An important initial comment: as you know, this course has no laboratory and will be discussion based with frequent short writing projects. As such, attendance is extremely important. The only excuses for missed attendance will be of a documented medical type. Please?

The above isn’t meant to be draconian. It is because of the fact scientists will be “tele-visiting” our class in to discuss their work with you all several times in this course. I want the University of Puget Sound…and that means all of you…to look great!

I. **Scope and Purposes of this Course:**

The poet and philosopher John Donne observed in 1624 that “no man is an island,” meaning that women and men do not exist in isolation, but as part of larger whole of humanity. This is true not only for interpersonal relations among human beings, but also between all living things on a more discrete and less philosophical level. In this course we will discuss and learn about these associations between what we can call the “large” and the “small,” ranging from bacteria living within aphids (and providing them with essential amino acids) to crustaceans that eat and replace the tongue of many species of fish.

Yet at the same time there are many less obvious associations, often with more positive benefits, that will also be part of our discussion and learning environment. In every case, we will return to the idea of organisms “living together,” shaped to do so by evolution, regardless of the impact of that association, positive, negative, or indifferent. Please keep in mind that the term “symbiosis” (“to eat at the same table”) can refer to positive, negative, and indifferent interactions---more of a spectrum than categorization.

Finally, there is disquieting evidence from various symbioses suggesting that some of these seemingly small organisms can in fact control the behavior of their larger “partners,” to promote their own “small agendas.” These can range from bacteria living within insects that attract or repel predators, to small worms that make insects seek out water (so that the parasite can complete its life cycle), to protists that make mice unafraid of cats. There is as of now little evidence that human beings dance like
marionettes to the tunes of small puppeteers, but there are many, many examples in nature of such associations.

To make this course topic more personally relevant, beings like yourself (and yours truly) can in fact be seen as a “metaorganism,” composed of myriad living things working together. Some scientists have calculated that a small proportion of the cells that make up a human being are actually human cells; the vast majority are viruses, bacteria, and archaea, along with some larger entities (a few of which may seem a bit disquieting). Some of those “human associated” organisms are vital for our well-being. Others cause disease. And many merely use us as a surface!

Humbling as that last sentence may sound, all of these “human associated organisms” have in fact co-evolved with us in remarkable ways, thus yielding the title of this course: we are never truly alone. From the bacteria in our gut that help us digest our food, to the strange mites that live for the most part harmlessly on our skin, to the parasites that cause tragic disease throughout human history, including today—all of these “intimate strangers” have been with us throughout evolutionary time. They are a part of us, their very lives shaped and patterned to “fit” within an ecological niche that is composed of our bodies. We will return to this core concept again and again in this course.

It can be argued, in fact, that symbiotic interactions drive and are essential to evolutionary processes. The original “merger of life” (between bacteria and primitive cells to create eukaryotic cells with mitochondria and chloroplasts) was symbiotic in essence, and is responsible for complex life on this planet.

All the above being said, in the course we are going to explore together, I have several general course objectives for each of you. Completing this course should give you the following:

- **Ability to evaluate sources of information for accuracy, relevance, possible bias, and scope---both in scientific and nonscientific spheres.**
- **The ability to deeply read, summarize, discuss, and apply cutting edge scientific journal articles.**
- **Development of self and peer review skills, as well as working within peer groups.**
- **Presentation of work to an academic audience verbally, in writing, and as part of a peer group.**
- **The development of a creative project of any type that relates to the subject matter of this course.**

II. **Specific Course Objectives:**

I would sum up the objectives for this course to be:

- **To be able to define various types of symbiotic interactions in the natural world around us, and upon and within us.**
- **To read assigned texts, scientific articles, blog posts, popular articles, and editorials critically and with care.**
• To compare and contrast how the public and scientists present research findings.
• To evaluate scientific arguments in peer reviewed scientific articles, particularly with regard to conclusions drawn from data.
• To learn how complex scientific arguments can be “repackaged” for other media outlets, including Twitter, blogs, podcasts, and editorials.
• To review your other biology courses in the light of this set of paradigms.
• To write a solid, analytical term paper focusing on one type of symbiotic interaction.
• With peers, create a solid and well-researched PowerPoint presentation focusing on another type of symbiotic interaction.
• To work individually and as part of a peer group, so as to take deep ownership of one’s work and the work of peers.

