

121707

TO: Biological Sciences faculty members

FROM: John Janovy, Jr.

RE: BIOS 101: analysis of an ACE model

As you all know, UNL is in the process of revising its General Education program, thus setting up an outcomes-based experience for all university students. The program is named Achievement Centered Education (ACE) and the details are spelled out in the four proposals passed by all undergraduate colleges during the fall semester, 2007. See the Senior Vice Chancellor's web site—[www.unl.edu/svcaa/gened](http://www.unl.edu/svcaa/gened)—for pdf versions of the ACE proposals now approved by all eight undergraduate colleges. The program will take effect in the fall, 2009. This message is a report on an attempt to present an ACE version of BIOS 101.

### **Summary:**

Regardless of what you read below, this particular section of BIOS 101 (MWF 1:30 Henzlik Hall) was the easiest, least time consuming, and most rewarding of any that I have taught in the past 41 years. By modifying the way I delivered content I saved about 45 hours of preparation time over the course of the semester. Furthermore, I gained an enormous amount of flexibility in handling student materials, which is the equivalent of still more time and effort savings. Most students finished with portfolios of tangible evidence for accomplishment, and ended up doing at least 11 weeks worth of weekly extemporaneous writing, revision, and follow-up self-assessment of both writing and content, ending with a fairly serious and creative piece of writing. Both campus museums were used for these exercises. The details will be modified slightly the next time around, but the basic design of my fall, 2008, section will be essentially the same as discussed below. The biggest surprise, and somewhat of a negative one, was the bi-modal grade distribution, resulting primarily from students opting out of the weekly extemporaneous writing (required) and thus becoming ineligible for the portfolio bonus opportunity.

### **(1) Introduction:**

One of the issues that came up continually during the two years of work on the ACE proposals was the logistical burden of converting large introductory classes into ACE courses and then actually delivering on the departmental agreement required for ACE certification. This issue is a non-trivial one. As chair of the General Education Advisory Committee that designed ACE, it seemed imperative to me to actually find out how much work was involved in offering an honest ACE version of a large introductory course because (1) Biological Sciences is such a major player in lower division coursework, and (2) we have a mostly captive audience of first-year students, many of them, probably up to 15% of the total based on my survey data, self-selected high achievers. This report is the result of testing one model of such a course, namely, BIOS 101, 1330 MWF, Henzlik Auditorium, during the fall semester, 2007. Enrollment started at 208 and ended at 196.

## **(2) ACE Constraints:**

Students in all ACE courses must generate assessable products, although not all students' products need to be used in later program assessment. The focus is on student academic habits and their own behavior that produces evidence they have accomplished an outcome or outcomes. A faculty member must therefore design activities that allow students to demonstrate learning. The ACE program guidelines do not specify how much of the graded activity has to be of this type, nor do they specify the exact nature of the activity. The certification agreement asks for a description of such work and ACE certification is awarded by a subcommittee of the University Curriculum Committee, however, so departments should expect to be questioned if course design seems inadequate (always somewhat of a judgment call, but one made by fellow academics).

## **(3) ACE Outcomes for BIOS 101 1330 MWF:**

Here are the outcomes as specified in the syllabus for this section:

As a result of taking this class, you should be able to clearly explain the following to your friends and relatives who have not taken biology:

- (1) The fundamental nature of science and of biology.
- (2) The biological roles and functions of the major ingredients indicated on labels of processed food.
- (3) The design of a typical experiment and analysis of the results.
- (4) The structure of a cell and the functions of all the cell organelles typically illustrated in an introductory biology text.
- (5) Mendelian inheritance of dominant and recessive traits and the calculations used to predict probabilities of genotype.
- (6) Why evolution is the central unifying theme in biology.
- (7) The evolutionary principles as outlined in an introductory college biology text.
- (8) The flow of energy, chemical elements, and molecules through an ecosystem.
- (9) The diversity of living organisms on Earth.
- (10) The role(s) that humans play, and have played, in modification of the Earth's biota and life support systems.

## **(4) The ACE Activities and Products:**

In this model BIOS 101 course, I decided that the ACE-related activities should be a mini-version of what faculty members do regularly, namely, writing or research on some biological subject that requires design of studies, interpretation of observations, follow-up on that writing or research with formal document preparation, and self-assessment of the end products. Because the intent of this teaching experiment was to determine the logistical demands of doing such a course, I was not too worried about the exact nature of the assignments this semester, only that they be legitimate biological exercises. Remember also that BIOS 101 is a non-majors'

course; thus it has always seemed to me that one of our major responsibilities is to help students understand just how pervasive are biological materials, problems, and issues in their daily lives, and subsequently to apply the scientific information obtained in BIOS 101 to those problems and issues. Many of my activities and products were designed to fulfill this responsibility. Here are the graded activities from my syllabus:

Your grades are calculated on the following basis:

(1) Hour exams – three @ 100 points each	= 300 points
(2) Final exam – one @ 160 points	= 160 points
(3) Written assignments 14 @ 10 points	= 140 points
(4) Attendance	= 100 points
<b>TOTAL</b>	<b>= 700 points</b>
<b>PORTFOLIO BONUS POINTS</b>	<b>= 50 points</b>

Hour exams: The tests may include multiple choice and matching questions, diagrams to label or interpret, and short essays. You should also expect a “critical and higher order thinking” section on each exam, consisting of 5 questions that explore a subject in depth. **There is a test question bank on Blackboard.**

Exam questions: I will take as many of the exam questions as I can from the question bank posted on the Blackboard web site for this course. I am likely to ask you to write some of your own exam questions and provide not only the answers but also the rationale for the answers (on Blackboard).

