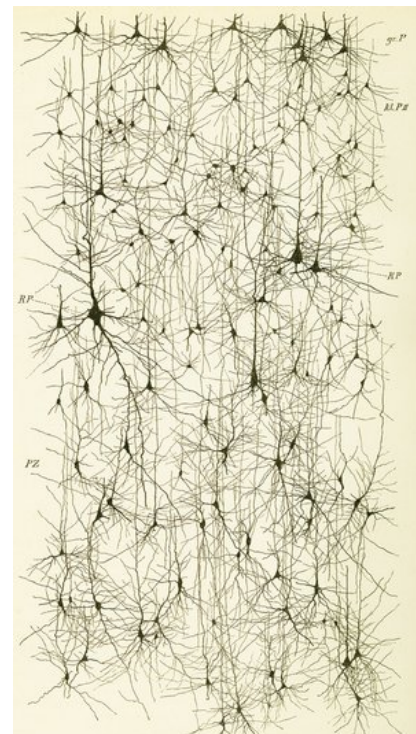


**BIO 114**  
**General Biology I**  
**Fall 2015; MWF, 9-9:50AM (Section 1)**  
**300 Cox Science & Language**

“When it came time for me to give my talk on the subject, I started off by drawing an outline of the cat and began to name the various muscles. The other students in the class interrupt me: ‘We *know* all that!’ ‘Oh,’ I say, ‘you *do*?’ Then no *wonder* I can catch up with you so fast ...’ They had wasted all their time memorizing stuff like that, when it could be looked up in fifteen minutes.”  
 ~Feynman RP, *Surely You’re Joking Mr. Feynman!* (1985) p. 72



Pyramidal cells and interneurons from *Cajal's Butterflies of the Cell* (2009), DeFelipe J.

**Faculty Name:** Dr. Nicholas A. Pullen  
**Office Hours:** TWR 2-5pm, and by appointment  
**Office Location:** 205 Cox Science & Language  
**Office Telephone:** (573) 592-1143  
**Email:** [nicholas.pullen@williamwoods.edu](mailto:nicholas.pullen@williamwoods.edu)  
**WWU Mission:** An independent voice in higher education, William Woods University distinguishes itself as a student-centered and professions-oriented university committed to the values of ethics, self-liberation, and lifelong education of students in the world community.

**Course Description:** This course will introduce the broad underpinnings of biological science with a focus on the subcellular level. Students will be expected to describe fundamental molecular topics – such as water, DNA, and shape – and begin integrating them in the context of overarching principles such as scientific method, biological systems, and evolution. This course is geared toward science majors and pre-health professions students. Concurrent enrollment in BIO115 required.  
 2015-2016 Academic Catalog: <http://www.williamwoods.edu/catalogs/1516/undergraduate/index.aspx>

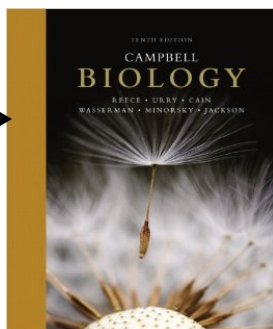
**Course Prerequisites:** Science ACT  $\geq 18$  or BIO 105/106 grade  $\geq C$  or permission of professor (majors requiring BIO 114 are usually enrolled regardless of scores). Concurrent enrollment in BIO 115.

**Required Text:** Reece, J. B., Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Jackson, R. B. *Campbell: Biology* (10th ed.) with *MasteringBiology*. Pearson, 2014. Or, if you are a non-major buy the á la carte edition to save money. See below.

**MasteringBiology Information:** Everyone needs MasteringBiology. I recommend buying it bundled with your textbook. However, you can purchase a license separately on the MasteringBiology website. The login site for the required homework is found here: <https://www.masteringbiology.com/site/login.html>. To gain access to the homework there are a couple pieces of information you need from me:

1. **The textbook:** Reece et al, Campbell Biology (College – U.S. & Canada)
  - a. **WARNING!** There are international and non-college editions of this text, you will not get access to the course unless you choose the correct version.
2. **Course Code:** **MBPULLEN45906**

**MAJORS:** Buy this version (full book) because it is also used in General Biology II (Spring)



**NON-MAJORS:** Buy this version (just the chapters for this semester) if you don't need to take General Biology II in the Spring



**Technology Use Expectations:** Messages via WWU email are official communication; students are responsible for regularly<sup>1</sup> checking their WWU email accounts<sup>2</sup>. Course documents, and grades will be available on the relevant OwlNet page(s). Most homework assignments will be administered through the MasteringBiology system, and it is your responsibility to maintain updated software if you choose to use your computer. The University maintains computer labs throughout campus, updated weekly; this includes a computer lab in the science building (room 200) and in the library. This course, combined with BIO 115, fulfills 4-credits of Natural Science in the General Education curriculum; as such, students are required to submit designated coursework through TK20.

