

Biology 827: Biostatistics

Dr. Marc Albrecht Spring 2019

University of Nebraska at Kearney

Contact Information

2401 11th Ave, Bruner Hall Room 323, Kearney NE 68849

Office Phone (308) 865-8713

Skype ID: Dr.AatUNK

Email: albrechtm@unk.edu

Office hours: WF 1:00 – 3:00, T 10:00 – 11:00 or by appointment

Introduction

Statistical tests and experimental design are the foundations of the Scientific Method.

Without valid experiments and valid assessment of quantitative data (numbers as opposed to 'qualitative' data which are not as good) no study *can* be scientific. Therefore, knowledge of statistical theory and practice is essential to be any kind of scientist, discovering any facts, or attempting to build theories. To put this different way, if one does not know how to design experiments and run statistics, one's ability to do, teach, or understand science is limited. Further, without statistical analysis almost no information can be said to be reliable.

This course is introductory and assumes no previous experience with statistics, or any particular math skills. Foundational terminology and concepts will be introduced and basic inferential statistical test will be covered. This includes both parametric and non-parametric tests. This course will also focus on the importance of hypothesis building and experimental design as essential parts of scientific research.

While it is true that in the days of Mendel counting proportions was enough to lead a researcher in the right direction, today complex experimental designs, scientific measuring devices, and many types of statistical tests are available to discover new knowledge. Scientific knowledge advances *only* by numerical testing of data. These days there is much interest in 'big data', referring to the huge amount of data being produced by sensors, satellites, DNA sequencers, and other devices. Even for these giant data sets the principles of probability and basic statistics still apply. In all cases a causal relationship is best seen by relatively simple tests

of a single dependent variable in a manipulative experiment. And these sorts of experiments will be the focus of this course.

Because quantitative data are necessary for science, statistics classes are necessary. And while they are necessary, I hope this class is not boring or unduly difficult. Rather, I hope that it becomes clear that statistics are critical and informative, and not as difficult as many people think. I hope it becomes habit for people who have had this class to examine the experimental design and statistics of every paper you read. The skills the class should help you with are understanding primary literature experiments and analysis (to the point of critical thinking) and completing your own experiments (from design to analysis).

This class also includes substantial material on experimental design and hypothesis building. These components are as integral to a project as the statistics. This work is also part of the assessment system for our online program. A final point about design: poor hypotheses or experimental design can result in an entire experiment that is fatally flawed (as in all the work is ruined no publication is possible), as is shown by this quote from famous statistician Sir Ronald Fisher:

To call in the statistician after the experiment is done may be no more than asking him to perform a postmortem examination: he may be able to say what the experiment died of.

Whitlock and Schluter p. 204

Class Objectives: After this class you should be able to . . .

1. Clearly present the foundational concepts of probability and inferential statistics.
2. Be able to read and write null/alternative hypothesis pairs of experiments.
3. Calculate and understand the meaning of descriptive statistics values, identify data distribution patterns in histogram plots.
4. Be able to list and explain the (“assumptions”) requirements underlying common inferential statistical tests.
5. Describe the importance of random sampling and sample size to experiments.
6. Know the statistical error types.
7. Understand statistical power.
8. Be able to select the correct statistical test for a provided experimental design.
9. Understand and interpret the results of statistical tests covered in class.
10. Understand data input and test outputs from MS Excel and JASP.

Required Text

Required textbook:

Whitlock, MC and D Schluter. 2014. The Analysis of Biological Data, 2nd Ed. 768 pp. WH Freeman Publisher. Amazon (for example) link: https://www.amazon.com/Analysis-Biological-Data-Michael-Whitlock/dp/1936221489/ref=sr_1_1?ie=UTF8&qid=1534431268&sr=8-1&keywords=the+analysis+of+biological+data+2nd+edition

You may certainly buy this book from any source. Used books are just fine. First edition books can be used as well but there may be issues with page numbers, and both practice and assignment problem numbers will be different than second edition. This book has been taken over by a new publisher but the 2nd edition from either publisher will be fine.

Suggested reading:

Gonick, Larry and Woollcott Smith. 1994. The Cartoon Guide to Statistics. 1994. ISBN 0062731025.

This book is an illustrated guide to statistics. It looks silly but also well done. This gives a different view of the same content as in the main text, which can be helpful.