Pop quizzes: If given, pop quizzes will range from 4-10 points, and those points will be subtracted from the ones available on regular tests.

Writing exercises: Every Friday during the semester I will give small, extemporaneous, writing assignments. You will get 1-3 points (awarded subjectively on the basis of grammar, information content, etc.) for actually doing these assignments in class, and another 4-7 points (awarded subjectively on the basis of grammar, spelling, originality and insight) if you pick them up on time, do the follow-up writing, and return them on time. Follow-up writing will consist of correcting your own hand-written paper in red ink, typing the paper exactly as you wrote it in class and also correcting the typed version in red ink, and then evaluating your own performance with a single page of double-spaced typing. These writing exercises are due the day the next one is given.

Portfolio Bonus Points: If, some time during the last week of the semester, you show me your complete set of work for this class, assembled according to instructions on Blackboard, and you have received at least 100 of the 140 points available through writing assignments during the semester, I will add 50 points to your total for the semester. Detailed instructions for preparing your course portfolio will be provided on Blackboard.

The writing exercises and portfolio bonus were intended to generate products appropriate for use in assessment of the ACE program, and at the beginning of the semester I planned to keep four of these sets of work, two from students in the top 10% of the class, and two from students in the middle part of the class, based on test scores. The Friday writing exercises were done during the last 10-15 minutes of class each week.

## (5) The Results:

Counting the portfolio bonus a total of 190 ACE points were available, out of 700; the 700 did not count the portfolio bonus, so obviously a student could finish the course with a final average of over 100%. The results of this pedagogical exercise can be summarized as follows:

- a. Number of students completing the course for a grade: 196
- b. Number of students completing the portfolio: 126
- c. Number of students with over 133 ACE points:  
(133 = 70% of available points) 127
- d. Number of students failing to meet ACE requirements: ~40
- e. Number of 4-Year Regents and National Merit Scholars: 16
- f. Final overall class average: 76.7%
- g. Final grade distribution for this section:

<u>Grade</u>	<u>Number of students</u>	<u>Final overall percent range:</u>
A	52	90-108%
B+	26	86-89%
B	29	80-85%
C+	16	75-79%
C	16	70-74%
D+	21	65-69%
D	26	60-64%
F	10	59% and less

This grade distribution is rather bi-model, and as such is unusual for a BIOS 101 class. My last five large lecture BIOS 101 sections have all had rather classic bell-shaped letter grade distributions; the class averages have ranged from 70.6% to 82.3% and aside from the latter class, were not statistically different as tested by ANOVA. The one 82.3% average was the first year of using clickers to count attendance, and I simply gave away too many points (200/700) for attendance. My best explanation for the fall, 2007, distribution, based on writing scores, is that a fairly large number of students (~40-50, about 23%) simply opted not to do the weekly exercises, or did not take the assignments seriously. The number of high grades is clearly due to students working seriously at the writing and thus getting not only most of those points during the semester, but also the portfolio bonus at the end. Fifty-five percent of the students were actually doing the intended behavior and doing it seriously.

The last four lectures were ones in which there were extemporaneous writings consisting of 10 complete sentences about the lecture topic of that class, done in the last 10 minutes, but guided by a particular task or prompt. I have saved about 200 of these last extemporaneous writings as indicators of how well students were absorbing and assimilating my lectures within the course of 40 minutes. In general, they do surprisingly well; either this class is a much better one than is typical of BIOS 101, or they have learned during the semester to pay attention and assimilate the material quickly, knowing they will be asked to write about it extemporaneously.

Attendance was taken for 36 days during the semester, using a variety of means (clickers, signup sheets, extemporaneous writing). Average attendance was about 85%, meaning that on any given day, probably 35 people were absent. Attendance grades were calculated as a percentage simply by dividing the number of days present by 36 and multiplying by 100.

#### **(6) Contract Theory:**

The ACE writing assignments (20% of the final grade excluding portfolio bonus) were designed in accordance with what might be called “pedagogical contract theory,” an instructional approach I have used in all my courses, to varying degrees depending on the course and level, for at least 30 years. The contract simply says: If a student will do exactly what I ask him/her to do, in the manner I require it to be done, and to the extent I require, then I will give that student full credit. Such a contract can be applied in many different ways, but in essence it does two things: (a) puts a demand on the faculty member to design activities that are in and of themselves educational, and (b) relieves the faculty member of actually grading how well an activity is done, and instead simply asks a faculty member to decide whether the contract has been fulfilled. In other words, contract theory places considerable burden on students to do what faculty scholars do, although at a student level. Examples of such exercises used in BIOS 101, BIOS 103, and BIOS 204 over the past decade can be found on my web site ([bsweb.unl.edu/labs/janovy](http://bsweb.unl.edu/labs/janovy)) in the document entitled FIELD-TESTED IDEAS FOR CONTRACT WORK IN LARGE (100-250) INTRODUCTORY CLASSES.