Technology issues should be directed to UIT, (ext. 4224; [helpdesk@williamwoods.edu](mailto:helpdesk@williamwoods.edu)).

### Course Objectives:

Successful students enrolled in this course will:

1. Construct an understanding of the history and underlying themes of biology (evolution, complex systems, etc.)
2. Become acquainted with the ways scientific information is presented. Develop higher order written and oral communication.
3. Analyze the scientific method and use it to evaluate information critically.
4. Explore fundamental biological theories and analyze supporting data.
5. Appreciate the interdisciplinary nature of science. Apply this understanding to discussing modern problems.
6. Explore how the study of science, and biology, impact quality of life.

### Biology Program Objectives:

1. Demonstrate knowledge of cell ultra-structure and basic cellular processes and develop an understanding of the requisites of life.
2. Converse with the basic tenets of transmission, molecular, developmental and population genetics.
3. Contributes to an overview of the major organ systems of the human body and the normal and pathological functioning of those organ systems.
4. Demonstrate knowledge of the diversity and taxonomy of organisms, and the significance of variation in morphology, behavior, and life history.
5. Explain the role that natural selection, genetic drift, and other phenomena have had on the production of biological diversity and the role evolution has in integrating explanations of both the unity and diversity of life.
6. Demonstrate knowledge of scientific methodologies and usage of current scientific equipment and technologies.

**Assessment Procedures and Course Assignment Details:** Grades are earned through the completion of scheduled unit exams, a final exam, homework assignments, in-class formative assessments, and two general education writing assignments integrating knowledge from lecture and practical experiences in lab.

Information addressing all of the above objectives is presented through assigned text & case readings, literature research, PowerPoint presentations, videos, in-class activities, and seminar-style discussions. Formative assessment of student achievement in all objectives is performed via class discussions, activities, and quizzes. Summative assessment is performed with unit exams, a comprehensive final exam, and two essays. *Data pertaining to Biology Program Objective 1 is retained and utilized for B.A. and B.S. degree-wide assessment.*

*Unit Exams:* Three scheduled exams will be given during class time and consist of multiple choice, modeling problems, short, and long essays. Unit exams assess topics discussed since the previous exam and may cover assigned reading material not directly discussed in class meetings. *Make-up exams are offered only in consideration of extraordinary circumstances. In the case of absence from an exam because of a University-sponsored activity, the student should arrange a time to take the exam beforehand.*

*Final Exam:* A final comprehensive exam will be given **Friday, December 11, starting at 9:00AM**. Factor this into your travel plans. *Make-up/early final exams cannot be arranged.* Absence will result in a score of 0.

<sup>1</sup> That means, like, at least once a day.

<sup>2</sup> I probably won't even receive emails from your other accounts. For good reasons our institutional spam filter zaps most external email addresses. Treat this as an opportunity to upgrade from your [fluffybunnyfroofroo@hotmail.com](mailto:fluffybunnyfroofroo@hotmail.com) address and be taken seriously. (I claim no responsibility if you actually try to email that made up address, by the way. If you end up in some weird scam to help a besmirched "prince" recover his "lost fortune," well that's your fault, but I hope you learn something from it.)

*Homework:* Most assignments are administered through MasteringBiology. Questions range from multiple choice to essay responses to popular media selections.

*In-class Formative Assessment:* Low-stakes feedback collected during class meetings, e.g. short quizzes, minute papers, polling, group discussions, etc.

*General Education (G.E.) Writing:* Brief, focused writing assignments will be given allowing students to demonstrate additional creative competencies in science. These assignments will be submitted to TK20 and in hard-copy format. Students should consult the Natural Science General Education rubric while preparing these papers (last page of this syllabus).

**General Education Objectives:** BIO114/115 fulfills 4-credits under the Natural Science General Education Objective: *Students will understand the natural world through systematic observation by analyzing data and by forming, testing, and revising hypotheses.* Four separate criteria are assessed for this objective (see attached rubric). The first and fourth criteria are addressed through a reflective essay responding to a prompt from popular media concerning recent scientific activity. The second and third criteria are addressed through a summative report/essay on the independent experiment(s) designed and executed as part of BIO 115.

