SYLLABUS – NEM 010V – GENERAL BIOLOGY
SPRING QUARTER 2020

After reading this Syllabus, I invite you to take an Introductory Quiz to be sure you understand what you have read. Don't worry, all of the questions are within the Syllabus, and you can take the quiz as often as you want until 5:00 pm Friday April 17, until you get all the questions correct. The quiz will be worth 15 points towards your final grade. This course will be using the canvas.ucdavis.edu course management system. The quiz is linked to the canvas.ucdavis.edu home page for the course. Click on Quizzes in the left hand column of the Canvas home page for the course.

Web Information: For this course, you must have ready access to the Internet, a current web browser, e-mail, and be reasonably proficient with these electronic tools. Arranging for computer and web access is your responsibility. There are a number of computer labs on campuses that can be used.

Advertising: Many of the web sites we will be visiting will contain annoying advertisements. I will never ask you to buy anything offered for sale on the web. Try to develop your concentration skills to the point where you can ignore these ads altogether. If you should have to watch an ad prior to being able to watch a video,

keep in mind that you are saving at least $150 by not having to buy a textbook for the course. You can watch a few ads and still be ahead of the game there.

Getting Lost on the web: My goal is to not have you get lost and be wandering around the web. I have been teaching this course online since 2002, so I hope we have worked out most of the bugs. You need to help me out by letting me know if you are getting lost and if my instructions are not clear.

Web sites with audio: Most of the web sites we visit will have audio as well as video content. If you don't already own a set, you should consider buying a small, inexpensive set of earphones to use for the course. If you are using a computer with speakers, keep this in mind if others are in the room trying to concentrate on something else. If you are in a computer lab, you will not be able to hear the audio unless you plug into an earphone jack located on or near the computer.

Email: I will use a class email list, as needed, to send you important information. The list will be generated using the email address under which you are registered for the course. You will be responsible for any communications sent to that email address and should check your email several times a week. Please read the Syllabus before asking questions about the mechanics of the course.

ILTI cross campus course: This is the third year Nem10V has been offered as a cross campus course. Things ran smoothly in the past, but be sure to let me know if you encounter any problems.

canvas.ucdavis.edu

For the course, we will be using some of the features of canvas.ucdavis.edu. To login to canvas.ucdavis.edu, open your web browser. Type http://canvas.ucdavis.edu in the url address line that should be visible at the top of the browser page.

Once at the canvas.ucdavis.edu page, click on the link that says UC Davis Log In. You will be prompted to enter your user name and password (the same ones you use to access other password protected UC Davis sites). Do this and you will be taken to your homepage for canvas.ucdavis.edu.