#### **(7) The Logistical Burden:**

I did not keep a detailed record of the amount of time involved in handling student materials, but I did estimate it roughly as the papers were processed. Obviously a large-enrollment ACE course will require investment of faculty and teaching assistant resources. For BIOS 101, fall semester 2007-08, I had a half-time undergraduate administrative assistant who did some of the “grading.” Handling the paper was significantly easier and less time consuming than dealing with electronic submissions, and the flexibility provided by using paper was an added positive aspect of the writing. We handled about 8000 pages of student-generated work this semester, and based on that experience, here is my estimate of the amount of time involved, per student, for handling each student-generated item, including recording of grades:

- |                                      |            |
|--------------------------------------|------------|
| a. Friday extemporaneous writing:    | 15 seconds |
| b. Follow-up writing and assessment: | 45 seconds |
| c. Portfolio checking:               | 60 seconds |

Based on the number of students in this class, and the nature of the assignments, I estimate that we spent about 50 hours total, including my hours and those of my assistant, handling these papers. I was able to make some marks and a brief comment on at least 75% of all typed follow-up papers. I also asked students for permission to post their work on Blackboard, without names, for peer instruction purposes, and I provided two fairly extensive collective assessments of their writing during the semester (see Appendix below). Posting student work, including scanning of the extemporaneous writing, and my preparation of the four portfolios for model assessment purposes, took about another 10 hours. So I estimate we spent

about 60 hours throughout the semester on ACE management, and of that my TA probably spent 25 (in addition to her other course-related duties).

Obviously someone will say: you can't grade a paper and provide meaningful feedback in only a minute or two. That's right; you can't. But remember the contract: it is the process I am teaching, and the habits, not the content (they get a bunch of that on the exams), and the extemporaneous writing prompts are intended to demand certain thought processes. In general, students tried honestly to address the Friday prompts whether they were comfortable with the writing assignments or not. I have never believed that "grading" student papers improves either writing or thinking skills; putting a premium on behavior, however, particularly repeated behavior with rewards and successful models, does seem to make a difference in the quality of work by a large fraction of the class.

By way of perspective, relative to the logistical burden, it takes me about four hours per class to prepare a PowerPoint lecture, even with materials supplied by publishers, and of that four hours, 30-45 minutes will be taken up simply waiting for software to load. This semester, because of the media setup in Henzlik, I prepared no PowerPoint shows for the cell biology and genetics sections of the course, and instead simply cut pages out of their book and used the diagrams, plus writing and zooming on the pages, with the document camera. I used this lecture technique for about half the semester, saving approximately 80 hours of time. As a rough estimate, I ended up saving about 20 hours of time (net) over the course of the semester by simply changing the way I delivered content, and counting what the TA provided, the total time savings for me personally was closer to 40-45 hours; i.e., an entire standard work week.

#### **(8) Assessment:**

If this section of BIOS 101 had been a real ACE course, I would have ended up with four student portfolios as pdf files (I have two from this particular section), each of about 80 pages, that included:

- a. a title page
- b. table of contents
- c. syllabus
- d. all exams and bubble sheets
- e. student self-assessment of his/her performance on exams
- f. all 14 weekly extemporaneous writing assignments, follow-ups, and self-assessments
- g. my collective comments about the writing from this class
- h. an overall self-assessment (by the student) of his/her writing
- i. an overall self-assessment (by the student) of his/her performance in this course

The last extemporaneous writing was not done in class, but was asked for as one single-spaced typed sheet with answers to the following questions:

- a. To what extent have these weekly writing assignments helped enlarge your view of biology?
- b. To what extent have these weekly writing assignments helped you improve your communication skills in general?

- c. If regular writing activities are used in the future, what kinds of changes would you recommend?
- d. Has the use of commonly available resources such as campus landscaping and museums helped you understand the role that biology plays in your life?

These sheets were kept; thus I have a file of 149 pages of student answers to these questions; see Appendix below for examples of these answers. If this section of BIOS 101 had been a real ACE course, I would then have had to make the portfolio pdf files available to an assessment team, probably one selected from this department, and I would have had to generate two or three pages of typing (similar to this report) as my overall assessment of how well the class performed and whether the outcomes were achieved. I did not take up the portfolios, but my student assistant and I simply checked them to make sure all the requisite items were present. The ACE program assessment activity will occur once every four years.

**(9) ACE Credit:**

One of the issues that came up regularly during committee discussions was that of ACE credit for students who did not complete the ACE assignments. In every case, the General Education Advisory Committee concluded that a faculty member should have the power to withhold ACE credit for students who did not perform the required assignments. In this particular section of BIOS 101, there would have been about 40 students who did not receive ACE credit and would have to take another course to fulfill ACE Outcome 4, simply because they did not (would not?) do the contract work.