Required Software

The software used in the course will be a word processing program, a spreadsheet program, and JASP (a statistical analysis program). Most people may choose to use Microsoft Office as you can download a subscription version of this as a UNK student. If you prefer you may use LibreOffice (<https://www.libreoffice.org>) or another program, but make sure you can see review notes from MS Word. From these office suites you will need to use Word (or Writer) to produce word processing documents for assignments. Also, MS Excel (or LibreOffice Calc) will be used for data entry and graphs. Both programs have some basic statistical functions built in as well. Finally, JASP (<https://jasp-stats.org/>) will be used for statistical analysis. Preparing data for JASP, and to see the functioning of JASP takes a few steps. JASP has a number of tutorials on its website and I will post videos on how to use the program as well.

I know some people may have access to statistical packages they are familiar with (e.g. SAS, SPSS, and PRISM). Please do not use these programs for this class. Answers vary slightly with programs that are used. I cannot learn every program out there well enough to help with settings and technical programs. Therefore, please stick to these programs for this class.

I recommend using software as soon as possible in the course. People who do calculations by hand the entire course end up spending too much time on assignments, have more mistakes in their work, and deprive themselves of learning more about spreadsheets and JASP.

Problem Sets

The problem sets are worth many points in this course. They will take a lot of time! There are two main aspects to the problem sets. The first aspect is stats: to get the statistical test choice, mathematical calculations and the statistical conclusions of the problem correct. The other aspect is presentation: present your work in a way that is clear, readable, and in scientific writing style. Scientific writing style is a specific writing style. See materials in the Scientific Writing folder online. Also use as examples scientific papers you already have from top journals in the fields you are interested in. The following elements should be present in your answers for this class:

1. The problem: describe the problem in some way, please do not give just numbers with no text. Write a bit of text for each problem giving the name of the organism, the basic design of the test including the response variable. Do not forget to state units for numbers given in answers.
2. If the problem is after the simple problems of the first few chapters, the hypothesis pair should be stated for the problem: null and alternative.
3. The calculations: what you write will vary a lot depending on the problem and if you used software to answer the question. If you do not describe what you did in written form I cannot tell where a problem went wrong. This means partial credit cannot be given. Please state what test was done and what settings were used in the software as part of the answer.
4. The final answer: make the answer easy to find, **have it highlighted** or in a **highly visible text color** and separated by line breaks from the rest of the answer so I can find it quickly.
5. The entire answer should be arranged and presented in such a way that a reader (me in this case, but this is also practice for professional work) can follow the entire answer and understand it rapidly and easily.

Please see examples in the 'Files/Example papers/Example Problem Sets' folder.

Course Grading

Grading for this course will be as follows (*note Late Assignment Policy on page 15*). Note that the Participation grade is based on 2 quality posts per week on Discussion Board (*see page 8*).

Graded Assignments	Points
Plagiarism Assignment	10
Participation (Canvas Discussion @ 10 pts per week, starts 3rd week, no points the last 3 weeks of class)	100
Problem Set 1	100
Experiment Proposal	40
Final Exam Part I (Problem Set 2)	100
Final Exam Part 2 (Experiment Report)	100
Total	450

Grading Scale: The following scale will be used: A (90-100%), B+ (88-89%), B (82-87%), B- (80-81), C+ (78-79%), C (72-77%), C- (70-71), D+ (68-69%), D (62-67%), D- (60-61), F (Below 60%)

Special Strategies for Biostatistics

Experience has given me some ideas about where people have trouble in the course. The following is a list of sticking points people have had in the previous terms of this course. These are, in no particular order:

1. Concept misunderstandings. It is easy to misunderstand important concepts such as equal variance between groups, how to rank data for non-parametric tests, or the fixed variable in a linear regression. As the class focuses on doing biostatistics (the problem sets and experiment) instead of talking about concepts some students think they can get by without understanding the concepts. Unfortunately, in biostatistics the concepts are important for:
 - a. picking the correct test, some problems ask you do to this (not many, but a few)
 - b. spotting errors in your own work, by realizing a number is so high or low it cannot be correct for example
2. Not focusing on discussions. Discussion posts can make the difference between understanding a chapter or not. Issues that can occur include:
 - a. Not reading posts during the week
 - b. Posting only on Sunday night (this is too late, people cannot respond to your posts, also this can result in a grade reduction)
 - c. Contributing only very short posts that do not get full credit as participation
 - d. Not checking grades as I post them for discussion

