

## **LB-144: CELL & ORGANISMAL BIOLOGY**

*If you strive to think and communicate like a scientist in your work throughout the semester, in the end, you will be a scientist and really know biology (Think like a serious scientist, not like a pretend one).*

### **LECTURER**

Douglas B. Luckie (he/him/his), Professor, Lyman Briggs College & Department of Physiology  
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**COURSE WEBSITE** <http://ctools.msu.edu/144> (mirror => cf.psl.msu.edu/144)

**TEXTBOOK** (online-only, for Luckie's LB144 custom textbook, <http://store.trunity.com/>)  
“Integrating Concepts in Biology” by Campbell, Heyer & Paradise, 2024 Edition, Trunity Holdings Inc

**COURSE PACK** "LB-144 Course Pack," (Luckie) from MSU Library Services via local bookstore

**INTERNET** 20+Mbps (download): 10+Mbps (upload) best. Use D2L, Zoom, TopHat, CATME, Turnitin.

### **LB-144 = LB-144 (LECTURE) & LB-144L (LAB) OVERVIEW OF CLASSES**

There are two overarching goals in these two connected classes.

- 1.) To gain a fundamental comprehension of the cellular & organismal processes of life and an appreciation why it is important to understand these processes.
- 2.) To learn how to think like a scientist and be able to adaptively negotiate a question or problem.

The cell & organismal biology course is an exploration of life at all levels. It examines the interplay of genes, cells, and chemistry allowing organisms to live, survive, and interact with each other and the environment. Specifically, we will study genes (molecular biology), living cells inside organisms (cell biology), organisms and their environments (ecology), genetic variation and inheritance (genetics), and the interactions of the environment and genetics over time (evolution) that led to the diversity of life observed on the planet today.

Our lecture will meet twice a week as two 80-minute class meetings. Once a week in-person (live, synchronous) and once on TopHat (recorded, asynchronous). In this class, you will have daily homework and in lecture we will review and discuss, in depth, parts of the readings. We will examine how scientists perform their work to help you master the ability to ... *think like a serious scientist, not like a pretend one.*

### **WORKLOAD**

The first semester of LBC Biology, LB144, consists of two connected courses (lecture 3 credits, laboratory 1 credit) and because LB144 is two classes they require twice as many hours of work as one class. For any university-level course, for each credit, you are expected to spend 2-3 hours/week outside of class studying and working on homework assignments. There will be a certain amount of preparation that you will need to do before each lab and readings that you will need to complete (with notes taken) before each lecture. Come to lecture and lab well-prepared or mastering the new material may be far more difficult and stressful.

### **SCHEDULE**

Both the lecture schedule and the lab schedule are found in the two syllabi provided. We reserve the right to modify schedule if necessary. You will be given advance warning if the schedule needs changed.

## OFFICE HOURS & LAB MEETINGS

Held each week on Mondays 10:20-11:40am in-person in our classroom & you can make appointments.

## ACADEMIC HONESTY

To avoid problems **turnitin.com** will allow you to upload and review writing assignments prior to submission for grading. Yet, if you are caught cheating, you will be assigned a “0” for the assignment or the course. The LBC academic honesty policy is -> <https://lbc.msu.edu/advising/academic-policies.html>

## GRADING

Your grade in LB144 is based on the total percentage earned in the both the lecture course and the laboratory course, each worth half. Your work will be graded on a flat scale.

4.0= 90-100%    3.5= 85-89.9%    3.0= 80-84.9%    2.5= 75-79.9%    2.0= 70-74.9%    1.5= 65-69.9%    1.0= 60-64.9%    0.0= <60

A “3.0” score is considered Excellent. It is impressive work, top of the class, and the work was done extremely well but nothing beyond what was expected.

A “3.5” is Most Excellent. Every detail of the work was done extremely well, and they found additional papers and evidence beyond what they were required.

A “4.0” is Outstanding. It has the 3.0, 3.5-level elements + student impresses instructor with how much/well they used additional papers and evidence.

**Late Policy:** Assignments are due in lab/lecture at the beginning of the session indicated (at the time of entering the room) unless otherwise specified. If an assignment is 1 day late, only 1 point will be deducted from the final score. After this 24-hour grace period, the penalty becomes more severe: 20% off for two days late, 30% off for three days, and so on. After 5 days, you will receive a “0” for the assignment.

**Rejected Manuscripts/Reports:** Each time a paper is “rejected”, because it did not follow the *Instructions to Authors*, 1 point is deducted. This is independent of the Late Policy, both can occur.

**Blind grading:** Whenever possible we will score assignments "blind" and thus ask you to not list your name but your "B-PID" (found in D2L grade book). This helps eliminate bias and makes grading more fair.

**\*Formal written grade appeal process:** If you feel that your assignment was not graded properly, you may submit an appeal in writing (on paper, not via email). You must concisely explain why and how your work in fact was correct and demonstrated you mastered that element of the grading rubric, providing sources. Please be advised that if you submit a formal grade appeal about one part of an assignment, we always re-grade your entire exam, paper, or quiz and the score may increase, decrease, or stay the same. For group assignments, all authors must sign the written request since re-grading may impact all. How well you provide your claim, evidence, and reasoning will be assessed, and students who provide good logical succinct arguments supported well by solid relevant evidence will earn approval (you may cite pages of textbooks, or even better, published research papers). Avoid emotional arguments that blame others or arguments based on hearsay, e.g. “I heard from a student” “A TA told me this was correct.” If you do not make logical arguments or provide thoughtful evidence to support them, your appeal will not gain traction to be approved. All discussion concerning score changes must be completed within 7 days from the date the grade was officially posted (on the returned assignment or online). No grade changes will be considered after this time. If illness or other emergency prevents you from completing assignments on time, you must make arrangements with your instructor before the due date (*example* of appeal provided in course pack).

*TIPS: Explicitly list/label "Claim" "Evidence" "Reasoning" on your appeal. Clearly identify which specific element of the grading rubric you are appealing. Text should be concise, a single-page appeal is optimal.*

## LB144 Biology Learning Goals

### 1. Practice at doing and communicating science. Speak your thoughts smartly.

- a) Communicate Scientific Thoughts: Manifest your smart thinking in the best words possible.
  - 1. Speaking: a high priority of this course is for you to practice public speaking & listening.
  - 2. Reading: practice careful reading of papers, identification of points, interpretation of figures.
  - 3. Writing: practice composition of text, writing manuscripts, building data figures and graphs.
- b) Design and Analyze Experiments: Make a hypothesis, design experiments, make predictions. Interpret data collected, look for patterns, ways to best share and represent findings.

