Bio 113: Integrated Concepts in Biology

Class Meets: MWF 8:30 Studio D classroom, inside library
Lab Meets: Thursdays (8:15 am or 1:40 pm)
Watson 147
Office Hours: M & Tu: 2:00 - 3:00; Thurs: 11-noon; or by appointment any day
Office: Dana 221 (through my lab, door on left side of lab)
macampbell@davidson.edu
Phone: 704-894-2692

General Information:

Integrating Concepts in Biology - eBook <-- Buy your Fall 2016 textbook here.

Echo360 available through Moodle

Learning Outcomes for 113 Outcomes are listed for each chapter of the textbook.

You are lucky for 3 reasons:
1) biology is very exciting and in the news every day;
2) in Bio113, you will learn biology in a new and effective way; and
3) you get to use an eBook that integrates the web with your reading.

Biology has become too massive to memorize factoids. Bio113 and 114 are organized around the 5 Big Ideas of biology: Information, Evolution, Cells, Emergent Properties and Homeostasis. The natural world is not subdivided into big or small biology. For this class, you will read chapters that cover all 5 big ideas at 3 size levels. Upon completion of Bio113, you may take Bio114 OR Bio112. For the biology major, you need one odd number (113 or 111) AND an even number (114 or 112) introductory biology course. Any combination in any order is acceptable.

Figure 1. Integrating Concepts in Biology brings together the five Big Ideas of biology at five different size scales. These big ideas fit together like a puzzle to complete students' understanding of biology.

You will use an eBook that I have coauthored along with Drs. Chris Paradise and Laurie Heyer, Integrating Concepts in Biology. In addition, you will have access to all the images as PowerPoint slides (available from book's "student resources". Finally, you will also have access to Echo360 electronic resources which includes recordings of every class.

You will want to read the chapter and answer the Integrating Questions as they appear in the reading. Do NOT skip the questions. Research has shown that students learn best if they construct their own knowledge. Therefore, the Integrating Questions are designed to help you extract the key information from the original figures published in scientific papers. You will not only learn the main points and retain them longer, you also will learn the skills of science by interpreting figures. Furthermore, you will use math to help you better understand biology. The math will be presented in BioMath Explorations which will enable you to use the math you already know to reinforce your understanding of biology.

The questions on the 4 exams will be drawn from the Integrating Questions and the Review Questions at the end of each section. Exams are take-home, closed-book tests. The answers to the take-home questions are to be typed, and are due at the next class time. Exams are not to be turned in late unless you have made prior arrangements with me. Acceptable reasons for delay include: death in the family, personal illness requiring physician's care, etc. Unacceptable reasons include: intramurals, Homecoming, Patterson Court functions, other tests or exams, etc. Once you open the take-home exam file, you cannot use your book, notes, or any other source other than your personal memory.

The format of each class will require each of you to read that day’s assignment BEFORE you come to class. We will spend each class going through the figures and discuss them since DATA are paramount in science. We will stick closely to the schedule because there is so much to learn and so little time. Therefore, if we do not cover a topic in class, but it is covered in your reading, you are responsible for it. In every class, I will “cold call” on individuals
randomly to answer a question or lead a discussion. If I call on you to answer a question, it is OK to say, “I got this part but this other section lost me.” It is not OK to say, “I didn’t read it.” I understand that some days you may have missed the reading but don’t make a habit of this since participation is part of your grade.

Davidson has a special benefit for science students because you pay the same amount for courses without labs as you do for science courses with labs. This means you get more for your money by taking science courses than non-science courses. Economically, this course is a real bargain. It comes with a 3 hour laboratory absolutely free! However, it is not acceptable to miss this “free” lab since 25% of your grade is based upon lab. Lab will be discussed further weekly installments in the form of Word files.

Finally, I do not know everything. If you think I have said something that is incorrect, please point this out. If you ask me a question that I cannot answer, I will research it and get back to you. If you have tried to understand the material but just can’t get it, then come talk to me either during my office hours or make an appointment. I am happy to work with each of you as much as is necessary.