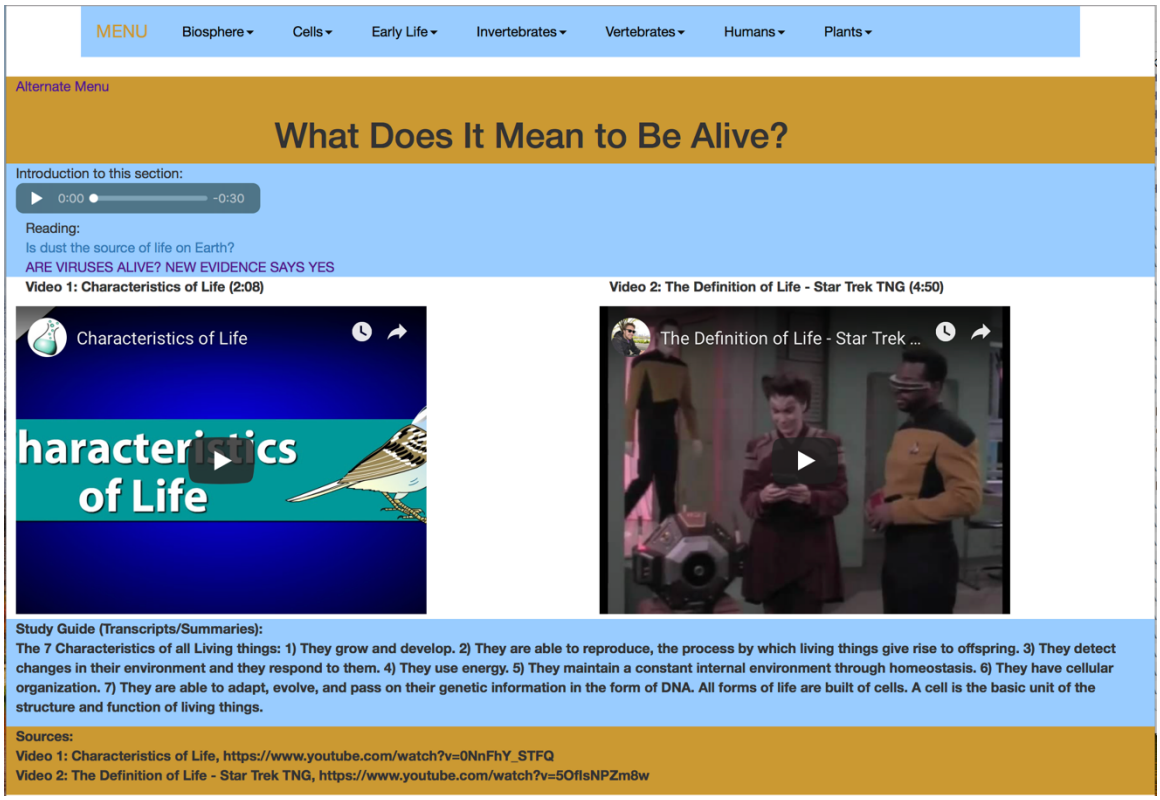
Click on the link to NEM 010V General Biology. This will take you to the homepage for your section of the course.

Along the left edge of the page you will see links for:

- Assignments
- Discussions
- Quizzes
- Grades

Clicking on these links will route you to those various elements of the course.

In the center of the page, above the dazzling montage illustrating the breadth of the course, you will see the words: Link to Course Content. Clicking on this link will take you to the Course Calendar that displays the topics you should cover during each week of the course.



When you click on one of the links to a topic, you will see that the course pages follow a similar format. There is a Menu bar at the top of each page showing that the course is divided into seven Units: Biosphere, Cells, Early Life, Invertebrates, Vertebrates, Humans, and Plants. Clicking on the name of a Unit produces a drop down menu of several Sections. Clicking on a Section will bring you to a page on that topic. Note that under Biosphere you will find links to the Syllabus and the Course Calendar. There is also a link to an Alternate Menu. A difficult problem facing web designers is how to make websites function the same with the many different browsers and devices available; and menu bars seem to be particularly problematic. On a small screen you will only see the word MENU to the left, and to the right a gold icon with three blue bars. Clicking on this icon will open the MENU. If you do not see the Menu bar on a page, click on the link to Alternate Menu, and it will take you to a conventional menu with the same links as the Menu bar. Moving down the page, you will find a link to: Introduction to this section. Here I have recorded a very short verbal explanation as to why I selected the Videos and Reading for the Section. Next you will find the assigned readings consisting mainly of links to current news articles or articles from the NobelPrize.org website. Then

you will find several YouTube videos to watch followed by the Study Guide (Transcripts/Summaries) for each Section. The Study Guide will help you to study for the exams. In many cases, you will find that I have extracted exact wording from the videos and readings rather than paraphrasing. This is because I plan to use the same wording when I develop multiple choice exam questions. The Study Guides within each Section were developed for the previous year's course. I will be doing some updating as we go through the quarter. Any updates for a Section will be posted prior to the start of the week it is listed on the Course Calendar. Finally, there is a Source list with urls that you can use to access the original sources directly if you wish.

I have set up the Sections so that the videos are embedded, and will play within the web page when you click on them. Note that once you click on a video, a menu bar appears at the bottom of the frame. This will give you various options depending on the video. Possibilities include moving forwards and backwards, muting, closed captions, watching on YouTube, and watching full screen. Some of the Sections include figures and/or tables. Before moving to Canvas (and in the backup website) clicking on the figures and tables would open in a larger view in a separate tab. In Canvas, the figure or table will download to your computer.