### 2. Study the Biology Idea of "Information". Learn examples and mechanisms to store/transmit information at molecular, cell, organismal, population levels.

These "**content**" goals are for you to understand, describe, and give examples of how:

- a) Heritable information (like DNA/genes) provides for continuity of life and non-heritable information (like talking) is also transmitted within and between biological systems.
- b) Imperfect information transfer, like during reproduction of cells, chromosomes, and genes, leads to *variation* of traits among individuals. (e.g., some beach mice have light colored fur because a mutation in a gene makes it difficult for their hair cells to make dark hair pigment)
- c) Interactions among organisms and the environment determine *individual* survival and reproduction. (e.g., animals who are in cooperative groups and communicate live longer)
- d) Selection (and other mechanisms) acts on individuals and leads to the evolution of *populations*. (e.g., beach mice with fur that matches the color of sand live longer than others because?)
- e) Information in DNA => becomes (transcribed) information as RNA => becomes (translated) information as proteins (e.g. How viruses enter our cells, take control, & make viral proteins)
- f) Small simple chemicals can associate to form nucleotides, amino acids, lipids, carbohydrates; which can polymerize, form structures and functions we define as "alive" (life on earth).

### 3. Practice Transfer of Learning: Work with your group to intentionally transfer knowledge learned in one context (e.g. squirrels) to another new context (e.g. humans).

- a) Reflect: Develop personal learning goals and regularly reflect on your progress during the semester. (e.g. regularly consider "What I am supposed to be learning here? Have I mastered that? What about transfer? Can I link this to life on Mars, or humans, or something different?")
- b) Collaborate: Confidently cooperate in teamwork, and practice team building, communication and leadership. (e.g. "that's a good idea, should we also test if it works in another animal?" "Jon, you haven't spoken much, what do you think?")

**LB-144: CELL & ORGANISMAL BIOLOGY (LECTURE)**SCHEDULE: Each week= **TOP HAT** online & *LIVE in-person*

	<i>Date</i>	<i>Scale/Level</i>	<i>Readings (emphasis)</i>	<i>Instructors LIVE or TopHat</i>
<b>W1</b>	W, 28 <b>Aug.</b>	Ecological	Lect. 1, Ch 18.1 (crickets call)	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W2</b>	online	Ecological	Lect. 2, Ch 18.1 (frogs sing)	Online videos ( <b>Luckie &amp; LAs</b> )
	W, 4 <b>Sep.</b>	Ecological	JClub1: Ulagaraj+Page papers	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W3</b>	W, 11	Population	Lect. 3, Ch 18.3 (corals settle)	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W4</b>	online	Population	Lect. 4, Ch 17.1&2 (fireflies)	Online videos ( <b>Chris Paradise</b> )
	W, 18	Population	JClub2: Lewis+Harrington papers	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W5</b>	W, 25	Population	Lect. 5, Ch 17.2 (storm petrel)	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W6</b>	online	Population	Lect. 6, Ch 17.3 (meerkats)	Online videos ( <b>Chris Paradise</b> )
	W, 2 <b>Oct.</b>	Population	JClub3: Bretagnole+Manser papers	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W7</b>	online	Organismal	Lect. 7, Ch16.1 (Sandworts)	Online videos ( <b>Chris Paradise</b> )
	W, 9	Organismal	JClub4: Caiazza et al paper	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W8</b>	M, 14	<b>EXAM I</b>	<i>LIVE in-person (in classroom)</i>	
	W, 16	<b>EXAM I</b>	<i>LIVE in-person (in classroom)</i>	

**Fall Break, Oct. 21-22**

<b>W9</b>	online	Molecular	Lect. 8, Ch1.1, 1.2 (Griffith)	Online videos (Luckie & LAs)
	W, 23	Molecular	JClub5: Watson+Crick papers	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W10</b>	online	Molecular	Lect. 9, Ch1.5 (Epigenetics)	Online videos ( <b>Malcolm Campbell</b> )
	W, 30	Molecular	JClub6: DeSimone paper	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W11</b>	online	Cellular	Lect. 10, Ch2.3 (Translation)	Online videos ( <b>Malcolm Campbell</b> )
	W, 6 <b>Nov.</b>	Cellular	JClub7: Dang+Johnson papers	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W12</b>	online	Organismal	Lect. 11, Ch3.1 (Mendel)	Online videos ( <b>Malcolm Campbell</b> )
	W, 13	Organismal	JClub8: Collins papers	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W13</b>	online	Molecular	Lect. 12, Ch4.1 (Evolution)	Online videos ( <b>Malcolm Campbell</b> )
	W, 20	Molecular	JClub9: Ingman et al paper	<i>LIVE in-person (Luckie &amp; LAs)</i>
<b>W14</b>	online	Molecular	Lect. 13, Ch4.3 (Competition)	Online videos ( <b>Malcolm Campbell</b> )
	W, 27	Molecular	JClub10: Miller paper	<i>LIVE in-person (Luckie &amp; LAs)</i>

**Thanksgiving Break, Nov. 28-29**

<b>W15</b>	M, 2 <b>Dec.</b>	<b>EXAM II</b>	<i>LIVE in-person (in classroom)</i>
	W, 4	<b>EXAM II</b>	<i>LIVE in-person (in classroom)</i>

**FINAL EXAM** finals week 2024, see official schedule (tentative time/date)

# Available ONLINE

## JClub1 - (Ulagaraj + Page papers)

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Raj Ulagaraj, T. Walker: [Phonotaxis of crickets in flight: attraction of male and female crickets to male songs](#), *Science* 182(4118):1278, 1973.

Rachel Page, M. Ryan: [Social transmission of novel foraging behavior in bats: frog calls and their referents](#), *Curr Biol* 16(12):1201-1205, 2006.

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## JClub2 - (Lewis + Harrington papers)

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Lindsay Harrington, Katharina Fabricius, et al: [Recognition and selection of settlement substrata in corals](#), *Ecology* 85(12):3428-3437, 2004

Sara Lewis, Michaelidis C, Demary K: [Male courtship signals & female signal assessment in fireflies](#), *Behavioural Ecology* 17:329-35, 2006.

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## JClub3 - (Bretagnolle and Manser papers)

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Vincent Bretagnolle: [Calls of Wilson's storm petrel: functions, sexual recognitions and geographic variation](#), *Behaviour* 111:98-112, 1989

Marta Manser: [Response of foraging group members to sentinel calls in suricates, \*Suricata suricatta\*](#), *Proc Biol Sci* 266(1423):1013-1019, 1999.