**(10) Future plans:**

Because of the typical (perhaps stereotypical) characteristics of today's university students—cell phone hooked, Internet addicted, iPod dazed, vanishing attention span, peer-dominated worldview, etc.—I will continue to do some contract activity, especially in large classes, that requires repeated original work and follow-up, with the follow-up activity being worth quite a bit in terms of grade. There were a great many helpful suggestions from the last writing assignment; I kept those and will use some of them next fall.

**(11) Personal time, logistical burden comments, and recommendations:**

The major problem with delivering this particular section of BIOS 101 was not the course itself, but my other obligations. Most problematic for me personally was the concurrent assignment to teach BIOS 381 (Invertebrate Zoology) a rather high-maintenance class, my textbook revision manuscript deadlines, American Society of Parasitologists secretary-treasurer position, and the on-going ACE committee work. Without those concurrent obligations (especially BIOS 381 and the textbook manuscript), this BIOS 101 course would have been quite easy and I would have gotten a great deal more research and other scholarly writing done. As it is, our lab has published at least five papers during 2007, so it wasn't a total disaster.

My major recommendation for any department or faculty members contemplating ACE certification for lower division courses is to begin designing their own products and assessment

mechanisms rather than responding to directives from above. In other words, take into account faculty time, concurrent obligations, clientele, course content, and habits of mind you want to develop, then design some activities that minimize the work involved and maximize the students' need to place value on their own work as evidence of accomplishment. In addition, I strongly recommend that a large lecture section ACE course should count as two courses, i.e., the only instructional assignment, for faculty members teaching the course.

JJ

## APPENDICES:

### APPENDIX I. Examples of Friday extemporaneous writing prompts:

(Students were asked to select a favorite campus plant—a perennial—at the beginning of the semester, one that they saw every day, with the idea that they would be writing about it.)

083107: Design an experiment to demonstrate the role your favorite campus plant plays in the community surrounding it.

090707: Explain the junk food label (TGIFriday's Potato Skins) to your grandparents.

091407: Describe the evidence for genetic vs. environmentally induced variation or characteristics in your favorite campus plant.

092107: How would a textbook author use your individual plant as a model for explaining the Big Picture in biology?

092807: In what way(s) can the compartmentalization of function in a cell be considered a metaphor for specialization in a society?

100507: Trace the flow of carbon skeletons through your campus plant and its surrounding community over the course of an entire year.

101207: Interpret the Red Grooms painting "The Unicorn Strikes Back" (given on the screen) in terms of all the energy and carbon skeleton flow we have discussed so far in class, using at least 15 different participants.

101907: Fill both sides of this page with writing, answering the single question: **What do natural history museums teach?** Be sure to make your answer a general one, and use at least three different exhibits. (JJ's note: this Friday was the one after the second exam and we spent the entire period on it.)

There were several others; see Appendix III for the 12<sup>th</sup> and 13<sup>th</sup> ones combined (the Sheldon assignment).

## **APPENDIX II. Writing feedback (posted on Blackboard at two different times during the semester):**

### **Feedback #1:**

#### **Writing instructions and advice:**

Now that I've read several hundred pages of your writing, it's time to pass along some general comments that may be of help not only during the rest of the semester, but also in other classes as well as in your employment beyond graduation.

- **Word usage:**

Below are some words that often are used incorrectly in student writing. Use these words correctly and you will get better grades than if you use them incorrectly.

*it's* = it is, not the possessive pronoun (e.g., It's a red car).

*its* = the possessive pronoun (e.g., The red car had its oil changed.)

*their* = the possessive pronoun; *there* refers to a place (e.g., They took their cars there to get the oil changed).

*a lot* – Alot is not a word; a lot is two words (e.g., "I like my red car alot." is not a sentence; "I like my red car a lot." is a sentence but not a very literate one.)

*your* = the possessive pronoun (e.g., I like your red car.)

*you're* = you are (e.g., You're going somewhere in your red car.)

*amount* = a word that refers to quantities that you measure with weight and volume (e.g. Your red car saves a small amount of gasoline compared to my old truck.)

*number* = a word that refers to discrete quantities that you count (e.g. Your red car has a low number of miles on it, even though it has a large amount of space in the trunk.)

*went* = the simple past (preterite) tense of *to go*. (e.g., The red car went around the block three times before the driver realized it had a flat tire.)

*have gone* = the present perfect tense of *to go*. (e.g., I have gone to the grocery store in your red car. See [http://en.wikipedia.org/wiki/Grammatical\\_tense#English\\_tenses](http://en.wikipedia.org/wiki/Grammatical_tense#English_tenses) for examples of usage. The use of "have went" either in spoken or written English is a glaring mistake.)

*wrote* and *have written* = See the same comments as for *went* and *have gone* above.

*since* = a reference to time. (e.g., It has been a year since I had the oil changed in my red car.)

*because* = a word to refer to a reason or cause. (e.g., Because it had been so long since the oil was changed in my red car, the engine exploded.)