- i. The discussion posts are worth many points in this course, it is worth it to contribute the required number of posts each week
 - e. There are only a few graded assignments in the course and a lot of guidance and help can come from talking with me and others via the discussions.
- 3. Not putting the time and effort into the problem sets they require. There are many things to double check: are all parts of the problems answered, does the answer seem possible given the data? The formatting of tables and figures takes more time than people estimate. Some tools, such as the Equation Editor, may require going back and looking at material in a lecture or online to learn how do use them for example.
- 4. Be sure to design a good experiment. The experiment in this course is worth many points. Common problems with this assignment that can lead to poor experiments, poor grades, and difficulties at the end of the course are:
 - a. Leaving this assignment too late in the term to start and running out of time to do it
 - b. Copying a published classroom exercise which means you have not designed your own experiment, among other problems
 - c. Having a failure of a first experiment, leaving no time in the semester to restart or to use the second proposal idea (always have a back-up plan!)
- 5. Letting the course get away from you: this refers more generally to letting the content overwhelm you at any point during the class.
 - a. Not addressing this often means there will be problems later in the course.
 - b. This material builds on itself in multiple ways. If a particular concept or chapter is not clear contact me immediately!
 - c. Often a quick phone call or video chat can clear up hours of confusion and pave the way for an entirely better semester.
- 6. Achievement plateaus: I mean this in two ways.
 - a. First the grade people get on the first problem set tends to be similar to the grade on all following assignments, this is the most common trend. Be aware of this if you get a low grade on the first problem set. Change the way you are studying, working, or discussing the course if this happens.
 - b. The second way I mean this is that some people have the opposite problem, the first problem set is easier than the second for instance. Be prepared for this and make sure to allow more time for the second problem set and experiment than for the first problem set.

Special Circumstances and UNK Policies

Withdraw (W) and Incomplete (I) Grades:

Until the conclusion of the 10th week of the semester, you may withdraw from any class and receive a grade of "W." This grade does not count toward your grade point average and merely indicates that you withdrew from (or "dropped") the class. No instructor can withdraw a student from the roster; that is, if you stop coming to class the instructor cannot withdraw you from the class. The instructor will be forced to assign you a failing ("F") grade for the class. Withdrawing from a class involves filling out a simple form that the instructor and student both sign and returning this form to the registrar's office by the withdraw deadline.

Under very unusual circumstances, a grade of incomplete ("I") may be issued. An incomplete is not a substitute for a "W" (withdraw), and it is not a substitute for a poor or failing grade. An incomplete is issued if circumstances beyond the student's control prevent the student from completing the required work for the class by the end of the semester (example: student is hospitalized during final exam week). If you qualify for an incomplete grade, it is expected that you will receive this grade in all your classes. An incomplete grade will give you an extension to complete outstanding work only; it is not an opportunity to "start over" in the class. All outstanding work must be completed within one year or the "I" grade automatically converts to a failing ("F") grade. An incomplete grade will be considered only during the final six weeks of the semester, after the deadline for receiving a "W" has passed.

Students with Disabilities

It is the policy of the University of Nebraska at Kearney to provide flexible and individualized reasonable accommodation to students with documented disabilities. To receive accommodation services for a disability, students must be registered with UNK Disabilities Services Coordinator, David Brandt, in the Academic Success Office, 163 Memorial Student Affairs Building, 308-865-8214 or by email unkdso@unk.edu

Students Who are Pregnant

It is the policy of the University of Nebraska at Kearney to provide flexible and individualized reasonable accommodation to students who are pregnant. To receive accommodation services due to pregnancy, students must contact Cindy Hayes in Student Health, 308-865-8218. The following link provides information for students and faculty regarding pregnancy rights. <http://www.nwlc.org/resource/pregnant-and-parenting-students-rights-faqs-college-and-graduate-students>

Reporting Student Sexual Harassment, Sexual Violence or Sexual Assault

Reporting allegations of rape, domestic violence, dating violence, sexual assault, sexual harassment, and stalking enables the University to promptly provide support to the impacted student(s), and to take appropriate action to prevent a recurrence of such sexual misconduct and protect the campus community. Confidentiality will be respected to the greatest degree possible. Any student who believes she or he may be the victim of sexual misconduct is encouraged to report to one or more of the following resources:

Local Domestic Violence, Sexual Assault Advocacy Agency 308-237-2599

Campus Police (or Security) 308-865-8911

Title IX Coordinator 308-865-8655

Retaliation against the student making the report, whether by students or University employees, will not be tolerated.