Manser M, Bell M, Fletcher L: [The information that receivers extract from alarm calls in suricates](#), *Proc Biol Sci* :268:2485, 2001.

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## JClub4 - (Caiazza et al paper)

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Nicholas Caiazza, Quinn JA (1980) [Leaf morphology in \*A.patula\* & \*L.japonica\* along pollution gradient](#). *Bulletin Torrey Bot. Club* 107(1): 9-18.

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#### JClub5 - (Watson and Crick et al papers)

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Watson JD, Crick FH. [nucleic acids](#). Wilkins MH, et al. [Molecular ...](#) Franklin RE, Gosling RG. [Molecular configuration](#). Nature 171:737, 1953. ([all four!](#))

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#### JClub6 - (DeSimone paper)

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DeSimone J, Heller P, Hall L, et al. [5-Azacytidine stimulates fetal hemoglobin synthesis in anemic baboons](#). PNAS 79(14):4428-4431, 1982.

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#### JClub7 - (Dang and Johnson papers)

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Dang MN, Hambleton J and Kayser SR. [The Influence of Ethnicity on Warfarin Dosage Requirement](#). The Annals of Pharmacotherapy. Vol. 39: 1008 - 1012. 2005.

Johnson JA. [Ethnic Differences in Cardiovascular Drug Response: Potential Contribution of Pharmacogenetics](#). Circulation. 118(13): 1383–1393. 2008.

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#### JClub8 - (Collins et al papers)

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Collins JW Jr, Wu SY, David RJ [Differing intergenerational birth weights in Illinois](#). Am J Epidemiol. Feb 1;155(3):210-6. 2002

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#### JClub9 - (Ingman paper)

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Ingman M, Kaessmann H, Pääbo S, and Gyllensten U. [Mitochondrial genome variation and the origin of modern humans](#). Nature. Vol. 408: 708 - 713. 2000.

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#### JClub10 - (Miller paper)

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Miller SL. [A production of amino acids under possible primitive earth conditions](#). Science 117(3046):528-529, 1953.

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## THE LECTURE ASSIGNMENT SCHEDULE

Researchers have found increased structure and active learning increase everyone's ability to learn in introductory biology courses<sup>1</sup>. In addition, every student in our course really does want to have time to slowly carefully read the textbook, learn new information and enjoy mastering topics in biology. Given we believe the textbook we are using is outstanding, we are only assigning short readings, with integrating questions, so you have adequate time to carefully read each section and reflect upon it. A quiz or exercise based on the reading may be given during each lecture. These quizzes/exercises are designed to help you assess your own learning before and between exams. They provide you with regular feedback as to how well you are mastering each topic.

**ATTENDANCE AND PARTICIPATION IN LAB & LECTURE:** It is essential that you not only come to class but also actively participate in order to construct your own knowledge. While *attendance* is being physically "present", *participation* includes reading and preparing well for class, answering questions verbally, and via clicker questions, collecting data in the field and recording it daily in your lab notebook. Active participation includes, the following behaviors:

1. *Bringing forth new ideas, information, or perspectives to academic conversations*
2. *Discussing your readings and reflections with instructors and peers*
3. *Meeting with the instructors to discuss your interests, assignments, or project*
4. *Participating in small group discussions and activities*
5. *Assuming responsibility for personal behavior and learning*

While working on group projects, students should be mindful, all participants should exercise:

- *Respect for themselves, each other*
- *Openness and a positive attitude toward new ideas and other's ideas*
- *Flexibility and tolerance of ambiguity*
- *Good communications amongst themselves.*

**EXAMS:** There will two exams and a final exam, each may be comprehensive of all prior material. Midterm exams may be traditional multiple-choice format, or may be essay-style. Answers to open-book & take-home exams must also be submitted online to <http://turnitin.com/>.

### Assignments (pts):

<u>Week</u> (all)	<u>Assignment(s)</u>	<u>@Lecture</u>	<u>%</u>
	Attendance, Participation, Homework, Quizzes	X	10
8	Exam I	X	30
15	Exam II	X	30
16	Final Exam	X	<u>30</u>

**Total = 100% of lecture grade**

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<sup>1</sup> Haak, D., J. HilleRisLambers, E. Pitre, and S. Freeman. 2011. Increased structure and active learning reduce the achievement gap in introductory biology. *Science* 332:1213-1216. Freeman, S., D. Haak, and M.P. Wenderoth. 2011. Increased Course Structure Reduces Fail Rates in Biology. *CBE Life Science Education* 10 (2):175-186

**LB-144: CELL & ORGANISMAL BIOLOGY (LABORATORY)**

(ALERT: *you must complete online safety training at [ehs.msu.edu](http://ehs.msu.edu) to work in the lab room*)

Lab will meet both on **Monday** mornings in E-26A and **Wednesday** afternoons in C-4 Holmes Hall

**LAB COORDINATOR**

Douglas B. Luckie, Ph.D., Professor, Lyman Briggs College & Department Physiology

**LAB MANUAL**

found inside "LB-144 Course Pack," (Luckie) from MSU Library Services via local bookstore

**COURSE WEBSITE** <http://ctools.msu.edu/144>

**RESEARCH TEAM RATIONALE**

Student groups are intended to be research & learning teams. Work with other students to study and discuss biology topics in lecture, as well as share your ideas and research predictions in lab. Teams are better learning environments but also, they are REAL LIFE. While scientists do some things on their own, they more often work in groups to solve problems because a well-functioning team is the most efficient way to work. Working in the same group in both laboratory and lecture will allow you to become more familiar with each other so you will feel comfortable enough to discuss your biology questions. Although it may be easier for an instructor to run a class or lab without group work, numerous research studies have shown that working in groups and discussing science with your peers can increase your learning *considerably* (although you must strive to be a “cooperative” group). By pooling your knowledge, members of your group will get “stuck” less often, and be able to progress far beyond what any individual in the group could do alone.