III. Course requirements:

Assignments in this course will be as follows:

A. Written assignments:

We don’t have a lab for this course. As such, there will be a fair amount of reading, discussion in class, and writing in this course, as described below. I will work hard to provide a detailed rubric with specific expectations in class, well ahead of deadlines, and to “space out” assignments. Work with me, and we will learn together. My twin mottos for any of my classes are “clear expectations” and “no surprises.” This course will be no different.

Writing assignments to be turned in will follow typical University guidelines: appropriate headings and labels, 12 point font size, 1.5 line spacing, and appropriate margins. Please pay attention to due dates; they are quite firm without prior arrangement with me. Late assignments will lose 15% of points per day after the due date/time.

1. Reading responses: About once a week, each of you will be asked to reflect in writing on a particular reading assignment. In some cases, you will be asked to focus on the main point (or three main points) of the reading. In other cases, you will be asked to summarize the assignment in a few sentences. In still others, you will be asked to search the literature or the Internet for related information (general expectation of 1-2 pages total per assignment).

2. Evaluation of sources: several times during the semester, you will be provided with several sources related to a particular idea under class discussion. Your mission will be evaluate these sources for intended audience, accuracy, purpose, and classification (primary, secondary, popular, etc.). (general expectation of 2-3 pages total).
3. **Commentary/analysis on select journal articles:** in this course, we will be “televisited” by various scientists working on different forms of symbiosis. As such, you will receive a journal article of their choice a week before their “visiting date.” You will read the article carefully, and come up with cogent and thoughtful questions that I will forward to the visiting scientist for discussion during their “televisit.” (1 page each).

4. **Analysis of select journal articles:** we will also discuss journal articles, essays, and so forth not involved with televisiting speakers. In these cases, we will be discussing and summarizing these articles in class. The former is part of classroom participation; the latter will be in the form of 2 page papers.

5. **“My Favorite Symbiont/Parasite”:** this will be one of the substantial assignments in this course, worth about 20% of your grade. Each student will, with my approval, select one type of symbiotic association, and delve deeply into it from a variety of perspectives. The assignment will be scaffolded so that the term paper will be built over the course of the semester, providing each student with a solid scholarly product. There will be peer review associated with this assignment (general expectation of 8 - 10 pages total).

6. **Popular news analysis:** often, issues of scientific importance are portrayed in a fashion that has not quite as much to do with accuracy than we might hope. Students will be given a journal article, and three “news sources” that describe that work. The assignment will have each of you evaluate the news stories with regard to accuracy and completeness. (general expectation of 2-3 pages total).

7. **Podcast evaluation:** social media (Facebook, Twitter, Tumblr, blogging, podcasts, etc.) are more and more common in today’s burgeoning electronic world. Students will be directed to a podcast describing a symbiosis/parasitism topic, and asked to evaluate that podcast with regard to audience, effectiveness, and accuracy. (general expectation of 2-3 pages total)

B. **Verbal/oral assignments:**

1. Students will create, in groups of three, a 20-minute PowerPoint presentation that will explore a specific example (to be selected in consultation with me) of symbioses or parasitism. This assignment will be presented to the class as a team effort. Evaluation will be both by yours truly and your peers.

2. Student discussion of PowerPoint presentations: students will be peer evaluating the presentations, and participating in exploration of this topic.

C. **Creative assignment:** it is true that no two students learn in quite the same way. Historically, I have found that allowing students to “create” something of their own design assists with learning, and increases enthusiasm. Students will thus come up with a small “creative assignment” of their own design exploring some aspect of symbioses or parasitism. Possible approaches could be a blog post, poetry, a painting, a video, a sculpture, or a musical performance.
D. Overall participation: as mentioned several times above, discussion and peer review are an important aspect of this course. I am happy to work with students on improving these vital skills (if there are issues involved with this requirement, I am happy to discuss them with you).

