

EEB 2244W Course Manual – Fall, 2016
(for students of Chris Elphick only)

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I. Contact Information

Dr. Chris Elphick. TLS (Torrey Life Sciences) 370/372; Telephone: (860) 486-4547; Office Hours: By appointment. Email: [chris.elphick @ uconn.edu](mailto:chris.elphick@uconn.edu). Email is the best way to contact me, but PLEASE put "EEB 2244W" in the subject line to ensure your message does not get missed in the email onslaught that is my inbox.

All papers should be sent to me by email at the address above. All assignments should be in my email inbox before 4 pm on the due date, with "EEB 2244W" in the subject line. I will acknowledge receipt of papers within 24 hours of the deadline. If you do not get an email back from me, assume that I did not get the paper, and that you should check with me.

For the final term paper send me an email copy but also turn in a hard copy to my mailbox in the EEB department office (TLS 316) by 4 pm on the due date.

II. What Help is Available?

LOTS – but you are responsible for seeking it. First, please email me to ask questions or make an appointment at any time, not just those required. When you do, tell me what you want to talk about and give me a range of times when you are available. I do not monitor email constantly, and cannot always check it at night or over the weekend. I will typically respond to queries within a day or two. Also, note that there are times when I will be working off-campus due to research needs or will be away from email for up to several days due to travel commitments. Consequently, if you choose to leave things until the last minute, I may not be around to help.

Second, take advantage of the Writing Center (www.writingcenter.uconn.edu), which runs regular tutorials for students. Visit the web site for information on how to make an appointment. The Center has a section of its web site devoted specifically to advice on writing in biology (see <http://writingcenter.uconn.edu/writing-in-biology/> and <http://writingcenter.uconn.edu/writing-in-biology-2/>) with a lot of superb information. Review this site during the first two weeks of the semester as it will serve you well for the assignments. Pay particular attention to the "Practical Guide to Reading the Primary Literature in Biology" and the "245W Long Paper Guide", which provides guidance on how to plan your paper. Although the latter is aimed at EEB2245W (formerly 245W) almost everything it says applies to 2244W.

Finally, please read this entire manual carefully. It is long (sorry), but it should contain almost everything that you need to know. I would suggest quickly skimming the entire document right away so that you know what it covers and can ask questions about anything major that you do not understand. Then, refer back to specific sections frequently as you work on the assignments to ensure that you do not miss important details.

Students with disabilities: Students who think that they may need accommodations because of a disability should meet with me privately early in the semester. Such students should also contact the Center for Students with Disabilities as soon as possible to verify their eligibility for reasonable accommodations. For more information, please go to <http://www.csd.uconn.edu/>.

III. Summary of Assignments and Due Dates

Students are required to write two papers over the course of the semester, both of which will be revised and resubmitted. The first paper is a 2-page summary and discussion of a recent (2016) peer-reviewed scientific paper. The second is a longer term paper on an ecological topic of your choice (subject to my approval). The source paper used for the first assignment can be used as a source for the term paper, and I would recommend this approach as it allows you to build off the first assignment for the long paper. **Note that I will not send reminders about due dates.**

All assignments should be submitted via email. Every document you submit should be titled using the course name, your last name, and the assignment, using the following format: "EEB2244W_yourname_initial_short ", "EEB2244W_yourname_source_paper", "EEB2244W_yourname_initial_short_cover", "EEB2244W_yourname_final_short", etc. Points will be deducted if you fail to do this.

VERY IMPORTANT: Every assignment you submit should include the following text in the accompanying email: "On my honor as a student, I pledge that this work is my own, and that the writing is original as defined in the course manual. I understand the penalties for violating this requirement."

NOTE: ASSIGNMENTS, DUE DATES, AND POINT SYSTEMS VARY AMONG 2244W INSTRUCTORS AND MAY BE DIFFERENT FOR STUDENTS IN OTHER SECTIONS.

The following table summarizes each part of each assignment. More detail is provided in the subsequent pages of this document. The total number of points for the W portion of EEB 2244 is 230 (25% of the entire EEB 2244W grade). Failing an assignment means that you will get zero points for that assignment. If this happens on the long paper you will fail both 2244 and 2244W. **One point per day will be deducted for short papers that are turned in late; five points per day for late term papers (these penalties apply to both initial and final versions).**

ASSIGNMENT	POINTS	DUE DATE	RETURN DATE	BRIEF DESCRIPTION
Short paper – email initial submission, cover letter, and source paper to instructor	15	Sun 25 Sept	By Wed 28 Sept	Summary and discussion of a published peer-reviewed paper on ecological research. The paper must have been published in 2016. Try to pick a paper that relates to the topic you will use for your term paper. Include a cover letter.
<u>Required</u> meeting with instructor	Fail short paper assignment if do not attend	Pick a time and email me: Mon 3 Oct: 11-5		Make a 30 min appointment to meet during the times shown. You should be ready to discuss revision of your short paper and your term paper topic. Setting up the meeting is your responsibility. If you have classes during all listed times, email me <u>before 28th Sept</u> to discuss alternatives.
1) Email final short paper and cover letter 2) Email short description of term paper topic	25	Before 4 pm, Fri 7 Oct	By Wed 12 Oct	1) Final version, with cover letter. 2) A brief (1/2 page max) description of your term paper topic with a list of at least 5 references that you plan to use (including one from 2016). The references must be listed in the proper format for a "References cited" section (see section VII).
<u>Required</u> meeting with instructor. Bring a detailed outline of your paper, for grading.	10	Pick a time and email me: Mon 17 Oct: 12-3 Wed 19 Oct: 12:30-3		Make an appointment to meet with me to discuss your term paper. Your outline can either be in list or diagram form, but must be a hard (paper) copy. If you have classes during all listed times, email me <u>before 10th Oct</u> to discuss alternatives.
Term paper – email initial submission, cover letter, and revised outline to instructor.	60	Sun 6 Nov	By Fri 11 Nov	The paper should include all parts listed in section VI. Include a cover letter and a revised version of your outline.
<u>Required</u> meeting with instructor	Fail term paper assignment if do not attend	Pick a time and email me: Thu 17 Nov: 11-2 Fri 18 Nov: 12-3		Make an appointment to discuss revision of your term paper. You should have already thought about the revision so that we can talk about your plan. Setting up the meeting is your responsibility. If you have classes during all listed times, email me <u>before 11th Nov</u> to discuss alternatives.
Revised term paper to instructor in <u>hard copy and via email</u> .	120	Before 4 pm, Mon 5 Dec		Final version of the term paper, with cover letter.

IV. Grading

A. Teaching goals

My goals are to (1) help you learn to present information, ideas, and arguments in clear, well-organized, original prose and (2) introduce you to literature research in biology, including reading the primary peer-reviewed literature in which scientists report the results of their studies.

B. General grading criteria

Grading will be based both on the quality of the writing and on the content. I will expect you to use the conventions of scientific writing, which I describe in detail later in this manual. I also expect your papers to read as well as good science journalism, though with more attention to the methods and specific results than is typically included in popular science articles. Grades will be based on your ability to follow the instructions; organize ideas and develop cogent arguments; use correct spelling, grammar, and syntax; and hold the reader's interest. Detailed grade criteria are given with the descriptions of each assignment. Please read those descriptions carefully.

