GENERAL BIOLOGY II (Biology 007)

5.00 units (UC:CSU)
Section 0410
Spring 2015
Professor: Patricia Zuk, PhD
email: zukp@wlac.edu

LECTURE: MSA Rm. 303
9:35am – 11:00 am

LABORATORY: MSA Rm. 303
12:00pm – 3:15pm

OFFICE HOURS: by appointment or from:

1. 3:30 to 4:30 PM Monday through Thursday
2. Office is MSB Room 210

General Biology II covers the principles of anatomy and physiology in plants and animals, in addition to microbiology, ecology, evolution and the taxonomic classification of organisms. It is for biology majors, pre-med, pre-dental, pre-pharmacy school students. It transfers in combination with General Biology I (Biology 6) as the first year of a biology majors program at most UC and CSU campuses.

ATTENDANCE: Attendance is mandatory (see Administration Regulation E13). If enough absences occur throughout the semester, I can exclude you from the course. Be aware that your grade in this course depends on your performance – which is dependent upon your attendance. **I guarantee if you miss too many classes and labs – you will fail the course.**

Lectures begin at 9:35am and run until 11:00am. You have a lunch break until 1:00pm. At this point, the laboratory section of the course begins. Each laboratory is preceded by a lecture portion of 1 to 1.5 hours and will cover the concepts of the laboratory for that day. These lectures are often an extension of the morning session. So being late for lab means you will miss part of this lecture. Labs run until 4:15pm.

Since biology labs cannot be duplicated outside the class it is very important for you not to miss any labs if possible. You also must plan on attending the entire lab period. When you are finished the labs – to my satisfaction – you may leave quietly without disturbing your fellow lab mates.

I consider extreme tardiness or early departure from lab/lecture without a valid cause to be very disrespectful conduct. However, I realize traffic and life gets in the way sometimes. So being late and having to leave early is fine – every now and then. **Do NOT insult me or your classmates by consistently showing up late to lecture/lab every time!!!**

DO NOT EVEN CONSIDER BEING LATE IF THERE IS AN EXAM SCHEDULED. I will NOT give you the exam if you are more than 10 minutes late and have provided me with a valid excuse for your tardiness that day!! If you have conflicts in your schedule – come and talk to me. I am very understanding about many things and do not bite my students (much!). Also, exchange numbers with your lab-mate so that if you are running late for an exam you can relay a message to me through them. That way I can set aside your exam for when you arrive.

WITHDRAWING FROM THE CLASS: Any student withdrawing from the class must inform the admissions office and complete the required steps. Students failing to follow the correct procedure for withdrawing will receive an 'F' at the end of the semester. I will not be held responsible for your grade if you fail to correctly withdraw from this course. Therefore, confirm your registration status. Finally, there are deadlines for withdrawing without a "W", with a "W" and a deadline where withdrawing is no longer possible. Be aware of these dates.

COURSE CONSTRUCTION: This course is comprised of two weekly lectures/labs that total over 9 hours per week! This is a lot of lecture time and a lot of lab time. Breaks will NOT be given during these sessions. However, you will have 60 minutes in between the morning and afternoon sessions to recharge your batteries.

The morning session is 90 minutes of lecture. These lectures cover the major topics in your biology textbook and should (hopefully!) coincide with what we will be studying in the afternoon laboratory session. The afternoon session is 3hrs and 15 minutes of lab time. However, the first 60 to 90 minutes will be a lecture that covers the specific concepts of that lab topic or continues on what we were covering in the morning session. The last 2 hrs will be devoted to individual or team lab research. This material will be covered in your lab manual.

You are welcome to tape my lectures. I also have my own personal website – www.patriciazuk.com where the lecture presentations can be found along with additional learning materials. This website is password protected with the username of **student** and the **case-sensitive password of #1Wlacstudent**. The lectures are "student lectures" and do NOT contain every detail you will find in my lecture presentations or will hear throughout my lectures. This is so that you are required to pay attention and write some things down. Therefore, please print out these lectures and bring them to class so that you may supplement them throughout the lecture/lab period with your own notes taken during class. You will also be required to re-create simple figures and diagrams that I will present to you throughout lecture.

Videos shown in lecture and lab are to be considered as important as lecture and you should pay close attention to the material presented in them.

Handouts may be given in class so be sure to pick them up the day they are offered. I am not guaranteeing that these handouts will be available after the day I offer them.

