Results, including specific data - if the results are quantitative in nature, report quantitative data; results of any statistical analysis shoud be reported
- Important conclusions or questions that follow from the experiment(s)

Style:

- Single paragraph, and concise
- As a summary of work done, it is always written in past tense
- An abstract should stand on its own, and not refer to any other part of the paper such as a figure or table
- Focus on summarizing results - limit background information to a sentence or two, if absolutely necessary
- What you report in an abstract must be consistent with what you reported in the paper
- Corrrect spelling, clarity of sentences and phrases, and proper reporting of quantities (proper units, significant figures) are just as important in an abstract as they are anywhere else

Introduction

Your introductions should not exceed two pages (double spaced, typed). See the examples in the writing portfolio package.

General intent

The purpose of an introduction is to aquaint the reader with the rationale behind the work, with the intention of defending it. It places your work in a theoretical context, and enables the reader to understand and appreciate your objectives.

Writing an introduction

The abstract is the only text in a research paper to be written without using paragraphs in order to separate major points. Approaches vary widely, however for our studies the following approach can produce an effective introduction.

- Describe the importance (significance) of the study - why was this worth doing in the first place? Provide a broad context.
- Defend the model - why did you use this particular organism or system? What are its advantages? You might comment on its suitability from a theoretical point of view as well as indicate practical reasons for using it.
- Provide a rationale. State your specific hypothesis(es) or objective(s), and describe the reasoning that led you to select them.
- Very briefy describe the experimental design and how it accomplished the stated objectives.

Style:

- Use past tense except when referring to established facts. After all, the paper will be submitted after all of the work is completed.
- Organize your ideas, making one major point with each paragraph. If you make the four points listed above, you will need a minimum of four paragraphs.
- Present background information only as needed in order support a position. The reader does not want to read everything you know about a subject.
- State the hypothesis/objective precisely - do not oversimplify.
- As always, pay attention to spelling, clarity and appropriateness of sentences and phrases.

Materials and Methods

There is no specific page limit, but a key concept is to keep this section as concise as you possibly can. People will want to read this material selectively. The reader may only be interested in one formula or part of a procedure. Materials and methods may be reported under separate

subheadings within this section or can be incorporated together.

General intent

This should be the easiest section to write, but many students misunderstand the purpose. The objective is to document all specialized materials and general procedures, so that another individual may use some or all of the methods in another study or judge the scientific merit of your work. It is not to be a step by step description of everything you did, nor is a methods section a set of instructions. In particular, it is not supposed to tell a story. By the way, your notebook should contain all of the information that you need for this section.

Writing a materials and methods section

Materials:

- Describe materials separately only if the study is so complicated that it saves space this way.
- Include specialized chemicals, biological materials, and any equipment or supplies that are not commonly found in laboratories.
- Do not include commonly found supplies such as test tubes, pipet tips, beakers, etc., or standard lab equipment such as centrifuges, spectrophotometers, pipettors, etc.
- If use of a specific type of equipment, a specific enzyme, or a culture from a particular supplier is critical to the success of the experiment, then it and the source should be singled out, otherwise no.
- Materials may be reported in a separate paragraph or else they may be identified along with your procedures.
- In biosciences we frequently work with solutions - refer to them by name and describe completely, including concentrations of all reagents, and pH of aqueous solutions, solvent if non-aqueous.

Methods:

- See the examples in the writing portfolio package
- Report the methodology (not details of each procedure that employed the same methodology)

- Describe the mehodology completely, including such specifics as temperatures, incubation times, etc.
- To be concise, present methods under headings devoted to specific procedures or groups of procedures
- Generalize - report how procedures were done, not how they were specifically performed on a particular day. For example, report "samples were diluted to a final concentration of 2 mg/ml protein;" don't report that "135 microliters of sample one was diluted with 330 microliters of buffer to make the protein concentration 2 mg/ml." Always think about what would be relevant to an investigator at another institution, working on his/her own project.
- If well documented procedures were used, report the procedure by name, perhaps with reference, and that's all. For example, the Bradford assay is well known. You need not report the procedure in full - just that you used a Bradford assay to estimate protein concentration, and identify what you used as a standard. The same is true for the SDS-PAGE method, and many other well known procedures in biology and biochemistry.

Style:

- It is awkward or impossible to use active voice when documenting methods without using first person, which would focus the reader's attention on the investigator rather than the work. Therefore when writing up the methods most authors use third person passive voice.
- Use normal prose in this and in every other section of the paper – avoid informal lists, and use complete sentences.

What to avoid

- Materials and methods are not a set of instructions.
- Omit all explanatory information and background - save it for the discussion.
- Omit information that is irrelevant to a third party, such as what color ice bucket you used, or which individual logged in the data.

Results

The page length of this section is set by the amount and types of data to be reported. Continue to be concise, using figures and tables, if appropriate, to present results most effectively. See recommendations for content, below.

