



ARIZONA STATE UNIVERSITY
GENERAL STUDIES COURSE PROPOSAL COVER FORM

Course information:

Copy and paste current course information from Class Search/Course Catalog.

Academic Unit CLAS Department School of Life Sciences
 Subject BIO Number 281 Title Conceptual Approaches to Biology for Majors I Units: 4
 Is this a cross-listed course? (Choose one)
 If yes, please identify course(s) no
 Is this a shared course? (choose one) If so, list all academic units offering this course no
 Course description:

Requested designation: (Choose One)

Note- a separate proposal is required for each designation requested

Eligibility:

Permanent numbered courses must have completed the university's review and approval process.
 For the rules governing approval of omnibus courses, contact the General Studies Program Office at (480) 965-0739.

Area(s) proposed course will serve:

A single course may be proposed for more than one core or awareness area. A course may satisfy a core area requirement and more than one awareness area requirements concurrently, but may not satisfy requirements in two core areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirement and the major program of study.

Checklists for general studies designations:

Complete and attach the appropriate checklist

- Literacy and Critical Inquiry core courses (L)
- Mathematics core courses (MA)
- Computer/statistics/quantitative applications core courses (CS)
- Humanities, Fine Arts and Design core courses (HU)
- Social and Behavioral Sciences core courses (SB)
- Natural Sciences core courses (SQ/SG)
- Global Awareness courses (G)
- Historical Awareness courses (H)
- Cultural Diversity in the United States courses (C)

A complete proposal should include:

- Signed General Studies Program Course Proposal Cover Form
- Criteria Checklist for the area
- Course Syllabus
- Table of Contents from the textbook, and/or lists of course materials

Contact information:

Name Valerie Stout Phone 5-4617
 Mail code 4501 E-mail: vstout@asu.edu

Department Chair/Director approval: (Required)

Chair/Director name (Typed): MILES ORCHOWIK Date: 11/26/13
 Chair/Director (Signature): Miles Orchowik

Arizona State University Criteria Checklist for

NATURAL SCIENCES [SQ/SG]

Rationale and Objectives

In a relatively short time in the history of civilized societies, humankind moved from what was essentially an agrarian population into an industrial age, which in recent years has been profoundly shaped by such scientific and technological advances as genetic engineering, the computer, and space exploration. Our history of irrepressible ingenuity makes a compelling case for a future that will be even more profoundly influenced by science and technology. It is imperative that we react expeditiously and effectively to the problems and the promise that these advances create. We must ensure that technological change is directed to the benefit of society and that it will promote human dignity and values. Success in achieving this goal will depend upon the insight and knowledge of political and public opinion leaders, and the scientific enlightenment of educated citizens. To a significant degree, the ability of these individuals to understand the nature of the issues and the alternative courses of action will be determined by the quality of science presented at the nation's institutions of higher learning.

The recommendation of at least one laboratory course that includes a substantial introduction to the fundamental behavior of matter and energy in physical or biological systems derives from a number of considerations. First, all physical and biological phenomena have at their roots the fundamental principles governing the behavior of matter and energy. These principles have been shown over a period of time to be a value in reliably predicting and rationalizing a broad range of phenomena. Unless the lines to these roots are established, our understanding of the broader range of the sciences, and other fields upon which these sciences impinge, will be impaired. Second, because these fundamental principles have been experimentally established beyond reasonable doubt, the essentials of the scientific method can be clearly and coherently revealed by their study. Third, the study of the behavior of matter and energy illustrates the usefulness of mathematics in precisely describing and rationalizing certain physical phenomena, and the expressiveness of mathematical equation.

10/1989

REV: 1/1991, 3/1991, 1/2000, 10/2008

Proposer: Please complete the following sections and attach appropriate documentation.

ASU--[SQ] CRITERIA			
I. - FOR ALL <i>QUANTITATIVE</i> [SQ] NATURAL SCIENCES CORE AREA COURSES, THE FOLLOWING ARE CRITICAL CRITERIA AND MUST BE MET:			
YES	NO		Identify Documentation Submitted
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A. Course emphasizes the mastery of basic scientific principles and concepts.	syllabi, book chapters, schedule
<input checked="" type="checkbox"/>	<input type="checkbox"/>	B. Addresses knowledge of scientific method.	syllabi, book chapters, schedule
<input checked="" type="checkbox"/>	<input type="checkbox"/>	C. Includes coverage of the methods of scientific inquiry that characterize the particular discipline.	syllabi, book chapters, schedule
<input checked="" type="checkbox"/>	<input type="checkbox"/>	D. Addresses potential for uncertainty in scientific inquiry.	syllabi, book chapters, schedule
<input checked="" type="checkbox"/>	<input type="checkbox"/>	E. Illustrates the usefulness of mathematics in scientific description and reasoning.	syllabi, book chapters, schedule
<input checked="" type="checkbox"/>	<input type="checkbox"/>	F. Includes weekly laboratory and/or field sessions that provide hands-on exposure to scientific phenomena and methodology in the discipline, and enhance the learning of course material.	syllabi, book chapters, schedule
<input checked="" type="checkbox"/>	<input type="checkbox"/>	G. Students submit written reports of laboratory experiments for constructive evaluation by the instructor.	syllabi, book chapters, schedule
<input checked="" type="checkbox"/>	<input type="checkbox"/>	H. Course is general or introductory in nature, ordinarily at lower-division level; not a course with great depth or specificity.	syllabi, book chapters, schedule
II. - AT LEAST ONE OF THE FOLLOWING ADDITIONAL CRITERIA MUST BE MET WITHIN THE CONTEXT OF THE COURSE:			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A. Stresses understanding of the nature of basic scientific issues.	syllabi, book chapters, schedule
<input checked="" type="checkbox"/>	<input type="checkbox"/>	B. Develops appreciation of the scope and reality of limitations in scientific capabilities.	syllabi, book chapters, schedule
<input type="checkbox"/>	<input checked="" type="checkbox"/>	C. Discusses costs (time, human, financial) and risks of scientific inquiry.	
NOTE: CRITERIA FOR [SG] COURSES BEGIN ON PAGE 4.			