Copyright Statement

The materials on this course website are only for the use of students enrolled in this course for purposes associated with this course and may not be retained or further disseminated. The materials on this course website may be protected by copyright, and any further use of this material may be in violation of federal copyright law.

Syllabus for Biology 827 Biostatistics

Here is the schedule for the class. Readings are from Whitlock and Schluter unless noted. Problem sets and experimental design proposal assignments will be posted.

Date	W Week	Lecture	Readings	Assignments
Jan 7	1	Lecture 01	Syllabus & Introduction	
		Lecture 02	Chp 1 Statistics & Samples	
		Lecture 03	Chp 2 Displaying Data	
		Lecture 04	Chp 3 Describing Data	
Jan 14	2	Lecture 05	Chp 4 Estimating with Uncertainty	
		Lecture 06	Using Excel with Statistics	Plagiar. assign Friday 5 pm
			Chap 1, 2, and 3 from Donovan & Weldon	(see Class Policies Section 3)
Jan 21	3	Lecture 07	Chp 5 Probability	
		Lecture 08	RealStatistics and JASP programs	
Jan 28	4	Lecture 09	Chp 6 Hypothesis Testing	
		Lecture 10	Chp 7 Analyzing Proportions	
Feb 4	5	Lecture 11	Chp 8 Fitting Probability models	
		Lecture 12	Chp 9 Contingency analysis	
Feb 11	6	Lecture 13	Chp 10 The Normal Distribution	
		Lecture 14	Chp 11 Inference for Normal Population	
Feb 18	7	Lecture 15	Chp 12 Comparing Two Means	
		Lecture 16	Chp 13 Handling Assumption Violations	
Feb 25	8	Lecture 17 -a and -b	Expt Design and Stats Heath readings Heath chapters 1, 2, 3	Prob Set 1 Due Friday 5 pm
Mar 4	9	Lecture 18	Experimental Design II Gotelli and Ellison: 6 (optional chapter), 7, 8	Last day to drop March 8
Mar 11	10	Lecture 19	Chp 14 Designing Experiments	
			Anderson and Engeman Readings	Exp. prop. Due Friday 5 pm
Mar 18	11		Spring Break	
Mar 25	12	Lecture 20	Chp 15 Comparing means > 2 groups	
		Lecture 21	Chp 16 Correlation	

Date	Week	Lecture	Readings	Assignments
Apr 1	13	Lecture 22	Chp 17 Regression	
		Lecture 24	Chp 18 Multiple Explanatory Variables	
Apr 8	14	Lecture 25	Chp 21 Meta-analysis, experiment work	
Apr 15	15		Class Work Week	
Apr 22	16		Class Work Week	Problem Set 2 due
Apr 29	17		Final Exam Week	Experimental Report (Final Part II) due April 30th 5 pm

Orientation to Dr. Albrecht use of Canvas

Version 2.1 Spring 2019

UNK Biology Department

Introduction:

The UNK Biology Distance Master's program has many faculty participating. Part of the experience and challenge of the program is that, as in other professional situations, faculty are different from each other. Faculty have different lecture styles, different discussion board expectations, different grading priorities, and even different methods to deliver class material. I realize this might be confusing for people, but hopefully the various methods will demonstrate what works and what does not for you in your own careers. Please read this section as I try to clarify how I use Canvas in this class.

Please contact me with any questions about Canvas, the class materials or grading. Also note that the UNK e-Campus website does provide both Video Tutorials and Atomic Learning Tutorials on using Canvas, email, and MS Office see [this page](#).

A note about Expectations:

I approach this program with the goal of providing, as closely as possible, the level of experience I was fortunate enough to experience in my graduate career at some very good universities. This means that generally my expectations are high. By this I mean at least six hours of study time per week, a high degree of mastery of even complex material, and the persistence to do outside research and ask questions of me as needed. I will do my best to find, present, and interpret material I think is important and appropriate for the subject area of classes. I will also do my best to explain how the process of science works including experimental design, statistical testing, writing, and thought processes. I will also work to be as available as possible, and turn around posts, emails, and graded work as quickly as I can. For graded work this means 2 weeks or less.

It is my hope and expectation that everyone in this program is here because they enjoy biology and wish to become more knowledgeable about the subject and more proficient at teaching or researching.