<b><u>Week</u></b>	<b><u>Before Lab Meeting</u></b>	<b><u>During Laboratory Meeting Activities &amp; Assignments DUE</u></b>
1	View "Strangers" Film	Film discussion, Quiz, Honey Guide paper
2	View "IDEO" Film	Film Quiz & Debrief, Writing INTROS, Form Groups
3	View "Islands" Film	Film Quiz, 4-slide Proposal Talk & movie, Grading TITLES
4	Group Contract	<b>2<sup>nd</sup>-Draft due</b> , Preparing for LA and Prof Thesis Interviews: Q&A
5	GEA1 on Catme.org	<b>LA Interviews begin</b> (during & outside lab time, groups of 4, 60m)
6		LA Interviews (cont.) Writing RESULTS & FIGURES
7		<b>Half-Draft due</b> (2 <sup>nd</sup> + Results/Figs paper), Grading FIGURES
8	GEA2 on Catme.org	<b>PCR &amp; Prof Interviews begin</b> (during lab, in groups of 2, 60min)
9-12		Gene research (PCR, gels, Primers, BLAST =Molecular Teams)
13		<b>Final film</b> and/or <b>Final paper (full DRAFT1) due</b>
14-15	GEA3 on Catme.org	<b>Prof Interviews completed</b> (during lab, in groups of 2, 60min)

## THE LABORATORY

**You will need the Laboratory Manual resources provided in the Course Pack.** Regularly, each week, revisit and review the lab guide materials provided to you in the Course Pack. This semester, you will design and pursue one experiment all semester long. You will find an interesting terrestrial animal behavior related to communication that has been studied and published in the literature (like a mating display) and attempt to document it when observing animals on campus (like squirrels & humans). 4.0-seeking students will also connect the behavior to a gene. Your group will capture your observations with still photographs and digital video from your smartphones. Ultimately, you may generate a short 5-minute documentary film showing the results of your research and write a formal research manuscript. Each week, you will examine and practice the methods of a scientist in performing your research. This approach is aimed at mentoring you, and providing regular practice, so you will master the ability to think and work like a serious scientist.

*Participation and collaboration: While working on group projects, you should be mindful of other students in your group; therefore, it is important for all participants to exercise:*

- Respect for themselves, each other
- Openness and a positive attitude toward new ideas and other's ideas
- Flexibility and tolerance of ambiguity
- Good communications amongst themselves
- *You, individually*, do observations every week, out in the field, and record it in your notebook
- *You, individually*, find new papers for your group's project, each week, and keep in a notebook
- Share your weekly data in your notebook and new papers you find, with your group and LAs

### ASSIGNMENT SCHEDULE & VALUES

<u>Speaking (value)</u>	<u>Writing (value)</u>	<u>Discussing/Demonstrating</u>
Proposal talk & movie= 10%	Proposal 2P¶-Paper= 10%	LA Thesis interview= 10
Progress talk & movie= (ReDo)	Half-Draft Paper= 20%	Prof Thesis interview= 20%
Documentary movie= (e.c.)	Final Paper/Film=30%	Attendance & Participation= 10%

<u>Week</u>	<u>Assignment(s) Due</u>	<u>Value (%)</u>
(all)	Attendance & Participation	10 (+ec)
3	<b>Proposal Talk &amp; movie</b>	10
4	First “ <b>2 paragraph</b> ” ¶-Paper	10
5	LA Thesis Interview (individual score, group format)	10
7	Second “ <b>Half-Draft</b> ” Paper	20
7-15	Prof Thesis Interview (individual score, pair format)	20
12	Final “ <b>Draft1</b> ” Paper and Film e.c. option	<u>20</u>

**Total = 100% of lab grade**

### **The "Honors Option" (optional)**

\*Note: The Honors Option for LB144 this semester is presenting your group's research findings as a poster or talk at the UURAF during the Spring Semester. This must be an individual assignment (not done as a group) and at an in-person setting (not virtual) if you seek individual credit for an Honors Option. Fyi: UURAF deadline is usually in January.

## **144 Contract (sign & return)**

A syllabus is a form of contract between the instructor and the students. If you, the student, complete tasks with a specific score a predefined grade is awarded. Read the announcements below and the syllabus *in full* before signing and submitting this page.

- 1. HYBRID** *I am aware this course is hybrid; half the lectures are online and require TopHat.*
- 2. WORKLOAD** *As an Undersigned student, I am aware the LB144 lecture & lab courses together are worth 4 credits and will require me to work outside of class 8-12 hours each week.*
- 3. TOURISM** *I am aware that I will work with a group of students who will meet and study together at night and on weekends. If I need to travel frequently, I should discuss this with them.*
- 4. GRADING SCALE** *I am aware this course will use a university scale with higher expectations than I may have experienced previously. Excellent work is a 3.0, more is necessary for a 4.0. Assignments will earn "grade levels", 3.5, 3.0, 2.0, instead of a specific point total or precise percentage. Those grade levels represent a range, e.g. 4.0 is 90-100%. A grade level will be converted to a mid-range percentage (e.g. 4.0 -> 95%) in the final calculation of course grade.*
- 5. QUIZZES** *As the Undersigned student, I am aware that I may have quizzes or graded exercises each week, and unless I read the assigned pages in the reading, take notes and study them prior to the quiz, it's likely I will get a low score on the quiz or exercise.*
- 6. EXAMS** *As the Undersigned student, I am aware exams may be purely open book essay-style and provided in advance, and in this case, I should work with my group studying the questions and developing excellent answers in the time prior to the test. If I just "cram" my studies and work into 48 hours prior to the exam, it's likely I will get a low score on the midterm.*
- 7. UNIVERSITY GRADING SCALE** *I am aware this course uses a university scale with higher expectations than high school, excellent work is a 3.0, and much more is necessary for a 4.0.*
- 8. GROUP GRADES** *I am aware that I, with the help of others, will be authoring one research paper (with several drafts) and my grade may include both the score of my sections as well as the score for the whole paper. I realize I will be expected to review the entire paper before submission. If this doesn't work well for me, I should discuss it with my group or the Prof immediately.*
- 9. HONOR CODE** *In the authoring of assignments, I accept that any piece of work may be submitted to <http://turnitin.com> for screening. I am aware that if the work authored by me is found to be plagiarized, I will be given a zero for the assignment & perhaps for the LB144 course grade.*
- 10. LAB PARTICPATION** *I am aware that in the laboratory course, each and every week, I am expected to go out in the field and collect observational data and record it in a handwritten notebook as well as find new research papers for my group project.*

***I have read this contract, I understand, I'm up to the challenge, I agree to these tenets.***

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Printed Name

Signature

Date

## **MSU & LBC INFORMATION AND POLICIES**



### **WASH HANDS OFTEN**

Wash your hands with soap or hand sanitizer.



### **FEEL SICK? STAY HOME.**

Fever, cough, aches, fatigue, nausea? Stay home.

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**Absence due to illness:** Students who need to quarantine themselves, have been sick with COVID-19 symptoms, tested positive for COVID-19, or have been potentially exposed to someone with COVID-19 must follow CDC guidance to self-isolate or stay home. Illness or self-isolation will not harm performance or put one at a disadvantage in the class.