### Tutoring Information for all Students:

- **Writing Center:** Kemper 216  
Contact Dr. Greg Smith for questions: [greg.smith@williamwoods.edu](mailto:greg.smith@williamwoods.edu)
- **Math Center:** Science and Language 313  
Contact Professor Raymond Hune for questions: [raymond.hune@williamwoods.edu](mailto:raymond.hune@williamwoods.edu)
- **SmartThinking**  
Online assistance for English, Math, and most other academic subjects is also available 24/7 through Smarthinking, our e-tutoring service provider. Just click on the "Tutoring" tab at the top of your OWLNet main page and follow the simple directions to connect with a dedicated personal tutor!

No separate login is required. You will see a list of basic subjects, and a field to do a subject search. For most subjects there are two options, "Drop-in tutoring" and "Offline questions." Drop-in allows you to chat live with a tutor, and offline allows you to submit a question and they email you back the answers.

Please contact the Academic Advising Office at [bonnie.carr@williamwoods.edu](mailto:bonnie.carr@williamwoods.edu) if you need additional assistance.

- **Atomic learning**  
All students at WWU have access to this online tutorial program. Atomic Learning is a digital tutorial website with more than 1,500 hours of online professional development and learning resources. This program will assist you in learning how to use different software programs.

Atomic Learning is accessed through OwlNet. Once logged into OwlNet, the Atomic Learning link is on the far right in the grey section under courses. The log in is your email user name and password. If you have any questions or concerns you can contact the UTT helpdesk at [helpdesk@williamwoods.edu](mailto:helpdesk@williamwoods.edu).

### Grading Scale:

- 600 points are distributed among the course assignments by the following scheme:

<b>Breakdown of Points</b>	
<i>Activity</i>	<i>Total Value</i>
Unit Exams (3)	300
In-Class Work	30
Homework	60
G.E. Writing	60
Final Exam	150
<b>Total Available for Semester</b>	<b>600</b>

- Final letter grades are based on the percentage of points achieved (see table below).
- Percentages from lecture and lab (BIO115) will be combined into one final grade.
- BIO 114 is weighted as  $\frac{3}{4}$  of the final grade and BIO 115 as  $\frac{1}{4}$ .
- Passing scores must be received in both BIO 114 and BIO 115 to pass the course.

<b>Letter Grade Ranges</b>	
<i>%Points Earned</i>	<i>Letter</i>
<60%	F
≥60%, <70%	D
≥70%, <80%	C
≥80%, <90%	B
≥90%	A

**Attendance Policy:** Attendance at every class meeting is expected.

**Class Conduct and Participation Expectations:** Students are expected to work hard, ask questions, and discuss relevant information.

Much information will be borne out of open-ended discussions. All participants are expected to be respectful of others.

The content of BIO 114 is presented along three themes, in order: (1) introductory inorganic and organic chemistry; (2) fundamental cell biology; and (3) the eukaryotic gene. Each unit exam covers one of these themes, and each theme spans 5-6 chapters of text reading with occasional supplementary materials (*e.g.* original scientific manuscripts). This amount of work should not be taken lightly and should be expected at the college level. Cramming will not work for this course – generally, data show that “crammers” can expect a low “C” grade at best, but often lower.

Therefore, I recommend that students get into the habit of studying frequently for short intervals. ONE example: 15-20 minutes, 2-3 times per day. Nevertheless, just because you hit a time limit does not mean you should stop. I find the best time to take a break is when I am becoming overly distracted, or just “power” reading, *i.e.* cramming – in this state it is easy to *technically* read something but comprehend nothing. So, just because you read the material does not mean you actually READ/understood/integrated the material. Studying in groups is also important. One way to learn is by teaching; however one should never assume that just because there is a group present that learning is also happening. There are numerous scientific studies with solid evidence supporting these principles.

Finally, my office hours are not exclusive. Feel free to stop by whenever my door is open. Every semester I schedule weekly tutoring appointments for individuals and groups outside of my listed office hours. You can expect to receive an email from me if you are not doing well in class. My main goal is to help you achieve success in science.

**Policy on Late Work:** Work not submitted on time incurs an immediate 20% penalty, and accrues an additional 20% penalty every day late (including weekends) until 0.