**Campus Support for Your Learning**

The Math & Science Center (MSC) offers free assistance to students in all areas of math and science, with a focus on the introductory courses. Trained and highly qualified peers hold one-on-one and small-group tutoring sessions on a drop-in basis or by appointment, as well as timely recap sessions ahead of scheduled reviews. Emphasis is placed on thinking critically, understanding concepts, making connections, and communicating effectively, not just getting correct answers. In addition, students can start or join a study group and use the MSC as a group or individual study space. Located in the Center for Teaching & Learning (CTL) on the first floor of the College Library, drop-in hours are Sunday through Thursday, 8-11 PM, and Sunday, Tuesday, Thursday, 4-6 PM, beginning Sunday, August 28. Appointments are available at other times. For more information, visit [http://www.davidson.edu/offices/ctl/students/math-science-and-economics-center](http://www.davidson.edu/offices/ctl/students/math-science-and-economics-center), or contact Dr. Mark Barsoum (mabarsoum or ext. 2796).

The Speaking Center @ Davidson College (for oral lab reports) offers the services of trained student tutors to support speaking across the curriculum. At any point of the process, from selecting a topic to delivering the speech, the Center can assist your students in learning to speak, and speaking to learn. No appointment is necessary; tutors see students on a first-come, first-served basis. Located very close to Studio D in the library, the Speaking Center includes private rooms, a camera and playback equipment, and resource materials to help students collaborate with tutors. Students wishing to keep copies of their presentations can bring recordable DVDs (available in the Bookstore). The Speaking Center will be open Sunday through Thursday from 8-11 pm starting Sunday, September 6th. If you want their help, try to come early; help is more

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**Note:** I assume that everyone has had some high school biology and chemistry. If you have not, this course may be very difficult for you. You should talk to me the first day if you have not had one or both of these high school courses.

**Grades:**

<table>
<thead>
<tr>
<th>Source of Grade</th>
<th>Percentage of Final Grade</th>
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<tbody>
<tr>
<td>3 exams during the semester plus 1 exam during finals</td>
<td>75%</td>
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<tr>
<td>lab grades (2 oral reports, 2 written reports)</td>
<td>25%</td>
</tr>
<tr>
<td>(10% of exam questions drawn from labs)</td>
<td>N/A</td>
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<tr>
<td>Class and Lab Participation</td>
<td>+/- one grade level</td>
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**Grading Scale:**

<table>
<thead>
<tr>
<th>Conversion of Percentage to Letter Grade</th>
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<tbody>
<tr>
<td>A = 100 - 94</td>
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<tr>
<td>A- = 93 - 90</td>
</tr>
<tr>
<td>B+ = 89 - 87</td>
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<tr>
<td>B = 86 - 83</td>
</tr>
<tr>
<td>B- = 82 - 80</td>
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<tr>
<td>C+ = 79 - 77</td>
</tr>
<tr>
<td>C = 76 - 73</td>
</tr>
<tr>
<td>C- = 72 - 70</td>
</tr>
<tr>
<td>D+ = 69 - 66</td>
</tr>
<tr>
<td>D = 65 - 60</td>
</tr>
<tr>
<td>F = ≤ 59</td>
</tr>
</tbody>
</table>

**Attendance policy:**

I will take attendance to facilitate a more objective means for assigning the participation grade. In order to receive a passing grade in this course, you cannot miss more than 5 classes without a legitimate reason. You may not miss any labs without a legitimate reason. Legitimate reasons include illness requiring physician’s care, family emergency, etc. Unacceptable reasons include over-sleeping, exam in another class, social function, etc. I will be flexible about tests and religious holidays if you come speak to me personally.