When you watch some of the videos, they may refer to a previous video or a following video in a series. Ignore these references because in most cases you will not have seen the previous video or be asked to watch the following video of the same series. These are conscious decisions I have made in choosing what I think are the best videos in particular areas of biology.

Link to Course Content on Backup Site: This is below the beautiful photo on the course home page. It is a link to a commercial server on which I have put a backup copy of the Course Content in case the Canvas server should be down for some reason. Please use the Canvas location whenever possible, because I have to pay for bandwidth on the alternate site.

It's important for you to understand that canvas.ucdavis.edu does not work reliably with all browsers. If you are going out of town, and will be using a computer you are not familiar with, you may have problems using canvas.ucdavis.edu if the computer does not have a compatible browser on it. You may also have problems if the computer has different security settings and software than the one you normally use (e.g. software to block pop-ups and cookies). Plan ahead so you do not have problems taking quizzes, and doing your postings. Take my email address with you (bbwesterdahl@ucdavis.edu) so you can let me know if you are having a problem.

If you are only going to be looking at the Course Content, you do not need to start with canvas.ucdavis.edu and will not need to enter a username and password to access it. I recommend that you bookmark both Course Content sites if you will primarily be using one computer during the course.

Grades: This is where I will enter your points for the Introductory Quiz, Virtual Office Practice Posting, Discussion Postings, Quiz 1, Quiz 2, Quiz 3, and Final Quiz. At the start of the course, you should be able to see all of these categories in Grades. At times, while I am grading various categories, some of the categories may disappear, so that I may enter grades and release them all at once. Don't worry, they will return.

Your grade will be based on 1,000 total points composed of 5 elements:

- (1) Introductory Quiz on course mechanics (take by 5:00pm on April 17) = 15 points
- (2) Discussion Postings = 420 points
  These points will be divided up among weekly postings.
- (3) Virtual Office practice posting (due April 17 by 5:00pm) = 15 points
- (4) Quizzes = 300 points total
  Quiz 1 (online May 1) = 100
  Quiz 2 (online May 22) = 100
  Quiz 3 (online June 4) = 100
- (5) Comprehensive Final Quiz June 5 = 250 points

Total: 1,000 points

Letter grades will not be given to any individual assignments, exams, or portions of the course. Your grade will be based only on the total number of points you have accumulated at the end of the course. What this means is that you cannot argue that if you receive what you feel are "A's" on some portions of the course and "F's" in others, your grade should be an average of what you feel those letter grades are. Because your grade is based only on the total number of points you receive, you need to participate and do well in all parts of the course in order to receive a good grade.

Unfortunately, Grades does not "roundup" the way many of us have been taught to expect. Each year, some students are disappointed to find themselves 0.5 points away from the next highest grade. I am sorry if this happens to you. I have complained about this to the Canvas developers but they do not seem to be inclined to do anything about it.

If you have a situation that requires special exam conditions, let me know and we will make the needed arrangements.

Quizzes: Here you will find a link to the Introductory Quiz that you should take after reading the Syllabus. You will be given the questions and answers for the quiz in the Syllabus. The quiz is just to be sure you have read and understood the mechanics of the course. You can take the quiz as many times as you want until 5:00pm on Friday April 17, until you get a perfect score. You will then receive 15 points towards your final grade.

I suggest taking the quiz as soon as you can. If you ask questions on course

mechanics that are answered in the Syllabus, before you take the quiz, I may ask you to re-read the Syllabus and take the quiz before I answer your questions.

This is also where you will find the links to take Quizzes 1, 2, and 3, and the Final Quiz online. Each quiz will be open for 24 hours and you can take them at any time during that period, but only one time. Quizzes 1, 2, and 3 will be multiple-choice tests with 25 questions (4 points per question). The questions will be drawn randomly from a "question bank" and could be different for each person taking the quiz. You will have 30 minutes to work on each quiz. You may use the course website (Readings, Videos, and Study Guide) if necessary. However you will not have a great deal of time, so it is best to thoroughly study the information beforehand.

The Final Quiz will be a multiple-choice test worth 250 points. It will consist of a total of 50 questions worth 5 points each (50 * 5 = 250 points). You will have 50 minutes to work on the test. It will be comprehensive covering the information covered in the course. It will be easier for you if you don't wait to the end to cram for it.