General intent

The purpose of a results section is to present and illustrate your findings. Make this section a completely objective report of the results, and save all interpretation for the discussion.

Writing a results section

IMPORTANT: You must clearly distinguish material that would normally be included in a research article from any raw data or other appendix material that would not be published. In fact, such material should not be submitted at all unless requested by the instructor.

Content

- Summarize your findings in text and illustrate them, if appropriate, with figures and tables.
- In text, describe each of your results, pointing the reader to observations that are most relevant.
- Provide a context, such as by describing the question that was addressed by making a particular observation.
- Describe results of control experiments and include observations that are not presented in a formal figure or table, if appropriate.
- Analyze your data, then prepare the analyzed (converted) data in the form of a figure (graph), table, or in text form.

What to avoid

- Do not discuss or interpret your results, report background information, or attempt to explain anything.
- Never include raw data or intermediate calculations in

a research paper.
- Do not present the same data more than once.
- Text should complement any figures or tables, not repeat the same information.
- Please do not confuse figures with tables - there is a difference.

Style

- As always, use past tense when you refer to your results, and put everything in a logical order.
- In text, refer to each figure as "figure 1," "figure 2," etc. ; number your tables as well (see the reference text for details)
- Place figures and tables, properly numbered, in order at the end of the report (clearly distinguish them from any other material such as raw data, standard curves, etc.)
- If you prefer, you may place your figures and tables appropriately within the text of your results section.

Figures and tables

- Either place figures and tables within the text of the result, or include them in the back of the report (following Literature Cited) - do one or the other
- If you place figures and tables at the end of the report, make sure they are clearly distinguished from any attached appendix materials, such as raw data
- Regardless of placement, each figure must be numbered consecutively and complete with caption (caption goes under the figure)
- Regardless of placement, each table must be titled, numbered consecutively and complete with heading (title with description goes above the table)
- Each figure and table must be sufficiently complete that it could stand on its own, separate from text

Discussion

Journal guidelines vary. Space is so valuable in the Journal of Biological Chemistry, that authors are asked to restrict discussions to four pages or less, double spaced, typed. That works out to one printed page. While you are learning to write effectively, the limit will be extended to five typed

pages. If you practice economy of words, that should be plenty of space within which to say all that you need to say.

General intent

The objective here is to provide an interpretation of your results and support for all of your conclusions, using evidence from your experiment and generally accepted knowledge, if appropriate. The significance of findings should be clearly described.

Writing a discussion

Interpret your data in the discussion *in appropriate depth*. This means that when you explain a phenomenon you must describe mechanisms that may account for the observation. If your results differ from your expectations, explain why that may have happened. If your results agree, then describe the theory that the evidence supported. It is never appropriate to simply state that the data agreed with expectations, and let it drop at that.

- Decide if each hypothesis is supported, rejected, or if you cannot make a decision with confidence. Do not simply dismiss a study or part of a study as "inconclusive."
- Research papers are not accepted if the work is incomplete. Draw what conclusions you can based upon the results that you have, and treat the study as a finished work
- You may suggest future directions, such as how the experiment might be modified to accomplish another objective.
- Explain all of your observations as much as possible, *focusing on mechanisms*.
- Decide if the experimental design adequately addressed the hypothesis, and whether or not it was properly controlled.
- Try to offer alternative explanations if reasonable alternatives exist.
- One experiment will not answer an overall question, so keeping the big picture in mind, where do you go next? The best studies open up new avenues of research. What questions remain?
- Recommendations for specific papers will provide

additional suggestions.

Style:

- When you refer to information, distinguish data generated by your own studies from published information or from information obtained from other students (verb tense is an important tool for accomplishing that purpose).
- Refer to work done by specific individuals (including yourself) in past tense.
- Refer to generally accepted facts and principles in present tense. For example, "Doofus, in a 1989 survey, *found* that anemia in basset hounds *was correlated* with advanced age. Anemia *is* a condition in which there *is* insufficient hemoglobin in the blood."

The biggest mistake that students make in discussions is to present a superficial interpretation that more or less re-states the results. It is necessary to suggest *why* results came out as they did, focusing on the mechanisms behind the observations.

Literature Cited

Please note that in the introductory laboratory course, you will not be required to properly document sources of all of your information. One reason is that your major source of information is this website, and websites are inappropriate as primary sources. Second, it is problematic to provide a hundred students with equal access to potential reference materials. You may nevertheless find outside sources, and you should cite any articles that the instructor provides or that you find for yourself.

List all literature cited in your paper, in alphabetical order, by first author. In a proper research paper, only primary literature is used (original research articles authored by the original investigators). Be cautious about using web sites as references - anyone can put just about anything on a web site, and you have no sure way of knowing if it is truth or fiction. If you are citing an on line journal, use the journal citation (name, volume, year, page numbers). Some of your papers may not require references, and if that is the case simply state that "no references were consulted."

What Skills Do We Need to Write Good Research Papers?