**Previous Exams for Dr. Campbell's Bio113:**

You may find it useful to see some old exams (often called spots at Davidson) written by Dr. Campbell for Bio113. For the last five years, I have used the same book and testing format, so past 113 exams might be useful. Because some members of Patterson Court organizations have access to these in paper
form, I provide them to everyone to ensure equal access.

**Honor Code**

All of your exams are closed-book, closed-notes, closed-friend tests. You do not have a time limit for these tests other than the two days between when I email them to you and when they are due. You can take your exams anywhere you want. This form of testing is only possible because of the Honor Code. If you violate my trust in you and the Honor Code, everyone will have to take the tests during the 50 minutes of class. You are required to not cheat on these tests, and to report to me or the Dean of Students any violations you observe, or hear about second hand. This means that even your lab partners or best friends must be reported if you know they are cheating. The entire system will break down when individuals make exceptions to the rule in order to spare their friends. I was a student at Davidson, so I know how important the Honor Code is.

Group written lab reports are to be produced by everyone in the group. It is considered an Honor Code violation if someone takes credit for work he or she does not deserve. I do not expect every person to contribute precisely equally to these reports, but I do expect every person to contribute substantially. Just showing up for the meeting and bringing the food does not constitute a contribution to the report. Therefore, when you pledge your lab reports, you are pledging that everyone has contributed substantially to the lab report. You should consult the Biology Department's plagiarism web site for additional help.

**Reading Schedule**

The following reading assignments are from the textbook manuscript Integrated Systems Biology. You should print out this schedule so you can see the schedule by itself.

**Lab Schedule**

The following lab schedule refers to the Bio113 Lab Manual. You should print out this schedule so you can see the schedule by itself.

Biology Home Page

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Send comments, questions, and suggestions to: macampbell@davidson.edu
A. Malcolm Campbell's Bio113 Learning Outcomes

Students who successfully complete Biology 113 will:

- Develop a foundational understanding of the key concepts in biology: information, evolution, cells, emergent properties, and homeostasis.

- Assemble overarching themes of biology (e.g. structure/function, surface area to volume, signal amplification, noise, etc.) that span more than one key concept and all size scales.

- Apply the process of science to answer questions about nature.

- Employ and understand quantitative analysis and mathematic reasoning with experimental data.

- Use mathematical modeling and simulations to enhance understanding of biology.

- Integrate different science and math disciplines to provide a more holistic understanding of biology.

- Communicate with a wide audience and collaborate with science and math colleagues.

- Connect biology with everyday world and society.

- Recognize that biology is not divided into two sizes as represented by common course divisions.

- Evaluate public policy in light of scientific evidence.

- Distinguish biology as a science based on experimental questions and data analysis rather than a discipline of vocabulary words.