To convert your numeric score into a letter grade, use the following scheme (interpretations are based on the undergraduate catalog's description of each letter grade).

Percent	Grade	Interpretation
> 92	A	Excellent
90-92	A-	Excellent
87-89	B+	Very Good
83-86	B	Good
80-82	B-	Good
77-79	C+	Good
73-76	C	Average
70-72	C-	Fair
67-69	D+	Poor
63-66	D	Poor
60-62	D-	Merely Passing
< 60	F	Failure

A few general things to consider:

- If you do not meet the minimum requirements for an assignment (number of pages, etc.), I will consider the assignment unfinished and return the paper without grading it. I also will not accept final versions of assignments if I have not seen an initial submission. Since deadlines are set well in advance and papers can be turned in early, I will accept late papers only under truly exceptional circumstances (e.g., prolonged illness) and with documentation. My advice is to plan ahead so that papers are finished early. If you get sick two days before a deadline and have nothing to hand in, then your paper will be considered late and penalties applied (1 pt/day for short papers; 5 pt/day for term papers). Back up everything you do (twice), and keep back-ups in separate places (e.g., use cloud storage, or email the latest version to yourself so it is on a server somewhere). "The computer ate my homework" is not an acceptable excuse for being late.
- Learning to identify errors yourself and edit your own text are critical writing skills. Consequently, I will only correct spelling, grammar, syntax, etc. for the first ~20% of each

paper. After that I will highlight places where I see something that needs fixing for the next ~20%. You should use these marks to guide your revision. For the rest of the paper I will not highlight basic writing errors, but will leave them for you to find. Problems with structure, content, etc. will be identified throughout. The required cover letters are intended to help you reflect on your writing and learn to critique your own work.

- Self-editing (revising) is something you should be doing on everything you submit (including initial submissions, cover letters, even emails, etc.). The more you do this, the better a writer you will become. The Writing Center provides good guidance on revision here: http://writingcenter.uconn.edu/wp-content/uploads/sites/593/2014/06/Tips_for_revising_any_scientific_writing.pdf.
- The ability to keep your writing sufficiently concise for the job at hand is another important skill. Consequently, I will not read beyond the assigned page count and your grade is likely to suffer if you write more than the assignment calls for. Writing the same thing over and over in slightly different ways also will not get you a good grade.
- If you turn in a paper that you did not write, is not based on your ideas, or does not appropriately cite other peoples' work, you will almost certainly fail the course. **MAKE SURE YOU READ THE SECTION ON PLAGIARISM LATER IN THIS MANUAL** (section VII). Papers should not include direct quotations, even if attributed.
- According to university-wide policies for W courses, you cannot pass this course unless you receive a passing grade for its writing components. I.e., if you fail the W, you will also fail the lecture.
- I do not give "extra-credit" under any circumstances. To do so retrospectively would be unfair to students who did not have the same opportunity to gain that credit and credit that is available to everyone is just normal credit.

V. The Short Paper Assignment

A. Basics

The short paper should be 2 pages long and double-spaced. Use a 12 point Times Roman font throughout (including headings). Number the pages. Use 1-inch margins and black text. Insert a header that includes your name, my name, and "EEB 2244W", so that this information appears on every page. Do not include any additional formatting. Email me the paper as an MS Word file (.doc or .docx). Also email me a pdf of the published paper that your paper discusses (if you just send me a link, or the abstract, you will not have met the minimum requirements of the assignment and I will return it ungraded). These details have all been included for a reason and they all matter; consequently, I will deduct points if they are not followed. If you don't know how to do some of these formatting things, please ask.

Getting input from your peers is often a helpful way to improve the quality of your paper, so I encourage you to seek out other students and read each other's papers. When reading and discussing a fellow student's paper, please make every effort to be constructive. Give them the type of feedback you would like to receive and that you think will help them get a better grade. Use my grading criteria (part D, this section) to determine what grade you think your fellow student is likely to get (assume I'm a tougher grader than you) – and then explain to them how

you came to that conclusion. Doing this will help you to understand the criteria better, which may help you get a better grade. Use the grading criteria to judge your own papers too.

Due date for the initial submission: Sunday 25th Sept, emailed to me before midnight. Your email should have three attachments: (a) the submitted paper, (b) a cover letter, and (c) a pdf of the source paper. Make sure that all emailed documents are named using the conventions described in section III. Graded papers will be returned by 28th Sept.

First required meeting: Make an appointment for a 30-min meeting with me on **3rd Oct** to talk about your initial submission and your term paper topic (email is the best way to contact me – put "EEB 2244W" in the subject line). Times that I am available to meet are listed in the table in section III. You should come to this meeting prepared to (a) talk about my comments on your initial submission, (b) ask questions about how to revise the paper, (c) describe what you liked or disliked about the writing in the source paper, and (d) discuss possible topics for the term paper.

Due date for the final version: Friday 7th Oct, emailed to me before 4 pm. Your email should have three attachments: a) the final paper, (b) a cover letter, and (c) a short description of your term paper topic (1/2 page max, at least 5 references, at least one reference from 2016, references must follow the format in section VII). Make sure that all emailed documents are named using the conventions described in section III. Graded papers will be returned by 12th Oct.

B. The task

The goals of the assignment are to write a concise summary of the key points of a scientific paper, to think about the paper critically, and to start developing a term paper topic. This is also an important, early chance to get feedback on your writing.

The short paper should summarize a scientific paper in ecology that was published in 2016. Choose an ecological topic using the guidelines given below. I encourage you to choose a paper related to your probable term paper topic. This paper can be used (and cited) in your term paper as well. Use the library to locate one paper from the primary peer-reviewed literature that relates to your chosen topic. This paper must contain original data collected by the authors, i.e. it should not be a commentary or a review of primary literature. I recommend that you check with me once you have found a paper, especially if you are unsure whether it is suitable.

Your assignment is to:

- State the main research problem addressed in the paper.
- Briefly summarize how the data were collected.
- Briefly summarize the results of the paper.
- Discuss the strengths and weaknesses of the study.
- Correctly cite the source paper and any other references that you use. (See section VII, for guidance on how to cite papers – yes, you need to follow this style exactly.)
- Think about the quality of the writing in the paper you read. Was the writing easy to understand? If so, why? If not, why not? Identifying what makes another piece of writing good or bad can help you with your own writing. You should not write about this issue in your paper, but thinking about it will help. I might also ask you about it when we meet.

Your audience is someone who has taken EEB 2244 and has solid basic ecological knowledge, but has not read the source paper that you are discussing and is not an expert on the topic. Strive to write a clear, concise "executive summary" for such a reader, so that she or he can understand what the scientists did, why they did it, what they found, and what conclusions they reached.

Point out any important ways in which the study was incomplete or unconvincing. Be sure to write your summary in your own words: do not copy the phrasing or organization of the paper's own summary or abstract. If you copy sentences, or even phrases, from the paper you will get a grade of zero. Be sure to read my comments on plagiarism (section VII) before starting to write.

C. Choosing a topic and paper for your short assignment

One goal of the short assignment is to get you thinking about your term paper topic, so you should choose a paper related to the probable topic for the longer paper. You can consider any area of ecology, including terrestrial or marine ecology; plants, animals, fungi, or microbes; applied ecology (conservation, sustainable harvest, pest control, disease ecology); global, ecosystem, community, population, behavioral, or physiological ecology. Looking through a textbook is a good way to discover topics that you are interested in and can focus on.