### **Technical Assistance**

If you need technical assistance at any time during the course or to report a problem you can:

- Visit the Distance Learning Services Support Site
- Visit the Desire2Learn Help Site (<http://help.d2l.msu.edu/>)
- Or call Distance Learning Services: (800) 500-1554 or (517) 355-2345

### **Mental Health Resources**

College students often experience issues that may interfere with academic success such as academic stress. If you or a friend is struggling, we strongly encourage you to seek support. Helpful, effective resources are available on campus, and most are free of charge.

- Drop by Counseling & Psychiatric Services (CAPS) main location (3rd floor of Olin Health Center) for a same-day mental health screening.
- Visit <https://caps.msu.edu> for online health assessments, hours, and additional CAPS services.
- Call CAPS at (517) 355-8270 any time, day or night.
- 24-Hour MSU Sexual Assault Crisis Line (517) 372-6666 or visit <https://centerforsurvivors.msu.edu/>

### **Resource Persons with Disabilities (RCPD)**

- To make an appointment with a specialist, contact: (517) 353-9642  
Or TTY: (517) 355-1293
- Web site for RCPD: <http://MYProfile.rcpd.msu.edu>

### **Inform Your Instructor of Any Accommodations Needed**

- From the Resource Center for Persons with Disabilities (RCPD): Once your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation ("VISA") form. Please present this form to me at the start of the term and/or two weeks prior to the accommodation date (test, project, etc.).

## **LBC Student Success and Advising Team**

LBC advisors work to educate, coach, and support students in our college. For more information about the Student Success and Advising team visit: <https://lbc.msu.edu/advising/index1.html>

To make a zoom or phone appointment with an advisor visit: <https://lbc.msu.edu/advising/advising-appointments.html>

To review LBC Academic Policies, including LBC's Academic Grievance Policy, visit: <https://lbc.msu.edu/advising/academic-policies.html>

### *Related Policies:*

Institutional Data Policy:

<https://tech.msu.edu/about/guidelines-policies/msu-institutional-data-policy/>

Student Privacy Guidelines and Notification of Rights under FERPA

<https://reg.msu.edu/ROInfo/Notices/PrivacyGuidelines.aspx>

## **Commitment to Integrity: Academic Honesty**

Article 2.3.3 of the [Academic Freedom Report](#) states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the (insert name of unit offering course) adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See [Spartan Life: Student Handbook and Resource Guide](#) and/or the MSU Web site: [www.msu.edu](http://www.msu.edu).)

Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use answers provided by Chegg.com or CourseHero.com or similar "cheat" web sites, or use Artificial Intelligence (AI) agents like ChatGPT to complete any course work in this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also the [Academic Integrity](#) webpage.)

## **LINKS TO UNIVERSITY POLICIES**

- [Spartan Code of Honor](#)
- [Academic Integrity](#)
- [RCPD Disability Accommodations Statement](#)
- [Mental Health](#)
- [Tolerance and civility](#)
- [Religious Observance Policy](#)
- [Student Athletes](#)
- [MSU Final Exam Policy](#)

## **Owner's Manual**

(With lots of ideas and text stolen from great authors, Drs. Alice Dreger and Tanya Noel)

### **Why is this an "owner's manual" instead of a syllabus?**

Most syllabi contain only class schedule information. By contrast, this is more like an "owner's manual" like the sort that comes with a new car. If you read and use this manual, you will understand how this course works, and you will be able to keep the course running smoothly and do the regular maintenance required to avoid breakdowns. Of course, this course isn't a car. It's more like a bus tour. I believe that a university course is in its essence not a number, and not a topic, but a group of people who share a common goal of learning about some particular thing. In this sense, a course is like a bus tour, a tour to a place that is unfamiliar to most of us. As the teacher, I am the bus driver and chief tour guide. Each member of the course starts off at "home" intellectually and emotionally and comes to the bus station which is the classroom. We agree to "take the tour" together, to get on the bus and travel together for the length of the course even though many of us may never have met before. Together we visit a number of different "places."

### **So why is this "owner's manual" so long?**

I've discovered that the more information I give students, the more comfortable and in control they feel, and the better they learn. This packet contains lots of information. Besides telling you about the mechanics of the course, this packet tells you a lot about my teaching style. I used to provide my students with a separate "statement of teaching philosophy." It now occurs to me it is weird to separate that teaching philosophy from my teaching materials. So now my philosophy is embedded throughout this packet. My teaching style, methods, and philosophy change over time, thanks to students who tell me what works and what doesn't work. I'm counting on you to give me lots of feedback about what is working for you and what is not, and most importantly why. It is very important to me to do a good job for you. In addition to the course learning objectives provided earlier, be aware this course aligns with the following MSU Undergraduate Learning Goals:

#### ***Analytical Thinking***

*A successful student uses ways of knowing from mathematics, natural sciences, social sciences, humanities, and arts to access information and critically analyzes complex material in order to evaluate evidence, construct reasoned arguments, and communicate inferences and conclusions.*

- *Acquires, analyzes, and evaluates information from multiple sources.*
- *Synthesizes and applies the information within and across disciplines.*
- *Identifies and applies, as appropriate, quantitative methods for defining and responding to problems.*
- *Identifies the credibility, use and misuse of scientific, humanistic and artistic methods.*

#### ***Effective Communication***

*A successful student uses a variety of media to communicate effectively with diverse audiences.*

- *Identifies how contexts affect communication strategies and practices.*
- *Engages in effective communication practices in a variety of situations and with a variety of media.*

#### ***Integrated Reasoning***

*A successful student integrates discipline-based knowledge to make informed decisions that reflect humane social, ethical, and aesthetic values.*

- *Critically applies liberal arts knowledge in disciplinary contexts and disciplinary knowledge in liberal arts contexts.*
- *Uses a variety of inquiry strategies incorporating multiple views to make value judgments, solve problems, answer questions, and generate new understandings.*

### **How does this course work in terms of the day-to-day?**

When we meet in-person for the lecture class, our meetings will consist of discussions of the readings and activities related to the topics we are investigating. You should complete the reading assigned for the day before you come to class, and spend enough time thinking about the readings before class. You should come to class ready to summarize the readings and to ask and answer questions about them. Homework and quizzes will often be given on the readings.

Always give yourself plenty of time to do your work, and feel free to contact me whenever you need help or clarification. I like teaching and not only do I feel good when you learn, often when you

learn something new, I learn, too.