III. - [SQ] COURSES MUST ALSO MEET THESE ADDITIONAL CRITERIA:			
YES	NO		Identify Documentation Submitted
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A. Provides a substantial, quantitative introduction to fundamental principles governing behavior of matter and energy, in physical or biological systems.	syllabi, book chapters, schedule
		B. Includes a college-level treatment of some of the following topics (check all that apply below):	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	a. Atomic and molecular structure	syllabi, book chapters, schedule
<input type="checkbox"/>	<input checked="" type="checkbox"/>	b. Electrical processes	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	c. Chemical processes	syllabi, book chapters, schedule
<input type="checkbox"/>	<input checked="" type="checkbox"/>	d. Elementary thermodynamics	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	e. Electromagnetics	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	f. Dynamics and mechanics	
[SQ] REQUIREMENTS CANNOT BE MET BY COURSES:			
• Presenting a qualitative survey of a discipline.			
• Focusing on the impact of science on social, economic, or environmental issues.			
• Focusing on a specific or limiting but in-depth theme suitable for upper-division majors.			

Proposer: Please complete the following section and attach appropriate documentation.

ASU--[SG] CRITERIA			
I. - FOR ALL GENERAL [SG] NATURAL SCIENCES CORE AREA COURSES, THE FOLLOWING ARE CRITICAL CRITERIA AND MUST BE MET:			
YES	NO		Identify Documentation Submitted
<input type="checkbox"/>	<input type="checkbox"/>	1. Course emphasizes the mastery of basic scientific principles and concepts.	
<input type="checkbox"/>	<input type="checkbox"/>	2. Addresses knowledge of scientific method.	
<input type="checkbox"/>	<input type="checkbox"/>	3. Includes coverage of the methods of scientific inquiry that characterize the particular discipline.	
<input type="checkbox"/>	<input type="checkbox"/>	4. Addresses potential for uncertainty in scientific inquiry.	
<input type="checkbox"/>	<input type="checkbox"/>	5. Illustrates the usefulness of mathematics in scientific description and reasoning.	
<input type="checkbox"/>	<input type="checkbox"/>	6. Includes weekly laboratory and/or field sessions that provide hands-on exposure to scientific phenomena and methodology in the discipline, and enhance the learning of course material.	
<input type="checkbox"/>	<input type="checkbox"/>	7. Students submit written reports of laboratory experiments for constructive evaluation by the instructor.	
<input type="checkbox"/>	<input type="checkbox"/>	8. Course is general or introductory in nature, ordinarily at lower-division level; not a course with great depth or specificity.	
II. - AT LEAST ONE OF THE ADDITIONAL CRITERIA THAT MUST BE MET WITHIN THE CONTEXT OF THE COURSE:			
<input type="checkbox"/>	<input type="checkbox"/>	A. Stresses understanding of the nature of basic scientific issues.	
<input type="checkbox"/>	<input type="checkbox"/>	B. Develops appreciation of the scope and reality of limitations in scientific capabilities.	
<input type="checkbox"/>	<input type="checkbox"/>	C. Discusses costs (time, human, financial) and risks of scientific inquiry.	

[SG] REQUIREMENTS CANNOT BE MET BY COURSES:	
	<ul style="list-style-type: none">• Presenting a qualitative survey of a discipline.
	<ul style="list-style-type: none">• Focusing on the impact of science on social, economic, or environmental issues.
	<ul style="list-style-type: none">• Focusing on a specific or limiting but in-depth theme suitable for upper-division majors.

Course Prefix	Number	Title	Designation
BIO	281	Conceptual Approaches to Biology for Majors I	SQ

Explain in detail which student activities correspond to the specific designation criteria. Please use the following organizer to explain how the criteria are being met.

Criteria (from checksheet)	How course meets spirit (contextualize specific examples in next column)	Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)
see attached table		

Criterion	How course meets spirit	Detailed evidence of how course meets criterion
IA	Basic biological concepts are covered in class, recitation and lab with assessments in all 3 parts.	Schedule shows concepts covered and major assessments of learning (exams). In addition, the syllabi show additional assessments in the lab and class portions to aid in student mastery of topics.
IB, IC ID	Classic experiments discussed in class and recitation. In lab, students conduct experiments using scientific method.	Syllabi -student outcomes/objectives include these topics. Lab schedule shows experiments performed by students. Special note: Recitation week 6, lab week7 examine literature and, thus scientific method and methods of inquiry and uncertainty.
IE	Students must analyze their own quantitative data in lab. Recitations often rely on statistics in genetics analyses.	Quantitative analyses used weekly (after week 3) in lab. Lab reports require basic quantitative/statistical skills including graphing (and reading graphs). Week 2 of recitation (on schedule) works on graphing skills.
IF	Students spend 3 hours/week in lab doing "hands-on" experiments	Lab schedule and syllabi show this
IG	Students submit 2 formal lab reports, written in the style of a journal article	Lab syllabus and schedule show that students must write 2 lab formal lab reports: Osmosis lab report and Bacterial Transformation lab report
IH	This course is intended as a broad survey of biology for all our Life Sciences majors	Class syllabus describes the course – "BIO281 will build conceptual foundations that prepare you for [other biology courses]"
IIA	The primary objective of the course is to help students to learn about basic biological principles.	Both syllabi describe the objectives of the course, which include learning basic principles. In addition, scientific "issues" which are not settled are allowed to be debated – e.g. weeks 5, 7, and 8 in recitation examined the origins of life debate (see schedule)
IIB	The lab repeatedly asks students to consider the limitations.	The lab manual and weekly lab questions directly ask students about the limitations of experiments. The recitation addresses scope and limitations when discussing evolution and origins of life.
IIIA	One of the major concepts for the course is to learn the interconversions required for the flow of energy and matter through cells.	Course schedule in weeks 3, 4 and 5 shows these topics: energy, metabolism, respiration and photosynthesis (in class, recitation, and lab)
IIIBa	Molecular structure and function is another major theme of the class	Course schedule: Molecular structure is directly discussed/experimented in weeks 2 & 3 in class and recitation and lab
IIIBcd	One of the major concepts for the course is to learn the chemical processes required for the flow of energy and matter through cells on a molecular basis.	Course schedule: weeks 2, 3, 4 and 5: chemical reactions, energy, metabolism, thermodynamics, respiration and photosynthesis (in class, recitation, and lab)

Syllabus
BIO 281: Conceptual Approaches to the Life Sciences
4 credit hours
Fall 2013

Course Description:

This is the first course in a freshman biology sequence for life sciences majors. In contrast to typical courses, the material is problem-oriented, built upon a few big questions that should fundamentally interest students of biology. These questions are: Is there life out there? Why have sex? Why is stress more than just a headache? Why does climate change matter? Important concepts will be visited in different contexts; for example, you will learn about genetics, in at least three of the four major units in the year-long sequence. Recognizing that a large lecture tends to force students to become passive learners rather than active learners, much of the learning in this course will take place outside of the classroom. You will study new terms and concepts before coming to class, and “lecture” will focus on working through the most difficult concepts. To facilitate this shift to student-centered learning, there will be only two 50-minute “lectures” per week. The third 50-minute meeting will consist of a breakout session, in which students will master concepts through hands-on activities. Additionally, a 3-hr lab will provide an opportunity for students to explore these concepts in greater detail. Studies have indicated that this approach helps students to assimilate and retain information.