#### **ADA Guidelines:**

- Students who choose to disclose a disability are responsible for notifying the University of their disability on a timely basis. Questions about disability services should be directed to the University's coordinator for disability services. Contact information is (573) 592-1194 or [ada@williamwoods.edu](mailto:ada@williamwoods.edu). The office is on the first floor of the Academic Building.

#### **Academic Integrity Policy**

- William Woods University, founded on the principle of honesty, has long endeavored to maintain an atmosphere of academic integrity. In all academic work, it is important that the ideas and contributions of others be appropriately acknowledged, and that work that is presented as original is, in fact, original. Insuring the honesty

and fairness of the intellectual environment at William Woods University is a responsibility that is shared by the entire campus community. Details of the Academic Integrity Policy can be found at the following web address: [https://www.williamwoods.edu/catalogs/1516/undergraduate/policy\\_detail.aspx?Policies\\_id=51](https://www.williamwoods.edu/catalogs/1516/undergraduate/policy_detail.aspx?Policies_id=51)

**Student Outcomes Assessment Policy:** 2015-2016 Academic Catalog  
[https://www.williamwoods.edu/catalogs/1516/undergraduate/policy\\_detail.aspx?Policies\\_id=30](https://www.williamwoods.edu/catalogs/1516/undergraduate/policy_detail.aspx?Policies_id=30)

**Additional Academic Policies can be found at:** 2015-2016 Academic Catalog:  
<https://www.williamwoods.edu/catalogs/1516/undergraduate/policies.aspx>

**Academic Credit Hour Definition:** The University has adopted the following United States Department of Education definition of a credit hour:

*A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:*

- (1) *one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time.*

**Expected Outside Time Commitment:** Following the US DOE definition, students should expect to spend a minimum of 90h outside time for the BIO 114 component, since it is similar to a 3-credit course, and 30h for BIO 115 (*i.e.* 1-credit) for a total combined *minimum* of 120h outside time. Estimated time is given by activity in the table below with an actual sum estimate of 123h outside time for BIO 114 and BIO 115.

<b>Summary of Expected Out-of-Class Time*</b>	
<i>Activity</i>	<i>Category Total Time (hours)</i>
Exam Studying (10h x 4)	40
Homework (1h x 7 assigned)	7
Readings (2h x 18 chapters)	36
G.E. Writing (5h x 2 assigned)	10
Lab Time (2h x 15 labs)†	30
<b>Semester Total</b>	<b>123</b>

\* Accounts for BIO114/115 combined four credits, a *minimum* of 120h outside time

†Laboratories (BIO115) are scheduled as weekly three hour blocks with two of the hours counted toward outside time

**Add/Drop Deadlines and Other Important Dates:**

- Last day to add a class – August 28, 4:30 PM.
- Last day to drop a class during refund period – September 21, 4:30 PM
- Last day to drop a class or withdraw from the University – October 30, 4:30 PM
- End of Midterm – October 16
- Midterm grades reported – October 20
- Daylight Saving Time ends – November 1
- Finals Week – December 7 -11

### TENTATIVE COURSE SCHEDULE

Topics may change and will be announced in class.

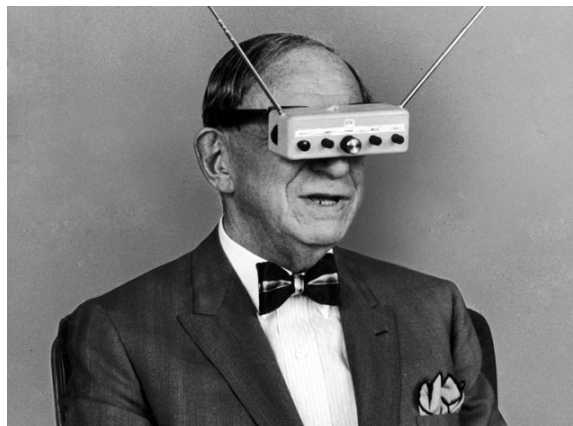
Reading numbers correspond to *Campbell* Chapters.