Generally, we will stick very closely to the attached schedule, however, the point of this class is for you to learn, so if we need to change our scheduled plans to achieve that goal, we will do so. If you feel that you need things to be done somewhat differently in class in order for you to learn better, please let me know and I will work to adjust our schedule or classroom dynamics so that we can maximize learning.

### **So what's my feeling about teaching?**

I love it! And I think it shows – my students have voted me “honorary member of the graduating class of Lyman Briggs” (“teacher of the year”) about five times in the last fifteen years, I was given the Teacher-Scholar Award of MSU, the MSU Alumni Club of Mid-Michigan Quality in Undergraduate Teaching Award (nominated by MSU faculty and alumni for teaching) and and most recently the Outstanding Faculty Award by the ASMSU Senior Class Council (nominated by MSU graduating seniors for teaching). If you hear that I am tough, I am, but that's because I care about your learning. If I didn't care about your learning, I would have stayed at Stanford University.

I am delighted to have recruited amazing LAs to help you do well in the course. You will find that our LAs share my love of teaching, of biology, and dedication to helping you learn. But they are tough too because they want you to learn, lots. They are trained to answer your questions with responses in the form of guiding questions. Why? because it helps you learn and *remember*, and they know your next class (and career) will be far more difficult and demanding than this course, you know this too.

### **What else besides being in class will be required of you?**

Note that this course uses a wider range of assignments than just several exams. This spreads out risk and stress so it's lower level, day to day, and allows you to assess your own learning with lower-stake quizzes to avoid any surprises when facing the bigger exams. Grades are pretty simple, like getting an "A" or "B+" or "C" written at the top of each assignment– and you can always check your grade on the D2L grade book – but be sure to keep your own spreadsheet and alert me if my grade sheet has an error.

- *Quizzes on readings:* I will frequently give short quizzes on a day's assigned reading at the beginning of the class meeting. These quizzes accomplish two things: (1) reward you for keeping up to date on the readings; (2) reward you for spending enough time on the readings to really understand them. If you read carefully, you should have little problem with the quizzes. If you have a lot of trouble with short, fast quizzes, remember there are lots of extra options in this class you can use as substitutions. If you miss a quiz because you are late or absent, you will receive a "0". These cannot be made up.

### **A note on grades & FERPA:**

To support blind grading, we will often request that you not list your actual name but just provide your PID. Privacy, as required by MSU FERPA regulation, will be maintained by utilizing a code that is NOT your real MSU ID, so we'll call it your B-PID. Your B-PID will be listed on D2L in your personal grade book.

Backstory: In recent years universities have become very afraid of getting in trouble for breaking the law called FERPA (Family Educational Rights and Privacy Act). The law was created back in 1974 to protect the privacy of students and their grades. In response to it all universities created student ID numbers so instead of placing a grade next to a person's name, instructors could place it next to a student number to maintain privacy. Many universities chose to use a student's social security number to also be their student number. When identity theft became a big problem, universities then changed all their

student ID numbers from social security to become some number randomly generated in house. In recent years now the randomly generated student ID number itself has become protected. In fact, while other people are permitted to know your name, and even say it aloud and post it publicly, the student ID number is super protected. Thus, instead of using your officially MSU-issued ID, in this course, MSU requires that we issue a new temporary student ID. We will call these the B-PID, it's for blind grading.

Professors can use grades in two ways: they can use grades to "sort" students into "A" students, "B" students, etc.; or they can use grades as learning incentives and rewards. Unfortunately, the sorting system generally sorts according to "talents" students either have or don't have before they ever reach a particular classroom, e.g., the talent of being able to memorize and recall a lot of things. I would rather use grades to encourage students to develop their skills, to expand their minds and interests. While students are often only familiar with positive curving (sometimes called a mother's curve) a number of university classes use an actual curve that raises or lowers the grading scale with the goal to only permit a few students (like just 10 in a class of 100) to earn a 4.0 and then only a few (perhaps 20) are permitted to have a 3.5 etc. Even if everyone in the class got above a 90% on an exam, the grade scale would shift up until only the prescribed number of students got a 4.0 grade. This is a real "curve," and, I will never grade on a curve like this. Our grading scale will stay exactly as stated in the syllabus and each student will get whatever grade she or he has earned by the end of the semester. Nothing would make me happier than if everyone worked hard and learned a lot and got 4.0s. I would feel that we had achieved something great.

**Table 1- University-level grading system:** The table below describes the relationships between grades, percent, and performance in the University-level grading system used in our lab and lecture courses. The first column describes the letter/number grade. The second column describes the percentage associated with that grade. The third column describes the performance-level required. Remember, if at any point you feel confused or distressed about your grades, carefully review the syllabus, and talk to me.

<i><b>Letter Grade</b></i>	<i><b>Percentage</b></i>	<i><b>Performance</b></i>
A (4.0)	90 to 100%	<i>Outstanding Work</i> - A "4.0" is Outstanding. It literally stands out. It has the characteristics described for 3.0 and 3.5-level elements but in addition, the work by itself impressed with how much & well it was done. The student taught Prof something original.
B+ (3.5)	85 to 89.9%	<i>Most Excellent Work</i> - A "3.5" is Most Excellent. Every detail of the work was done extremely well, and they found additional papers and evidence beyond what they were told.
B (3.0)	80 to 84.9%	<i>Excellent Work</i> - A "3.0" score is considered Excellent. It is impressive work, top of the class, and the work was done extremely well but nothing beyond what was expected.
C+ (2.5)	75 to 79.9%	<i>Pretty Good Work</i> - A "2.5" is Pretty Good, the student did the minimum work required and did a pretty good job, this is expected at the university level and near average for the class.
C (2.0)	70 to 74.9%	<i>Average Work</i> - A "2.0" is average, the student did the minimum work required.
D+ (1.5)	65 to 69.9%	<i>Below Average Work</i> - the student did less than minimum work required.
D (1.0)	60 to 64.9%	<i>Poor Work</i> - the student did less than minimum work required and of poor quality.
F (0.0)	0 to 59.9%	<i>Failing Work</i> - the student did far less than minimum work required and very poor quality.

## **Course Structure**

This course will use a public website and online tools like Turnitin, CATME, Desire2Learn, and Top Hat. The course website may include online lessons, course materials, and additional resources. Activities may consist of readings, discussion forums, email, journaling, wikis, and other online activities. You will need your MSU NetID to log in to the course to access the grades on *D2L* (<http://d2l.msu.edu>).