Students who successfully complete this course will understand the themes and concepts that underlie the molecular biology of cells and multicellular organisms as well as the biological processes that shape the diversity of organisms on our planet. BIO 281 will build conceptual foundations that prepare you for not only BIO 282 but also biology courses at higher levels. The following topics will be covered in this course: molecular and cellular biology, genetics, metabolism, ecology, evolution, behavior, and physiology. Additionally, students will enhance their abilities to generate, analyze, and interpret data from experiments. This course, in conjunction with BIO 282 (beginning fall 2013) serves as a gateway to more advanced courses in biology.

Student Learning Outcomes: Upon completion of this course, students will:

- Students will be able to explain patterns of biodiversity using principles of evolution.
- Students will be able to apply principles of cell and molecular biology to organismal function.
- Students will be able to generate solutions to problems the ways scientists have approached them. They will interpret, evaluate, and synthesize biological information from experimental data.

Required Materials:

- **BIO281 PACKAGE** which includes: (1) Textbook: *Biological Sciences*, 5th edition by Freeman et al., 2014; (2) online access code for the Freeman book; (3) book titled “Get Ready for Biology”, (4) book titled “Short Guide to Writing about Biology”; (5) book titled “Into the Jungle”
- **TurningPoint clicker** available at ASU Bookstore. You need to use TurningPoint clickers. We will NOT use other forms of ResponseWare (like cell phones or computers)
- **Lab Manual** (can be purchase at Alternative Copy Shop)
- Calculator
- Access to a computer with an internet connection and printer

Instructors

Dr. Valerie Stout
Office: LSE 333
Email: vstout@asu.edu
Phone: 480-965-4617

Dr. Bina Vanmalli
Office: LSC 262
Email: binaben.vanmalli@asu.edu
Phone: 480-965-9801

TA

Yasmeen George
Office:
Email: yasmeen.george@asu.edu
Phone:

Course Participation and Evaluation

Exam Policy:

Three Midterm Exams and a comprehensive Final Exam are scheduled (please see the lecture schedule for the exam dates). Exams will be primarily multiple choice but may also include other types of questions. The exams will cover all material presented in lecture, breakouts, and assigned readings material. Note that the textbook and other assigned readings are required and critically important supplements to your learning; they will enhance understanding of material presented in lecture, posted lecture presentations, and breakouts. The Final Exam will be cumulative and cover all content and assignments from the semester.

Bring a number two pencil, eraser and your ASU ID card to each exam. No electronic devices (e.g., ipod, bluetooth, earbud, or phone) are permitted during exams although calculators may be allowed, if specified; unauthorized devices will be confiscated and returned only after the last person has finished.

THERE WILL BE NO MAKE-UP EXAMS!

- If you miss a Midterm Exam without an excuse, you will receive a zero for that exam. The only valid excuses are medical emergencies or catastrophes. These emergencies *must* be documented with a physician's note, police report, etc. Please contact your professor or your course TA before the exam, or by the end of exam day at the latest. In the unfortunate event of an emergency, your score for that exam will be the average score you receive on the other lecture exams.
- Every student *must* take the final exam to receive a passing grade for the course. In the unlikely event that you miss the Final Exam due to a legitimate emergency, and you have appropriate documentation, you must make arrangements with your instructor for an alternative exam at some later date. If you miss the Final Exam without a valid excuse, you will fail the course.

Weekly Quizzes:

Quizzes will be administered online and will be primarily multiple choice. The quizzes will be based on reading assignments, lectures, and breakout topics. The purpose of these quizzes is to help the student and instructors to assess the student's understanding of the material at the end of each week, allowing the instructor and student to make adjustments to enhance learning. Your top 12 quiz scores will count towards your final grade. Since there will be 14-15 quizzes throughout the semester, there will be **no make-up quizzes**. To minimize chances of technical problems during a quiz, please follow the directions we provide and use a reliable Internet connection; on the ASU campus, if necessary.

Breakout Exercises:

Unlike traditional courses that require students to attend three in-class lectures, this course will only have two 50-minute "lectures" per week. The third "lecture" has been replaced with a 50-minute breakout session in the SoLS Active Learning Classroom. These breakouts will provide an opportunity for students to work in small groups to solve problems relating to core biological principles and enhance critical thinking skills. Prior to all breakout sessions, students will be asked to complete supplementary reading which, in addition to the readings and concepts discussed in lectures, will provide ample preparation for the breakout sessions. During these breakout sessions, students will work in groups to complete exercises that require students to actively participate in learning and mastering objectives. These exercises will have both quantitative and written components to them. Some exercises will be graded by TAs, others by peers, and some will not be graded.

- Attendance at breakouts is mandatory. Failure to attend a breakout will result in the student receiving a zero for any assessments from that breakout. In the case of emergencies, students should make arrangements to attend a breakout other than the one scheduled, or arrange alternatives with the instructor.

Classroom Participation and Clickers:

Much of the information transfer in this course will occur outside of the classroom through assigned readings and lecture notes posted online. It is the responsibility of the student to do these assignments before class. Classroom time will be dedicated to working on the most difficult concepts and student misconceptions and answering student questions. A successful student-oriented learning environment such as this only works if the instructor receives feedback about student problems and misconceptions and students come to class prepared. Therefore, we will use clickers extensively during all "lecture" periods. Students should expect to see a pre-lecture clicker quiz at the start of class as well as periodic questions throughout the 50 minute class time. It is the student's responsibility to bring the clicker to class. Ample opportunities will be provided throughout the semester to receive the full allotment of clicker/class participation points, so there will be no make-up of missed clicker points.