Be aware that ecology is not the same as environmental science and that the way the term "ecology" is often used in the media or by the general public does not always match the way it is used by ecologists. Hence, a paper on wetland food webs or on the effects of wetland loss on biodiversity would be appropriate, but a paper on the effects of wetland loss on the human water supply would not. Similarly, most papers on human health are not appropriate for this course. There are exceptions (e.g., papers that deal with the ecological interactions among human parasites, the effects of biodiversity on human disease risk, or human population dynamics in response to disease, etc., might be suitable), but if you have chosen something that verges into this area, check with me first to ensure that it is OK.

Then, look at recent issues of journals that report basic ecological research (e.g., *Ecology Letters*, *Ecology*, *Journal of Animal Ecology*, *Journal of Ecology*, *Oecologia*, *Oikos*), or the application of ecological research (e.g., *Biological Conservation*, *Conservation Biology*, *Conservation Letters*, *Ecological Applications*, *Journal of Applied Ecology*), or journals that include ecological topics among other areas of science (*Nature*, *Science*). Journals such as *The American Scientist*, *Bioscience*, and *Scientific American* are good sources for ideas, but often do not present primary research and are less likely to be appropriate. Babbidge Library receives all of these journals.

If you have a specific topic you are interested in, you can also search for papers on-line using one of the search engines available at the library. These can be used for free on any computer within UConn's network (note, you should be able to connect your computer to the network – contact UITTS for help or go to: <http://security.uconn.edu/services/vpn/>). You can find these and other databases by going to the UConn library web page: <http://www.lib.uconn.edu/>. More information will be given at the special library sessions set up for students taking this course.

Another good way to search for papers is Google Scholar (<http://scholar.google.com/>; note this is different from the regular Google site). This database will return links to pdfs of papers available on-line. As with the library databases, you will generally need to be connected to the UConn network (via the VPN) to get online access to papers without paying for them. Do not use the regular Google site for searches because most of the returns will be articles that are not peer-reviewed and thus not acceptable sources for my assignments. Even Google Scholar will provide returns that are not peer-reviewed articles so ensure that you know how to identify papers from peer-reviewed journals. For further help, ask one of the librarians at the library help desk, or contact me.

D. Detailed grading criteria

The following table describes the grading criteria for the short paper. I will place greatest emphasis on clarity of writing and scientific accuracy. I do not expect flowery or profound writing, that you have a thesis or particular view to defend, or that you will be knowledgeable about statistical or technical methods presented. I want to read a clear, concise summary of the source paper without snagging on awkward or ungrammatical sentences. I want to find your paper interesting, to not have to re-read sentences to understand them, and to feel I have learned something by the end. Achieving all that is harder than it sounds, and will require self-editing and revision before you turn in the initial submission. With practice it should get easier (really).

Grading criteria	Strong papers: A to high B grades	Satisfactory papers: low B to C grades	Problematic papers: D and F grades
Clarity of writing	The paper reads smoothly, so that the reader can follow the intent of the writer, and readily extract information. The reader can easily understand the most important aspects of the source paper, including its intent, methods, and conclusions. The overall organization (number, order, and content of paragraphs) is strong, as are paragraph and sentence structure. Within each paragraph, the individual sentences cohere around a unified theme, which is declared by a topic sentence when appropriate. Sentence structures are direct and clear. There are very few or no errors in grammar, spelling, punctuation, or word use.	The paper is mostly well written, presenting a good summary of the source paper and its conclusions. The flow may occasionally be interrupted by confusing statements or awkward sentences. The paper has some problems in overall organization, paragraph structure, and/or sentence structure. For example, it may begin abruptly, may not return to questions raised early on, may lack strong topic sentences where they would be helpful, or may contain sentences that are choppy, awkward, or hard to interpret. The reader can readily comprehend some, but perhaps not all, major aspects of the source study. A few spelling and grammatical errors may be present, and word choice not always optimal.	The organization of the paper is discernable, but has not been crafted to convey information effectively. This may be because sentences are rewritten in the same order in which they appear in the source, without taking into account how well this approach works in a short summary. The reader cannot understand key aspects of the source paper. Sentences have to be re-read multiple times to discern their meaning. Errors in spelling, grammar, punctuation, and word use are common.
Use of evidence	All statements are well supported with evidence from the cited paper(s). Personal or anecdotal observations and unsupported opinion are largely avoided.	Most information in the paper is based on data presented in the cited paper(s). Personal opinion or emotion-based statements interfere with objectivity in places.	Supporting evidence is rarely provided in sufficient detail to back up statements made in the paper.
Was the assignment followed?	All requirements are met. The source paper is from the primary literature and published in 2016. The goals, methods, and results of the study are summarized, and the paper addresses strengths and limitations. The paper is turned in on time, along with a copy of the source paper.	Most or all aspects of the assignment were followed. A copy of the source paper was turned in. Documents and email were labeled appropriately. The source paper is acceptable, but one or more sections may be treated too briefly. Points will be lost due to missed deadlines.	Characterized by major deficiencies in following the assignment, e.g., choosing an inappropriate source, not turning in a copy of the source paper or cover letter, not including important aspects of the summary, or submitting the paper late.
Lack of plagiarism	The summary and discussion of the source paper show that the source was read and information digested. The organization and wording of the summary are original, rather than being closely related to those in the source.	The paper is based on original writing, but papers too commonly adopt elements of paragraph organization, sentence organization, or wording from the original source. Doing this will result in a lower score.	The paper is unacceptable if not written by the student, or if it takes wording from the original source(s), e.g., by copying phrases or using the same organization with minor word changes.

Mechanics	Each requirement in the format checklist was met.	The format checklist was satisfied with no more than minor deviations.	The specified format was not followed closely.
Revision	The final version represents a serious effort to improve on the initial submission, based on the instructor's comments and the writer's own efforts to improve the content and quality of the writing. Evidence of self-editing is essential.	The revision addresses most of the instructor's comments, but does little more. For example, if particular problems are noted in the first two paragraphs by the instructor, a weak revision does not correct similar problems elsewhere in the paper.	Little effort was put into revision beyond typing in corrections noted by the instructor.

VI. The Term Paper

A. Basics

The term paper should be 13-15 pages long (excluding references, tables, figures, etc.) and double-spaced. Use a 12 point Times Roman font throughout (including headings). Number the pages. Use 1-inch margins and black text. Insert a header that includes your name, my name, and "EEB 2244W", so that this information appears on every page. Do not include any additional formatting. For the initial submission, email me the paper as an MS Word file (.doc or .docx). For the final paper, send me an electronic version and turn in a hard copy (staple pages together, printing double-sided is preferred). Do not send source papers. Once again, all of these details are listed for a reason and points will be deducted if they are not followed.

Second required meeting: Make an appointment for a 30-min meeting with me on **17th or 19th Oct** to talk about your term paper (email is the best way to contact me – put "EEB 2244W" in the subject line). Times that I am available to meet are listed in the table in section III. You should prepare an outline of your paper before this meeting (see below for guidance) and bring two copies with you; one to leave with me and one for you to write comments on. Be prepared to (a) describe the paper you plan to write, (b) go over your outline with me, and (c) ask questions about anything you do not understand in the source papers you have been reading (bring copies of the papers – or the citation so that I can look them up). Your outline will be graded.