E. Quizzes: throughout the course, there will be four short quizzes (25 points each) to make certain that particular concepts and connections are well understood.

A word about Canvas: I am new to this format, and will have a Canvas site up and running by the second week of class. There, you will find PDFs of classroom materials, a portal to turn in assignments, and the ability to determine your grade (in progress) directly.

IV. Evaluation of your work:

As with any course, the grade assigned is earned by your work ethic, attention to detail, and willingness to meet your instructor halfway. The following is a breakdown of the percentage of the grade earned by assignment:

<table>
<thead>
<tr>
<th>A. Written assignments:</th>
<th>Total points</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reading responses (10 points per assignment)</td>
<td>100</td>
</tr>
<tr>
<td>• Evaluation of sources</td>
<td>20</td>
</tr>
<tr>
<td>• Televisiting scientist journal article review</td>
<td>60 (10 points, six visits---and we may get more).</td>
</tr>
<tr>
<td>• Analysis of journal articles in general</td>
<td>50</td>
</tr>
<tr>
<td>• “My Favorite Symbiont”</td>
<td>100</td>
</tr>
<tr>
<td>• Popular news analysis</td>
<td>20</td>
</tr>
<tr>
<td>• Podcast evaluation</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Verbal/Oral Assignments</th>
<th>Total points</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Group presentation</td>
<td>50</td>
</tr>
<tr>
<td>• Discussion and participation during presentations</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Creative assignment</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Overall participation (this includes attendance, participation in discussions, peer review assignments)</td>
<td>40</td>
</tr>
<tr>
<td>E. Quizzes (four at 25 points each)</td>
<td>100</td>
</tr>
</tbody>
</table>

Total number of points for YOU to earn: 600 points

Grading will follow typical University standards:
Your total number of points at the end of the semester will be used to determine your average percentage (92%, 78%, etc.) which can be easily converted to a letter grade using the table below.

<table>
<thead>
<tr>
<th>Average Percentage</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-100</td>
<td>A</td>
</tr>
<tr>
<td>90-92</td>
<td>A-</td>
</tr>
<tr>
<td>87-89</td>
<td>B+</td>
</tr>
<tr>
<td>83-86</td>
<td>B</td>
</tr>
<tr>
<td>80-82</td>
<td>B-</td>
</tr>
<tr>
<td>77-79</td>
<td>C+</td>
</tr>
<tr>
<td>70-76</td>
<td>C</td>
</tr>
<tr>
<td>68-69</td>
<td>C-</td>
</tr>
<tr>
<td>66-67</td>
<td>D+</td>
</tr>
<tr>
<td>60-65</td>
<td>D</td>
</tr>
<tr>
<td>0 - 59</td>
<td>F</td>
</tr>
</tbody>
</table>

If you wish to calculate your grade at any point during the semester, simply divide your total points by the number of possible points at that time. Convert the decimal to a percent and look up your grade in the table above.

V. **Required course materials:**

   A. Required texts (available in bookstore). These texts will be sources of background and formation necessary for classroom discussion, responses, and future assignments.


   B. Reading assignments on Canvas.

Reading will be available at least one week before class discussion or assignments are due. In other words, you will have ample time to read and reflect on each writing assignment before it is due. I want to keep this open so that students can interact with me about current interests; I will then begin to “fine tune” assignments, to provide students with items reflecting those interests.
C. Web-based resources.

There are many fascinating website and podcasts to explore. Here are a few (and I will assign some of them as the semester progresses).