MB = MasteringBiology

Date	Topics	Reading/Assignment
24-28 Aug	Intro & Expectations, Chemistry of Life	1, 2 MB tutorial
31 Aug - 4 Sep	Chemistry of Life, Water	2, 3, MB Ch 1 & 2
9-11 Sep	<b>No Class 7 Sep (Labor Day)</b> Carbon, Molecular Diversity	3, 4
14-18 Sep	Carbon, Molecular Diversity	4, 5, MB Ch 3-5
21-25 Sep	Biomolecules	5, <b>Exam 1: 25 Sep (Friday)</b>
28 Sep - 2 Oct	The Cell, Membranes	6,7, MB Ch 6 & 7
5-9 Oct	Metabolism, Respiration & Fermentation	8, 9
12-16 Oct	Respiration & Fermentation, Photosynthesis	9,10, MB Ch 8-10
19-21 Oct	<b>No Class 23 Oct (Fall Holiday)</b> , Photosynthesis	10, <b>Exam 2: 21 Oct (Wednesday)</b>
26-30 Oct	Communication, Cell Cycle	11, 12, MB Ch 11 & 12
2-6 Nov	Meiosis & Gametes, the Gene	13, 14
9-13 Nov	Heredity	15, 16, MB Ch13-16
16-20 Nov	Heredity	16, <b>Exam 3: 20 Nov (Friday)</b>
23 Nov	Gene to Protein, <b>No Class 25-27 Nov (Thanksgiving Holiday)</b>	17, media-based G.E. assignment due 23 Nov (Monday)
30 Nov - 4 Dec	Gene to Protein, Gene Regulation	17, 18, Lab-based G.E. assignment Due 4 Dec (Friday)
11 Dec	Final Exam – 9:00am	<b>Comprehensive -FRIDAY</b>

# GENERAL BIOLOGY CLASS FAQs!

- 1. Is this class awesome?**
  - a. Of course it is! You really have to ask that? It's so awesome that if you're not a biology major, you probably will be!
- 2. Is this class hard?** (DISCLAIMER: this is a highly contextual and subjective question. I believe this is the correct answer.)
  - a. No. But, it's really easy for you to make this class "hard." Please refer to the "Class Conduct and Participation Expectations" section on p. 4 of this syllabus. There are a few other points I can think of that will help you with some of the course content if you recognize them at the outset:
    - A lot of what we read and talk about is at a molecular and cellular level. People have a hard time understanding what they cannot see directly. We have some excellent experimental techniques to visualize what we know, and we will talk about and do some of them as we go along.
    - There is a lot we still don't know. Ph.D. projects my friends: go forth and earn them.
    - If you are comparing this class to "Connections," then yes, it is "hard;" but I hope you appreciate that's a silly comparison you should avoid making. Kind of like comparing real bacon to Canadian bacon... why would you do that? Those two things just cannot be compared because one of them isn't even bacon!
    - I'm not trying to make this hard or be a difficult turd. I am here to help you learn about important aspects of biology, and how they affect your life.
- 3. Do I have to read all these chapters?**
  - a. I think you should, and if you don't I bet you will struggle with this class. The reading is actually pretty simple: most of it is in pictures. MasteringBiology has all of the figures, and some movies, to go along with the reading too. So, avoid insulting your reading comprehension and use those eyeballs + brain (ew! eyes!).
- 4. Do I need to take notes? Your voice is ambrosia, and I learn so much more by "osmosis."**
  - a. This is garbage nonsense, and if you believe in it you are being intellectually dishonest with yourself (never mind the improper use of "osmosis"). The idea that note taking in a classroom is detrimental to learning is one of the biggest layperson misconceptions in modern education/psychology: too often note taking is confused with multitasking, **it is not**. Multitasking is using your laptop to cruise unrelated websites during class. Note taking is a form of participation in class. You can always record my lectures, but these are intellectual property for your personal use only.
- 5. The following question usually pops up around week 2: Oh my gosh! It says on OwlNet that I have a 20% F, what did/can I do?!**
  - a. First, calm down. Second, take a look at the syllabus, specifically how points are earned (p. 3). For the first month all that is in your gradebook is the small stuff (in-class activities that count for 5% of your total grade over the *entire* semester). For example, maybe you skipped class, thus you got a 0 for a 2-pt. pop quiz, and then on another one later you got 1 out of 3-pt. – if these are the only things in OwlNet by week 2, then you technically have a 20% F (1/5). But here's the good news: exams count for 100-points each! So your scores on exams are going to be the major grade weight. Following the scenario above with a decent B on exam 1 (83), add up all the earned points, and divide that by the total points offered:  $(0+1+83)/(2+3+100) = 0.8... 80\% B!$  However, if you have an F after the first exam, then you should definitely be asking this question, and I will seek you out for tutoring. NOTE: homework grades are not incorporated into your OwlNet gradebook until the end of the semester.
- 6. I can't do my homework, because the stupid website doesn't work! What do I do?**
  - a. First answer this: did you try to do it on a university computer? If your answer is "no," then you should try it on one of the student campus computers (*e.g.* library, or the science computer lab in room 200). No one has ever answered yes to that question. Remember, it is your responsibility to maintain updated software if you choose to use your computer. Outdated Java, Flash, and Shockwave are usually the problem in this case. You are given plenty of time to do your homework, so you should probably just own up to procrastination if you are having this problem the day it is due.
- 7. Can I see you for extra help?**
  - a. YES OF COURSE! I have office hours and you can even setup a recurring appointment.