Due date for the initial submission: **Sunday 6th Nov, emailed to me before midnight.** Your email should have three attachments: (a) the initial submission, (b) a cover letter, and (c) a revised version of your outline. Make sure that all emailed documents are named using the conventions described in section III. Graded papers will be returned by 11th Nov.

Third required meeting: Arrange a 30-min meeting with me on **17th-18th Nov** to talk about your initial term paper submission (email is the best way to contact me – always put "EEB 2244W" in the subject line). Times that I am available to meet are listed in the table in section III. Before this meeting you should have (a) read my comments on the initial submission, (b) drawn up a list of questions about those comments, and (c) thought about how you plan to revise your paper. During the meeting I will ask about these things.

Due date for the final version: **Monday 5th Dec, emailed to me before 4 pm,** with hard copy turned in to my office or the EEB office on the same day. Make sure that all emailed documents are named using the conventions described in section III. Include a cover letter.

B. The task

The term paper should summarize and discuss several related papers from the primary literature that focus on an ecological topic. Your audience is the same as for the short paper: someone who understands basic ecological concepts, but knows little about the specific topic that you have chosen. Your paper should bring such a person up to date on ecological research on your chosen topic. In organizing your paper, you might find it helpful to consider the following issues. What are the main questions around which the research is organized? What approaches have been taken by scientists investigating this topic, and what have these studies revealed? If there are several competing hypotheses, which ones have been well supported? Have any of the others been refuted? What questions remain unanswered? You should comment on the strengths and limitations of the studies you summarize. We can also discuss these things when we meet to talk about your paper.

Your first goal is to find an appropriate topic (see below), which must be approved by me, and several papers from the primary literature that relate closely to that topic. There is no magic number of papers, but if you discuss fewer than ten you should not expect a good grade (the best papers often cite a lot more); less than 5 papers is unacceptable. At least one paper must be from 2016. These papers must all come from the peer-reviewed sections of scientific journals (news articles, editorials, etc. are not appropriate, even if they appear in journals that also publish original peer-reviewed research). Many appropriate papers will be available on-line, but you may not use changeable web pages (e.g., Wikipedia) as sources. If you are uncertain about what a peer-reviewed scientific paper is, please ask for help. I can guide you in your search for papers, but I will expect you to have made a serious attempt to find materials on your own first.

C. Format

The term paper should include the following items:

Title – The title should be brief and informative. This is the bait that lures the potential reader to continue further, so choose your words carefully. Most scientific publishers limit the number of words or characters that you can use in a title, so it is good to learn to be concise.

Abstract – This brief section (no more than 200 words – yes I will count them) gives a concise, specific, balanced summary of all the main points made in the paper. The abstract should not simply describe what the paper is about, but should summarize the content. Write it after you have finished a full draft of your paper or it is unlikely to be very good.

Do not include a separate title page. Instead, put your name (in the header), title, and abstract all on the first page, along with however much of the introduction fits.

Introduction – This section can range from one to several pages. The purposes of the section are to introduce your topic or question, to put it into a general framework, and to provide necessary background information for the reader. Clearly state the specific question you are asking, or the topic you are addressing. Put the question or topic in some more general context so that the reader understands why it is interesting and important. If you are not sure why it is interesting and important, then you should find another topic.

Also use this section to explain (briefly) **HOW** you are going to address the topic. For example, you might state that you are going to (i) summarize several hypotheses related to the issue you have selected, (ii) present and discuss the results of several studies testing these hypotheses, and (iii) draw your own conclusions about the best-supported view(s).

It is not necessary to organize your paper around a particular thesis (a single idea that you plan to support). It is more likely that you will present several lines of evidence that bear on a problem, or several hypotheses along with evidence for or against each of them.

Main body of the text – This section should present an objective, unbiased account of the relevant information from the primary literature and your critical evaluation of that literature. It will be most effective if you present information organized around key points, rather than around individual papers (do not simply summarize the source papers sequentially or you will get a horrible grade). You should give the reader sufficient information about the sources for your arguments to be followed and your opinions understood and evaluated, but no more. Being critical does not necessarily mean finding flaws in the papers. Rather, it involves expressing a reasoned opinion on a matter, involving judgment on its correctness, value, or significance.

Use of citations – The main point of each paragraph should be clear and supported by evidence from the literature. You must use proper citation format when describing data or conclusions from the papers you have read. If the author's name is used as part of the sentence, the citation should be in the form: "Waites (2005) argues that" If the author's name is not used in the sentence, then the citation should be in the form "(Waites 2005; Earle and Waites 2005; Richards *et al.* 2007)". If there are more than two authors, use "*et al.*" rather than listing all authors. (Note that "*al.*" is an abbreviation and needs a period; "*et*" is not and does not. Since these words are not English, they should be italicized.) The citation should be placed at the end of the sentence (but before the punctuation – DO NOT put it after the period) if it applies to the entire sentence, or immediately following the information to which it applies. See the citation guide later in this document for more details.

Use of subsections – If you think that subdividing your paper into sections will help the reader to follow your discussion, then do so. If you use subsections, think carefully about what they should be, and be careful not to subdivide the paper so much that it lacks flow. Also, make sure that your subsections are clearly distinguished from each other and follow a logically nested structure. If you find you have multiple subsections with only a paragraph or two in each, then you have too many subsections.

Tables and Figures – In general you will not need to include tables or figures in your paper, and I do not expect you to include them. If, though, you think they will help you to communicate something to the reader, then it is great to use them. In particular, graphics can be useful for simply describing the framework for a set of ideas or for summarizing the results of a set of papers reviewed. You should not, however, simply copy graphics from the articles you read – any that you use must be original and based on your synthesis of the material you have written about. Note that, like the references, figures and tables do not count towards the page total.

Conclusions – In this section, present your own conclusions or analysis of the information you have described. The quality of your paper rests on how well you support your case, not on what position you choose to support. If there is no controversy, use this section to synthesize the major conclusions of the papers you have read. If there is controversy, then suggest what studies/experiments should be done to resolve it. Be sure to return to the main issues you said you would address in the Introduction.

References cited – This section is a list of all the source papers (references) that you cited. Do not list references that are not cited in your paper. It is inappropriate to list papers that are related to your topic, but to which you do not specifically refer – such a comprehensive list is a

bibliography. On the other hand, any ideas or information that are derived from papers that you have read should be credited to the authors who wrote the original paper through correct citation. Failing to give appropriate credit is plagiarism and could result in you failing the class.

Use the format exactly as shown in the section on scientific paper citation at the end of this document to produce a list of sources, which should come at the end of the paper. In the body of your paper, sets of citations should be listed chronologically, not alphabetically (e.g., Davies 2005, Moffat 2010, Gatiss and Moffat 2011). In the References cited section, papers should be listed alphabetically according to the first author's last name. When there are multiple papers by the same author(s), list them chronologically within author.