- If you don't have a TurningPoint response unit already, you will need to purchase one at the ASU Bookstore and **register it**.
- Instructions for registering the clickers can be found on Blackboard or <http://clickers.asu.edu>.
- Some of the time, you will be able to discuss clicker problems with your neighbor, and many times we will ask the same question before and after discussion, so participating in class is a great way to learn and to accumulate points.

- Since we will go over the correct answers to clicker questions, we will not accept answers to clicker questions after class.
- If you forget your clicker, or your battery goes dead and you don't have spare batteries, there will not be make-up clicker points. Don't give up clicker points though by forgetting to bring your clicker to class.
- If another student brings your clicker to class or you bring someone else's, **that is cheating**. The minimal penalty will be for **both students to lose all clicker points for the semester!**

Classroom Behavior:

It is your responsibility to attend **ALL** lectures. If you miss a lecture it is your responsibility to obtain notes, including various announcements and instructions that may not appear on Blackboard. We expect "lecture" to be more engaging than in a standard course, but we expect you to behave in a way that is respectful of your fellow students, the TAs and your instructors. You are encouraged to participate actively in class by asking questions and joining in discussions. Please keep in mind though that this is a large class, so some discussion topics may be more appropriate for office hours. Note the following rules:

- **All cell phones should be off during lecture.** If you must receive emergency calls, use a vibration alert; leave the class to take the call.
- You may use a notebook computer for taking notes in class. However, **if you are going to check email or Facebook or surf the web, sit in the back row so you don't disturb you neighbor.** A TA may ask you move to the back of the classroom if you are distracting others.
- You are expected to **arrive to lecture on time and stay for the entire lecture.** If you arrive late, please enter through the back door, and sit in the back row, an aisle seat, or stand so you don't disturb your fellow students. If you know you have to leave lecture early, please sit close to the aisle near a rear exit, and close the door silently behind you.
- Please don't talk about extraneous material during class. You will have many opportunities to talk with your neighbors about biology during class.

Students are required to adhere to the behavior standards listed in Arizona Board of Regents Policy Manual Chapter V – Campus and Student Affairs: Code of Conduct (<http://www.azregents.edu/policymanual/default.aspx>), ACD 125: Computer, Internet, and Electronic Communications (<http://www.asu.edu/aad/manuals/acd/acd125.html>), and the ASU Student Academic Integrity Policy (<http://www.asu.edu/studentaffairs/studentlife/srr/index.htm>).

Students are entitled to receive instruction free from interference by other members of the class. If a student is disruptive, the student may be asked to stop the disruptive behavior and warned that such disruptive behavior can result in withdrawal from the course. An instructor may withdraw a student from a course when the student's behavior disrupts the educational process.

Labs:

The goal of the labs is to provide a hands-on experience with biological material and to enhance your abilities in scientific methodology, critical thinking, and communicating about biology. The lab is an important part of the course, and accounts for about 25% of your total BIO 281 grade. Lab grades will be tallied based on scores from quizzes, worksheets, participation, lab reports, presentations, peer evaluations, and the lab final exam. Please note that your TA is the instructor for the lab portion of the course. The lab TA will be the person who assigns your lab work. The specific due dates for projects and more detailed lab policies will be given in lab. It is extremely important that all students have read each protocol thoroughly and completed the pre-lab assignments *prior* to coming to lab. **Attendance at labs is mandatory.** Students missing 3 or more labs, whether excused or unexcused, will receive an E grade for the course. The laboratory requirements are very strict because experimentation is at the heart of biology. If you miss a lab (or any part of a lab) for any reason, excused or unexcused, you will receive no points for any assignment associated with that day's laboratory exercise.

Grading Policies and Percentages:

Your final grade will be based on a potential total of 1400 points, earned in six areas:

<u>Description</u>	<u>Points</u>
Two Midterm Exams @ 100 points each	200
Final Exam (comprehensive)	120
Weekly Quizzes; keep top 12 scores	120
12 Breakout Exercises (Quizzes or Assignments) + Peer evaluations	240
Classroom Participation (Clicker questions, in-class assignments)	200
Cumulative Assignments	100
Pre and Post Assignments (10 pts for completion of each)	20
Lab	400
	TOTAL POINTS 1400

We believe that all students in the class are capable of earning an A in the class. Thus, we do not grade on "the curve", but rather pre-set the number of points that students need to earn to attain each letter grade.

Final grades will be assigned according to the following chart:

<u>Percentages</u>	<u>Total Points</u>	<u>Grade</u>
≥ 98%	1372 - 1400	A+
93 - 98%	1302 - 1371	A
90 - 93%	1260 - 1301	A-
87 - 90%	1218 - 1259	B+
83 - 87%	1162 - 1217	B
80 - 83%	1120 - 1161	B-
77 - 80%	1078 - 1119	C+
70 - 77%	980 - 1077	C
60 - 70%	840-979	D
< 60%	< 840	E

Grade Disputes or Questions:

Any questions about exams, quizzes or grading from lectures, labs, and breakouts should be initially directed to the appropriate TA or instructor. For exams, the instructor should be consulted; for online quizzes and clicker points, the lecture TA should be consulted; for breakout assignments, one of the breakout TAs should be consulted; and for lab questions, your lab TA should be consulted. In all cases, questions and concerns about grades must be filed in writing within **ONE WEEK** from that date the grade was posted. No grades can be changed after the deadline.

Accessibility/Disability Policy:

Disability Accommodations

Qualified students with disabilities who will require disability accommodations in this class are encouraged to make their requests at the beginning of the semester either during office hours or by appointment.

Note: Prior to receiving disability accommodations, verification of eligibility from the Disability Resource Center (DRC) is required. Disability information is confidential.

Establishing Eligibility for Disability Accommodations

Students who feel they will need disability accommodations in this class but have not registered with the DRC should contact DRC immediately. Their office is located on the first floor of the Matthews Center Building. DRC staff can also be reached at: 480-965-1234 (V), 480-965-9000 (TTY). For additional information, visit: www.asu.edu/studentaffairs/ed/drc. Their hours are 8:00 AM to 5:00 PM, Monday through Friday.