Biology 113 Home Page

Biology Home Page

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<table>
<thead>
<tr>
<th>Date</th>
<th>Information</th>
<th>Reading Assignment</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Aug 22</td>
<td>Introduction to Course; eBook; Echo360 (via Moodle)</td>
<td>Chapter 0 (no kidding) located: student resources</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>W Aug 24</td>
<td>Information at Molecular Level</td>
<td>Sections 1.1 &amp; 1.2 + BME 1.1</td>
<td>Echo 360 for class bacterial cell structure</td>
</tr>
<tr>
<td>F Aug 26</td>
<td>Information at Molecular Level</td>
<td>Section 1.3 + ELSI 1.1</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>M Aug 29</td>
<td>Information at Molecular Level</td>
<td>Section 1.4 + BME 1.2 &amp; BME 1.3</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>W Aug 31</td>
<td>Information at Molecular Level</td>
<td>Sections 1.5 &amp; Conclusions</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>F Sep 2</td>
<td>Information at Cellular Level</td>
<td>Section 2.1 + ELSI 2.1</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>M Sep 5</td>
<td>Information at Cellular Level</td>
<td>Section 2.2 + BME 2.1 &amp; BME 2.2</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>W Sep 7</td>
<td>Information at Cellular Level</td>
<td>Sections 2.3, 2.4 + ELSI 2.2</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>F Sep 9</td>
<td>Information at Organismal Level</td>
<td>Section 3.1; BMEs 3.1 + 3.2</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>M Sep 12</td>
<td>Information at Organismal Level</td>
<td>Section 3.2 + ELSI 3.1 &amp; Section 3.3 + BME 3.3</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>W Sep 14</td>
<td>Information at Organismal Level</td>
<td>Sections 3.4 &amp; 3.5 + ELSI 3.2</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>F Sep 16</td>
<td>Evolution at Molecular Level</td>
<td>Section 4.1 + ELSI 4.1 + first half Section 4.2</td>
<td>Echo 360 for class</td>
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<tr>
<td>M Sep 19</td>
<td>Exams due by class time</td>
<td>ELSIs already read</td>
<td>Discuss ELSIs in Detail</td>
</tr>
<tr>
<td>W Sep 21</td>
<td>Evolution at Molecular Level</td>
<td>Finish Section 4.2 + BME 4.1; + Section 4.3 + BME 4.2</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>F Sep 23</td>
<td>Evolution at Molecular Level</td>
<td>Section 4.4 + BME 4.3</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>M Sep 26</td>
<td>Evolution at Cellular Level</td>
<td>Section 5.1, Start 5.2 + BME 5.1</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>W Sep 28</td>
<td>Evolution at Cellular Level</td>
<td>Finish Section 5.2 + ELSI 5.1</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>F Sep 30</td>
<td>Evolution at Cellular Level</td>
<td>Section 5.3 + ELSI 5.2</td>
<td>Echo 360 for class</td>
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<tr>
<td>M Oct 3</td>
<td>class canceled</td>
<td>Dr. C. out of town</td>
<td>I'll be evaluating educational programs in AR.</td>
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<td>W Oct 5</td>
<td>Evolution at Organismal Level</td>
<td>Sections 6.1 &amp; 6.3</td>
<td>Echo 360 for class</td>
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<tr>
<td>Date</td>
<td>Cells</td>
<td>Reading Assignment</td>
<td>Additional Information</td>
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<tr>
<td>F Oct 7</td>
<td>Cells at Molecular Level</td>
<td>Section 7.1, start 7.2</td>
<td>Echo 360 for class</td>
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<tr>
<td>M Oct 10</td>
<td><strong>Fall Break</strong></td>
<td>catch up reading</td>
<td>no class meeting</td>
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<tr>
<td>W Oct 12</td>
<td>Cells at Molecular Level</td>
<td>Finish Section 7.2 + ELSI 7.1</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>F Oct 14</td>
<td>Cells at Cellular Level</td>
<td>Section 8.1</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>F Oct 14</td>
<td>Exam #2 goes out Friday 14th</td>
<td>Exam Due Monday 17th</td>
<td>do not read for class Monday</td>
</tr>
<tr>
<td>M Oct 17</td>
<td>Exams turned in</td>
<td>ELSIs already read</td>
<td>Discuss ELSIs in Detail</td>
</tr>
<tr>
<td>W Oct 19</td>
<td>Cells at Cellular Level</td>
<td>Section 8.2 + BMEs 8.1 &amp; 8.2 + ELSI 8.1</td>
<td>Echo 360 for class</td>