*while* = a reference to time (e.g., I had to wait two hours while the guy tried to change the oil in my red car.)

*although* = a word to indicate an alternative or comparative situation (e.g., Although I had to wait two hours while the guy tried to change the oil in my red car, he did a pretty good job of telling me about Husker football while he worked.)

*whereas* = a word that can be used in many of the same contexts as *although*; i.e., as a replacement for *while*.

*research* = a word that is best used as a noun (e.g., I'm going to do some research on why red cars are more popular than blue cars.)

*study* = a word that can be used as either a noun or a verb (e.g., I'm going to study that Department of Transportation study about the safety of red cars.)

## **Feedback #2:**

### **BIOS 101 – I-07-08 Feedback on your writing and portfolio comments:**

Now that you have completed eight of the fourteen extemporaneous writing assignments, perhaps this is a good time to pass along some general impressions of the class as a whole. Remember that this activity has four pedagogical goals: (1) To teach you to see biological materials and content in contexts outside the classroom, i.e., in your everyday life; (2) To provide an opportunity for earning points toward a letter grade in ways other than multiple-choice exams; (3) To develop scholarly habits that will pay off throughout your academic career and beyond; and (4) To encourage you to start placing serious value on your own creative work. For Kari Neill and I, who end up reading this writing, there is the additional goal of trying to extract something original and interesting from a generation that is, or at least seems to be, increasingly homogenized by a number of powerful social/cultural forces. So here are my comments:

- (1) Fewer than half of you have 90% of the available writing points as of 102907, and given the available points remaining, 40 of you will be ineligible for the portfolio bonus points. Remember, folks, that these are the cheapest points available for any university course, especially in the sciences, and that the writing points are awarded solely on work that you yourselves have complete control over. In this kind of contract work, the faculty member decides what is to be done and to what extent the student is to do it, and the student fulfills the contract within broad limits that allow a great deal of individuality. The prompts are almost always ones that can be addressed in as many different ways as there are students in the class.
- (2) Originality and insight always (*always!*) leap out from the page, especially when a paper is prepared well and cleanly. Again, I recommend re-reading Chapter 6 (Papers) of *OUTWITTING COLLEGE PROFESSORS*, especially that section that deals with the Internet.
- (3) Some of you are able to find quite a bit to say about the prompts, others struggle just a little bit. If you are one of those people who are struggling to find enough words to fill up a page, I strongly suggest thinking about biology, about the implications of what you are seeing and learning in class, and noticing such biological materials as campus vegetation. Finding words is one of those individual and free activities; anyone can do it, but we all have to devote some time and intellectual energy to the task if we are to be successful. This technique of simply thinking about the subject matter, asking about the meanings of whatever

you have been reading or studying, and imagining yourself writing on some strange prompt, works for all classes, not just BIOS 101.

- (4) The follow-up writing seems to be working like it's supposed to in a large number of cases. The idea behind this follow up is to teach you to see your own writing in a way that gives you the power to modify it, make it accomplish whatever you want to with it, and to empower you a little bit. Remember that in the United States, formal English is the language of commerce, and skill with this language will greatly enhance your ultimate chances of success in life, at least if you remain in this country.
- (5) A large number of you (especially the guys) have absolutely abominable handwriting. I really do encourage you to work on your penmanship, regardless of what you see up on the document camera when I write during class. That penmanship will make a major difference in your grades in any course where you have essay exams actually taken in class.
- (6) Some of you need to work on your paragraphing, especially making the paragraphs long enough so that a page of double-spaced typing with 1-inch margins in 12 pt Times New Roman type has two to three paragraphs on it (or breaking up a page of writing into two paragraphs).
- (7) Remember that there may be several kinds of marks on your pages. Anything that is underlined (by me or Kari), set off in brackets, checked, or starred is interesting and probably worthy of expansion. Anything that is circled is probably something you need to correct, usually grammar.
- (8) If you have scanned the grade sheets on Blackboard, you have discovered that I've started giving a few extra points now and then for particularly well-done papers. These extra points, usually an 8 instead of 7 on the follow-up, are typically for the self-assessment and always indicate that the student has provided some depth and insight well beyond that of the other students.
- (9) I strongly recommend reading the posted examples of student papers, and if you have been asked to provide such papers, then I greatly appreciate the contribution. I don't always get them up on Blackboard as quickly as you might want, but eventually there will be examples for most of the writing we have done this semester.
- (10) If anyone who has gotten an extra point would like to volunteer his/her paper, I could easily go through that in class using the document camera. This would be more of a lesson in writing and in what faculty members look for than in biology, but it might help you communicate better in all your classes, and that's one of the reasons we're here. However, about everything I'd say is already in that chapter (6) in **OUTWITTING COLLEGE PROFESSORS**, except the stylistic points.