Here is a quick checklist of points that may help you succeed in the course, based on my experience as a graduate student and professor:

1. **Have you prepared for the progress of the class?** Have you read the material, not just once but twice? Have you looked up authors, concepts, or words you were not familiar

with during the reading? Do you understand how this reading fits into the discipline in general, and why it was assigned? On primary literature papers have you noticed the author, date, and author's institution of the paper in addition to the data, statistical tests, and concepts in the paper?

2. Before asking an entire class what a word means **have you tried to look it up?** Did you try to find the word from appropriate, professional, recognized sources? Have you used the assignment itself, the index in the book, or another biology text you own? Wikipedia is also a good place to start, but may not a good place to end such a search.
3. Is the work you are turning in **reflective of you** as the professional you are working towards? Have you looked at it for mistakes? Do you have all the important concepts covered in your work? Is the organization of the paper clear and useful? Have you put in thought and work on the figures and tables to make them clear, professional, and are they referenced correctly? Has the work been proofread for grammatical, factual, spelling, and formatting errors? Do you know that the formatting correct?

Canvas:

The main portal for the class work in the UNK Biology Distance Master's program is the learning management system (LMS) Canvas. Being familiar with the LMS is helpful for success in the program. Here are the components are the ones I use the most:


1. "Files" Section of Canvas for this class:
 - a. This is where Powerpoint, pdf, and video files are that are materials for classes.
 - b. Video files (the lectures) should be **downloaded** (not streamed) for viewing. This means a right click, not a left click on most computers.
 - c. The video files are in MP4 format, which can be played by many video players.
 - d. Some files are large and should be downloaded on fast internet connections.
 - e. I may post papers here as well as book sections or links to other sites, these are class materials and should be read and have notes made on them.
 - f. It is fine to download files available at any time during the semester. There are no restrictions on what devices you use or how many times you use them. Please note these files are UNK files created by me in terms of authorship.
2. "Discussions" Section:
 - a. This section of the LMS is how you will communicate with me and each other in the class. Note: do not use the 'mail' system in Canvas, I hardly look at this area and will not be using it. Email me through the Loper system / Outlook if you want to email me.
 - b. In my classes Discussions are an important part of the class experience, there are lot of points associated with participation on Discussion Board. But more than this people get to know each other, really help each other, and provide good feedback on ideas folks have on the class material.
 - c. Typically, discussion boards open Monday around 9:00 am Central Time, and closed Sunday night around 10:00 pm Central Time (I reserve the right to change these times) for a particular week.

- d. Because discussions are important, posts will be graded.
 - i. At least **two** quality postings each week and not both on Sunday night.
 - ii. *The quality of your posts*. This is a somewhat subjective category, but the more thoughtful your comments the better the quality of discussion will be for the entire class. Comments should be at least a few sentences. Conciseness and clarity are necessary to keep the reading load for the class to a reasonable level, i.e.: page long postings are discouraged. Comments should be supported with information, file attachments or web sites, and should be relevant to the current topic of discussion. References are encouraged.
 - iii. *How well you interact as classmates*. Your responses should demonstrate that you are aware of the discussion that has been taking place. Go beyond stating “I agree” with someone with someone by stating your reasoning. Posts that say just “I agree” in one form or another will not be counted as contributing toward posting credit for the week.
 - iv. *Be polite and professional* be polite and constructive in your responses to other students and me.
- 3. “Assignments” Section:
 - a. Many, if not all, the assignments in the class will appear here, so please find this area of the LMS
 - b. There are two types of assignments I use most:
 - i. Quizzes: these are timed tests, typically multiple choice questions that are available for a limited amount of time. The time frame is for quizzes is usually to open at 5:00 pm Friday on the week they are assigned and closing on the following Monday at 10:00 pm Central Time. These tests must be completed online within their time limit (e.g. 30 minutes) once started.
 - ii. Papers: I create assignments that are links through which you can upload documents. This system has the distinct advantage over email in that papers go directly to a ‘space’ that is specific to one person for one assignment. Users will see a paper icon in the Gradebook for the assignment when documents have been uploaded.
 - 1. This function can be set to be available for a limited amount of time. See the syllabus schedule or assignment description for due dates and times. Typically, I post the assignments at least 1 week ahead of the deadline.
- 4. “Grades” Section:
 - a. This is the area of Canvas where grades are recorded and displayed, these are the actual grades I use to calculate final grades, so check the scores!
 - b. Note the symbols in the gradebook. It is your responsibility to make sure assignments are in on time, uploaded correctly, and that the correct file is uploaded.
 - i. If the wrong file is uploaded, or the file is late, penalty of at least 10% will be assessed.