ASU and Class Policy on Academic Dishonesty:

If you are thinking about cheating, be aware that this is a decision that can negatively alter the rest of your life!

By enrolling in this course, you explicitly pledge on your honor that you will not give or receive any unapproved assistance on any quiz, exam or assignment.

- Students know what constitutes cheating on an in-class exam. The same rules apply to online quizzes. All work presented in this class must be your own, unless collaboration is specifically and explicitly permitted (like working on a breakout problem or clicker question with a neighbor). ***If a student is found to be cheating on an Exam or Quiz, the minimum penalty will be to FAIL THE ENTIRE COURSE.***
- ***Plagiarism*** is sometimes harder to define or identify. The 'Student Academic Integrity Policy' manual defines ***plagiarism*** [as], "using another's words, ideas, materials or work without properly acknowledging and documenting the source. Students are responsible for knowing the rules governing the use of another's work or materials and for acknowledging and documenting the source appropriately."
- ASU states that "Academic dishonesty, including inappropriate collaboration, will not be tolerated. There are severe sanctions for cheating, plagiarizing and any other form of dishonesty." In serious cases, your instructors can request that you be expelled from the university.
- Remember, if another student brings your clicker to class or you bring someone else's, **that is cheating**. The penalty will be for ***both students to lose all clicker points.***

- All contents of our lectures, exercises, quizzes and exams are under copyright protection. **You may NOT distribute, post, sell, or buy any notes, exercises, quizzes or exams without the written permission of your instructor.** Unauthorized use of our intellectual property is unethical, illegal, and potentially constitutes plagiarism, and will be dealt with as such.

University Withdrawal and Incomplete Policies:

- The unrestricted withdrawal deadline is (**Nov. 6, 2013**). After that date, withdrawals (and a grade of W) will be given only to students with documented medical problems or personal issues warranting a compassionate withdrawal.
- A grade of **Incomplete (I)** will be given only when a student has a passing grade, but cannot complete the final exam or one or two exercises due to health problems or other emergency. Incompletes must be completed within a year or the grade automatically becomes an E. Incompletes should only be considered in extreme circumstances because they are hard to complete.

A syllabus is a contract between student and instructor so please read it carefully.

We will do our best to honor our part of the agreement. If we have to modify a small component of the syllabus during the semester, we will announce this in class and post the revisions online.

We expect students to honor their part of the agreement.

If you do not agree to the standards of behavior and academic expectations outlined in this syllabus, please drop the course now.

With this out of the way, let's have a great semester. This class will be a lot of work and a lot of fun. Put in the effort, and you'll learn a lot about the natural world and yourself.

BIO 281 Tentative Course Schedule: Conceptual Approaches to the Life Sciences

Basic Description: Lectures will occur twice a week while breakouts will occur once a week. Labs will begin on the first Monday of the term and will be scheduled throughout the week.

<u>Week</u>	<u>Date</u>	<u>Lecture Topic</u>	<u>Breakout Topic</u>	<u>Related Readings</u>	<u>Lab Exercise (Mon. – Fri. each week, depends on your lab time)</u>	
1	8/22	Classes begin!			1.1, 1.5, 2.4	No Labs
	8/22	Introductory lecture and the origins of life				
2	8/27	Chemistry of cells and macromolecules – What did early life start with and where are we today?		2.1, 2.5, 3.1-3.2, 4.1 – 4.3, 5.1 – 5.3, 6.1	Lab orientation / Nature of science and scientific inquiry	
	8/28		Graphing & Getting to know the Active Learning Center	BioSkills – “Reading Graphs”		
	8/29	Macromolecules, chemical reactions and properties of water		3.1-3.2, 4.1 – 4.3, 5.1 – 5.3, 6.1		
3	9/2	Labor Day Holiday Observed - University Closed			Examining the role of structure and scale in macromolecules	
	9/3	Chemical reactions, chemical/physical principles, and properties of water		2.2, 2.3		
	9/4		How structure and function are tied together?	Supplementary reading		
	9/5	Energy & metabolism – the first link between all organisms Laws of Thermodynamics and Respiration		8.1 – 8.3, 8.5, 29.1 (only pg. 530-531 section titled: “Some microbes thrive”)		
4	9/10	Energy & metabolism – the first link between all organisms		9.1 – 9.6, 10.1	Respiration	

		Respiration			
	9/11		Metabolic Pathways	Big Picture: p. 198	
	9/12	Energy & metabolism – the first link between all organisms Respiration and photosynthesis		9.1 – 9.6, 10.1	
5	9/17	Energy & metabolism – the first link between all organisms Photosynthesis		(repeat 10.1) 10.2 (p.182-183 only), 10.3 – 10.4	Photosynthesis
	9/18		Origins of Life – Metabolism first hypothesis	Supplementary reading	
	9/19	The cell Water, hydrophobicity, and cell membranes		1.2, 7.1 – 7.3, 7.5	
6	9/24	Cells and cell membranes, cont.		Skim: 6.1 – 6.2 Read: 6.3 – 6.4	Diffusion and osmosis
	9/25		Reading primary literature	Supplementary reading	
	9/26	How DNA, RNA, and the central dogma like all life together Heredity; DNA structure		15.1, Big picture: p.366 – 367	
7	10/1	EXAM I			Scientific literature
	10/2		Origins of Life – Replication first hypothesis	Supplementary reading	
	10/3	Molecular Biology “Central Dogma” DNA Replication, Transcription		15.3, 16.1 (only section on 1 gene-enzyme hypothesis), – 16.2, 17.1, Skim 17.2	

8	10/8	Molecular Biology "Central Dogma" Translation		16.3, 17.3 – 17.5	DNA fingerprinting
	10/9		Origins of Life – Debating Replication vs. Metabolism first hypotheses	Review readings for Origins of Life Breakouts (from week 5 & 7)	
	10/9	Mutations and protein function Prokaryotes, eukaryotes, and their origins?		16.4	
9	10/12 – 10-15	Fall Break – Classes Excused			Onconomics
	10/16		Exobiology	Supplementary reading	
	10/17	Regulation of gene expression		18.1, 18.3, 18.4, Fig. 18.6, Big picture: p.366-367	
10	10/22	Why Have Sex? Costs versus benefits		13.4, 50.1	Bacterial transformation
	10/25		Why sex can be useful	Supplementary reading	
	10/24	Recombination & meiosis		13.1	
11	10/29	Independent assortment		13.2	Bacterial transformation continued
	10/30		Mendelian Genetics	Supplementary reading	
	10/31	Using probability to predict genotypes and phenotypes		14.1 – 14.3, 14.4	
12	11/5	Non-Mendelian Genetics + The phenotype: Is it genes or environment?		14.5	