JJJr

**APPENDIX III. Sheldon assignment and feedback:**

**Writing instructions for the Sheldon Assignment, I-07-08:**

- (1) This assignment is to take the place of two Friday extemporaneous writing assignments, numbers 12 and 13. You have until November 30 to turn it in, and you may do it with one other individual. If you and another student do the assignment together, be sure that both students' names are on all pages and that the pages are numbered.
- (2) **Here is the assignment: Choose five different pieces of art from inside the Sheldon Gallery or from the campus Sculpture Garden, in at least three different mediums. Use these five pieces as your material for writing on the subject "the big picture in biology as it must have been understood by the artists." The Big Picture PowerPoint show and pdf files are still up on Blackboard, and a document version of the Big Picture in Biology will be up on Blackboard and will be e-mailed to you (see also below). Take only a notebook and a pencil into the galleries.**
- (3) Any papers that are not in my possession by Friday, November 30, at 5:00PM will receive a zero. I am not accepting any e-mail or electronic submissions, including those in Digital Drop Box.
- (4) The papers must be hard copy, double spaced, and stapled at the upper left hand corner. They must include at least four pages of typing plus a page listing the art pieces used. You are allowed one sentence maximum to name and describe each of the pieces you use in your essay.
- (5) You may not once mention agriculture, health, the military, family, politics, sex, sports, or religion in your papers.
- (7) In order to get credit for this assignment, the form below must be turned in to the Sheldon security staff, or the Sheldon office, and the Sheldon staff must be instructed to put these forms in the mailbox of the Education Coordinator.

-----  
BIOS 101 Janovy I-07-08 Big Picture in Biology assignment

Name(s) \_\_\_\_\_

Date(s) visited the Sheldon Gallery and/or sculpture garden \_\_\_\_\_

Time spent in the galleries or sculpture garden \_\_\_\_\_

**Sheldon Security Staff: Please return this form to the Education Coordinator. Thank you very much! - John Janovy, Jr.**

- **Format for Sheldon assignment:**

The art citations in your bibliography must be in the format given below. This one is only an example, but note that it includes all the information given on a label had the piece been on display.

Newman, Barnett. 1949. *Horizon Light*. Painting; oil on canvas. UNL-Gift of Mr. and Mrs. Thomas Sills

- **Writing advice reminder (or, How to get better grades on your written assignments not only for BIOS 101, but for other classes as well):**

- (1) Use some clean, standard, font (Times New Roman, Arial, MS Sans Serif) instead of a fancy one; set type size at 12 pt; make sure your printer makes dark copy.
- (2) Check each sentence to make sure it is complete (subject, verb, object) and that verb tense matches the subject.
- (3) Check for typing errors, especially those that occur over and over again (which are really spelling errors).
- (4) Turn on your spell-check and grammar-check options on your word processing program and follow up on the suggestions, especially in cases of red underlines indicating misspelled words. Also, get and use a good dictionary. Be careful about what word processing programs say about grammar, however.
- (5) Turn off your right justify.
- (6) Write your paper(s) soon enough so that you have time to let them sit for a day or two prior to their due dates, then read them again with a fresh eye toward style, grammar, spelling, etc.
- (7) The text should average about 2.5 paragraphs per page.
- (8) Follow format instructions and examples exactly; these instructions are provided because faculty members must write their professional papers according to these kinds of instructions, and therefore find papers written this way easier to read. In addition, if you ever decide to publish an undergraduate research paper, you will be required to follow some journal's format instructions exactly or the paper will probably be returned to you (as they will in this class) for re-writing prior to review.
- (9) See Chapter 6, Papers, in OUTWITTING COLLEGE PROFESSORS for advice on maximizing your writing skills and grades. (free download at <http://bsweb.unl.edu/labs/janovy>)

**THE BIG PICTURE IN BIOLOGY: Take home lessons from BIOS 101 (with JJ's personal comments in parentheses):**

"The natural world need not be logical in any obvious way. Science does not consist of imposing our reason on the world but rather reducing our preconceptions to the point that the world imposes its logic on us. This is very difficult indeed, involving a minimalization of our ego while maintaining our full powers of observation and receptivity. The capacity to perform this feat is what the teacher of science attempts to foster in the student. No one succeeds completely."

--L. Slobodkin (from *Simplicity and Complexity in Games of the Intellect*)

**I. Earth is the only planet in the universe actually known to support life.**

(Get ready for a BIG surprise if life is discovered elsewhere, but in the meantime, don't be short-sighted and stupid about how you interact with this planet.)

**II. Life on Earth is characterized by enormous diversity superimposed on great uniformity.**

(Uniformity is in DNA structure, metabolic processes, etc.; diversity is in the massive number of species that occupy the planet.)

**III. Evolution is the best general explanation *science* has for life's enormous diversity superimposed on great uniformity.**

(That's why it's the central unifying theme of the discipline.)

**IV. The vast majority of species that have ever lived are now extinct.**

(It's real easy to be naïve and arrogant about our own, mainly because we're so smart, but the evidence for IV. is *very* convincing.)

**V. There is a staggering amount of scientific evidence that virtually all things in the universe have a beginning and an end, and our solar system is probably no exception.**

(The term "virtually all things" includes everything from individual lives, to nations and civilizations, to planetary systems, stars, and galaxies.)

**VI. The present distribution of life and other natural resources is a result of several billion years of planetary change (evolution, both geological and biological).**

(That distribution has significant social and political consequences, and so to some extent, your daily headlines are a result of planetary forces at work, forces over which you have no control and did not make happen.)