## **Definitions, terms, transparency**

*Admission:* I believe caffeine and sugar increase attention and learning but have no empirical data to support this, except for eating donuts, which is documented to work, but just for 15 minutes post-eating. I like the drink called the Cortado (it's coffee, like a tiny latte) but particularly enjoy the moment I pour cane sugar out of the brown paper packet on top of the frothed milk and watch it sink into the drink. When you come to office hours, unless there's a rush, I'll likely offer you an espresso.

*Attendance:* Student learning is impacted by many things, yet education research has robustly shown it is significantly impacted by these three things: class size, teacher quality, and attendance. You are, of course, permitted to skip classes but often attendance is taken verbally in lab, and in lecture a single clicker point is made available to you, to encourage attendance since it correlates with learning. Attendance at the meeting of a class will be defined as being physically present in the room for the full time period of the class meeting. Thus, be present, in your seat with your notebook open and pen in hand, at the very beginning when the clock in the room strikes the hour and class begins, still there during/throughout the entire duration of the class, as well as at the very end of the official time period (feel free to come and go to visit the restroom, just not off vacationing elsewhere). It's only fair to treat students who arrive late exactly the same as those who depart early. We will often reward students for attendance by using technology to record their presence. If you fail at using your device to click in for attendance at the beginning middle or end of class, due to whatever reason, be aware we do not micromanage the attendance data (no appeals). If it happens, making the choice to schedule another course that has a start or finish time that is proximal or even overlaps with this class is, of course, your choice and entirely acceptable. Yet this will not change the definition of attendance or waive it. University students are adults and literally everything in a course is optional, yet if you want credit for attendance (and more importantly to learn) you must be there.

*Belong:* Lyman Briggs College is dedicated to promoting inclusion and fostering diversity. Let's make our classroom comfortable and welcoming for everybody. Let's strive to treat everyone with respect, civility, and empathy and rather than avoid new things to learn from others about different beliefs, practices, and lives. You are all super wonderful smart people, and all belong here.

*Blind grading:* When a computer scores a scantron bubble sheet from a multiple-choice exam, it is objective, it doesn't have a pre-conception as to which students are smart, or are nice to it, so it treats everyone the same and just rewards correct answers. Unfortunately, human graders are less objective. LAs, GTAs, and Profs, are all unable to be perfectly objective when they have already had interactions with the person whose work they are grading. While they try hard to be so, education research shows that even knowing what the person's name is will impact the grader and grade (even if they never met the person). Thus, imagine if they know the person reasonably well. If they have read prior papers, knew the person's prior grades, or had several positive (or negative) conversations with them. Wow, that will cause major problems when trying to be objective while grading, even for the best teacher ever, unless the grader is blind to the identity of the author. Professional journals and grant review panels use single blind or double-blind systems to avoid subjective evaluation. We will use this in our class too.

*Participation:* It turns out participation is different from attendance. It refers to a student who is actively working to perform the work and learn the materials discussed in the course. Students who are active participants do not merely talk during class but also prepare in advance for the class and do work outside of class. For the lecture course, this means carefully completing the readings, taking notes on them (best for learning, is to do this by handwritten notes on paper), and preparing for the upcoming class meeting by reviewing notes and highlighting any questions you thought of while preparing for class. To reward this behavior, which enhances learning, often there will be a pop quiz or problem or writing exercise during class which is scored. Also, there are clicker questions during the lecture, and you earn a point each time you choose a correct answer. There are also online lectures hosted on TopHat.com with readings and questions you can gain points for getting correct. You only need to get above 70% of all TopHat points to earn an Outstanding (4.0) grade for lecture participation. For the lab course, this means going out in the field, collecting data for your project each week, and recording it in your official lab notebook (trifecta style). It also means working well with your group, working just as much as your peers, and CATME as well as instructors' observations of you and your notebook, will be used to evaluate your lab participation. If you prepare well for class (lecture & lab courses), you'll get good grades, and if you don't, you are accountable. This helps increase the number of people who ultimately decide they need to study the material or collect data before class and as a result, also learn more when discussing the material again in class. If you prepare, the class is fun and interesting. If you don't, it can become confusing and frustrating, as it feels like everyone else seems to know all the answers while you don't even understand the questions. The lab participation grade represents half of the final combined Attendance and Participation grade. Here are examples of Outstanding versus 0% participation in the lab course. OUTSTANDING participation would be: you did all CATMEs, got high scores on all, have many full experiments listed in your lab notebook, and many highlighted/read papers on your gene, animal, and behavior kept in a notebook. A 0% participation would be: you did no CATMEs, got low scores on all, have zero full experiments listed in your lab notebook, and found/read/contributed zero papers on your project's gene or animals or behaviors.

*Random calling in the lecture:* How often have you been in a big lecture class that has maybe 8 students who are the only people who ever are called upon to answer the professor's questions in the lecture? The other 100+ students throughout the entire semester will generally never speak aloud during lectures. After a while, you get used to it. Everyone knows that "those students" answer the questions, so we don't have to, cool. Yet deep down you also know, that while it's comfortable to never have to answer a question, it likely reduces your learning, heck some folks fall asleep. My wife tells a story about a small class where the Professor always asked these incredibly difficult questions that nobody ever even understood. Then one day, near the end of the semester, for the very first time, she did the reading before class and during class realized that every single question the instructor asked had always been directly out of the reading. She was embarrassed because she realized the Professor must know nobody does the reading, given no student ever understood the questions he asked, even though they were right out of the first pages of each reading. Because our goal in this class is learning we will use random calling in lectures to help *\*everyone\** increase their learning and gain skills in communication/public speaking. Given that our #1 goal in the course is you to become comfortable and confident at public speaking, this is required to help that happen.

*What is inheritance?* This is when the grade of a second assignment, e.g. a second paper, a second talk, or a second exam might replace the grade of the first paper, talk, exam, etc. to reward improvement.

*What are ReDos?* This is an opportunity to retake an exam or repeat an assignment and have the new score/grade replace the old one (even if it is lower). This is a second chance at learning.

*What are BUMP points?* In the lab course, these are percentage points awarded to students each week, which elevate the final score of their next Exam. They are earned by those who demonstrate their high-quality work by showing instructors their full experimental records in their official lab notebooks as well as new research papers they found and read on their research project and explaining them.

*TARDIS pass:* If you win a TARDIS pass, through high attendance and participation, it can be used to ReDo an assignment. It is similar to the Formal Written Appeal Process outlined on page 2 of the syllabus. It can be used for everything except the Final Exam itself (due to time constraints). All discussion concerning score changes must be completed within 7 days from the date the grade was officially posted (on the returned assignment or online). So alert Luckie soon, within 7 days, if you wish to use your TARDIS pass to use time travel and ReDo an assignment.