D. Choosing a topic and sources for your term paper

When selecting a topic, the trick is to choose something that is neither too broad nor too narrow. "Pollination ecology" is far too broad – thousands of papers on diverse aspects of pollination ecology have been published. "Pollination of azaleas by bumblebees in northern Venezuela" is perhaps too narrow: you may not find enough appropriate sources. It will also be easier to write a strong paper if you focus on a conceptual question, rather than a description of a particular organism or interaction. Once you have done your initial literature search and have some ideas about what you would like to write about, ask whether your topic sounds suitable. No one should start work on the term paper without first getting my approval of the topic.

E. Researching the paper

The campus library is a tremendous resource. In addition to books and journals, it provides electronic databases searchable by topic or author and an interlibrary loan (ILL) service to obtain books and articles that the library does not own. Information about library databases will be given at the library sessions organized for EEB2244W students. Databases can be used to do standard author or topic searches, or to search for papers that have cited a known paper or author. This second feature is especially useful if you have found an older paper on your chosen topic and want to move forward in time to discover more recent sources. Furthermore, once you have found a good source, you can easily find other papers on the same topic. Google Scholar is probably the most useful and easiest to use (see guidelines for the short paper) and JSTOR is good for finding older papers, but feel free to explore any of the databases available at the library. Note that you should not have to pay to access articles in any of the major ecology journals – if your searches suggest otherwise, you either need to connect your computer via the VPN (see above) or you should seek help from a librarian.

Requesting articles through interlibrary loan (ILL). If you find yourself wanting articles that are not available at UConn, you should submit an ILL request through the library website. The first time you do this, you may have to set up a patron profile. Subsequently, all you will have to do is log on with your netID. In many cases ILL is amazingly fast, with next day turn-around. But, sometimes it can take longer, so you should begin your research early to give the library time to respond to any request. Typically, if you request a journal article, the library will send you a digital version.

F. Outlining your paper

Before you start writing, it is a good idea to create an outline of your paper. An outline should identify all of the main parts of the paper and put them into some sort of organization. At the second required meeting I will expect you to bring an outline of your planned term paper (in hard

copy), which I will grade. During the meeting we will discuss your outline and I will expect you to revise it and submit an updated version with the initial submission of your term paper.

There are many on-line resources that describe the process of outlining a paper (just Google “outlining a research paper”); one that I like is <http://owl.english.purdue.edu/owl/resource/544/1/> (note that there are multiple pages, this link just takes you to the first one; this site has a lot of other good writing advice). Most people (and most writing guides) use a linear, hierarchical structure similar to the table of contents at the start of the manual you are reading. Another method that I sometimes use, especially early in the writing process, is to draw a diagram summarizing the main points and showing how they connect with each other (sometimes called a “mind map” or a “concept diagram”). Again, there are many examples on-line, including this one, http://www.school-for-champions.com/writing/graphical_outlines.htm, which focuses on using the process when writing. Often, diagramming can be a good way to get all your ideas on paper without having to worry about the order. Then, once you’ve done that, you can work out a good sequence and convert the mind map into a linear outline that guides your actual writing.

I do not mind what form your outline takes (linear vs. mind map), as long as it clearly conveys to me the main topics your paper will cover and how they will be organized. It should not, however, take up much more than a page.

G. Detailed grading criteria

Stronger papers clearly reveal an effort to synthesize information from the different sources, to think critically about their strengths and limitations, and to provide evidence from the sources to support statements made. How best to synthesize information will depend on the specifics of your topic and on the sources that you read. Two possibilities are: If the sources approach the topic in different ways (e.g., some are based on surveys, while others use controlled experiments), then it might be effective to group the studies together by approach, discussing the successes and problems that arise with each. Alternatively, it may be that multiple hypotheses have been developed to explain a phenomenon. Then, you might organize your paper according to the hypotheses, discussing the papers that bring evidence to bear on each one. There are many other possible approaches.

Stronger papers avoid plagiarism in all its forms/interpretations (see discussion in section VII), and have strong and original paragraph and sentence organization, with few or no grammatical and spelling errors. Strong revisions respond to the comments written by the instructor on the initial submission by reorganizing material, rewriting whole paragraphs, seeking new information, and even eliminating paragraphs or writing new ones, as appropriate. Stronger papers indicate a critical attitude toward the sources by commenting on their strengths and weaknesses in insightful and original ways.

Weaker papers often lack synthesis, for example by moving through the sources one-by-one, summarizing each source separately and doing little to pull them together coherently to produce something that goes beyond the sum of the separate parts. Failure to adequately back-up arguments with supporting evidence drawn from the source papers also is often a problem. In weaker papers, critiques of sources are often gratuitous and lack justification, for example by suggesting simply that the researchers should have collected more data over a longer period of time. (Nearly every study would benefit from including more data, so this is rarely an insightful comment. If you really think it to be true then you should identify the types of data that are missing, describe how they could have been obtained without unrealistic amounts of time or

money, and/or explain how the lack of specific data has led to poor conclusions.) Mirroring the wording, sentence structure, and paragraph organization of the original sources will also result in a low grade. In general you will be better off if you write an awkward paragraph yourself, which can then be revised for the final paper, than if you copy a good paragraph written by someone else and tweak the wording in the hope that it will help you avoid the charge of plagiarism. Weak revisions involve little more than typing in the corrections marked on the initial submission by the instructor.

Grading of the term paper will include the same criteria as those for the short paper, plus the items in the following table:

Grading criteria	Strong papers: A to high B grades	Satisfactory papers: low B to C grades	Problematic papers: D and F grades
Choice of source papers	The source papers are all from the peer-reviewed primary literature, and cohere around a common issue.	The source papers are clearly related, but discussion of sources may not be well integrated, e.g., because they focus on substantially different issues. For example, the source papers may all be about the same animal species, but one may address habitat choice, while another addresses breeding biology. In these cases, term papers often march through the sources one after the other, without synthesizing the material.	The number of papers from the primary literature is unacceptably low; one or more may be treated too briefly; there is no source from 2016; or the paper relies on information obtained from web sites (such as Wikipedia) or news items, rather than peer-reviewed papers from science journals.
Outline	The outline is detailed, clearly identifies several major areas that will be discussed in the paper, connects those topics to specific sources, and indicates what the organization of the paper will be.	The outline identifies major areas that will be discussed, but lacks detail on the content that will be covered in each area, on which sources will provide information on each topic, and/or lacks a clear organization for the final paper.	The outline is brief and lacks detail and clear organization. If no outline is submitted during the second required meeting no points will be given for this portion of the grade.
Discussion of the underlying question, issue, or topic	The paper describes how the authors of the source papers drew their conclusions (what methods were used, and how the conclusions follow from the results). The paper evaluates the strengths and limitations of the approaches presented in the source papers, informing the reader of the current status of investigation and of any controversy. Information from different papers is well integrated and synthesized around general themes.	Descriptions of methods and results from source papers have problems, such as presenting too much detail on specifics rather than a concise summary that informs the reader of the essence of the approach. The paper could go further in evaluating what has been firmly established, and what is not yet known. Information from different papers is presented well but is not well integrated to address broader themes.	The paper presents statements about ecological phenomena, but does not focus on how these conclusions were reached, or the degree of support. Overall, the paper lacks independent thought and synthesis of the material.