The following list of skills and abilities is in completely random order. The categories are not mutually exclusive. Every one of these skills makes you a better employee and a better boss, as well as an academically successful person. Can you think of more skills that are needed? Which ones do you already have?

- [ ] Reading for meaning -- denotation (What do the words say?) and connotation (What is the author doing or trying to do in this piece? What could it mean?)
- [ ] Writing in order to fulfill a requirement
- [ ] Critical thinking
- [ ] Researching facts and opinions
- [ ] Differentiating between facts and opinions
- [ ] Evaluating ideas
- [ ] Evaluating presentation styles
- [ ] Analyzing and identifying issues and problems
- [ ] Synthesizing and solving problems
- [ ] Organizational skills, both mental and physical
- [ ] Analyzing the arguments of others
- [ ] Constructing your own arguments
- [ ] Expressing your ideas and arguments effectively
- [ ] Persuading and impressing others with your ideas and arguments
- [ ] Presenting and packaging ideas
- [ ] Following through and completing projects independently
- [ ] Meeting a deadline

Teaching Research and Writing Skills: Not Just for Introductory Courses

By: Kevin Brown, PhD in Teaching and Learning

Add Comment

Most professors want students to know how to research and write in their fields. In fact, many degree programs now have introductory courses for majors with content that addresses these research and writing basics. However, the assumption that students learn everything they need in one course is a faulty one. All of us who teach courses for majors need to regularly revisit this content if students are to develop these research and writing abilities. Let me be specific and suggest six things professors can do that help students improve in both areas.

1. Show them how to find appropriate research sources and methods. Introductory courses do a fine job of giving students an overview of research; however, in subcategories within disciplines, research can be conducted very differently. Students writing papers on Chaucer will approach research one way, while those examining contemporary literature will tackle their subjects differently. Thus, professors need to show students how researching their particular areas differs from more general approaches, whether that involves taking the students to an archive, helping them develop surveys, getting librarians working with them on primary texts, or showing them how to design an experiment.

2. Teach them the structure of articles in the field. Again, articles in subfields of the same discipline structure content quite differently, and students do not automatically see those structures. In my upper-division courses, I have students outline two critical articles, looking specifically at the location of the thesis (and subtheses, where appropriate), how explanatory footnotes are used, what types of sources the author used, and the overall structure of the argument.

3. Give them student work to examine. By showing work from previous students, professors can make clear what worked in those papers and where students fell short. If we only provide students with professional work, we miss opportunities to talk about those places where students often struggle, especially with structure. Frequently, students do not value the work of other students. Thus, professors need to provide positive models that show what students are capable of and that clarify our expectations.

4. Have them evaluate and defend their sources. In my first few years of teaching, I would see students' papers refer to leaders in the field, but reading the papers showed me that students did not recognize the importance of these people. I would often write notes about their importance, but, by then, it was really too late for them to use that information. Now I have students submit a proposal and an annotated bibliography in which they tell me why a source is credible. In doing so, they often learn what other works that person has published or how he or she is viewed in the field. I've also noticed that this step helps students see connections among their sources.

5. Set aside time for peer review. For some reason, we tend to think that peer review (or peer editing) works best in beginning composition courses. After that, we assume students don't need it or that they will do it on their own. However, as professionals we know that peer input is always valuable. Most of us wouldn't think of submitting a paper we had not first shared with trusted colleagues. And if the submitted paper is peer reviewed, we benefit from that critique. Students don't know how we operate, so we need to explain and then create a space for them to function as we do.

6. Make them write multiple drafts. Again, we assume that in those early courses students learn the value of a writing process that includes revision and rewriting. Several years ago, before I began requiring drafts of my upper-division students, a student was in my office crying over her paper. She had earned a D, the lowest grade she had ever received on a paper. What I realized, in looking at her paper and listening to her, was that many of these problems could have been solved with just a bit of feedback earlier in the process. Her peers had missed her leaps in logic, but I could have caught them and helped her to improve her argument rather dramatically. Needless to say, all my students now provide me with a draft when they give one to their peers.

We need to remember that introductory courses are a first encounter with our fields. The idea that a student learns everything after being taught it once or twice is shortsighted. Our students need repeated chances to learn how our fields approach research and writing, if we want them to graduate ready to become members of our disciplines.

Dr. Kevin Brown is an English professor at Lee University.

Reprinted from "Not Just for Introductory Courses" *The Teaching Professor,* 25.8 (2011): 1.