I have tried to write the Study Guide for each topic so that its statements can be directly converted into test questions. For each quiz, at least 70% of the questions will come from the Study Guide for each section of the course. The remaining questions will be similar to and from the videos, readings, figures and tables. The "authority" for correct answers on all quizzes will be the assigned videos, figures, tables, readings, and Study Guide; as opposed to something you may have read or heard elsewhere or learned previously.

When you take an online quiz, it is always possible that the Canvas server may malfunction and there will be no one to "fix-it" right away. If this happens to you please try to make a screen shot of the error message that you get and to email me immediately. I will handle any problems on a case-by-case basis.

If you are not able to take the online quizzes at the scheduled times, let me know so that a time can be arranged for you to take a closed source written exam.

Your scores for the online quizzes will be released in the Grades section of canvas.ucdavis.edu, after the 24-hour exam period is over.

QUIZ QUESTION: Which of the following is true about when the class meets and timing of exams?

a. This is a web based class that does not meet in a classroom.

b. The course will have 3 online quizzes (May 1, May 22, June 4).

c. The comprehensive final quiz will be on June 5.

d. All of the other answers are correct.

Virtual Office: To access the Virtual Office, click on the link to Discussions in the left hand column of the Canvas homepage for the course (canvas.ucdavis.edu). During the first three weeks of class, you must do a single practice posting to demonstrate that you understand how to access the Virtual Office and to ask questions. To get credit for your practice posting, you must post this sentence: "This is my practice posting." This posting will be worth 15 points towards your grade. This practice posting must be done by 5:00pm on Friday April 17. It is your responsibility to check the Virtual Office to be sure that your practice posting has been received. If you can't find your posting, neither can I, and you will not receive credit for it.

The Virtual Office is the place to ask questions about the course, find answers to questions that others have asked, and where I will share important information with you. If you have general questions about the class, the Virtual Office is the place to ask them. If you have personal questions or private matters to discuss with the instructor, email is more appropriate. You are responsible for checking the Virtual Office at least every other day (e.g. Monday, Wednesday, Friday) during the course for new information that may have been posted.

QUIZ QUESTION: Which of the following is true about the Virtual Office?
a. The Discussions feature of Canvas will function as a Virtual Office for questions concerning the course.
b. You are responsible for checking the Virtual Office at least every other day (e.g. Monday, Wednesday, Friday) during the course for new information that may have been posted.
c. During the first three weeks of class, you must do a single practice posting to demonstrate that you understand how to access the Virtual Office and to ask questions.
d. Your practice posting must be done by 5:00pm on Friday April 17.
e. It is your responsibility to check the Virtual Office to be sure that your posting has been received.
f. All of the other answers are correct.

Weekly Discussion Postings
You will find links to the Weekly Discussions under the Discussions link in Canvas. The Weekly Discussion Postings are worth a total of 420 points towards your grade, so please take them seriously, and do them each week. There are a total of 19 Weekly Discussion Postings. See the detailed weekly schedule at the end of this section. Each post is worth a maximum of 20 points (19 posts X 20 points = 380 points). Late postings can receive a maximum of 10 points each. If you submit all of your postings on time, you will receive an additional 40 points. Discussion posts are due at midnight on Sunday each week. For example, posts for the Week of March 30 to 3 are due at midnight on Sunday April 5. If this sounds like I'm trying to make you work on a weekend, tell yourself that the posts are due at 5:00pm on Friday, but not late until midnight on Sunday. If there is a reason that you cannot submit a post on time, or canvas.ucdavis.edu is down, email me the reason or the post before it is due.

I will make decisions about this on a case-by-case basis. Still, be sure to submit the post as soon as you can to be sure to receive partial credit. After you submit a post, refresh the canvas.ucdavis.edu page, and check that your posting is visible. If you can't see your posting, I can't either. It is your responsibility to check that your postings have been submitted successfully.

In your postings, please use formal sentence structure that you have learned in English classes, and that you will likely be expected to use in your future careers. Do not use "texting" abbreviations. Not only am I not likely to understand them, but they are not acceptable in formal scientific writing.