VII. Important Tips and Requirements

A. Summary of requirements

Short paper checklist (see also detailed description given previously)

- Written in black, double-spaced, with page numbers, a header containing required information, and 1-inch margins.
- No more than 2 pages long (I will not read beyond this limit).
- 12-point Times Roman font (not Courier, Arial, Helvetica, etc.).
- No quotations from the source paper. No phrases copied from the source paper.
- Source paper (from 2016) is cited within the text of your paper and referenced at the end, following the required format.
- Submissions emailed to instructor before the deadlines or points will be lost.
- Submissions both need a cover letter, emailed as a separate attachment (details given later in this section).
- Paper and cover letter should be MS Word (.doc or .docx) files. Email a .pdf of the source paper (not a web link) when you turn in your initial submission.
- All emailed documents follow required naming conventions described in section III.
- Email contains original writing pledge.
- Backup copies retained in at least two places (one in the cloud).

Term paper checklist (see also detailed description given previously)

- Written in black, double-spaced, with page numbers, a header containing required information, and 1-inch margins.
- 13-15 pages (plus references).
- 12-point Times Roman font (not Courier, Arial, Helvetica, etc.).
- No quotations from the source papers. No phrases copied from the source paper.
- No separate title page. The title, abstract, etc. are on the first page.
- Discusses multiple papers (probably >10) from the primary literature, including at least one from 2016.
- Each source paper is cited within the text of your paper following the required format.
- “References cited” section lists papers alphabetically by the first author’s last name, and follows format described in this document (exactly).
- Submissions both emailed to instructor before the deadlines or points will be lost. Hard copy of the final paper also required (double-sided, stapled).
- Submissions both need a cover letter, emailed as a separate attachment (details given later in this section).
- Initial submission should be accompanied by an outline (in a separate document).
- Paper and cover letter should be MS Word (.doc or .docx) files. Outline can be a word document, or a scanned/photograph image if you draw a mind map (as long as I can read it; .pdf or .jpg are best). DO NOT turn in copies of your source papers.
- All emailed documents follow required naming conventions described in section III.
- Email contains original writing pledge.
- Backup copies retained in at least two places (one in the cloud).

B. General advice

- **Know the deadlines.** For your own benefit, meet the deadlines on the attached schedule. One point per day will be deducted for short papers that are turned in late; five points per day for late term papers (these penalties apply to both initial submissions and final versions). It is your responsibility to meet deadlines and make appointments with your assigned instructor to keep on schedule. In this course, you have weeks of warning for most assignments. Consequently, it is up to you to plan ahead so that you do not miss deadlines, even if something does happen right before an assignment is due. Do not expect to get an extension except in highly unusual circumstances. Extensions will not be considered unless you have documentation of the problem that resulted in the request.
- **Backup your work.** Keep a copy of anything you turn in, just in case something gets lost. And back-up your computer files constantly, in duplicate. Periodically emailing your paper to yourself, or storing it in the cloud somewhere, is not a bad idea. If a computer eats your homework and there is no backup, you will not get an extension.
- **Make sure I receive your assignments.** When you turn in a paper, expect to get an acknowledgement from me within 24 hours. If I will be unable to respond within this time frame (e.g., due to research travel), I will let you know before the assignment is due. If you do not hear back from me, email me as soon as possible to ensure that I got the paper. Keep a copy of the emails that you send. If an assignment disappears in the ether, the only acceptable evidence that it was sent will be the original email.
- **Treat class-related emails as a professional activity.** Class assignments are part of your training for a professional career. Consequently, your emails should be written professionally, using full sentences, avoiding abbreviations, starting with a salutation ("Hi Chris" is fine), ending with your name, etc., etc. This requirement may seem like I am just being an annoying fuddy-duddy, but it will greatly increase the chance that I understand what you are telling me if you treat email exchanges seriously. Note too that many employees are at least as annoying and old-fashioned as I am, so view it as good practice for life after college and humor me a little.
- **Know how the grading system works.** Most importantly, if you fail the "W" portion of the course, you will receive a grade of "F" for the entire EEB 2244W course, regardless of your scores on exams, etc. This is a University rule, not mine, so there are no exceptions. Failure can result from plagiarism (see next section), from failing to turn in required assignments (including initial submissions) or attend required meetings, or from poor performance on the assignments.
- **If you are not sure, check your grammar on-line.** Help with grammar is available at many web sites. Two that I find helpful are: <http://owl.english.purdue.edu/owl/section/1/>, and <http://www.quickanddirtytips.com/education/grammar>.

C. Plagiarism and the misuse of other people's writing

Plagiarism has always been a serious concern in science (and elsewhere), but is increasingly so as scandal after scandal hits the headlines and results in people losing their jobs. Especially with the advent of the internet, an increasing number of people seem unaware of what constitutes appropriate use of work created by others. In order to ensure that you understand my views on what is and is not okay, it is important that you read this section extremely carefully. It is your responsibility to ensure that you understand what I judge to constitute plagiarism. If you are not sure, please talk to me about it when we first meet (or before) so that you do not find yourself in an unfortunate position.

Representing the work of another author as your own in any way is plagiarism. There are several ways to commit plagiarism. The most obvious is to turn in a paper that you did not write (i.e., a paper that you bought, borrowed, copied, or stole). Doing this will automatically result in a grade of "F" for the paper and course, and the possibility of sanction under the Student Code (see <http://community.uconn.edu/the-student-code-preamble/>). No matter how pressed you are for time, it is simply not worth the risk.

Another form of plagiarism is to copy the wording or sentence structure of your sources. To do so without explicitly acknowledging the original author is dishonest. Even when acknowledged (e.g. by quotation marks), direct quotes are very rarely necessary for the papers I assign – the sources are rarely paragons of literary expression and the reader does not need to study the subtle nuances of the original text (the same is not necessarily true when writing in other disciplines). Because this course is focused on the production of original writing, I will not accept papers that contain direct quotes, whether they are attributed or not. It is important in many careers to be able to express the information and ideas that you read about in your own words and a major goal of this course is for you to get practice doing just that.

It also is not enough to rework the original source writing by substituting or omitting some words and phrases. Here is an example:

The original: "Interspecific competition between *Balanus* and *Chthamalus* was, on the other hand, a most important cause of death of *Chthamalus*. This is shown both by the direct observations of the process of crowding at each census and by the differences between the survival curves of *Chthamalus* with and without *Balanus*....In addition, the evidence is strong that the observed competition with *Balanus* was the principal factor determining the local distribution of *Chthamalus*. *Chthamalus* thrived at lower levels when it was not growing in contact with *Balanus* ." (Text taken from: Connell, J. H. 1961. The influence of interspecific competition and other factors on the distribution of the barnacle *Chthamalus stellatus*. Ecology 42: 710-723.)

An unacceptable summary: "Competition between the two barnacle species was, nonetheless, an important source of mortality for *Chthamalus* (Connell 1961). This was indicated both by the observations of crowding and by the contrasts between the survivorship schedules of *Chthamalus* with and without *Balanus*. Furthermore, there is strong evidence that competition with *Balanus* was the most important factor determining the local distribution of *Chthamalus*. *Chthamalus* prospered at lower levels when they were not touching *Balanus*."

This summary is not original writing, even though it is not identical to the original. Instead, it simply mimics the source material in the organization of the paragraph, in sentence structure, and in choice of words and phrases. Writing of this kind is both lazy and unoriginal, and will result in a substantially lower grade. If I identify cases like this in your initial submission, I will point out the problem, reduce the grade (substantially if it happens a lot), and suggest that you rewrite the section of the paper. If I find examples like this in the final version of a paper, you will receive an F.