Add Comment

Tags: improving student research skills, improving student writing skills, teaching undergraduate research, writing assignment strategies

- See more at: http://www.facultyfocus.com/articles/teaching-and-learning/teaching-research-and-writing-skills-not-just-for-introductory-courses/#sthash.OootKij0.dpuf

---

Writing Skills – How to Write a University Paper

- Up one level
- Academic Advising
- **Study Skills**
  - Anti-Procrastination
  - Concentration
  - Exam Anxiety
  - Exam Preparation
  - Lecture Note-taking
  - Motivation
  - Multiple Choice Workshop
  - Reading Textbooks Effectively
  - Stress Management
  - Study Skills for Distance Learners
  - Student Skills for International Students
  - Time Management
  - **Writing Skills – How to Write a University Paper**
  - Academic Survival: Top Ten Tips for a Successful First Year
- Writing Centre
- Student Success Course

If you need help writing a paper, the library is the best place to start. Its webpage has a variety ofinformation that will help with your writing. Some of the topics on the webpage include:

- Writing a research paper: This includes details on planning ahead, choosing a topic, developing a thesis statement, finding material and writing tips (check out writing a book review).
- Finding journal articles: print and electronic sources.
- Using the Internet for scholarly research.
- Citing your paper: This includes information on documenting your sources and avoiding plagiarism.

Many students have unrealistic expectations of themselves when writing a paper. This often leads to procrastination, because they feel like the paper has to be perfect. Professors grade papers on content, organization and style. A paper needs to be clear and thoughtful, correctly written and say something that makes sense. The goal is for students to figure out how to think critically and, in the process, learn something they didn't know before they wrote the paper.

Here are some tips to help you write a better paper:

1. Break the paper into smaller steps

The thought of writing a 10-page research paper can be scary, but if you break it down into smaller pieces it seems easier to manage. See the steps below for the various stages. For more information on time management, click here.

2. Choose a topic

Brainstorming can help you think of a good topic for your paper. Choose one that is manageable so you'll be able to gather enough information on that topic.

3. Practice pre-writing

Plan how you are going to gather information, then come up with a thesis statement and outline.

* **Research your topic**. Don't leave your research until the last minute. Make sure that you have enough time to change your topic if you can't find what you're looking for. You may need to order books or journal articles from other universities through Interlibrary Loan or Novanet Express. This process could take anywhere from two days to three weeks, so you should begin early. You should also ensure that the research you do is credible. This means using peer-reviewed journals and being careful about what you take from the Internet. If you need help researching your paper, you can go to the library webpage or visit a librarian to get more information.

***Thesis statement**. A thesis statement is the overall point your paper is making. It should be in the introductory paragraph so the reader will know what the paper is about. This is very important, because the rest of your paper either proves or disproves this statement. A thesis statement should say something meaningful and significant, not something the reader already knows.

***Outlining**. Don't just imagine what you're going to do in your head; write it down so you can see if there are any holes in it. Draft a list of the points you want to cover and the order in which you will make them. A good outline should include the framework of the paper from the thesis statement to the main point to the supporting points.

4. Do a first draft

Get your ideas down quickly and don't worry about how they're worded; you can always fix them later. It's a good idea to use a word-processing program on a computer to do your first draft because that lets you go back later and add information or move things around easily.

5. Revise

Wait a day or two before you revise your paper so you can look at it through fresh eyes. Revise your paper for content, organization and style.

6. Proofread

Proofread your paper carefully. Most word processors have grammar and spelling checks, and while they do help a lot, they're not foolproof. Careless mistakes send a message to your professor that you don't care, so edit carefully.

7. Avoid plagiarism

Students must learn to use sources and document them the right way. You can't change a few words in a passage and call it your own. You need to cite information, whether you quote it directly or reword it entirely. It's better to cite too much than too little; if you don't, you could end up plagiarizing.

Mount Saint Vincent University has a Writing Resource Centre that provides friendly, professional, writing advice free to all Mount students. Students can get help at any stage of their writing assignment, whether they're a struggling or skilled writer. Click here for more information on the Writing Resource Centre.

Develop Your Writing - Writing Skills and Technique

As you get further along in the writing of your thesis, you will start to think about its quality and whether there is anything you can do to improve this.
In this section you will find advice on what you can do to develop your writing through focussing on the needs of your readers and thinking about how your thesis - both as a whole and in its individual sections - will communicate your original contribution to knowledge.

The Graduate School's Top Tips for Developing Your Writing

Think About Your Readers' Needs

Remember Basic Rules for Good Written English

Write Regularly to Develop Confidence and Quality

Have a Structure for Drafting and Re-Drafting

Get Feedback on Your Writing and Use It

Be Realistic About What You Can Achieve

Think About Your Readers' Needs

Whatever you are writing, your aim should be to make your text as clear as possible – to present your ideas clearly and concisely and to avoid ambiguity or redundancy. Achieving this becomes easier the more you practice writing and begin to develop your confidence in your writing style.

If it is something you are still having problems with, try adopting these very basic rules as you write your thesis:

- avoid excessively long sentences
- do not use a difficult word where a simple one will do

- use punctuation correctly to aid the sense of your writing
- use paragraphs to break your text into logically self-contained units

To guide your readers through your thesis it should include a system of "signposts" – things that explicitly or implicitly tell the reader what to expect. Signposts that you can use in your thesis are:

- a detailed table of contents
- a well written abstract
- an introductory section/chapter for the thesis as a whole
- an introductory paragraph for each individual section/chapter
- a consistent system of headings and sub-headings

Remember that your thesis is telling a story – your original contribution to knowledge in your discipline. It should be clear from the very start what your original contribution to knowledge is and each section/chapter should then help to tell that story.