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<tr>
<td>F Oct 21</td>
<td>Cells at Organismal Level</td>
<td>Start Section 9.1</td>
<td>Echo 360 for class</td>
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<tr>
<td>M Oct 24</td>
<td>Cells at Organismal Level</td>
<td>Finish Section 9.1  + BME 9.1; Start Section 9.2</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>W Oct 26</td>
<td>Cells at Organismal Level</td>
<td>Finish Section 9.2; + ELSI 9.1; Start Section 9.3</td>
<td>Echo 360 for class</td>
</tr>
<tr>
<td>F Oct 28</td>
<td>Cells at Organismal Level</td>
<td>Finish Section 9.3; ELSI 9.2</td>
<td>Echo 360 for class</td>
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<tr>
<td>Date</td>
<td>Homeostasis</td>
<td>Reading Assignment</td>
<td>Additional Information</td>
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<tr>
<td>M Oct 31</td>
<td>Homeostasis at Molecular Level</td>
<td>Section 10.1, start 10.2</td>
<td>Echo 360 for class</td>
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<tr>
<td>W Nov 2</td>
<td>Homeostasis at Molecular Level</td>
<td>Finish 10.2 + ELSI 10.1 &amp; Section 10.3</td>
<td>Echo 360 for class</td>
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<tr>
<td>F Nov 4</td>
<td>Homeostasis at Molecular Level</td>
<td>Section 10.4 + ELSI 10.2 &amp;</td>
<td>Echo 360 for class</td>
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<tr>
<td>M Nov 7</td>
<td>Homeostasis at Cellular Level</td>
<td>Section 11.1</td>
<td>Echo 360 for class</td>
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<tr>
<td>W Nov 9</td>
<td>Homeostasis at Cellular Level</td>
<td>Section 11.2 + ELSI 11.1 &amp;</td>
<td>Echo 360 for class</td>
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<tr>
<td>Date</td>
<td>Emergent Properties</td>
<td>Reading Assignment</td>
<td>Additional Information</td>
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<td>F Nov 11</td>
<td>Emerg. Prop. at Molecular Level</td>
<td>Sections 13.1 &amp; 13.2 + BME 13.1</td>
<td>Echo 360 for class</td>
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<td>Exam #3 goes out Friday 11th</td>
<td>Exam Due Monday 14th</td>
<td>do not read for class Monday</td>
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<td>M Nov 14</td>
<td>Exams turned in</td>
<td>ELSIs already read</td>
<td>Discuss ELSIs in Detail</td>
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<td>W Nov 16</td>
<td>Emerg. Prop. at Molecular Level</td>
<td>Section 13. 3</td>
<td>Echo 360 for class</td>
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<tr>
<td>F Nov 18</td>
<td>Emerg. Prop. at Molecular Level</td>
<td>Section 13. 4 + ELSI 13.1</td>
<td>Echo 360 for class</td>
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<td>Emerg. Prop. at Cellular Level</td>
<td>Section 14.1 + ELSI 14.1</td>
<td>Echo 360 for class</td>
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<td>W Nov 23</td>
<td><strong>Thanksgiving Holiday</strong></td>
<td>catch up + rest</td>
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<tr>
<td>F Nov 25</td>
<td><strong>Thanksgiving Holiday</strong></td>
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<td>M Nov 28</td>
<td>Emerg. Prop. at Cellular Level</td>
<td>Section 14.2 + BME 14.1</td>
<td>Echo 360 for class</td>
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<td>W Nov 30</td>
<td>Emerg. Prop. Organismal Level</td>
<td>Section 15.2</td>
<td>Echo 360 for class</td>
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<tr>
<td>F Dec 2</td>
<td>Emerg. Prop. Organismal Level</td>
<td>Section 15.3 + ELSI 15.2</td>
<td>Echo 360 for class</td>
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<tr>
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<td>Level</td>
<td>BME 15.1 &amp; 15.2</td>
<td>Additional Notes</td>
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<td>M Dec 5</td>
<td>class canceled</td>
<td>Dr. C. out of town</td>
<td>I'll be presenting research about Bio113 at ASCB meeting.</td>
</tr>
<tr>
<td>W Dec 7</td>
<td>Emerg. Prop. Organismal Level</td>
<td>Section 15.4 + ELSI 15.3</td>
<td>Echo 360 for class</td>
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<tr>
<td>Dec 7 - 15</td>
<td><strong>Final Exam</strong></td>
<td><strong>Exam Due Thurs 15th at noon</strong></td>
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**Dr. Campbell's Bio113 Page**

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