*Our no-points grading system:* The grading system in the course is based upon the University Grading Scale (described earlier) and grade levels are described by terms e.g. "Pretty Good", "Excellent", "Outstanding" which are equivalent to 2.5, 3.0, 4.0. While some assignments like TopHat, or rubrics for the papers, still use points in evaluation, their final overall grade becomes a grade-level not a precise point total. We actually do not track a point total as the grading system, nor do the instructors track your current grade in either the lecture course or lab course. We just work to make sure the data, the individual grades, are provided and accurate on the D2L grades page. In a University level course students are not treated like children, they have incredible math skills and are expected to do the mathematics needed to regularly calculate and track their own grades. Each assignment's grade often becomes a grade-level and in the end every assignment is just worth a portion (percentage) of the final grade.

### **Here are descriptions associated with each grade level.**

PRETTY GOOD= If a student did mostly what was asked (nearly or at the very minimum required) AND a pretty good job of it, the grade awarded is a "Pretty Good" grade level.

EXCELLENT= If a student did everything that was asked (the very minimum required, but nothing beyond) AND did an excellent job in the work, the grade awarded is an "Excellent" grade level.

MOST EXCELLENT= If a student did everything required AND MORE (did the very minimum in all categories as well as more than the minimum in one or more) AND an excellent job.

OUTSTANDING= If the student did everything that was asked for AND went FAR above and beyond what was asked (more than the minimum in multiple categories) AND did an amazing job!

### **WHEN YOU NEED MORE LEVELS:**

If a student did the minimum work required but not pretty good quality, just average quality =AVERAGE

If a student does less than the minimum work required =BELOW AVERAGE

If a student does less than the minimum work required AND of poor quality =POOR

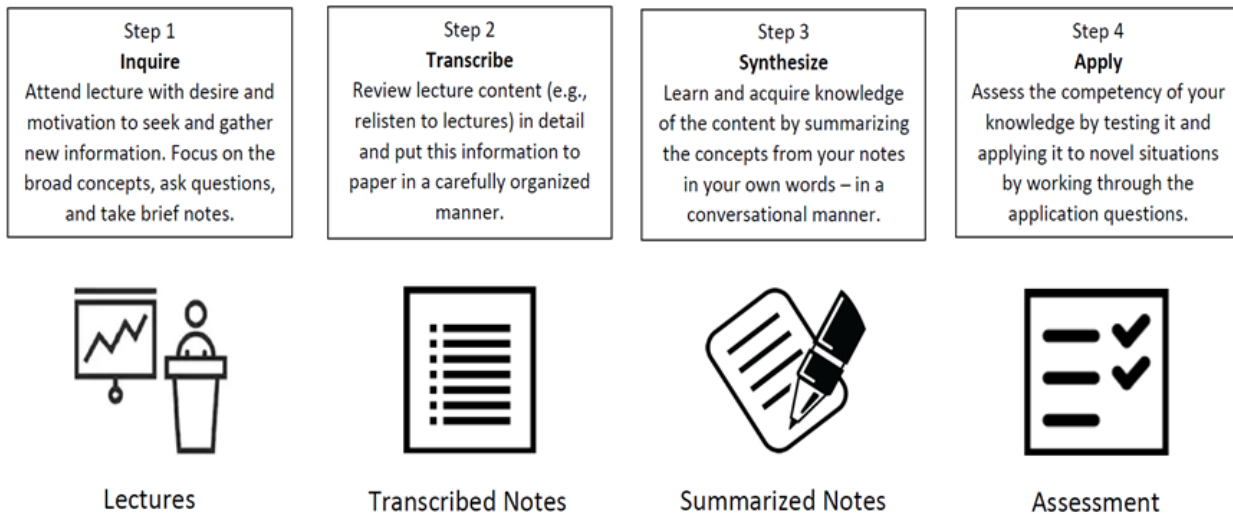
If a student does FAR less than the minimum work required AND of poor quality= FAILING

NOTE: If the listed score for an assignment is not a descriptive "grade level" like those above, but instead just a number, e.g. 100% or 78.2%, which is always the case for exams, that is the final grade. It will not change to become a grade level.

At the end of the semester, in final grades calculations we will convert these grade levels to these numbers and do math to determine each student's final percentage grade: **Outstanding (4.0 level) =95%, Most Excellent (3.5 level) =87.5%, Excellent (3.0 level) =82.5%, Pretty Good (2.5 level) =77.5%, Average (2.0 level) =72.5%, Below Average (1.5 level) =67.5%, Failing (1.0 level) =62.5%**

### Study Skills Tips from Dr. Marty Spranger (plus 18min video)

To gain deep understanding and be able to recall material try these four steps. Here is a link to an 18 minute video where he explains these steps. [Study skills for better learning](#)



### Some Tips for students about technology use in the classroom from Dr. Tanya Noel

Almost everyone has a smartphone, laptop, tablet, or combination of these devices with them during their waking hours (and beyond, in some cases). There is huge potential for distraction using these– which is fine if you’re waiting in a long, boring line or on a bus, but can be problematic in a class. Be aware of:

- There have been studies that have shown **“multi-tasking” in class is detrimental to learning.** (Actually, the evidence overwhelmingly suggests humans can’t really multi-task ... or, at least, can’t multi-task well!) If you’re trying to go back and forth between course-related stuff and other websites (or assignments for other courses, etc.), this will affect how well you’re learning/working.
- **Notifications (e.g., beeps/vibrations for new emails, text messages, etc.) are highly distracting,** and feed into “reward systems” in the brain that can reinforce behaviors like frequently checking your phone, Facebook, etc. (You know that uncomfortable feeling that makes you check your phone/email? Your brain gets a dopamine hit when you give in to that urge ... and makes it more likely to continue the behavior leading to the reward.) **Consider turning off these notifications,** at least during class and other times when you want to be able to focus uninterrupted. (Some people have found turning off notifications altogether has helped them not only focus but reduced their stress levels!)
- **Note-taking on computers is associated with lower-quality learning/test scores (vs. by hand).** Results from some recent studies support the idea that writing notes by hand on paper is superior to taking notes on the computer. There are several hypotheses about this, but many experts agree that taking notes by hand involves more thinking about what’s important and worth writing down (as you can’t transcribe every word spoken by the professor). On the computer, it is tempting to try to record everything verbatim, with the brain not processing much of the information. Touch typing by definition is writing by reflex as a result of training, by not thinking at all really.

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