Finally, your readers will expect your thesis to be fully and accurately referenced. For more advice, read the University's**Avoiding Plagiarism Study Guide** and the **Referencing and Bibliographies Study Guide**. Ask your supervisors if you are unsure of the conventions for referencing in your discipline.

Remember Basic Rules for Good Written English

It is important that you pay attention to the basic rules for good written English - accurate spelling and correct use of grammar and punctuation.

Errors of spelling are best avoided by careful proof reading - and you should never rely simply on your word processor's spell check function. Proof reading is something you should allow time for as part of your structure for re-drafting your work - do not expect your supervisors to do your proof reading for you.

Grammar and punctuation can be more difficult to get right, particularly if English is not your first language. For more advice, read the University's Grammar Study Guides:

- **Sentence Structure**
- **Using Paragraphs**
- **Using Colons and Semi-Colons**
- **Using Apostrophes**
- **Using Commas**

You may also want to consult the University's **Inclusive Writing Study Guide**.

Write Regularly to Develop Confidence and Quality

Research students are encouraged to start writing early on in their research degree. Writing as you go takes some of the pressure out of your final year and gives you the opportunity to practice writing and develop your writing technique.

As you enter your final year and your expected thesis submission date gets closer, regular writing becomes even more important. Research students who make a routine out of writing find it helps them to concentrate on their work and that this helps them feel more comfortable putting their thoughts into words. Most research students find that in their final year they need to spend at least some time each day writing their thesis in order to complete it on time and many find that keeping "office hours" for their thesis is a good way of making sure they focus on their writing.

Critical Writing

One of the skills that regular writing will help you to develop is your ability to write critically - that is, to write in a way that is characterised by:

- a clear and confident refusal to accept the conclusions of other writers without evaluating the arguments and evidence that they provide
- a balanced presentation of reasons why the conclusions of other writers may be accepted or may need to be treated with caution
- a clear presentation of your own evidence and argument, leading to your conclusion
- a recognition of the limitations in your own evidence, argument, and conclusion

It is important that you can demonstrate a critical writing style in your thesis. For more advice, read the University's **Critical Writing Study Guide**.

Academic Conventions

Whatever discipline you belong to, there will be certain conventions of academic writing - for example, specific modes of phrasing, specific terminology, recognised acronyms/abbreviations, etc. It is important that you make yourself familiar with these and the best way to do this is through reading theses, articles, and other texts.

Ask your supervisors if you are unsure of the specific conventions for academic writing in your discipline.

Have a Structure for Drafting and Re-Drafting

To start with, your thesis will be very much a work in progress. It is important to remember in the early stages of your writing that you are working on a draft, not the finished thesis. Keep writing even if you know that you can do better - leave the improvements until you come to write the next draft. This will give you time to reflect and think more carefully about anything that you might need to change.

Instead of re-drafting as you go, why not look to make drafting a process with formal stages and different questions to be addressed at each stage:

- 1st Re-Draft - Editing for Academic Rigour
- 2nd Re-Draft - Reducing Redundancy
- 3rd Re-Draft - Editing for Consistency
- 4th Re-Draft - Signposting and Linking
- 5th Re-Draft - Proof Reading

For more advice on the type of things you need to consider at each stage, read the University's **Art of Editing Study Guide**. We recommend that you apply this structure to each complete section/chapter of your thesis as well as your final complete version - so it is important that in your work plan you allow sufficient time for each re-drafting stage.

Get Feedback on Your Writing and Use It

Getting feedback from your supervisors as your writing progresses should already be a part of your work plan and your strategy for managing your writing.

Your supervisors may structure their feedback in a way that brings out the positives before going on to talk about any weaknesses. You will need to take a balanced approach - be pleased with the positives, but take seriously any weaknesses and listen to and act on any comments your supervisors might have for addressing these.

Your supervisors will comment on the content of your work, but if you would find it helpful to also be given feedback on your writing style and what you could do to develop your writing, let your supervisors know that this is something you would appreciate their comments on.

Alongside your supervisors, your friends - particularly fellow researchers - are a useful source of feedback and can offer general advice on tone, phrasing, and structure as well as suggestions on how you might improve your writing.

Be Realistic About What You Can Achieve

It is natural to be anxious about the quality of your work, but do not let this stop you writing or allow yourself to be caught in the trap of repeatedly revising the same section. Being realistic as to what to expect from your writing will avoid wasting time through worrying rather than getting on with your thesis.