	11/6		Exam prep	Bioskills – “Using Bloom’s Taxonomy”	Mendelian genetics
	11/7	Mating: What’s the best way to find a partner – focus on sexual selection activities		53.1, 53.3, 26.3 (only p. 475 – 478 section titled “Sexual selection”	
	11/11	Veteran’s Day Observed - University Closed			Poster presentations
13	11/12	EXAM II			
	11/13		Sexual selection and fitness	25.1, 25.3 – 25.5	
	11/14	After mating – fitness and the introduction of offspring with variable fitness into the population		25.1, 25.3 – 25.5	
	11/19	Biological species and reproductive isolation: What is a species?		27.1, 27.3 (p. 472 – 474 all sections but Sexual selection,” 27.4	Phylogenies - domesticating dogs
14	11/20		Phylogenetic trees	28.1, Bioskills – “Reading a Phylogenetic Tree”	
	11/21	Natural selection and evolution		26.1	
	11/26	Mutation, genetic drift, and gene flow		26.3 – 26.6	No Lab due to holiday
15	11/27		An evidence based analysis of evolution	25.2	
	11/28 – 11/29	Thanksgiving – University Closed			
	12/3	Macroevolution		25.2 (refresh)	Sickle-Cell Alleles
16	12/4		Connecting big ideas using concept mapping		
	12/5	Why have sex?		No reading	

	12/6	Last day of class			
17	12/7 – 12/8	Reading Day			No Labs
	12/9 – 12/14	Final exam (Cumulative – Entire Semester)			

BIO 281: GENERAL BIOLOGY I – LAB SYLLABUS

Fall 2013

Teaching assistant:

Office:

E-mail:

Office hours:

Lab section:

Lab Day and Time:

Lab Location: LSE S_____

Laboratory Coordinator: Kevin McLean

Office: LSE S41/S37

E-mail: kamclean@asu.edu

Office hours: by appointment

Required text:

Bio 281 Lab Manual, digital lab files will be posted on Bb
Lecture Text Book, refer to lecture syllabus for more info

Required materials:

Safety goggles, Available at the ASU Bookstore

Lab coat, Available at the ASU Bookstore

Closed toed shoes

ASU student ID or another form of ID (needed to check-out microscopes and laptops)

Laboratory objectives:

The School of Life Sciences has specific expectations for learning outcomes for students who complete an undergraduate major. The three main areas of proficiency are;

- Knowledge (e.g. concepts, content, and theories of major areas of life science),
- Research skills (e.g. interpretation of numeric data and models, communication of findings in writing and verbally, basic computer operation)
- Scientific literacy (e.g. ways that scientific research is conducted and knowledge generated).

My goal in this laboratory section is to teach you how to think and communicate about biology. This requires that you:

- 1) Practice good critical thinking skills by:
 - a) Learning to ask good questions
 - b) Evaluating knowledge and assumptions – how we know what we know
 - c) Applying knowledge to new situations
 - d) Learning to read and write carefully
- 2) Understand and use scientific language, including the scientific method; recognizing its strengths, limitations, and common misunderstandings.

- 3) Explore fundamental concepts in biology, particularly cell biology, molecular biology, metabolism, and physiology of selected tissue and organ systems.
- 4) Improve your written and oral communication skills and share the results of your work with others.

Lab attendance policy:

- Attendance is mandatory
- **Students missing 3 or more labs, excused or unexcused, will receive a grade of E for the course.** In another word, if you miss more than 2 labs, you will receive an E in the lab and lecture combined.
- Students arriving 5-15 minutes late to lab will be excused **once**. If it happens again, then every two times the student is 5-15 minutes late will be considered an absence.
- Labs will usually take the full 3 hours. Showing up more than 15 minutes late and/or leaving early will count as an absence.
- Arriving late to a lab and after the quiz has been collected will result in missing that quiz points.
- If you miss a lab without an approved excuse, you will receive **zero credit** for the assignments associated with the lab.
- Without proper documentation an excused absence will not be given. Documentation (doctor's note, etc.) must be turned in to your TA, and approval given by your TA in order for you to be excused for a lab. Examples of an excused absence include doctor's appointments, attending a funeral or memorial service, etc. Examples of things not considered as an excused absence include bad traffic, being stopped by the police, being hungover, hanging out with friends, going on vacation, attending a friend's wedding etc.
- If your TA recognizes your absence as an excused absence, s/he will let you know how you can make up the assignment/quiz associated with that lab.
- Once a laboratory has been completed by all the lab sections, the materials and equipment needed for that lab session are dismantled and cannot be reassembled later for purposes of making up missed labs

Safety:

- You **MUST** wear shoes that cover your toes and the tops of your feet. If you are not wearing appropriate footwear, you will be asked to leave and you will receive an **unexcused absence**.
- You **MUST** wear a lab coat at all times while in the lab. If you leave the lab room for any reason, remove your lab coat and put it back on when you return. You should button down your lab coat while in the lab.
- You **MUST** wear goggles (protective eyewear) while working with chemicals or organisms.
- Food and drink (other than water) are NOT permitted in the lab room. Bottled water is permitted, but must have a secure cap and be stored in your backpack on the ground and not on the table. If you need to drink water, you should step outside the lab to do so.
- Cellphones should be put away and on silent mode while in the lab. You should not have your cellphone on the lab bench, because of possibility of contamination.