I have observed that people often make the same mistakes repeatedly in their writing. If I observe errors such as these in your postings, I will bring them to your attention, and hope that you try to avoid such errors in future postings. One year, a student commented in their course evaluation that I was misusing Oxford commas, and that this was terribly distracting. I had no clue what an Oxford comma was. After checking it out in Wikipedia, I realized that when I was in college, we were actually trained out of using Oxford commas. Now that they are in vogue again, I try to use them, but hope you are not offended, or distracted if I don't.

My plan for the Discussion Section is to ask open-ended questions to which each person can have a unique response. I would like for you to try to limit each discussion posting to around 250 to 300 words. One theory on improving one's writing skills is that the more pages you write, the better writer you will become. My theory is that the more often you write, the more your skills will improve. Also, I believe that it's actually more difficult to write concisely rather than verbosely. Each week you will write an "original post" in response to a new question for the week. The following week you will write a "follow-up post" to another student's "original post" from the previous week. For example, in Week 3 of the course you will write an "original post" in the Week 3 Discussion; and a "follow-up post" in the Week 2 Discussion. There is a more detailed schedule of this at the end of this topic.

Weekly posting will also encourage you to keep up to date with the topics and readings rather than cramming for Quizzes at the last minute. In each posting, I would like for you to refer to at least one video and to one reading. Use the following format for indicating the video and the reading: Topic/ Video 1 and Topic/ First 3 words of article title. For example: Scientific Method/ Video 1 and Scientific Method/ Landmark Huntington's trial. Do not quote the information you choose, but paraphrase the relevant information. This means writing it in your own words. See Scientific Method/ Video 6 and Scientific Method/ Video 7.

One of my goals in this course is that rather than to delve deeply into biology topics that you would likely never encounter in real life, I would like to help you organize and solidify a background knowledge of biology so that you can use it to understand and evaluate what is happening in the real world. Your postings should help you relate what you are learning in the course with what's happening in the world.

When selecting topics and videos, I continually asked myself whether this was something that people not majoring in science really needed to know. After providing background in an area, some of the Sections proceed to discussions of policies on which there are a variety of opinions, such as the creation of life, evolution, acid rain, climate change, biodiversity, and population growth. These are topics we will delve into in Discussion Postings. Try to make connections between the factual information about biology and the current news about the topic that is presented in the same Section. Frame your views in a way that presents factual, rather than emotional information, and do so in a way that does not denigrate the views of others. Confine your postings to information relevant to the class. Inappropriate postings will be removed and 10 points will be deducted from your grade for each inappropriate posting.

A common misconception about science is that it is conducted and reported in a totally objective manner. Ideally this is the case, but today's scientists are under tremendous pressure to sell themselves and their ideas in order to obtain funds to support their research. To help you understand what biologists do and how they do it, quite a few of the videos and the readings describe ongoing research in a variety of areas. Here are some ideas of things you could include in your postings. As you watch the videos, be alert to ways their creators may be trying to influence your reaction to the information presented. If there is background music, why was it chosen, and how does it make you feel? Is the announcer's voice authoritative, or perhaps condescending as if speaking to a child? In several of the videos scattered throughout the course, the narrator pitches their voice as if speaking to a child as if that will make a topic easier to understand. Why are some topics presented as animations rather than live media? Can you spot any fallacies in the videos (Scientific Method/ Videos 3 and Scientific Method/ Video4)? Does the video correctly or incorrectly use correlation to imply causation (Scientific Method/ Video 5)? If you find a better video on a topic than I have chosen, please share it with the class and provide the url (the link to the video).

Schedule for Discussion Postings:

Week 1 (March 30 to April 3): Virtual Office Practice Posting, plus Original Posting for Week 1 (due midnight April 5).

Week 2 (April 6 to 10): Original Posting for Week 2, plus Follow Up Posting for Week 1 (due midnight April 12).

Week 3 (April 13 to 17): Original Posting for Week 3, plus Follow Up Posting for Week 2 (due midnight April 19).

Week 4 (April 20 to 24): Original Posting for Week 4, plus Follow Up Posting for Week 3 (due midnight April 26).

