

Biology in the 21st Century (BIOL 105) Lab Syllabus

CourseCoordinator: Greg Adkison (gadkison@email.wcu.edu, 227-3655, 126 Natural Sciences Building).

Office hours 10:00-11:00 Monday, Tuesday, Thursday. I'm happy to meet other times when not in class. Just drop by, email, or call.

Teaching Assistant: Kyle Pursel

Class website: <http://paws.wcu.edu/gadkison>

* Visit this website for lab worksheets and last minute announcements.

Contacting you: I will rely on your catamount email address to contact you.

Course description, approach, & goal:

1. The lab component of 21st Century Biology emphasizes ideas and techniques currently used in forensics, disease/medicine, biotechnology, and evolution. Lab activities are sequenced to match the lecture topics as closely as possible. Nevertheless, the lab will not perfectly correspond to the lecture because some topics taught in lecture can't be taught in *this* lab, because some topics require more time or less time in lab, and because our biotech equipment is shared with other classes.
2. The lab is part of the overall course, not something extra. The lab does not exist for the purpose of helping you in lecture any more than the lecture exists for helping you in lab. Rather, lab is for learning concepts, skills, and patterns of thought that are not fully learnable in a lecture room setting. Lecture and lab may overlap at times, but lab is not meant to be a rehashing of what was taught in lecture. It is important to recognize that **lecture and lab serve different, albeit complimentary, functions.**
3. Context and guidance will come from worksheets that you will complete in class most weeks. **The vocabulary you'll need to understand and complete the activities will be contained in the worksheets themselves.** Your patience will be required to understand the complex writing and to appreciate the details. These materials must be thoughtfully read, usually multiple times, as you work through them.
4. The expression "**hands on**" refers to **doing** the work involved in a particular profession or discipline rather than just talking about it or reading about it. "**Doing science**" is mostly an intellectual activity. It should be no surprise, then, that "hands-on" science involves more intellectual work than physical work. The physical work done in a science lab class is useful for teaching things like manual skills, the use of equipment, the difficulties of setting up and carrying out experiments, etc.; and it often sparks interest and feels fun, even akin to play, in contrast to intellectual work. However, physically touching lab equipment and organisms or cells **teaches little if any of the intellectual activity that is central to doing science.** Hands-on activities are of little use if students have their "**hands on**" (literally) and their "**minds off.**" **A good science lab activity requires students to think through ideas or questions as they design, carry out, and interpret experiments and observations!**
5. This course partially satisfies the C5 science requirement of the WCU liberal studies program and contains a laboratory component. Specific objectives for the course follow.
 - a. Students will learn that biology, like other natural sciences, requires honest observation and testable logic; that it is expansive and self-correcting because it requires tests that refute, corroborate, or modify proposed or previously accepted explanations.
 - b. Students will learn methods of biology hands-on in the field and lab.
 - c. Students will learn biological concepts that relate to people and the problems people confront, as well as the ethical considerations that arise when we apply principles of biology to human issues.

Grading: The average of two assessments will make up 80% of your grade. The other 20% will be the average of a daily participation score (up to 100% each day) assigned based on completion of in-class activities. You do not receive a letter grade for the lab component of this course. Rather, you'll receive a score between 0 and 100, and professor teaching the lecture component of the course will determine how much it counts in your overall grade.

Assessments typically follow a short answer format and require you to evaluate the design of experiments and form conclusions based on the results of experiments.

Activities will be assigned each week during class. Activities are simply another method I use for teaching (in contrast, for example, to lectures), and I generally think they should not be part of your grade for three reasons.

First, it's somewhat unfair to hold you accountable for content and skills involved in an activity if you're doing the activity to *learn* that set of content and skills. Second, it's something of a misrepresentation of how much you've learned if you're given credit for simply doing the activity. Third, your grade should be based on how well you've learned the content and skills taught, not on your behavior. However, to motivate you to thoughtfully complete the activities, we will grade them for completeness.

Writing: Please take care to directly answer the specific questions that I ask on tests and activities. I am evaluating your ability to **distill** and **apply** information to specific questions. Accordingly, writing that fails to **directly** answer questions or introduces irrelevant thoughts will be penalized.

Writing guides and style manuals are excellent resources for instruction on how to write clearly and simply, how to avoid jargon, how to use proper grammar and punctuation, etc. I recommend Strunk and White's **Elements of Style** (<http://www.bartleby.com/141>) for the basics. Jane Straus's **Blue Book of Grammar and Punctuation** is also useful (http://www.grammarbook.com/english_rules.asp).

Policies:

1. **Attendance:** absence results in a zero for the missed day's participation grade.
 - **Most lab activities cannot be made up because of limited supplies, use of shared equipment, etc.**
 - If you miss one of the two graded assessments and have a legitimate excuse based on my standards and university policy, and if you can provide absolute proof of your excuse, you and I will work out a time for you to make up the assessment.
2. Academic dishonesty (e.g., plagiarism, cheating, fabrication, facilitation; see Student Handbook) will minimally result in a failing grade for the work in question, and can result in a failing grade for the course (e.g., if more than one offense). **Although students work in lab groups, each student's written work on exams and graded assignments must be entirely her/his own.** Violating the "spirit" of this policy will be treated as an outright violation. You may NOT keep or copy any part of my exams/assessments or practice exams/assessments. **Copying or keeping any part of the graded assessments or practice assessment will be considered academic misconduct!**
3. Topics, sequence of topics, and dates of exams may be modified.

Accommodations for Students with Disabilities

Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities. Students who require disability services or reasonable accommodations must identify themselves as having a disability and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact Disability Services for more information at (828) 227-2716 or 144 Killian Annex.

Schedule (this schedule will likely change based on interest, access to equipment, & changes in lecture)

week 1 (Aug 26)	goal, approach, policies
week 2 (Sep 2)	design and purpose of experiments (context: bio molecules, diet, & lactose intolerance)
week 3 (Sep 9)	isolating, staining, and observing cells; use of compound microscope
week 4 (Sep 16)	extracting DNA, experimental error/variation, and experiments vs. procedures
week 5 (Sep 23)	practice assessment
week 6 (Sep 30)	assessment 1
week 7 (Oct 7)	gel electrophoresis in forensics
week 8 (Oct 14)	detecting genetic disease (use of restriction enzymes, electrophoresis, & Southern blot)
week 9 (Oct 21)	no class (Advising Day)
week 10 (Oct 28)	biotechnology 1: extracting and amplifying a region of your DNA
week 11 (Nov 4)	biotechnology 2: examining your DNA for the presence of an insertion (a SINE)
week 12 (Nov 11)	DNA sequencing -or- gender determination -or- cloning via somatic cell nuclear transfer
week 13 (Nov 18)	infectious disease (spread and identification of microbes)
week 14 (Nov 25)	no class (Thanksgiving)
week 15 (Dec 2)	radiometric dating, biological evolution, natural selection, and adaptation
week 16 (Dec 9)	assessment 2

Course Evaluation

Please complete course evaluations online November 22 through December 6. You will be sent notifications by email. You can access the course evaluation website through a link provided in emails that will be sent as the evaluation window approaches.