LABORATORIES: Each afternoon session is 3 hours and 15 minutes long. The first 60 to 90 minutes will be lecture material pertinent to that lab session or a continuation of the morning

lecture. Please bring your lab manual and all lab materials to each lab as your assigned material will be in the lab manual.

You will work in teams of 2 or 3 for each lab but are also encouraged to interact with other groups throughout the lab. Each student will use their lab manual for their observations and conclusions. This lab manual will be available to you either through the course website or through the bookstore.

COURSE MATERIALS: be sure to bring these to each class
1. Textbook: Campbell Biology – Campbell, Reece et al. 9th Edition. Benjamin Cummings Publishing.
2. Lab Manual: Available at www.patriciazuk.com or at the bookstore. You have a choice of spending your money to print out this manual or buying it from the bookstore. However, this manual IS MANDATORY!!!
3. A Photographic Atlas for the Biology Laboratory – 5th edition; Van de Graaff and Crawley (Morton Publishing Company): This 263-page book contains numerous pictures and drawings critical to your success in this class. It is available at the bookstore and IS MANDATORY!!!
4. Lecture notebook: This may be your own preference but I would recommend a three-ring binder. You should also print out the lecture slides prior to coming to class and put these in your notebook.
5. Dissection supplies – while dissection instruments are provided in lab, you may want to use your own. Therefore, you can buy your own dissection kit at the bookstore for about $15. You will also HAVE TO PURCHASE YOUR OWN GLOVES!! Let me repeat, GLOVES WILL NOT BE PROVIDED TO YOU. You may also want to buy a cheap lab coat to protect your clothes will you are dissecting but this is not mandatory.
6. Numerous colored pens and pencils for lectures and labs
7. Scantron 882E forms for exams

EXAMINATIONS: You will have two different types of exams: Lecture exams and Laboratory exams. Lecture exams will be worth a maximum 100 points. These exams will be multiple choice, fill in the blank, short answers and may include figures from my notes and from the text that you will have to complete. These exams will range anywhere from 50 to 100 questions. You will use your lecture notes to study for this exam. If your exam is less than 100 questions, I will convert your grade to 100 when I calculate final grades

Each laboratory exam will be worth a maximum of 50 points. These exams are based on your afternoon lab sessions. They will also include multiple choice and fill in the blank questions and may also include identification questions using images projected by the computer. The exams will range anywhere from 35 to 50 questions. You will use your laboratory notebook to study for this type of exam. If your exam is less than 50 points, I will convert your grade to 50 when I calculate final grades

There will be a final exam held during the exam period. It will be a **cumulative exam worth 150 points.** This exam will encompass materials given during the lecture and lab sessions

throughout this course. Like your previous exams, it will include multiple choice, true/false, fill in the blank and short answer questions.

You have a total of 5 lecture exams and 4 lab exams held during the normal course of the semester. In addition, you have a final lecture and lab exam held during finals. This means you have a total of 6 lecture exams and 5 lab exams. **However, I drop your lowest lecture and lab exams.** This means if, at the end of the semester, you are happy with your final grade (based on 5 lecture and 4 lab exams), you do not have to take the final. If you are not happy, you may take these final exams and if the grades are better, I will use them to replace your lowest lecture and lab exams you took during the regular semester. **At the end of the course, I will use your top 5 lecture exams and your top 4 labs exams to calculate your final grade (out of 700 points).**

In creating my course like this, it also allows you the chance to skip a regular semester test if you are not prepared for it or miss a regular semester test due to illness, family emergency, being out of town or religious holiday. **This means I will not give make-up exams due to these reasons.** For example, if you must miss a regular semester test due to a religious holiday, you may re-take this exam during finals and in the form of the final cumulative exam. **I will NOT allow you to re-take your missed exam at any other time.** I realize that everyone has a good reason for missing a test, but in the interest of being fair to everyone, I must create a single policy and stick to it no matter the individual, personal circumstances.

I will discuss each exam and what to expect – so don't freak out! I may also provide you with some study guides to ensure you are keeping yourself on track during your study times. But don't count on it! This is a majors biology course so you are expected to know what could be on an exam.

Exam breakdown:
Lecture exams = 4 x 100 = 400 points
Laboratory exams = 4 x 50 = 200 points
Final cumulative exam = 150 points (100 points lecture portion, 50 points lab portion)
Total points = 750 points

West LA College specifies the following ranges for grades:
90% - 100% = A
80% - 89% = B
70% - 79% = C
60% - 60% = D

I do not allow you to keep any tests so please keep track of your performance in the class by recording all your exam scores.