Week 5 (April 27 to May 1): Original Posting for Week 5, plus Follow Up Posting for Week 4 (due midnight May 3).

Week 6 (May 4 to 8): Original Posting for Week 6, plus Follow Up Posting for Week 5 (due midnight May 10).

Week 7 (May 11 to 15): Original Posting for Week 7, plus Follow Up Posting for Week 6 (due midnight May 17)

Week 8 (May 18 to 22): Original Posting for Week 8, plus Follow Up Posting for Week 7 (due midnight May 24).

Week 9 (May 25 to 29): Original Posting for Week 9, plus Follow Up Posting for Week 8 (due midnight May 31).

Week 10 (June 1 to 4): Original Posting for Week 10, plus Follow Up Posting for Week 9 (due midnight June 7).

QUIZ QUESTION: Which of the following is true about the Discussion Section?
a. Discussions will be held using the Discussions feature of canvas.ucdavis.edu (look for the link on the left hand side of the course web page).
b. Each week you will write an "original post" in response to a new question for the week. The following week you will write a "follow-up post" to another student's "original post" from the previous week.
c. Discussion posts are due at midnight on Sunday each week.
d. Each post is worth a maximum of 20 points (19 posts X 20 points = 380 points). Late postings can receive a maximum of 10 points each.
e. If you submit all of your postings on time, you will receive an additional 40 points.
f. It is your responsibility to check that your postings have been submitted successfully.
g. All of the other answers are correct.

Reading / Textbook

There is no textbook for the course. There are a number of required readings and you will find links to these close to the top of each Section of the course website. They are listed under the heading "Reading". Most of the readings are short and are links to current news articles related to the subject matter of the section for which they are posted. Many of these are from the BBC news website. I seem to gravitate to this website because I find it has fewer advertisements than other news sites. Other readings are from the NobelPrize.org website. In some cases, these are press releases and in other cases they are lectures delivered by Nobel Prize Laureates. I have selected these because they provide good explanations of the topics covered and/or provide insight into the way science is done. There will be questions on the quizzes from major points covered in these readings.

If you feel that you need to have a textbook, I would look online for any recent editions of C. Starr, C. A. Evers, and L. Starr, "Biology Today and Tomorrow With Physiology".

There are also options to access free biology books online:
This links to a book that is entirely online.
http://www2.estrellamountain.edu/faculty/farabee/biobk/biobooktoc.html

At this link you can download a PDF of the biology book from which I took most of the figures and tables I've used in the course:
http://www.ck12.org/book/CK-12-Biology-Concepts/

Office Hours

If you are on the UC Davis campus, I will be holding office hours by appointment. I would be happy to meet with you at any time. My office is in room 4202 Storer Hall. My email is bbwesterdahl@ucdavis.edu. Because of my Cooperative Extension appointment, I am frequently away from campus. So, it is best for you to make an appointment to see me, rather than just dropping by. When you do come to see me, be sure to knock. The UCD Fire Department does not allow us to keep our doors open.

I check my email regularly and will try to respond quickly to all of your questions. Please put Nem10V or something similar in the subject line. I get a lot of junk email and may not open your email if I don't realize it concerns the class.

Will I be grading on a curve?

I will be grading on what I call a modified curve. If I were to grade on a curve, the average grade for the class would be a C and some of you would have to receive Ds and Fs. My preference would be that none of you receive Ds and Fs . However, if your scores are much lower than the rest of the class, you will leave me no choice. I would also like to think that I am a good enough teacher that most of you will learn enough about biology to receive a grade higher than a C.

Extra Credit

There will be no extra credit. I have never understood the concept of extra credit. My preference is that you spend any extra time you may have studying the lecture material and writing better Discussion Postings.

Adding the Course After the First Day of Class

You are welcome to add the course up until the last day to add which is Tuesday April 14. If you add the class late, you will need to take the Introductory Quiz by 5pm on Friday April 17. This quiz will cover information in the Syllabus on the mechanics of the course. You can take the quiz as many times as you want until April 17, so you can get a perfect score. It is worth 10 points towards your final grade. You will need to be sure to do a practice Virtual Office posting by 5:00 pm on Friday April 17. This is worth 15 points towards your grade. You will take Quizzes 1, 2 and 3 on the same days as the rest of the class.