Hugo Gernsback, *Life* (1963).

**General Education Natural Science Objective:**

Students will understand the natural world through systematic observation by analyzing data and by forming, testing, and revising hypotheses.

<b>Criteria</b>	<b>Exemplary (4)</b>	<b>Proficient (3)</b>	<b>Developing (2)</b>	<b>Insufficient (1)</b>
<b>Understand the nature of science: that science is a way of explaining the physical world through replicable physical evidence, and that scientific knowledge is simultaneously reliable and tentative.</b>	<ul style="list-style-type: none"> <li>Articulates that science is simultaneously reliable and tentative</li> <li>Makes predictions about nature using a systematic method</li> <li>Discerns the quality of evidence used to draw a conclusion</li> </ul>	<ul style="list-style-type: none"> <li>Usually articulates that science is simultaneously reliable and tentative</li> <li>Draws conclusions based on evidence</li> <li>Finds patterns in nature that explain the physical world</li> </ul>	<ul style="list-style-type: none"> <li>Occasionally articulates that science is simultaneously reliable and tentative</li> <li>Draws conclusions based upon personal experience.</li> <li>Sometimes demonstrates an understanding of science being simultaneously reliable and tentative</li> </ul>	<ul style="list-style-type: none"> <li>Fails to articulate that science is simultaneous reliable and tentative.</li> <li>Unable to discern what constitutes reliable evidence upon which to draw conclusions</li> </ul>
<b>Understand current theories/models used to explain natural phenomena</b>	<ul style="list-style-type: none"> <li>Integrates the most important unifying laws, theories/models and principles in natural science</li> </ul>	<ul style="list-style-type: none"> <li>Applies the most important unifying laws, theories/models and principles in natural science</li> </ul>	<ul style="list-style-type: none"> <li>Names some of the unifying laws, theories and principles in natural science</li> </ul>	<ul style="list-style-type: none"> <li>Fails to identify the unifying laws, theories and principles</li> </ul>
<b>Apply the scientific method as a means for discovery of knowledge and be able to communicate those ideas.</b>	<ul style="list-style-type: none"> <li>Formulates testable questions</li> <li>Designs and conducts experiments</li> <li>Draws valid conclusions based on experimental results</li> <li>Clearly and succinctly communicates experimental results and conclusions orally and/or in writing</li> </ul>	<ul style="list-style-type: none"> <li>Formulates testable questions with guidance</li> <li>Designs and conducts experiments</li> <li>Draws limited conclusions based on experimental results</li> <li>Usually able to communicate experimental results orally and/or in writing</li> </ul>	<ul style="list-style-type: none"> <li>Interprets questions with guidance</li> <li>Conducts experiments</li> <li>Needs help to draw conclusions based on experimental results in a systematic way</li> <li>Attempts to describe or explain own results to another</li> </ul>	<ul style="list-style-type: none"> <li>Fails to connect question hypothesis to experimental results to conclusions</li> <li>Unable to design an experiment or to follow protocol without extensive direction.</li> <li>Cannot draw conclusions based upon results</li> <li>Cannot explain own results to another</li> </ul>
<b>Interpret the validity of scientific statements in the press; make informed judgments about science-related topics and policies</b>	<ul style="list-style-type: none"> <li>Evaluates a given source for its scientific credibility</li> <li>Analyzes the roles of science and society as they interact to determine public policy on the direction of technological progress</li> </ul>	<ul style="list-style-type: none"> <li>Usually able to evaluate a given source for its scientific credibility</li> <li>Recognizes the roles of science and society as they interact to determine public policy on the direction of technological progress</li> </ul>	<ul style="list-style-type: none"> <li>Sometimes able to evaluate a given source for its scientific credibility</li> <li>Identifies and describes some major scientific and technological challenges to society</li> </ul>	<ul style="list-style-type: none"> <li>Unable to evaluate a given source for scientific credibility</li> <li>Fails to recognize the scientific aspects of public controversy</li> </ul>