1. “Small Things Considered” is a primarily microbiology blog, sponsored by the American Society of Microbiology, but has wonderful essays describing symbioses, parasites, and diseases as well.

http://schaechter.asmblog.org/

2. “Daily Parasite” is a fairly intense parasitology blog, but there is a great deal to explore here.

http://dailyparasite.blogspot.com/

3. “Parasite Wonders” is exactly as you might expect.

http://parasitewonders.blogspot.com/

4. “Phenomena” authored by Carl Zimmer (the author of one your required texts) is a very accomplished and serious science journalist. He does a meticulous job of explaining science. Many of his posts involve issues relating to symbioses and (of course) parasitism.

http://phenomena.nationalgeographic.com/blog/the-loom/

5. “Not Exactly Rocket Science” is authored by another superb science journalist, Ed Yong. Ed Yong has now moved his blog to “The Atlantic,” and is a readable, accurate, and engaging science writer. Yong has a particular interest in parasites that alter the behavior of their hosts (we will watch his fine TED talk on that topic).


6. “This Week in Parasitism” is an American Society for Microbiology sponsored podcast hosted by the great Vincent Racaniello. Dr, Racaniello sponsors a number of podcasts exploring issues relating the microbial world to everyday life; this is one of them. Much of the content is of medical importance, but a search through the archives will reveal a number of podcasts of interest!

http://www.microbeworld.org/podcasts/this-week-in-parasitism
7. “This Week in Microbiology” is an American Society for Microbiology sponsored podcast hosted by the great Vincent Racaniello. As before, not everything will relate directly to your (or this class’ interest), but do scan through previous episodes.

http://www.microbeworld.org/podcasts/this-week-in-microbiology

If you have read thus far in the syllabus, please e-mail me (to my Gmail account, not my Puget Sound account) an image of a parasite, with the subject line Symbionts Read Carefully. You will receive 5 points extra credit if you do this before midnight of our first meeting.

A few final words that are important for every student at the University of Puget Sound.

ACADEMIC HONESTY

You are expected to conduct yourself with integrity, as part of the academic community here at the University of Puget Sound. **ALL WRITTEN ASSIGNMENTS MUST BE WRITTEN INDIVIDUALLY AND ALL SOURCES OF INFORMATION MUST BE PROPERLY CITED.** If you plagiarize or cheat, or aid someone else in doing so, you violate a trust. No credit will be given for work copied or paraphrased from other sources (including another student) and harsher penalties may be applied (e.g. dismissal from the course with a failing grade, suspension, and/or expulsion from the University). Refer to the University of Puget Sound Logger for a definition and examples of plagiarism, as well as potential penalties for academic dishonesty:

http://www.pugetsound.edu/student-life/student-resources/student-handbook/academic-handbook/academic-integrity/

Every incident of academic dishonesty in this course **WILL** be reported to the Registrar. Academic dishonesty includes:

- plagiarism, copying, or misrepresenting yourself on written work
- misrepresenting data in lab reports
- using written notes during quizzes or exams (when notes are not permitted by the instructor)
- altering an exam or assignment after it has been returned
- defacing or unauthorized removal of library materials

Academic honesty is **serious** business. Please keep the above in mind.

Possible Disability Issues As They Relate to Academics:

Here is what the University of Puget Sound asks that I include in your syllabus regarding this topic:

“If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Peggy Perno, Director of Disability Services, 105 Howarth Hall, 253-879-3395. She will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.”
Please remember that these arrangements (as part of Disability Services and possible accommodations), are made ahead of time; **no last minute arrangements** can be made.

**Classroom Emergency Response Guidelines:**

Here is what the University of Puget Sound asks that I include in your syllabus regarding this topic:

“Please review university emergency preparedness and response procedures posted at [www.pugetsound.edu/emergency/](http://www.pugetsound.edu/emergency/). There is a link on the university home page. Familiarize yourself with hall exit doors and the designated gathering area for your class and laboratory buildings.

If building evacuation becomes necessary (e.g. earthquake), meet your instructor at the designated gathering area so she/he can account for your presence. Then wait for further instructions. Do not return to the building or classroom until advised by a university emergency response representative.

If confronted by an act of violence, be prepared to make quick decisions to protect your safety. Flee the area by running away from the source of danger if you can safely do so. If this is not possible, shelter in place by securing classroom or lab doors and windows, closing blinds, and turning off room lights. Lie on the floor out of sight and away from windows and doors. Place cell phones or pagers on vibrate so that you can receive messages quietly. Wait for further instructions.”