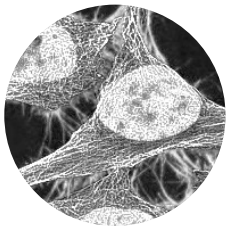
Biology 006
Units: 5
Section: 18486 (Lec) /18488 (Lab) – Spring 2019



Instructor Name: Kareen Martin
School Website: www.wlac.edu
Class Day(s): Monday, Wednesday
Address: 9000 Overland Ave., Culver City, CA 90230
Class Hours: **Lecture**: 5:10pm to 6:35
Class Location: Building and room number
Laboratory: 6:45 to 9:55pm

Office Hours: MW 4:10 to 5:00 pm
Instructor E-mail: martink@wlac.edu
Office Location: MSB211
Pre-requisites: Biology 3A/3B and Chemistry 101 and Math 125 or Math 123C with a grade of "C" or better

Course Description:
General Biology I is the first of a two semester general biology series for Biology Majors, pre-Medical, pre-Dental, pre-Pharmacy. The principles of molecular biology, cell structure and function, genetics, reproduction and organization at the tissue level in plants and animals are covered. Biology 6 and 7 satisfy requirements of lower division biological science majors.

Required Texts

- **Campbell Biology** – Campbell, Reece et al. 10th Edition. Benjamin Cummings Publishing. ISBN 978-0-321-77565-8
- **Lab Manual: Biology 6 Kareen Martin** available at the WLAC Bookstore.

Recommended Materials

- Lab notebook: This will be a spiral bound notebook of at least 200 pages and is available at the bookstore. This book will be used to record your laboratory observations
- Lecture notebook or three ring binder: The type you use may be your own preference but please purchase a separate notebook from that of your lab manual. This book will be used to supplement the lectures. You should also print out the lecture slides prior to coming to class and put these in your notebook.

Required Materials
- 7 Scantron 882E forms for exams

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 10 minutes in between the lecture and lab sessions.

The first session is approximately 90 minutes of lecture. These lectures cover the major topics in your biology textbook and will coincide with what we will be studying in the laboratory session. The lab session is 3hrs and 10 minutes. 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 lecture session. The last 2 hrs will be devoted to individual or team lab research. This material will be covered in your lab manual or in handouts that I distribute to you.

You are welcome to tape my lectures. You will also be able to access the lecture presentations along with additional learning materials on the Canvas website. The lectures on this site 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 will 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 session is 3 hours and 10 minutes long. The first 60 to 90 minutes will be lecture material pertinent to that lab session or a continuation of the morning's lecture. Please bring your lab manual with the lab handouts to each lab as your assigned material will be in that lab manual. If no lab is planned, then the first 60 to 90 minutes will be used as a continuation of your lecture section and you will be free to leave after that.
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 should record for their observations and conclusions in their lab manual.

Course Requirements and Grading Criteria

Your grade will be based upon the following scores:

- **Lecture Exams**
  - 5 exams will be administered (100 points each).
  - Exams will consist of objective-type questions (true/false, multiple choices, fill in the blank, matching, short written answers). They may contain figures from my notes or the textbook.
  - Exams range from 50 to 100 questions. If there is less than a 100 questions, I will convert your grade to 100.
  - They will take place on **Feb 25, Mar 27, Apr 22, May 6 and May 20.**

- **Laboratory Assignments**
  - 4 exams will be administered (50 points each).
  - Exams will consist of written answers that will need to be submitted on the companion website Canvas
  - They will be posted on a Wednesday and will be due on the following Monday. **LATE ASSIGNMENT WILL NOT BE GRADED.**
  - **Any plagiarism will result in a zero**
  - The due dates for these exams will be on Monday **Feb 25, Apr 8, May 6 and May 22.**

- **Lab Reports**
  - 2 Lab reports will be graded and will be worth 25 points each.
  - They will be chosen randomly and collected during class at two random meetings and **ONLY during these meetings. I will not accept lab reports at later times.**

- **Scientific Article Review**
  - This will be a group assignment which will be composed of 4 parts. Details and due dates will be given under the module "**Scientific Article Review**" on Canvas (each part will be worth 25 points, which will come to a total of 100 points)
  - The last part will be an oral presentation **on May 22nd**. Assignment posted later won't be accepted.

- **Final Cumulative Exams**
  - There will be two Final Exams: a lecture one worth 100 points and a lab one worth 50 points.
  - They will be based on materials given during the lecture and lab sessions throughout this course. They will include multiple choice, true/false, fill in the blank and short answer questions.
  - They will take place on **May 29.**

- You have a total of 5 lecture exams and 4 lab assignments 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/assignments. **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).**
- **During an exam/quiz, you may not leave the classroom for any reason. If you leave the room during an exam, your exam/quiz is over & must be turned in.** Make sure to give yourself enough time to use the restroom prior to exams.

- **Missed Exam**: All exams must be taken on the day decided by the instructor. I understand some circumstances such as illness, family emergency, being out of town or religious holiday may result in you missing a test, However, I drop the lowest lecture and lab exam. Which means there will be **NO MAKE UP EXAMS** given for any reason. Any exam that is missed will receive a zero on it.