- ii. As stated elsewhere in the syllabus header information must be on the paper including your name, give the file a unique filename not just “paper 1”. These are basic issues, but they keep occurring.
- iii. Empty assignment: this means no file has been uploaded, or test taken according to Canvas. You **do not** want to see this if you have taken a test or uploaded a file.

Pre-problem set (optional)
Out of 0
-
-
-

- iv. Paper icon: this means that Canvas has received a file, or that a test has been taken. A file that is uploaded may still be corrupt, or the wrong file could have been uploaded, but whatever it is, Canvas has it. This means I have to grade the assignment before you will see a grade. Any paper, and any test with subjective questions (such as fill-in, short answer) will have this symbol until graded.

Pre-problem set (optional)
Out of 0
-


- v. Graded assignment: this is the grade for the assignment. It is what will be used in the final grade calculations.

Plagiarism Certificate
Out of 10
10
10

- vi. Other symbols: I think there may be a failed upload symbol that looks like a broken paper icon, but I have not seen this icon recently and I am not sure how Canvas shows failed uploads. If you see something other than the images shown above please contact me immediately.
 - vii. If the assignment is a paper I will give feedback on the paper after I grade it. This feedback is done with the review function in Word and “show all markup” needs to be chosen (in Review tab) to see this feedback. None of this can be seen in a preview window.
5. “Announcements”:
- a. These are pieces of information I post that I think will help people with the class or a particular assignment as a semester progresses. Please read these when I post them.
6. “Conferences” and other features:
- a. I may have live ‘conferences’ through Canvas during a class. I try to record them and make this link is available to you when the recording process works.
 - b. There are other features of LMS that I use from time to time so please look around at the program.
7. Scientific Writing:
- a. I have included documents in Files/Scientific Writing folder to help with scientific writing. I hope to see the highest level of professional writing in assigned papers.
 - b. I encourage everyone to work on improving their writing skills, as I continue to work on mine. Everyone in the program should have at least a few papers from primary journals from other classes or your own reading.
 - i. If not, get a few from the UNK library collection that you have access to as a UNK student on subjects you are interested in.
 - ii. Recent papers from a major journal should be read for style, voice, formatting. Such examples will show you how to build sentences, tables, figures, paragraphs, references, and abstracts. Everything you need to know is there.
 - c. Also, you can always ask for feedback on sample writing before large assignments are due!
 - d. Changing writing style or formatting seems easy for some students but hard for others. Not writing in scientific style or not formatting papers (or problem sets) correctly can cost a person valuable points on assignments. Please do your best with writing. I have provided reference material and encourage people to read current literature articles for structure as well as content.

Dr. Albrecht Class Policies

Version 1.9 Spring 2018

Introduction:

Every institution has its rules and policies and UNK and the Biology Department have them too. Because of the distance education environment, the degree of communication between student and faculty can be difficult, and misunderstandings do happen. Please keep in mind “talking” over the computer is not the same as face to face – several types of communication are lost. There is nothing quite like a conversation after class or in a hallway. Please be patient and allow more time than you might otherwise to get the solution you need. Here are my policies that will be in place for this class in addition to those of UNK and the Biology Department.

Policies:

1. Paper formatting: all work turned should have the following formatting.
 - a. Size 12 font, 1” margins all around the page, page numbers present, no right justification for the text
 - b. Header information on the first page: name, class, date, assignment at least.
 - c. All text double-spaced with proper English spelling and grammar used. The writing should be simple, clear, scientific writing style. At the least this means: subject-verb-direct object structured sentences.
 - d. Tables must be labeled at the top and have captions that explain them.
 - e. Figures must be labeled at the bottom and have captions that explain them. No titles within the phase (graph) space which is the Excel default unfortunately.
 - f. All work turned in should have correct references. All citations must be “(author year)” format in the text (including figures and tables if they are adapted from existing work) with a full citation at the end of the paper. Papers should be listed alphabetically by last name of first author.
 - i. Citations **are** needed if textbook or lecture material is used (especially when quoted!). This is both the legal necessity and good practice for work beyond class.
 - ii. Full citations should be in a “References” section at the end of each paper and follow these formats, reverse indented and alphabetical by author.
 - iii. Each text citation should have a full citation in the Literature Cited section and each citation in the Literature Cited section must have at least one text citation.