How to avoid “accidental” plagiarism – It is not unusual for students to tell me that they did not realize that their writing was so similar to their source. One way that this can happen is when you start writing just after you have read a passage and it is fresh in your mind. Although making this mistake is easy to do, it is still not okay and it remains your responsibility to guard against it happening. (By analogy, it is easy to drive faster than the speed limit by accident, but the courts will still judge you to be at fault and penalize you accordingly.)

To reduce the chance of falling into the trap of inadvertent plagiarism, I recommend that you do not write your paper with your source papers directly in front of you. Instead, read the papers, put them aside, make notes based on what you remember (i.e., do not copy phrases directly into your notes), take a break (maybe even a day or two), then start writing without looking back at the source(s). Once you have a draft of your paper, go back to the source material to ensure that you have not mischaracterized it and to check specific details. My experience is that people who do this not only avoid inadvertent plagiarism but also learn more and write better papers.

Another situation where I frequently see this form of plagiarism is when the source material is quite complicated or poorly explained by the original authors. I suspect that the reason is that such material is hard to understand, so people worry that they will make a mistake if they do not use similar wording to that in the source. Unfortunately, when people take this approach it is usually still obvious that they do not really understand the source information and they get penalized because they both explained the science poorly AND they copied the source material. If you think that this scenario may apply to you, then you should either pick a different paper (one that you are confident that you understand) or seek help understanding the material you have chosen. It is worth also knowing that the parts of papers that trip people up often are not even terribly important (e.g., frequently they are very specific details from the methods or data analysis sections). This information is important to specialists, but not critical to a basic understanding of the research goals or conclusions. The bottom line is that, if you are to write well about a topic, you need to understand it. So, the first step to getting a good grade is to ensure that you know what the source material means.

Once again, please ask questions if you are unsure as I am very happy to help you learn to navigate this difficult issue. I do not like failing people or having to discuss this topic any more than the average student does and would much rather talk to you about it before it becomes a problem.

Finally, if you think that I will not really check up on any of this stuff, you should know that in some years I have had to give warnings to more than half of the students in my W sections, and that I frequently apply the penalties I have warned about (including Fs). I would prefer it if that does not happen this year.

D. Cover letters

Each paper you turn in to be graded should have a brief cover letter. The point of doing this is to help you critique your own work, which will hopefully help you to get a better grade. The exact format of the cover letters is up to you, but I would suggest using these sample formats provided by the Writing Center, which give a good summary of the type of information to include.

For initial submissions (should be no more than half a page long):

Dear Professor _____:

In this submission I am trying to...

I arrived at my core ideas for this paper by...and developed them by.....

I think that the strongest parts of the paper are... And what I struggled with most was....

My top two priorities for revising are...

Other things that I know I need to work on include...

Questions I have for you at this stage are...

Sincerely,

And for final papers (should be less than a page long):

Dear Professor _____:

In this paper I am trying to...

In my initial submission I..... Given the feedback I received on that version, I decided to... because..... I rejected Y advice because....

What I struggled with most was.... Now, as I look over all my notes and compare my draft(s), I would characterize my revision process as...

I think that the strongest parts of the final essay are.... But if given more time, I would work on.....

Given the goals of the assignment and your grading criteria, I think that my essay ... [excels/does OK/falls short/etc.]... in [rubric categories here] categories.....For example, in the _____ part of my essay, I

On my last paper, your comments and evaluation focused on.... Looking over those earlier comments again now, I realize that in this paper I ...

Other things you may want to keep in mind as you read this essay are....

Sincerely,

E. Avoid some common problems

Everyone (professor, editor, potential employer, boss) who ever reads your writing will have pet peeves that make them grumpy whenever they see them. Some are true errors that are always wrong (though sometimes accepted), some are widely accepted conventions, and others are more a matter of preference (though often no less annoying). If you look carefully, you will find all of these problems (even clear errors) in published papers and books. You might even find some in this manual. (In fact, can you spot the one in this paragraph?) None of this makes them okay, and you should guard against them. So, as fair warning, this section includes a few things that – rightly or wrongly – really drive me crazy, and that I would recommend learning to avoid.

The word "data" is a plural noun – Thus, it is grammatically correct to write "The data are presented in Table 1," but it is incorrect to write "The data is presented in Table 1." "The data set is summarized in Table 1" would be acceptable because "data set" is singular.

Effects affect things – The most common spelling error in 2244W papers arises from confusion of "affect" and "effect." One is a verb and one a noun. If you do not know the difference, look them up – they are not interchangeable.

Format species names properly – Scientific ("Latin") names for species should be italicized. The genus name is capitalized, but the species name is not. The lion, for example, is *Panthera leo*. The genus name should be written in full on first use, and abbreviated to its initial letter thereafter. So, *P. leo* should be used for any further references to lions. If you abbreviate, be careful that Word does not capitalize the specific name (*leo*) because it thinks a sentence has just ended. Taxonomic names at higher levels of classification should be capitalized, but not italicized. Our own classification, for example, is: Animalia (kingdom), Chordata (phylum), Primates (order), Hominidae (family), *Homo sapiens* (genus and species).

If a species has a common name, it is okay to use it. But, you should also give the scientific name when you first mention the species. For example, if you are explaining the lack of coyote *Canis latrans* predation on greater roadrunners *Geococcyx californianus*, you should give the scientific names when you first mention each species. When you then write that roadrunners have amazing anti-coyote defensive mechanisms you can just use the common names.

Avoid naked "this" – When the word "this" is used as a stand-alone pronoun to refer to some previous idea, the logic of the passage is often lost – or, worse, the reader may assume the wrong antecedent and get confused. (If you do not know what pronouns or antecedents are, look them up.) Although not necessarily incorrect grammatically, you should avoid using a "naked this." For example: "Leaf-cutter ants cultivate fungi in their nests on a mulch of leaves from many species of plants. Biologists consider this a case of mutualism." "This" what? The cultivation? The relationship between the ants and the fungus? Between the ants and the plants? Between the fungus and the plants? There would be no doubt if the second sentence read: "Biologists consider the relationship between the ants and the fungus to be a case of mutualism."

Don't write about "proof" – A basic tenet of science is that scientists keep an open mind to alternative hypotheses. In other words, we accept that there is at least a small possibility that our current understanding of a phenomenon might be wrong. If we do not do this, then our preconceptions might cloud our objectivity when we design studies and examine data. This way of thinking should be reflected in your writing – so avoid statements such as "without a doubt" or "the researchers proved". Instead use wording that acknowledges at least some uncertainty.

F. Tips on writing style

Sentence length – Vary the length of your sentences. Short ones are fine, but not too many in a row. To combine two or more short sentences, identify the most important idea, and frame the other ideas around that. Avoid simply "gluing" sentences end-to-end. For example, all the short sentences make this piece of writing rather stilted: "Leaf-cutter ants have several castes. Each caste carries out a specific duty for the colony. For example, one caste cuts leaf discs. Another caste guards the foragers." The "gluing" method seems like an easy fix but yields an awkward and wordy result: "Leaf-cutter ants have several castes and each caste carries out a specific duty for the colony, so that, for example, one caste cuts leaf discs and another caste guards the foragers." Instead, choose the first sentence as the primary idea and subordinate the others within the same sentence: "Leaf-cutter ant colonies have several castes, each committed to a specific duty, such as cutting leaf discs or guarding foragers."