**VII. *Science* is different from *Technology*.**

(Science and technology both require fundamental knowledge of nature, but technology seeks to *control* nature, while science seeks to *understand* nature. Control is not necessarily "good;" understanding is not necessarily "bad." It's what humans do with their control and understanding that make *humans* "good" or "bad.")

**VIII. Many of our most difficult social and political problems have a major biological component:**

(The list of these problems includes racism, sexism, unwanted pregnancy, global energy distribution, intellectual and cultural richness, the definition of "human being," narcotics, global water distribution, genetic "engineering" and its consequences, infectious disease evolution and transmission, our relationships with insects, etc. Such a list could go on for several more pages.)

**IX. You are surrounded by biological information, but you need to take the time and effort to look for, then use, it.**

(Your life, and the lives of those around you, will be greatly enriched by such awareness; after all, life is *the* characteristic that sets Earth apart from other planets and, insofar as we know, all other planetary systems.)

**X. The scientific and technological explosion is not going away any time soon; it's better to be educated than ignorant about all scientific and technological issues.**

(For one obvious example: the information technology you use hourly is taking away your privacy, and re-defining what it means to be a human, about as fast as it can be done.)

**Feedback on the Sheldon assignment:**

**BIOS 101 I-07-08 Feedback on Sheldon assignment:**

Any time that a large class does one of these kinds of assignments, involving original out-of-class observations and extensive writing, then a faculty member owes that class some collective feedback in addition to whatever marks were made on individual papers. So here are my comments on reading about 700 pages of your work over the last few days:

- (1) These papers were really well done. There were very few grammatical errors, only an occasional mis-spelled word (and those were mostly artist's names or titles of work), and few if any incomplete sentences. In addition, the vast majority of you constructed your paragraphs according to formula, and linked paragraphs together in an obvious way. Faculty members always have the option of giving extra credit for excellent work, and in this case fourteen papers were awarded more than 20 points.
- (2) What makes a paper worth extra credit? That is a difficult question to answer, but in general, those papers are ones that I end up reading several times, usually after saying to myself "Wow! That was a good one!" the first time through. There is some combination of preparation, originality, insight, and narrative structure that just makes a major impact on a reader, or at least on this reader. There seems to be no established relationship between extra credit and a student's exam grades, and that has been the case in every one of my large classes for the past 35 years, i.e., as long as my introductory students have been writing these kinds of papers. Some people simply write beautifully, think deeply, and are not afraid to be original, regardless of what they make on multiple choice exams.
- (3) I would again like to express my appreciation to the individual who allowed her paper to be used as a grading guide, although I'm not sure that use was entirely voluntary. Nevertheless, almost 70 of you re-did your papers over the weekend as a result of going through her work in class, so that one paper made a major instructional impact on a third of the class.

- (4) As a general rule, I know what is up on exhibit in both of the big museums on campus, and I also have a pretty good idea of what is available on the Sheldon web site. So when I send a BIOS 101 class to Sheldon with an assignment that involves original encounter with the works, I can usually tell when students visit the web instead of actually going to the building. In the case of this assignment, the Sheldon security staff was quite impressed with the number of you who actually showed up, and the amount of time you spent studying the pieces. Out of all the papers I read, there were only three or four in which it was fairly obvious you'd taken material from the web, Tom Otterness' *Fallen Dreamer* being a case in point (not out on the steps for the past couple of weeks), and even in those papers the other pieces written about were ones that I know were up and were not on the web.
- (4) In general, you made excellent connections between the Big Picture and at least some of the pieces. There were a few favorites, e.g., the Jason Middlebrook meadowlark painting and the oil drum bench. Middlebrook was here not long ago, and I believe that I made an announcement in class about his public lecture. As you might suspect, because of family connections I end up at many of those talks, as well as at private dinners with visiting artists, and I honestly believe Jason Middlebrook would have been thrilled with your use of his work and your interpretations. He is a very intellectual person with a strong sense of ecological responsibility; he could easily have given that public lecture in our class, illustrating it with his work, and not been out of place. James Surls also gave a public lecture; he's a little more mysterious than Middlebrook, but still if you had seen all the rest of his work you'd have realized the deep connections between it and the southern Texas pine woodlands where he grew up. The photography in the first floor gallery was also heavily used, and appropriately so. In fact, most of you came pretty close to picking the same pieces, and saying the same things about them, that I would have done had I been a student in this class knowing what I know now.
- (5) This kind of exercise seems to work best toward the end of the semester, after students have gotten over the fear of not doing something correctly; at least that's my impression. Nevertheless, I always get the sense that most students are being careful, trying to do the assignment in a way that seems legitimate to the instructor. In the future, if you are ever given the opportunity to do an exercise with characteristics similar to this one, I'd encourage you to be a little more courageous, at least with part of the paper.
- (6) I am always willing to give detailed comments (about writing) to anyone who really wants them, and to talk about writing and other forms of communication in general. But you have to be fairly aggressive in seeking time for this to happen and not be afraid of the results. I have been on the receiving end of several different editors' work, and I can assure you that some of these editors can make you look great, and others can stifle you almost to the point of literary suffocation. The suggestions about which magazines to read regularly is pretty good advice: *TIME Magazine*, *Sports Illustrated*, and *The New Yorker*. After you've read them, cover to cover, every week, for content, then go back and read them for style, sentence and paragraph construction, use of material, vocabulary, etc. Studying how the successful folks do "it" is always educational!