QUIZ QUESTION: Which of the following is true about adding after the first day of class?
a. You are welcome to add up until the last day to add which is Tuesday April 14.
b. You will need to take the Introductory Quiz on the Syllabus by 5:00 pm on Friday April 17.
c. You will take the online quizzes at the same time as the rest of the class.
d. You will need to do a practice Virtual Office posting by 5:00 pm on Friday April 17.
e. Within one week, you will need to make-up any Discussion Postings that were due before you added the class.
f. All of the other answers are correct.

Course Evaluation
UC Davis has an online course evaluation system that you will be able to access at some point towards the end of the quarter.

How much time will the course take?
The UC Davis General Catalog indicates that you should receive 1 unit of credit for three hours of work each week including time spent in lectures and discussions. For this four-unit course, this would be 12 hours per-week.

One thing that is very important for a web-based course is for you to plan several hours each week to work on the course. Do not let yourself get behind. This is a course in which you will need to learn new information via memorization. If you are not used to courses in which memorization is required (sometimes called "content" courses), you should set aside time each week rather than cramming just before an exam. You will also need to use the new information you are learning when you prepare your discussion posts. Each year, some students lose points because they "forget" to turn in their assignments on time. Be sure to put the due dates for assignments on a calendar and be sure to check it regularly.

There is no perfect way to determine how much work/time an online course should take compared to a traditional lecture/discussion course. This is the rationale I used when creating this YouTube version of the course. In a typical 4-unit course, you would be spending 200 minutes a week in class (e.g. 4 class periods of 50 minutes each) and attending 38 lectures/discussions during the quarter for a total of 1,900 minutes in class (50 minutes X 38 lectures = 1,900). Many of the videos deliver information more rapidly than a professor would during an in class lecture. Other videos are great depictions of biology but contain less information. My goal was to limit the total amount of video time to 950 minutes so that you could watch each video twice during “class time”. I missed my target by 85 minutes and the course consists of 1,034 minutes of video. Next, rather than dividing the Sections up into lectures, I developed a calendar for each week listing the Sections you should try to cover that week and the total time for videos for that week. You can

cover the information at your own pace, as long as you complete the Sections required prior to each online quiz.

Why is this an online course?

This course was originally developed by Dr. Richard Falk who taught BIS 10 Spring Quarter each year by the traditional lecture and discussion method. More than 20 years ago, faculty became aware of the potential for the web to be used for teaching. Some thought it was a great idea and others thought a medium used to advertise cars and soft drinks should be relegated to just that. Dr. Falk gave it a try and gave his student's the option of taking the same class either by traditional methods, or by accessing the web. He decided that both groups of students learned a similar amount of biology and convinced the faculty committee on courses to create the web course BIS 10V (with V standing for virtual).

Before actually teaching BIS 10V, Dr. Falk moved on to a position with another University. I asked to be allowed to take over the course and was given permission to do so. Because my appointment is in the Department of Entomology and Nematology, the course became crosslisted as NEM 010V. Recently, BIS 10 was revised and renamed Everyday Biology. NEM 10V was decrosslisted and continues to be taught online as General Biology.

For the past 24 years, I have been actively engaged in a combination of traditional classroom and web based instruction. I have taught a portion of Entomology 156 (Biology of Parasitism) lecture and laboratory, and PPP 201 (Concepts of Plant Protection and Pest Management), and Nematology 204 (Management of Plant Parasitic Nematodes). As is common for many working in the sciences, I have a joint appointment at UC Davis. This includes a partial I&R (Instruction and Research) appointment combined with a CE (Cooperative Extension Specialist) appointment. NEM 10V is part of my I&R role. My CE role takes me on teaching and research adventures throughout the state of California.

Is a web-based course a better way to teach biology than in a traditional classroom?

There is still much discussion and debate about this. Until recently, my own opinion was that if I could be in a classroom with 10 of you at a time, the more traditional methods of teaching biology would be as good, if not better than a web based course. However, in my experience, once a class reaches a certain size, the quality of the student - teacher relationship and of the teaching begins to deteriorate. The maximum class size for each instructor to feel they are still engaging each student in a quality learning process is different for each instructor.