Real nouns and verbs – Try to find ways to maximize the information conveyed by the subject and the main verb of every sentence you write. Many sentences waste the power of these two key grammatical elements by beginning sentences or clauses with "It is...", "There is...", "There are...", or "This is...." Thus, instead of writing, "There are many important effects of the activities of leaf-cutter ants on tropical forests," write "Leaf-cutter ants transform tropical forests with their activities." Go over your drafts and circle every occurrence of the words is, are, was, and were. Then, try to substitute other verbs that make the text more interesting to read, altering other parts of the sentence as necessary. Sometimes you will find that you must use the verb to be, but not nearly as often as many writers do – including many successful scientists.

Unnecessarily long words and jargon – Scientists (and many students) often suffer from the apparent belief that long words seem more "scientific" than shorter ones with the same meaning. Instead of "Leaf-cutter formicids acquire nutritional materials from the fungi they cultivate in subterranean habitats," simply write: "Leaf-cutter ants get food from the fungi they grow underground." Remember that the main reason for writing is to communicate to someone else. Avoiding long words when short ones will do nearly always improves technical writing. Limiting your use of jargon will usually also make your writing easier to understand. There are times when a longer, less familiar or technical word is helpful because it has a very specific meaning. Frequently, however, such language just makes it harder to work out what the writer is trying to say. Even worse, it can reveal that the writer does not really know the meaning of the words they are using. For example, it is common to see people use the word "utilize" (or, worse, "utilization") as a synonym for "use." Choosing this word not only uses three (or five) syllables where one would do, but also demonstrates that the writer does not know that the words have different meanings (at least, they did before the jargonistas took over!).

Readable prose – Be a reader and a listener as you write. When you complete a paragraph or a section, read the passage out loud to yourself. If your writing sounds stilted or you find that you cannot read it in a clear and communicative way, then the passage needs revision. If you are worried about whether your writing is readable, ask a friend or someone else in the class to read it. If they do not understand what you are trying to say, then you should probably revise the text before you turn it in.

G. Scientific paper citation format

Reference styles vary from journal to journal, even within the field of ecology. For your term paper, I will expect you to use a simplified "generic" style that is common to the field. Do not use MLA reference style, which is rare in scientific publications. Instead, follow the examples shown below carefully; both for the "References cited" section at the end of your paper and for citations of these references in the text (see the last Note in each reference category, below). Getting these details exactly right is important because it is what would be expected of you if you were writing as a professional scientist. Points will be deducted if you do not follow the format described below.

In your References cited section, you should use a "hanging indent" style (first line of entry left-justified, continuation lines indented), as shown below. To do this in Microsoft Word, select the relevant text, then go to Format/Page Layout, then Paragraph, then select "Hanging" in the "Special" pull-down menu (details may be slightly different in different versions of Word). Do not try to achieve this effect using spaces or tabs.

In-text citations should not be placed after the period at the end of the sentence the citation refers to. The citation is part of the sentence, not a new sentence. If you are unsure what I mean, look at some published papers for examples.

Citing journal articles with a single author

Holt, R.D. 1990. The microevolutionary consequences of climate change. *Trends in Ecology and Evolution* 5:311-315.

Notes:

1. Give the author's last name (surname) first, then *initials only*, not the author's full given names (Holt, R.D., not Holt, Robert David).
2. The year of publication (1990), followed by a period, is placed immediately after the author's name.
3. The title of the article (The microevolutionary consequences of climate change) is set in lowercase, except for the initial capital and any proper nouns (see the word *British* in the next example). The title is followed by a period.
4. The title of the article is *not* italicized.
5. *No quotation marks* enclose the title of the article.
6. The journal name (*Trends in Ecology and Evolution*) follows full capitalization rules for titles (each word is capitalized except for conjunctions, articles, and prepositions).
7. The journal name is *not* italicized.
8. The volume number and page range for the article, separated by a colon, without any spaces (5:311-315), follow the journal name without any intervening punctuation (*Trends in Ecology and Evolution* 5:311-315).
9. A period appears after the page range to end the citation.

10. In-text reference to this article would be: Holt (1990) or (Holt 1990). Do *not* give the particular page(s) cited for in-text citations of journal articles unless you are referencing a direct quote. (Note that in papers of the type assigned in this class, quotes should be rare, short, and only used in exceptional circumstances where a quote is absolutely necessary. As a general rule I do not allow ANY quotation. If you think you have an exceptional case you must ask me about it first.)

Citing journal articles with two or more authors

Lennon, J.J., P. Koleček, J.J.D. Greenwood, and K.J. Gaston. 2001. The geographical structure of British bird distributions: diversity, spatial turnover and scale. *Journal of Animal Ecology* 70:966-979.

Notes:

1. The first author's name is entered in the same way as for a single-author journal article: last name first, followed by initials for given name(s).
2. Names of the second and any additional authors are *not* inverted: initials for given name(s) *first*, followed by last name.
3. All other elements appear exactly as for a single-author journal article.
4. In-text reference to this article (*three or more* authors) would be: Lennon *et al.* (1990) or (Lennon *et al.* 1990). Note that *et al.* (an abbreviation for *et alia*, Latin for "and others") is italicized because it uses non-English words. Note too that "*et*" is not an abbreviation and should not be followed by a period (unlike "*al.*").
5. For articles with *exactly two authors*, use *and* instead of *et al.*: Brown and Smith (2004) or (Brown and Smith 2004).

Citing books

Darwin, C. 1859. *The origin of species by means of natural selection*. Murray, London.

Notes:

1. The book title is *not* italicized.
2. Author names (single or multiple) and year of publication appear just as they would for a journal article.
3. The name of the publisher and the city of publication, separated by a comma and followed by a period, end the citation.
4. No page numbers are given. You may cite page numbers in the text, if necessary to identify the location of a specific idea, as shown in the next note, but this is generally not necessary.
5. In-text reference to this book would be: Darwin (1859) or (Darwin 1859). To cite a particular page in a book: Darwin (1859, p. 325) or (Darwin 1859, p. 325).

A titled chapter in an edited book

Colwell, R.K. 1984. What's new? Community ecology discovers biology. Pages 387-397 in Price, P.W., C.N. Slobodchikoff, and W.S. Gaud, eds. A new ecology: novel approaches to interactive systems. Wiley, New York.

Notes:

1. The format for authors, year of publication, and title of the chapter (What's new? Community ecology discovers biology) follows the rules for journal articles.
2. The pages that the chapter occupies in the book appear as shown above in the example (Pages 387-397), followed by the word "in".
3. The editor (or list of editors) of the book itself appears just as for a journal article, but is followed by: "ed." (for one editor) or "eds." (for more than one editor). In the example: Price, P.W., C.N. Slobodchikoff, and W.S. Gaud, eds.
4. The publisher and city of publication end the citation entry, as for any other book.
5. In-text reference to this article would be: Colwell (1984) or (Colwell 1984). The editors are not mentioned here.

IMPORTANT: Many sections of this manual are based on text written by other members of EEB over the years and it is not all my own work. They have given permission for me to use their material in this way, without direct attribution.