Cheating will NOT be tolerated. ANY STUDENT FOUND CHEATING WILL RECEIVE THE GRADE OF 'F' FOR THAT EXAM AND MAY BE EXPELLED FROM THE COURSE!!! Please see the college's

policy on academic dishonesty for additional information. While not written in this syllabus, the college's policy on academic dishonesty will be adhered to in this course.

WEST LA COLLEGE STUDENT LEARNING OUTCOMES (SLOs): West LA College as an institution is committed to an environment of learning and respect for its students. Its mission is to serve the community by providing quality instructional services through its programs and facilities. The college has created a series of Student Learning Outcomes (SLOs) that are designed to maximize the successes and experiences of the students here at WLAC.

A. Critical Thinking: Analyze problems by differentiating facts from opinions, using evidence, and using sound reasoning to specify multiple solutions and their consequences.
B. Communication: Effectively communicate thought in a clear, well-organized manner to persuade, inform, and convey ideas in academic, work, family, and community settings.
C. Quantitative Reasoning: identify, analyze, and solve problems that are quantitative in nature.
F. Technological Competence: Utilize the appropriate technology effectively for informational, academic, personal, and professional needs.

BIOLOGY PROGRAM SLOs: In addition, the Biology program also has several unique SLOs.

- Explain how scientists investigate causes of natural biological phenomena.
- Utilize biological information to make informed decisions about environmental issues.
- Utilize biological information to make informed decisions about personal issues.

STUDENT LEARNING OUTCOMES FOR BIOLOGY 7:
At the end of the semester, the students should understand and be able to explain the fundamental concepts contained in the following:

1. the principles of taxonomy and how it works & how molecular genetics has changed taxonomy
2. the differences between a prokaryotic and a eukaryotic cell and how each are structured and function the structure of unicellular eukaryotes known as the protists
3. the feeding and reproductive strategies of fungus
4. the major adaptations plants made to colonize terrestrial life
5. the life cycles of the major plant groups
6. how plants use photosynthesis to make food
7. the evolution of the major animal phyla
8. how animal anatomy relates to their physiology
9. how organisms interact within the biosphere and its levels

LEARNING OBJECTIVES FOR BIOLOGY 7: In addition to the course SLOs listed above, there are multiple subject and technical objectives that the students should reach by the end of the

semester. These objectives encompass many of the major themes presented in this course, in addition to covering more specific topics.

SUBJECT OBJECTIVES: At the end of the semester the students should demonstrate proficiency in understanding and explaining the following:

1. Taxonomy, including being able to define terms such as taxa, phylum, class, order, genus and species
2. Cladistics, including being able to define and classify the three major superkingdoms and clades found on Earth
3. The different types of feeding strategies by living organisms on Earth
4. The two divisions of the Prokaryotic superkingdoms and their major characteristics. The major divisions of the Bacterial domain, including gram negative and gram positive bacteria
5. The role of prokaryotes in biology, including their major adaptations in metabolism
6. The structure and function of the following bacterial structures: the cell wall, the glycocalyx, pili, fimbrae, the nucleoid regions, the bacterial chromosome, the flagella
7. The organization of the bacterial genome, how the bacterial genome replicates and the three types of genetic recombination in bacteria
8. The major clades of protists and their major defining characteristics, structures and functions
9. How protists may have evolved through endosymbiosis
10. The life cycle of protists such as paramecium, water molds, slime molds and algae, including understanding the difference between sexual and asexual stages and how protists like trypanosomes and plasmodium infect humans
11. The body structure of a typical fungus, including the mycelium and types of hyphae
12. Fungal associations with plants and animals, including the types of mycorrhizal fungi
13. The basic sexual and asexual reproductive strategies of fungi, including karyogamy and plasmogamy
14. The major structures and reproductive strategies for each fungal phyla, including spore dispersal
15. Fungi as food and as pathogens
16. Yeasts and how they are considered fungi
17. Lichen types and their reproductive strategies
18. The classification scheme for terrestrial plants, including understanding the differences between non-vascular and vascular plants; seedless vs. seed plants
19. The traits shared between plants and charophyceans
20. The adaptations by terrestrial plants, including understanding their derived traits such as alternation of generations and development of apical meristems