Many in the sciences have embraced the web concept of teaching by placing their course material on the web for others to share. If one were to do a web search for a common topic of biology courses, such as biome, one would find numerous sites developed by experts in the field anxious to share their best descriptions, pictures and animations with us. When I first developed NEM 10V, web pages

loaded much more slowly than they do today. The course utilized text-based lectures linked to the best visuals available on the web. Over time, web speeds have increased dramatically, and many excellent short subject videos on biology have become available on YouTube. In 2016, I totally recreated NEM 10V as a YouTube based course supplemented by web based readings, and a text based Study Guide. Given that Biology is the study of life, and that with videos we can observe life in real time, I now feel that a web-based course is a better way to teach biology than in a traditional classroom.

How should You study for this course? This is a question I am frequently asked. First, you will need to take more responsibility for your actions in this course than in a traditional lecture course. The information presented and the learning expectations for the quizzes will be very similar to those in a traditional biology lecture course. Ask yourself what you get from a traditional lecture. Why do you attend (or not attend) lectures and what adjustments will you need to make in your study habits to be able to learn the information presented.

You may find that most of the information presented in this course is already familiar to you. This is because you have very likely taken biology or life science in middle school and high school. The California curriculum requires you to have a year of biology or life science in middle school, and at least an additional year in high school. I understand that for some, your previous exposure to biology has developed into a fear and loathing rather than into an understanding of biology. My hope is that you will find actually seeing biology in YouTube videos rather than listening to it in a lecture format will clarify and dispel the confusion and fear that you feel.

Taking notes is an activity you likely participate in when you attend a lecture. An expert on the subject is speaking and you are trying to learn what is being presented. Learning takes place when you are actively involved in manipulating the information presented. You are hearing the instructor deliver the lecture, you are watching information being written on the blackboard, and you are actively summarizing the information presented in your notes. If the class is not too large, and you are not too intimidated, you will ask questions if you don't understand. You may want to take notes on the videos, or you may find the Study Guide in each Section will substitute for this.

In a lecture class, you are also alertly and very keenly trying to read the instructor’s mind and determine by mannerisms, voice inflections or direct questioning what is likely to be on the exams. All of this has been happening at least since the days of Aristotle, several hundred years BCE. In spite of tremendous changes in technology, with the exception of increasing class sizes, the University learning process has remained relatively unchanged for hundreds of years.

In this course, we are taking a huge leap in a different direction. We are attempting to substitute for, and perhaps even improve on, the traditional learning

process. What has changed that could allow us to do this? For one thing, technology has changed. The web has created an environment where we can travel anywhere in the world via our computer screens.

Perhaps most importantly, students have changed and their expectations have changed from those of previous generations. Many of you are "digital natives". You are part of a generation that likely played video games before you could walk or talk. You grew up with Sesame Street, Barney, Carmen San Diego, and other educational television programs teaching you the basics of language, math and science before you even went to school.

How do you learn your way through video games? How did Big Bird teach you to read? I don't actually know. Practice, repetition, memorization, and synthesis of ideas are all involved in learning. In both video games and classroom lectures, your senses and your concentration are engaged, and you manipulate the information presented. You do this differently perhaps, but hopefully just as effectively, as when you are sitting in a classroom lecture. And which have you found to be more enjoyable?

But, how will you know what is going to be on the exams? Well, we don't actually have video games, but I have prepared a Study Guide for each Section of the course. I have tried to write the Study Guide so that its statements can be directly converted into quiz questions. For each quiz, at least 70% of the questions will come from the Study Guide for each Section of the course. The remaining questions will be similar to and from the same source materials. I do not believe in writing trick or trivial questions. When I write each question, I will be asking myself if it reflects information that is useful for you to know.

Please use the Study Guide to review the information presented in the Videos and Reading, not as a substitute for them. Remember that you will only get out of this course what you put into it. If you choose to just memorize the Study Guide without watching the Videos and doing the Reading, it is likely that you will end up feeling like you have not learned much of anything, and that will be true.