Remember that:

- you are just starting out as an academic writer - you should not expect, nor will your examiners expect, to see in your thesis the writing style of an experienced academic writer
- you need to keep sight of what is important about your writing style - do not waste time agonising over phrasing or your choice of words, your writing is doing its job if it communicates clearly what you have to say

- you can use feedback from your supervisors and others to reassure yourself that what you are writing is of an appropriate standard

Writing Skills for Theses and Articles

½ زµ{²§°ت:
6/2 -°±½ ز
6/8 (R107)
6/9, 6/16 (R101), 10:30~12:00

Syllabus

Short Course Syllabus
Writing Skills for Theses and Articles
Department of Computer Science & Information Engineering, National TaiwanUniversity
http://www.csie.ntu.edu.tw/~writing/

Non-credit elective, Eligibility: 2nd year M.A. students, 3rd year+ Ph.D. students

Instructor: Dr. William C. Vocke:
Home: 2218-8630, Cell: 0937-061-456, Email: wvocke@csie.ntu.edu.tw

[Before the first class, email ‹§Homework 1‹¨]

Purpose

- ،Π To increase the quality of the English writing skills focusing on theses/dissertations and articles/papers

As Microsoft demonstrates, it isn‹¦t necessarily the best ideas that are successful. You have to effectively communicate ideas for others to accept and use them. This short course will help you and your great ideas gain acceptance. The course is in English and about English, but does not emphasize grammar or spelling. Rather, the course focuses on strategies and techniques that make your communications more effective. Writing is the central theme. However, the general techniques also apply to speaking and the final two sessions focus on presentations.

Goals

- ،Π You will have an effective, personal outline for a research topic by the course‹¦s end.

- More student papers will be accepted for presentations or publication in English.
- English theses/dissertations will be more polished upon submission to faculty.

Format

- Each 3 hour class meeting is divided into thirds for a total of 12, 50-minute sessions
  - A homework assignment precedes each class meeting
- Each 50 minute session includes:
  - Lecture, bulleted PowerPoint handouts
  - Illustrations from
    - Completed theses and papers
    - Student homework assignments
  - Activities: one of the following
    - Planning practice
    - Outlining practice
    - Writing practice
    - Editing practice
  - Hints
    - Writing hint of the session
    - ESL hint of the session

Useful Texts [If available, these will be on reserve in the main library.]

Alley, Michael. (2003). *The Craft of Scientific Presentations*. New York: Springer-Verlag.

Alley, Michael. (2000). *The Craft of Editing: A Guide for Managers, Scientists, and Engineers.*

New York: Springer-Verlag.

Alley, Michael. (1996). *The Craft of Scientific Writing* (3rd ed.). New York: Springer-Verlag.

Booth, Vernon. (1993). Communicating in Science-Writing a Scientific Paper and Speaking at

Scientific Meetings (2nd ed.). Cambridge: Cambridge University Press.

(Dictionary (a Chinese/English version at your level, i.e., introductory, intermediate or advanced)

Grammar (one good one is: Swan, Michael. (1995). Practical English Usage. Oxford:Oxford

University Press.

Paradis, James G. & Zimmerman, Muriel L. (1997). *The MIT Guide to Science and Engineering*

Communications. Boston: MIT Press.

Strunk, Jr., W. & White, E. B. (1979). *Elements of Style* (4th ed.). Needham Heights, MA: Allyn & Bacon

Style and citation format from your target journal, convention or department.

Turabian, K. L. (1996). *A Manual for Writers of Papers, Theses, and Dissertations*(6th ed.). Chicago: University of Chicago Press.

Evaluation

Students develop a portfolio of materials that they have written or edited. This shows their commitment and provides a measure of their progress. A pass/fail grade is given.

Homework

See the four assignments listed below

Due: Thursday before class.

Format: English Name, Chinese Name, Homework #___

Assignment

Email to: wvocke@csie.ntu.edu.tw

RE: CS Homework #___

Course Framework

Day 1: Planning to Write (Homework 1 due in advance)

Session	Title	Main Points
1	Overview	Assessing a good thesis
		Format and expectations
		Process Writing
		#1 ESL and Writing Hints
2	Audience	Targeting
		Idea generation techniques
		Idea sets
		#2 ESL and Writing Hints
3	Focus	Research question
		Thesis statement
		Selecting winners
		Research strategy
		Sources
		#3 ESL and Writing Hints

Day 2: Outlining (Homework 2 due in advance)

Session	Title	Main Points
4	Formal Structure	Fields
		Paper, article, M.A., Ph.D
		Authority vs. Function
		Process writing
		#4 ESL and Writing Hints
5	Outlining	Start with the thesis statement
		Transforming idea sets
		Top Down
		Bullets
		#5 ESL and Writing Hints
6	Bullets to sentences	Rule of 3‹¦s, 2‹¦s and 5‹¦s
		‹§Discourse Grammar 1‹¨
		#6 ESL and Writing Hints

Day 3: Writing (Homework 3 due in advance)