21. The role of the following structures in plants: sporophytes, sporangia, gametophytes, gametangia, archegonium, antheridium
22. The definition and classification of a non-vascular plant, together with the structure and function of non-vascular gametophytes and sporophytes
23. The life cycle of a moss
24. The two types of vascular plants
25. The two types of vascular tissues, including the cellular component and function of xylem and phloem, metaxylem and metaphloem
26. The development of roots and leaves by vascular plants
27. The four characteristics of seedless vascular plants
28. The difference between heterospory and homospory within the sporangium; the differences between the microsporangium and megasporagium. What gametophytes do they produce?
29. The two phyla of seedless vascular plants and the structures of their sporophytes and gametophytes
30. The life cycle of the fern, including its major stages, their structures and functions
31. The three reproductive adaptations by seed vascular plants
32. The major characteristics shared between seed vascular plants, seedless vascular plants and non-vascular plants
33. The difference between monoiecous and dioecious plants in terms of structure, monocots vs. dicots in terms of vascular bundle organization, germination mechanisms and embryo development
34. The development, structure and function of gymnosperm and angiosperm ovules and ovaries, the angiosperm fruit, the seed, the endosperm and the embryo sac
35. The structure and function of pollen, including the types of cells within the pollen grain
36. The process and types of pollination strategies by plants, including double fertilization and self-fertilization
37. The definition and major characteristics of the gymnosperms, including their phylogeny
38. The life cycle of the pine, including its major stages in the male and female, their structures and functions
39. The definition and major characteristics of the angiosperm, including their phylogeny and the differences between monocots and dicots
40. The life cycle of a typical angiosperm, including its major stages in the male and female, their structures and functions
41. Definition and understanding of the following: plant embryology, double fertilization, self-fertilization
42. The components and function of a plant cell, including the composition and function of the cell wall, the types and function of plastids

43. Communication methods between plant cells
44. The structure and function of the three types of plant cells, in addition to the composition and functions of plant tissues, such as dermal, vascular, ground tissues, cambium and meristematic tissues
45. The composition and organization of the vascular bundle in stems, roots and leaves, comparing monocots vs. dicots
46. The structure and function of stems, roots and leaves, including the organization of tissues and any evolutionary adaptations
47. Primary and secondary growth by stems and roots, including the tissues involved in secondary growth
48. The types of root systems and zones of root growth
49. Plant nutrition, including the role of CO_2, water, soil minerals and nitrogen
50. The requirements to be an essential element
51. Micro vs. macronutrients. What is mineral deficiency? What minerals are most commonly deficient?
52. Soil structure and composition of layers
53. The stages of nitrogen fixation and the role of bacteria and bacteroids
54. The overall reaction for photosynthesis, including what is produced
55. The steps of photosynthesis, including the Light reactions, non-cyclic and cyclic electron flow, chemiosmosis, the Stroma reactions, the Calvin cycle, carbon fixation, carbon reduction and regeneration of the CO_2 acceptor
56. The role of the following in photosynthesis: chlorophylls, chloroplasts, carotenoids, photosystems, reaction centers
57. The difference between C3, C4 and CAM plants in terms of their photosynthetic mechanisms
58. What is an animal? Clade Metazoa and its members. What is the criteria to be an animal?
59. The unique reproductive strategies of animal vs. plants and fungus
60. Embryonic development in animals: cleavage, embryonic stages, gastrulation
61. Animal body plans and how they vary
62. Animal developmental modes. How do protostomes and deuterostomes differ?
63. The five points of animal phylogeny
64. Phylum Porifera and the development of true tissues and immunity
65. Phylum Cnidaria and the development of animal locomotion and defense
66. Worms and the development of terrestrial animals
67. The structure and function of the invertebrate body plan, including the development and function of specific cell types, tissues and organ systems in the following: sponges, cnidarians, annelids, flatworms, nematodes, molluscs, arthopods and echinoderms