- g. **Failure of any of these policies will result in letter grade reductions.** For those of use familiar with rubrics, these are level one issues.

2. Citation Style Examples: further information here:

<http://www.scientificstyleandformat.org/Tools/SSF-Citation-Quick-Guide.html>

a. Books:

Darling D. 2001. Life Everywhere: The maverick science of astrobiology. Basic Books. New York. 206 pp.

b. Computer Programs:

Microsoft. 2010. Microsoft Excel Version 14.06112.5000. Redland, WA.

c. Journal Articles:

Chekalyuk A C, and M Hafez. 2008. Advanced laser fluorometry of natural aquatic environments. Limnological Oceanographic Methods 6: 591-609.

d. Websites:

Food and Agriculture Organization of the United Nations. 2006. Livestock impacts on the environment. URL: <http://www.fao.org/ag/magazine/0612sp1.htm>. Accessed Feb 26, 2014.

3. Plagiarism and Cheating:

- a. **Please see and complete (the underline ahead is the hyperlink, please click on it) [this page](#) - I require everyone in the class has visited this site, take the quiz and send me a completion certificate (Test & Certificate section) by the 5:00 pm Central Time on the second Friday of the semester.** Every semester, even if you have done it before (but only once per academic year is needed). Post a Word document containing a screenshot or scan into the Assignment link. The reason? So everyone knows exactly what plagiarism is. **ALL** sources in **anything** turned in for this class must be cited, including figures and anything taken from class texts (such as copying the text of problems) every time!

- i. Also, I want to make sure you can take screenshots, place images in Word documents (and resize and crop as needed), as well as upload to Canvas.

- b. Also see the [UNK Student Handbook](#) for UNK policy statement on plagiarism

- c. I consider plagiarism a scourge and a stain on science and detrimental to the progress of humanity. Penalties include zeros on questions, or entire tests, or failing the class outright in addition to letters in the permanent files here at UNK
 - d. Citation information for APA style is given at the UNK eCampus website [here](#).
 - e. A quick rule: **more than 3 words in a row from any source must be referenced**
 - f. Do not communicate with outside experts to answer tests. This includes non-UNK websites. Assignments are meant to assess your knowledge, not that of others, or “answers-provided” websites.
 - g. Work individually unless directed into groups. Your work should be your own, and any personal pronouns used in your writing (which should be few in any case) should reflect this, i.e. no ‘we’ in assignments you work on by yourself!
4. Late work/technical difficulties:
- a. Late work will be subject to the following grade reductions:
 - i. 10% reduction of grade for any work submitted after stated deadline
 - ii. A further 10% grade reduction for each 24-hour period past the stated deadline
 - b. I understand that online classes demand attention to deadlines. However, this graduate program is *not* a self-paced one. This program is structured to academic terms and time frames (such as breaks) as the brick and mortar University of Nebraska system. In general people in the program show great dedication and hope this tradition continues.
 - c. Technical difficulties are part of the reality of the online world. Given that truism, do NOT wait to submit assignments until the last minute or hour of a deadline. Both you and I cannot be responsible for failures of power, computers, computer networks, or even Canvas. Do not procrastinate; *turn assignments in early*, so there is time to resubmit if there are any problems.
 - d. Important: please install and run some sort of anti-virus and anti-malware software on your computer. This is for all of us in the class, so that viruses are not spread through the class. Finally, a utilities program will help your computer run well by fixing registry files and defragmenting and optimizing hard drives:
 - i. Microsoft Security Essentials (recommended and free):
 - ii. other maintenance software such as System Mechanic (my favorite), Symantec System Works, Glary Utilities (free)
 - iii. Malwarebytes Anti-malware (free)
5. Online etiquette:
- a. **Please be respectful of others in the class, even me.** It is easy to be more confrontational via electronic post than in person. I understand conversations may become heated, and irony, even sarcasm may be attempted at times be

used to make a point; however, such attempts are often not understood via posts. Please try to remain clear and kind at all times.

- b. Posts I deem as offensive or inflammatory towards others or me will be removed from the discussion boards. If this becomes a continuing problem, grade reductions may result. I will keep copies of such posts.