Session	Title	Main Points
7	Reader First	Discourse Grammar 2
		Culture and English usage
		Voice
		Clarity &/or Complexity?
		Process writing
		#7 ESL and Writing Hints
8	Paragraphs 1	Optional organization patterns
		Cohesion & coherence
		Parallelism
		Topic sentences
		‹§Least to Greatest‹¨ or invert?
		#8 ESL and Writing Hints
9	Paragraphs 2	Effective sentences
		Transitions
		Signaling
		Word choice
		#9 ESL and Writing Hints

Day 4: Polishing (Homework 4 due in advance)

Session	Title	Main Points
10	Design	Layout Graphics
		Process writing
		#10 ESL and Writing Hints
11	Outlining revisited	Global editing
		Sentence editing
		#11 ESL and Writing Hints
12	Powerful ideas	Colleague review Final Polishing Professional Presentation Conclusion #12 ESL and Writing Hints

Homework

Homework 1: Planning to Write (submit on Thursday before class):

Write one paragraph on each of the following. Together, they should be no more than one page.

a. Describe yourself.
b. What are your research interests?
c. How far advanced are you on your thesis research?

Homework 2: Outlining (submit on Thursday before class):

Write two generic outlines: one for either an M.A. theses or Ph.D. dissertation, the other for a research paper. Together, they should be no more than one page. These are not outlines for specific research projects. They are the guidelines that initially structure most professional work in a your field. Be sure to note the target field, journal and/or convention. Styles differ depending upon the target. [Hint: Ask your professors for the normal formats in their specialty.]

Homework 3: Writing (submit on Thursday before class):

1) Find three examples of technical writing on web sites of major corporations, institutions, universities or governments. One should be good, one just OK, and one bad. 2) Cite them appropriately. 3) Explain why the first is good. 4) Rewrite the bad example making it better. The examples should total no more than one-page, and your analysis should also be no more than one page.

Homework 4: Polishing (submit on Thursday before class):

I. Generate 3-7 ideas, linked together around some research issue
II. Write

a. The central research question
b. The thesis sentence

III. Outline your ideas

Exercises/Handouts

1. Two examples, good and bad, from actual theses.
2. Editing Code is distributed
3. The self-description from H1a and the instructor‹¦s version of the same.
4. Student research interests from H 1b
5. Citation Guide is distributed
6. Basic Formats in Computer Science, from H 2
7. Process Writing diagram
8. The best thesis statement, question, and idea set from Day 1, Session 3 is returned and a bulleted outline created.
9. List of Criteria for Good Writing is distributed
10. The outline is turned into sentences, written on transparencies, and used for discussion.
11. From the ESL hints
12. An illustration of Chinese vs. American writing expectations
13. Bring up web site for ‹§Overcoming Chinese-English Colloquial Habits in Writing‹¨
14. A set of sentences from a technical paragraph is provided and has to be ordered.
15. A selected illustration from H3 is distributed, rewritten and reviewed on the overhead.
16. A portion of an NTU paper or thesis, and its outline are handed out, rewritten and reviewed.
17. Review the syllabus. It is both flawed and effective in writing and designs.
18. Write a Research Question and a Thesis Statement for something that you hope to complete!
19. Students Outline their thesis.
20. Students present their thesis to other members of their small group.
21. Student use the Evaluation Grid handed out to assess their peers.
22. A mock, 5-minute presentation by a CS Professor which the students evaluate using the grid.

Instructor Information

Dr. Jennifer Bay
Office: HEAV 301C
Phone: 494-8122
Email: jbay@purdue.edu
Office Hours: Tues/Thurs 9-10 am and by appointment

Course Description

English 203 serves as an introduction to research approaches and methods useful for professional writers. The course will focus on developing ideas to guide research; collecting print and online information; interviewing, surveying, and conducting observations; and evaluating, summarizing, analyzing, and reporting research. Perhaps most important, the course will focus on developing your writing skills so that you might not only engage in but also produce quality professional research.

One textbook that deals with professional writing research lists several characteristics and skills necessary for productive research; these also serve as the general goals of this course:

- Curiosity: to learn more, to discover why or why not, to follow up on questions, to ask new questions, to wonder.

- Interest in detail: to document everything, to work methodically, to check facts, and to discern among facts, theories, hypotheses, and opinions.
- Ability to see trends: to envision the future, to anticipate needs, and to take the next step.
- Awareness of audience: to understand needs and expectations, to empathize, to assist, and to plan what needs to be done next.
- Critical thinking: to look as objectively as possible, to verify, to support, to analyze, to criticize, to evaluate, and to think logically.
- Innovative thinking: to look as creatively as possible, to try something new, to try something different, and to make connections among ideas.
- High ethical standards: to expect logical, honest, and collaborative work from yourself and others; to credit other's work; and to conduct safe and appropriate research. (Porter and Coggin 8)

Required Texts

Booth, Wayne C., Joseph M. Williams, and Gregory G. Colomb. *The Craft of Research, 3rd ed.* Chicago: U Chicago Press, 2008. (Vons)
Gibaldi, Joseph. *MLA Style Manual and Guide to Scholarly Publishing.* New York: MLA, 2008. (Vons)
Coursepack (Copymat)