68. The development and function of the following organ systems in invertebrates: digestive - the gastrovascular cavity and the gastrodermis; gas exchange and respiration – the development of the terrestrial lung; locomotion; the nervous system – nerve nets and ganglia; the circulatory system – the heart, open vs. closed systems; the excretory system – nephridia types; reproductive system – sexual vs. asexual reproduction, external vs. internal fertilization
69. The development and function of unique invertebrate systems and structures, such as the water vascular system, the exoskeleton
70. The unique adaptations of terrestrial vs. marine vertebrates, including the adaptational success of arthropods
71. The four characteristics of Phylum Chordata: structure and function
72. The development of vertebrates from chordates: the development of the head, the jaw and limbs
73. Thermoregulation in vertebrates: ectoderms vs. endoderms; the four ways of heat exchange; balancing heat loss vs. gain; circulatory adaptations; thermostats, metabolism, the BMR and metabolic adaptations in thermoregulation
74. Differences in the body plans and structures of the vertebrates, including being able to compare and contrast the major organ systems in fish, amphibians, reptiles, birds and mammals
75. Using the mammal as an example of vertebrate physiology, be able to understand the structure and function of the following systems: digestive, circulatory, respiratory, excretory, reproductive, and nervous
76. The biosphere of planet Earth and how it can be subdivided
77. The biomes of planet Earth
78. The major forces contributing to climate on the planet, including the role of sunlight, mountains and ocean currents
79. The process of evolution

<u>TECHNICAL LEARNING OBJECTIVES:</u> Add the end of the semester, the student should be able to understand the following within a laboratory setting:

1. The difference between coccus, bacillus and spiral in terms of bacterial shape, including identifying these under a microscope
2. Identification of the major types of protists using prepared slides and pictures, including some of the internal structures of the paramecium, Euglena
3. The identification of the five fungal phyla and the following fungal structures using specimens or prepared slides: ascocarp, ascospores, basidium, basidiocarp, conidia, conidiophores, zygosporagium, zygospores and sporangium
4. Identification of lichen types using specimens

5. Identification on models, pictures and under the microscope of the following plant structures: sporophytes, sporangia, gametophytes, gametangia, archegonium, antheridium
6. The three phyla of non-vascular plants and identification of some of their representatives using specimens
7. Identification on models, pictures or specimens: the structural components of roots, stems and leaves, the major types of leaf phyllotaxy, the morphology of leaves
8. Identification of the two phyla of seedless vascular plants, their major representatives and identification of their sporophytes and gametophytes under the microscope or in specimens
9. Identification of the major structures of a fern, including the structure and function of the sorus and the annulus using specimens, models and prepared slides
10. Identification of the major structures of gymnosperms using specimens and prepared slides, including structures such as needles, stomata, bracts, scales and cones
11. Identification of the parts of a flower and the fruit using models and specimens
12. The types of fruits using specimens
13. Identification of the three types of plant cells and the tissues they create
14. Identification of the tissues found in the vascular bundle in stems, roots and leaves; both in monocots vs. dicots
15. Identification of meristematic tissue of the stem using prepared slides
16. Identification of the major regions and tissues involved in secondary growth using models and prepared slides
17. Identification of the major kinds of root systems using specimens
18. Identification of the tissues found in sponges and cnidarians using prepared slides and the types of body plans using specimens
19. Understanding of the internal anatomy and function of the following animals using dissection, models and prepared slides: flatworms, roundworms, and annelids
20. Understanding of the internal anatomy and function in more complex animals through the dissection of: a clam, a crayfish, a grasshopper, a frog and a starfish
21. Using dissection of the fetal pig, an understanding of the internal anatomy of the following vertebrate organ systems: digestive, circulatory, respiratory, excretory and reproductive