Assignments: Your laboratory grade will develop as follows:

- *In-lab quizzes* will be given at the beginning of every class. If you arrive to class late you will not be given extra time to complete the quiz. These quizzes will cover the material from both the previous labs, and the lab you will be performing that day. The questions maybe from the lab manual or the reading assignments.
- *Ticket In and Ticket Out Activities:* There are ticket in and ticket out activities for each lab. Ticket in activity is answering the pre-lab (or assigned questions) for a particular lab. Ticket in questions should be completed prior to each lab. Ticket out questions are post-lab questions which should be completed by each student at the end of each lab and should be handed to the TA. Your TA will grade the accuracy of your ticket out responses. Each of these activities is worth 5 points.
- Two written *Lab Report* will be assigned during the semester. First lab reports is a group report where students will work in groups of 2 to write the report. Your second lab reports is an individual report and should be your own work. If you have taken this class (or Bio 181) during a previous semester, you may not turn in your old lab report, or a variation of, again. You need to write a new report.
- Final Student Presentation: The topic of this assignment will be announced early on in the semester. This is a group assignment (4 students per group). This assignment is 40 points.
- There are 10 points assigned to lab participation. To earn all 10 points you should be present in the lab both physically and mentally and participate in the lab discussions and be an active member in your lab group. You also need to ensure your lab station is clean and equipment are washed and dried and your lab bench is wiped with simple green before you leave the lab.

Grading: 360 points of your BIO 281 grade is based on lab work.

Assignment	Points
Nature of science in class worksheet	20
Plagiarism Awareness certificate	10
Quizzes, 9 in lab quizzes, 10 points each	90
Ticket in, 9 ticket in pre-lab questions, 5 points each	45
Ticket out, 9 ticket out post-lab questions, 5 points each	45
Diffusion and Osmosis Group Lab Report (two students per group)	40
Bacterial Transformation Individual Lab Report	50
Final Student Presentation (group of 4)	50
Lab participation points	10
Total	360

Late assignments will be penalized 20% per day late. You automatically lose 20% off your assignment if you don't hand it in on time at the beginning of lab. That being said, not having enough time to complete an assignment is not an excuse to plagiarize. You should contact your TA to find out other options you might have. Plagiarism is taken very seriously at ASU and has severe consequences in this class.

Lab reports should be submitted electronically via the SafeAssign link on Blackboard prior to your lab. A hard copy of the lab report is due on the TA table at the beginning of the lab session the day it is due.

There are no make-up assignments or extra credit.

24/7 Rule: I strive to be transparent and fair in grading. If you wish to question a grade you must do so during office hours or by appointment (i.e., *not during or immediately following lab*). You may not discuss your grade on a recently graded assignment within the first **24 hours** of receiving the grade. This period is for you to look over your assignment. If you still have questions after the 24-hour period, you have **7 days** to contact me and discuss any issues. The grade will not be revised after this time has elapsed.

Cell phone/Laptop policy: Use of such devices is NOT permitted in the BIO 281 lab unless instructed to. Students should not have the laptops available during the demonstration or lecture portion of the laboratory. Instant messaging and checking email are not appropriate uses for the laptops in the laboratory.

Reminders about using lab laptops:

- You can save your work to 1) the D drive, 2) a USB drive, or 3) email it. Any file saved on the lab laptops and computers will be erased when it is shut down.
- Please ensure that you return computers and power cords to the appropriately numbered location in the cart (please do not plug the cord in when stored in the cart).

Clean up: Your fellow students will be using the same equipment and specimens. Lab should be left in the same condition that you found it. Defacing lab equipment in any way will not be tolerated. Please respect your classmates and clean up after yourself. Not cleaning up after yourself will result in losing some/all of lab participation points. **Never leave the lab before you have your TA's approval.**

Student conduct: A major component of the learning process in this lab involves discussion, and therefore we require you to participate in the classroom dialogue. However, we do insist that you be respectful of your fellow classmates and your TA at all times. Please be aware that other students come from different backgrounds and may hold different beliefs. We ask that you be sensitive to these differences and behave in an inclusive manner. In addition, in the interest of fostering a productive learning environment, disruptive behavior of any kind will not be permitted.

Academic misconduct: Academic misconduct in any form is in violation of the Arizona State University Student Code and will not be tolerated. This includes, but is not limited to, copying or sharing answers on tests or assignments, plagiarism, and having someone else do your academic work. Depending on the act, a student could receive a failing grade (E) on a particular assignment/test, a failing grade for the course, or be suspended or expelled from the University. For more information about academic misconduct, please see page 8 of the syllabus.

Plagiarism Recognition Website and Bio 281 Laboratory Safety and Student Code of Conduct: Students **must** read the content and complete the test on Indiana University website, School of Education; <https://www.indiana.edu/~istd/definition.html> and bring the printed certificate as the proof of their completion, for total of 10 points. Failure to do so will disqualify the student from receiving credit for all the lab report assignments, total of 90 points.

Disabilities: If you need special accommodation for testing (e.g. extra time) or during the lab portion of the course, please visit the Disability Resource Center, <http://www.asu.edu/studentaffairs/ed/drc/>, and discuss your special needs with the DRC staff **within the first week of the semester**. Be sure your instructor knows about your association with DRC well before the first lecture exam.
The syllabus is subject to change with notice. It is the student's responsibility to check Blackboard and your campus email regularly.

Bio 281 Lab Schedule
Labs begin the week of August 26th

#	Week of	Lab	Quiz	Assignments due
1	Aug 26	Intro/nature of science		
	*Sep. 2	Week off (Labor day)		
2	Sep. 9	Molecules of Life	x	Due: Plagiarism certificate
3	Sep. 16	Respiration	x	
4	Sep. 23	Photosynthesis	x	
5	Sep. 30	Diffusion and Osmosis	x	
6	Oct. 7	Peer review of lab reports (Scientific literature)	x	
	**Oct. 14	Week Off Fall Break		
7	Oct. 21	DNA Fingerprinting	x	Due: Osmosis group report
8	Oct. 28	Onconomics	x	
9	Nov. 4	Bacterial Transformation	x	
10	***Nov. 12	Data Collection for Bacterial Transformation + Why Frequency if sex is important for evolution?	x Tuesday-Friday Labs Only (no labs on Monday due to Veteran's day)	
10	Nov. 18	Data Collection for Bacterial Transformation + Why Frequency of sex is important for evolution?	x Monday Labs Only (no labs the rest of the week)	
	****Nov. 25	Thanksgiving No labs		Due: Bacterial Transformation Lab Report
11	Dec. 2	Final Student Presentations		Due: Group Presentation

Holidays that affect the lab schedule:

***September 2nd (Labor day)-September 6th: Week off, no labs**

****October 14th -18th (due to Fall Break): no labs**

*****Nov. 11th (veteran's Day):** No labs on Monday. If your lab usually meets on Mondays, you will need to make up this lab on Monday November 18th.