Evaluation

I will evaluate your work using a 4.0 scale (+/-) as outlined by the university. Components will be worth the following percentages:

Portfolio—50%
Writing assignments—25%
Participation (in class, online, and group)—25%

Portfolio

This class uses the portfolio method of assessment to evaluate student performance. The portfolio method is a process whereby students extensively develop, revise, and edit a variety of projects during the course. This semester, we have three major projects. Throughout the semester, students submit full drafts of their projects to the instructor and to class peers, who provide constructive feedback, suggestions, and commentary for further revision. Formal grades are not assigned on these drafts. Rather, students have the opportunity to revise their work using those comments and suggestions. At the end of the course, students submit their revised projects in a portfolio that represents their best work. These portfolios are evaluated holistically, meaning that the work is assessed as a whole rather than as individual pieces. The purpose of this method of assessment is to allow students to focus intensely on improving their writing and critical thinking skills without an emphasis on letter grades or rankings. If you are concerned about your standing in the course, please make an appointment to discuss your work with me.

Writing Assignments

There will be several short writing assignments, such as project proposals, annotated bibliographies, summaries of research, response papers, reading notes, and other brief in and out of class assignments. Some of these will concern assigned readings, and some will be part of the deliverables for the portfolio projects. These writing assignments are intended to demonstrate that you have been reading, that your research is going well, that you can summarize or comprehend complex information, etc. I will use a +/- grading scale to evaluate your work in this component.

Participation

Participation includes active and constructive involvement in class discussions, online collaboration, as well as being prepared for class by doing the assigned reading and writing assignments. In order to help assess participation, we may have periodic pop reading quizzes, which will figure into your participation grade. Participation also includes active and constructive involvement in peer groups, peer review sessions, turning in projects to group members for feedback, giving effective feedback on projects, and learning to work diplomatically with others to achieve common goals. Note: there is a lot of reading for this course, some of which may be online; occasionally, some of the very "how-to" material will not be completely covered in discussion. Nevertheless, you are still responsible for that content.

Late Work

I do not accept late work. I expect all work to be completed by the beginning of the class period on which it is due.

Attendance

For the course to be a success, everyone's participation is necessary. Therefore, attendance is required. You are allowed three absences, no questions asked. For each class absence over three, your final grade will be lowered by one letter grade. More than six absences will result in a failing grade for the course. You are responsible for obtaining all information about missed class meetings from a classmate and for submitting work on time. Excessive tardiness will not be tolerated. Three tardies equals one absence. If you enter the class more than 30 minutes late, you will be counted absent.

Academic Integrity

Academic dishonesty is a serious crime. If you are suspected of academic dishonesty, you may be reported to the Office of the Dean of Students to receive disciplinary action. Forms of academic dishonesty include: Collusion - lending your work to another person to submit as his or her own; Fabrication - deliberately creating false information on a works cited page; and Plagiarism - the presentation of another person's work as your own, whether intentional or not. Please read and familiarize yourself with Purdue's student guide to academic integrity: http://www.purdue.edu/ODOS/osrr/dishonesty.htm

Technology Requirements

Because much of the exchange of information and materials in this class will be online, familiarity with certain technologies is crucial for participation and success in the course. If you need any assistance now or at any point during the semester, please do not hesitate to ask. Very early in the semester, you will need to make sure that you can meet the following responsibilities:

- Have access to your Career Account.
- Set up your @purdue.edu email address and check your email regularly, especially before class meetings.
- Become proficient with sending, receiving, and opening email attachments, resolving file compatibility issues, and following email decorum.
- Send email messages to the class list, post to online discussions, and use course technologies such as del.icio.us and Google Docs.
- Check the course calendar and webpage before the beginning of each class.
- Become more proficient with unfamiliar computer technologies and applications that are essential to professional writing.
- Maintain back-up copies of all assignments via your home directory, flash drives, and/or email attachments to yourself.

General Course Policies

Come to class prepared to engage with the assigned readings, course concepts, class peers, and instructor. This can best be accomplished by completing your assignments before the beginning of class.

Please respect your peers and your instructor by actively listening and paying attention. This means that unless we are using the computers during a class activity, students should be facing the instructor, other students, or whoever has the floor and is speaking.

Please do not talk or type while others (students or instructor) are speaking to the class. This especially includes when other students ask questions of the instructor.

Printing while one of your peers or your instructor is speaking is not allowed.

Please do not sit in the back of the room. You will not be able to hear your instructor or peers.

Because of the new printing policies for the university, I will be unable to print copies of your papers.

Remember to bring your texts to class with you and remember to print copies of all documents (drafts, electronic and online readings, etc.) before class begins.

You must complete all of the projects in a timely manner in order to pass this course.

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Information about changes in this course can be obtained through email: jbay@purdue.edu.

If you have a university-recognized disability that requires an accommodation, please make an appointment with me to discuss your needs.