Schedule of Topics

Section	Text Chapters	Date	Lecture Topic Lab Topic
Primitive Life: Bacteria, Algae & Fungi	Ch. 26	02/09	Biological Diversity Phylogeny & the biological kingdoms ***Lab 1: The Microscope***
	Ch. 27	02/11	Kingdom Monera: The Prokaryotes ***Lab 2: Eubacteria, Cyanobacteria***
		02/16	**PRESIDENTS DAY** **NO CLASS**
	Ch. 28	02/18	Kingdom Protista ***Lab 3: Protists & Algae***
	Ch. 28	02/23	Kingdom Protista cont…. ***Lab 3: Protists & Algae cont…***
	Ch. 31	02/25	Kingdom Fungi ***Lab 4: Fungi***
		03/02	**LAB PRACTICAL 1 – 9:45AM → 11:00AM** **LECTURE EXAM 1 – 12:00PM → 2:00PM**
Botany	Ch. 29, 30	03/04	Plant Diversity I: Non-vascular plants & Seedless Vascular plants ***Lab 5: Bryophytes & Non-Seed Vascular Plants*** ***-mosses, liverworts & ferns***
	Ch. 30, 35, 38	03/09	Plant Diversity II: Vascular plants - Gymnosperms ***Lab 6: Gymnosperms***
	Ch. 35	03/11	Plant Diversity III: Vascular Plants - Angiosperms Plant Reproduction ***Lab 7: Angiosperms*** ***-Plant Reproduction – flowers & fruits***
	Ch. 10	03/16	Angiosperm Form & Function – Plant anatomy & histology ***Lab 8: Angiosperms*** ***- Plant Anatomy – leaves, stems, roots***
		03/18	Angiosperm Form & Function cont… ***Lab 8: Angiosperms*** ***- Plant Anatomy – leaves, stems, roots cont….***
		03/23	**LAB PRACTICAL 2 – 9:45AM → 11:00AM** **LECTURE EXAM 2 – 12:00PM → 2:00PM**
Invertebrate biology	Ch. 32, 33	03/25	<u>Clade Metazoa:</u> The Animal Kingdom <u>Clade Parazoa:</u> Phylum Porifera <u>Clade Eumetazoa:</u> Phylum Cnidaria ***Lab 9: Sponges & Cnidarians***
	Ch. 33	03/30	<u>Worms, worms, worms</u> Phylum Platyhelminthes: <u>Clade Lophotrochozoa</u>

			Phylum Nematoda : Clade Ecdysozoa Phylum Annelida: Clade Lophotrochozoa ***Lab 10: Worms*** ***-earthworm & roundworm dissection***
	Ch. 33, 34	04/01	Clade Lophotrochozoa: Phylum Mollusca Clade Ecdysozoa: Phylum Arthropoda ***Lab 11 & 12: Molluscs & Arthropods*** ***-spiders, crustaceans & insects*** ***-crayfish & grasshopper dissection***
		04/06 & 04/08	**SPRING BREAK** **NO CLASSES**
	Ch. 34, 40	04/13	Clade Deuterostomia: Phylum Echinodermata ***Lab 13: Echinoderms*** ***-sea stars & lancets*** ***-sea star dissection*** ***-review for lab practical***
		04/15	**Field Trip to Point Dume Tide Pools** **OR** **Aquarium of the Pacific**
		04/20	**LAB PRACTICAL 3 – 9:45AM → 11:00AM** **LECTURE EXAM 3 – 12:00PM → 2:00PM**
Comparative Vertebrate Biology	Ch. 47	04/22	Clade Deuterostomia: Phylum Chordata and the Vertebrates Thermoregulation in Vertebrates ***Lab 14 – Vertebrate Lab*** ***-dogfish dissection*** ***-frog dissection***
	Ch. 41	04/27	Vertebrates: The Digestive System and Nutrition ***Lab 15: Vertebrate Anatomy I*** ***-the Digestive System***
	Ch. 42	04/29	Vertebrates: The Cardiovascular System ***Lab 16: Vertebrate Anatomy II*** ***-the Cardiovascular System***
	Ch. 42	05/04	Vertebrates: The Respiratory System ***Lab 17: Vertebrate Anatomy III*** ***-the Respiratory System***
	Ch. 44	05/06	Vertebrates: Osmoregulation & Excretion ***Lab 18: Vertebrate Anatomy IV*** ***-the Urinary System***
	Ch. 46	05/11	Vertebrates: Reproduction ***Lab 19 Vertebrate Anatomy V*** ***-the Reproductive System***

	Ch. 48, 49, 50	05/13	Vertebrates: The Nervous System ***Lab 20: Vertebrate Anatomy VI*** ***-the Nervous System***
		05/18	**LAB PRACTICAL 4 – 9:45AM → 11:00AM** **LECTURE EXAM 4 – 12:00PM → 2:00PM**
Ecology & Evolution		05/20	Ecology – AM lecture Evolution – PM lecture ***No labs planned***
		05/25	**MEMORIAL DAY** **NO CLASS**
		05/27	**LAB PRACTICAL 5 – 9:45AM → 11:00AM** **LECTURE EXAM 5 – 12:00PM → 2:00PM** **** EXTRA-CREDIT PRESENTATIONS 3:00PM → 5:00PM ****
		06/01	**FINAL LAB PRACTICAL – 9:45AM → 11:00AM** **FINAL LECTURE EXAM – 12:00PM → 2:00PM** **** Cumulative exam - all lecture and lab materials**