(7) The other trick that sometimes is exceedingly helpful, especially to students, is to take some famous book or best-seller and simply copy the first few pages with your own computer, double-spaced, with one inch margins, then print out the typing, set it aside for a few days, then pick it up and read it. You'll see what that [famous, important, . . . etc.] book looked like when it was sent off to the editor long before it was published. This little exercise takes a lot of the mystery out of writing and trying to write well.

**APPENDIX IV. Sample response (out of ~150) to last writing assignment:**

The weekly extemporaneous writings have helped enlarge my view of biology in a big way. It has helped me use critical thinking more often, because when you are given a topic to write about without previous thinking about such topic you have to use critical thinking in order to write about whatever topic was given to you. It helped me to think in a way that I am not use to thinking in. Such as campus plants, and the evolution about animals and many more. These writings have also helped me to be more aware of my grammar. When you have to revise your paper every week and get sick of changing the grammar, you then go to write the paper and don't make so many errors so then you don't have as much to correct.

In addition to how these extemporaneous writings have helped me expand my biology knowledge; the extemporaneous writings have also helped my communication skills. In ways such as having to go to the Sheldon museum and asking the workers about art pieces, and asking the employees at the Morrill Museum about the exhibits. The papers have also helped me with communicating in way that it expands my "scientific literacy" so I can talk to people about biology and actually show knowledge on the subject, not just babble on about the basics on biology that everyone knows. Another way that the extemporaneous writings have helped my communication skills, is conversing with fellow classmates on the weekly topics about what they think on the topic presented. We can then trade ideas about what to write.

If regular writings were continued to use in the future there could be a few changes made. One change I would consider is to make the writings relate to the chapter that we are studying at the time. Therefore, it would help us to learn and embed the information that we need to know for the upcoming test. However random topics are also good because it helps expand our knowledge about things that we would probably never think about if we didn't have to write about them. So maybe is one week you would write about a random topic and how it relates to biology and then the next week you would write about something relating to the chapter that is currently being studied. Another change that I might make is continue to give the students the fifteen minutes in class to write on the topic given, but within the follow up let the students expand on their topic if they want to put more thought in to it. If the students expanded their paper on the topic it could then be added as bonus points.

The use of commonly available resources such as campus landscaping and museums has helped me understand the role that biology play in my life. Before we had to pick out a favorite campus plant I did not really pay much attention to all of the beautiful diversity of plants that surrounds the University campus. But after choosing a plant, I would walk to class and look at all the different plants and think to my self all the biology that is involved with each plant. Like the genotypic and phenotypic differences of each plant itself. The mating of all the different plants and how it occurs through pollination. Furthermore, the evolution that might have been involved with each plant and so on. The museums have also helped me understand the role that biology plays in my life because, now that I go into museums I can think that even an art gallery has tons of biological sense to it and animals museums I think about evolution.

## **APPENDIX V. Portfolio:**

At some time in the next 60 days a portfolio from this class will be posted on my web site <http://bsweb.unl.edu/labs/janovy>, probably under the hot links to instructional materials. The portfolios generally ranged from 40-50 pages, and I added some of the feedback materials above before posting. The instructions given to students for portfolio preparation were as follows:

### **BIOS 101 Portfolio Preparation Instructions:**

The portfolio you will prepare for this class is intended to be tangible evidence for what you have accomplished this semester in BIOS 101 and what you have learned as a result of taking this course. The portfolio is optional, but it is also a fairly easy way to simply add 50 points to your total for the semester. Portfolio preparation is an activity that forces you to reflect on your own work in a way that is educational instead of simply trying to satisfy an instructor on exams. But this project also requires some constant writing and self-assessment during the semester. By the end of the semester, those who prepare a portfolio successfully, and receive the extra credit points, will see themselves as people who can produce tangible evidence for accomplishment.

- (1) In order to receive the 50 points extra credit, you will have to have done the weekly writing assignments and follow-up writing enough so that you've accumulated at least 100 out of the possible 140 points by the time the portfolio is due.
- (2) The portfolio consists of the following sections:
  - a. A title page with your name, student ID number, and clicker number on it.
  - b. A table of contents.
  - c. The three hour exams, each one accompanied by your answer sheet and a single page of double-spaced typing which is a self-assessment of your performance and study methods for each exam.
  - d. Your weekly writing assignments. At the end of this section is a single page of double-spaced typing which is a self-assessment of your performance on the weekly writing assignments as a whole.
  - e. Two pages of double-spaced typing, which are a self-assessment of your overall performance in the class, what you have learned, and how you might apply this learning to new situations in the future.
  - f. Each section should be tabbed for easy access.