******November 25th - 29rd: No labs- Thanks Giving Holiday**

Academic Integrity

The following is an excerpt from the official Arizona State University policy on Academic Integrity. This policy may be viewed in its entirety at:

<http://provost.asu.edu/academicintegrity>

Each student must act with honesty and integrity, and must respect the rights of others in carrying out all academic assignments. A student may be found to have engaged in academic dishonesty if, in connection with any Academic Evaluation or academic or research assignment (including a paid research position), he or she:

- A. Engages in any form of academic deceit;
- B. Refers to materials or sources or uses devices (e.g., computer disks, audio recorders, camera phones, text messages, crib sheets, calculators, solution manuals, materials from previous classes, or commercial research services) not authorized by the instructor for use during the Academic Evaluation or assignment;
- C. Possesses, reviews, buys, sells, obtains, or uses, without appropriate authorization, any materials intended to be used for an Academic Evaluation or assignment in advance of its administration;
- D. Acts as a substitute for another person in any Academic Evaluation or assignment;
- E. Uses a substitute in any Academic Evaluation or assignment;
- F. Depends on the aid of others, including other students or tutors, in connection with any Academic Evaluation or assignment to the extent that the work is not representative of the student's abilities;
- G. Provides inappropriate aid to another person in connection with any Academic Evaluation or assignment, including the unauthorized use of camera phones, text messages, photocopies, notes or other means to copy or photograph materials used or intended for Academic Evaluation;
- H. Engages in **Plagiarism**;
- I. Uses materials from the Internet or any other source without full and appropriate attribution;
- J. Permits his or her work to be submitted by another person in connection with any Academic Evaluation or assignment, without authorization;
- K. Claims credit for or submits work done by another;
- L. Signs an attendance sheet for another student, allows another student to sign on the student's behalf, or otherwise participates in gaining credit for attendance for oneself or another without actually attending;
- M. Falsifying or misrepresenting hours or activities in relationship to an internship, externship, field experience, clinical activity or similar activity; or
- N. Attempts to influence or change any Academic Evaluation, assignment or academic record for reasons having no relevance to academic achievement.

Plagiarism: Means using another's words, ideas, materials or work without properly acknowledging and documenting the source. Students are responsible for knowing the rules governing the use of another's work or materials and for acknowledging and documenting the source appropriately.

Bio 281 Lab Schedule
Labs begin the week of August 26th

#	Week of	Lab	Quiz	Assignments due	Ticket In?	Ticket Out?
2	Aug 26	Intro/nature of science				x
3	Sep. 2*	Molecules of Life			x	x
4	Sep. 9	Respiration	x	Due: Plagiarism certificate	x	x
5	Sep. 16	Photosynthesis	x		x	x
6	Sep. 23	Diffusion and Osmosis	x		x	x
7	Sept. 30	Peer review of lab reports (Scientific literature)	x		x	x
8	Oct. 7	DNA Fingerprinting		Due: Osmosis lab report	x	x
9	Oct. 14	Online Onconomics	x			x
10	Oct. 21	Bacterial Transformation	x		x	x
11	Oct. 28	Data Collection for Bacterial Transformation	x		x	x
12	Nov. 4	Mendelian Genetics	x		x	x
13	Nov. 11*	Poster Presentations				
14	Nov. 18	Phylogenies – domesticating dogs	x	Due: Bacterial Transformation Lab Report	x	x
15	Nov. 25	Thanksgiving No labs				
16	Dec. 2	Sickle Cell Anemia alleles	x		x	x

Biological Science by Freeman, Quillin and Allison. 2014

ISBN-13: 9780321743619

publisher: Pearson

1416 pages

Table of Contents

1. Biology and the Tree of Life
- I. THE MOLECULES OF LIFE
2. Water and Carbon: The Chemical Basis of Life
3. Protein Structure and Function
4. Nucleic Acids and the RNA World
5. An Introduction to Carbohydrates
6. Lipids, Membranes, and the First Cells
- II. CELL STRUCTURE AND FUNCTION
7. Inside the Cell
8. Energy and Enzymes: An Introduction to Metabolic Pathways
9. Cellular Respiration and Fermentation
10. Photosynthesis
11. Cell-Cell Interactions
12. The Cell Cycle
- III. GENE STRUCTURE AND EXPRESSION
13. Meiosis
14. Mendel and the Gene
15. DNA and the Gene: Synthesis and Repair
16. How Genes Work
17. Transcription, RNA Processing, and Translation
18. Control of Gene Expression in Bacteria
19. Control of Gene Expression in Eukaryotes
20. Analyzing and Engineering Genes
21. Genomics and Beyond
- IV. DEVELOPMENTAL BIOLOGY
22. Principles of Development
23. An Introduction to Animal Development
24. An Introduction to Plant Development
- V. EVOLUTIONARY PROCESSES AND PATTERNS
25. Evolution by Natural Selection
26. Evolutionary Processes
27. Speciation
28. Phylogenies and the History of Life

VI. THE DIVERSIFICATION OF LIFE

- 29. Bacteria and Archaea
- 30. Protists
- 31. Green Algae and Land Plants
- 32. Fungi
- 33. An Introduction to Animals
- 34. Protostome Animals
- 35. Deuterostome Animals
- 36. Viruses

VII. HOW PLANTS WORK

- 37. Plant Form and Function
- 38. Water and Sugar Transport in Plants
- 39. Plant Nutrition
- 40. Plant Sensory Systems, Signals, and Responses
- 41. Plant Reproduction

VIII. HOW ANIMALS WORK

- 42. Animal Form and Function
- 43. Water and Electrolyte Balance in Animals
- 44. Animal Nutrition
- 45. Gas Exchange and Circulation
- 46. Animal Nervous Systems
- 47. Animal Sensory Systems
- 48. Animal Movement
- 49. Chemical Signals in Animals
- 50. Animal Reproduction
- 51. The Immune System in Animals

IX. ECOLOGY

- 52. An Introduction to Ecology
- 53. Behavioral Ecology
- 54. Population Ecology
- 55. Community Ecology
- 56. Ecosystems and Global Ecology
- 57. Biodiversity and Conservation