Lecture Exams	400 points
Laboratory Assignment	150 points
Lab reports	50 points
Scientific Article Review	100 points
Final Cumulative Lecture Exam	100 points
Final Cumulative Lab Exam	50 points
Total points	***850 points***

GRADING SCALE

The grade scale for the entire course will be assigned using a percentage system:

A	B	C	D	F
90-100%	**80-89%**	**70-79%**	**60-69%**	**below 50%**

CLASS POLICIES

- **CHEATING/ACADEMIC DISHONESTY:**

Each student is expected to do his/her own work on all assignments, reports, examinations, etc.
Here is a list of some actions that are considered cheating:

- Talking during an exam
- Copying answers from someone else's paper
- Using notes of any kind during an exam
- Showing a fellow student your exam or passing information
- Turning in someone else's work
- Providing your work for someone else to copy
- Taking a call on your cell phone (please turn them off!)
- **Plagiarism** (Plagiarism is defined as the use, without giving reasonable and appropriate credit to, or acknowledging the author or source, of another person's original work)

If you have a question during an exam, quietly walk up to the instructor and whisper your question. **Translation dictionaries are not permitted during exams. No electronic devices of any kind are permitted during exams. Exiting the room during an exam is not permitted, this also includes going to the restrooms.**
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.

- **ATTENDANCE POLICY:**

Attendance is mandatory (see Administration Regulation E13). If enough absences occur throughout the semester, I can exclude you from the course. Furthermore, consistent attendance to each lecture is required for successful completion of this course. Attendance will be taken at the beginning of each class. **If the student misses more than three classes, either lecture or lab, he/she may be dropped from the course.** Coming late to class and leaving early is irresponsible, impolite, disruptive and is not acceptable. If a student needs to be late, miss a class or leave early, please inform me, preferable by email or before the class. Late students will be marked as absent, since attendance is taken at the beginning of the class and not after. Leaving early from the class, will be noted and may count as absent.
Any student wishing to withdraw from the course must follow the correct procedure with the admissions office. It is the student's responsibility to drop the course should he/she decide to stop attending, DO NOT rely on the instructor to do this. Students who stop attending class and fail to follow the correct procedure will receive the letter grade of the scores they have accumulated for the semester. Be aware of the deadlines for withdrawing without a "W", with a "W" and a deadline where withdrawing is no longer possible. You may find them on the WLAC calendar.
Walking in and out of class is rude and disruptive. Any student who does this excessively may be asked to leave the class and will count as an absence. Please notify the instructor if you miss a class due to illness or other emergency.

There is a NO Eating and Drinking policy in the classroom.

RELIGIOUS HOLIDAYS

If you are going to miss an exam due to religious holidays, inform me **in writing** within the first 2 weeks of class. You will need to provide the appropriate verifications from your religious leader. We will meet and discuss the arrangements.

Student Conduct:

- **Academic Integrity**

Violations of academic integrity include, but are not limited to, the following actions: cheating on an exam, plagiarism, working together on an assignment, paper or project when the instructor has specifically stated students should not do so, submitting the same term paper to more than one instructor, or allowing another individual to assume one's identity for the purpose of enhancing one's grade.

- **Student Conduct**

According to code *9803.15*, disruption of classes or college activities is prohibited and will not be tolerated. Refer to the catalog and the Standards of Student Conduct in the Schedule of Classes for more information.

- **Recording Devices**

State law in California prohibits the use of any electronic listening or recording device in a classroom without prior consent of the instructor and college administration. Any student who needs to use electronic aids must secure the consent of the instructor. If the instructor agrees to the request, a notice of consent must be forwarded to the Vice President of Academic Affairs for approval (WLAC College Catalog).
For more information, refer to the attached link: http://www.wlac.edu/academics/pdf/WLAC_Catalog_Policies.pdf

Campus Resources:

- **Office of Disabled Student Programs and Services (DSP&S)**

Student Services Building (SSB) 320| (310) 287-4450.

West Los Angeles College recognizes and welcomes its responsibility to provide an equal educational opportunity to all disabled individuals. The Office of Disabled Students Programs and Services (DSP&S) has been established to provide support services for all verified disabled students pursuing a college education. DSP&S students may qualify for: priority registration, registration assistance, special parking permits, sign language interpreters and assistive technology (WLAC College Catalog).

- **Instructional Support (Tutoring) & Learning Skills Center**

Heldman Learning Resources Center (HLRC) | (310) 287-4486
Improve your reading, language, vocabulary, spelling, math fundamentals and chemistry knowledge with convenient, self-paced computer-aided courses in the Learning Skills Center. Increase your knowledge and learning success: sign up for tutoring in various college subjects (WLAC College Catalog).

- **Library Services**

Heldman Learning Resources Center (HLRC) | (310) 287-4269 & (310) 287-4486
The WLAC Library provides instruction on how to use the online catalog, periodical and research databases. In addition to a large collection of books, periodicals and videos the WLAC Library has course textbooks which students may use while in the Library. Web access is available in LIRL as well as meeting rooms. The upper floors provide a beautiful view ideal for study (WLAC College Catalog).

- **Campus Sheriff's Office (Emergency Preparedness)**

C3 Building, Parking Lot 5 | (310) 287-4311 & (310) 287-4314

The Sheriff's Office website includes information about drill or emergency building evacuations, Title IX resources (if you have been the victim of Sexual Harassment; Sexual Violence and/or Gender-Based Discrimination), and what do to in the event of a lock-down or active shooter situation.

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.
A student who completes this program will be able to:
1. Explain how scientists investigate causes of natural biological phenomena.
2. Explain how living things are organized, reproduce, acquire matter & energy, and inherit & express genetic instructions.
3. Utilize biological information to make informed decisions about environmental issues.
4. Utilize biological information to make informed decisions about personal issues.
5. Perform basic biological lab procedures.

STUDENT LEARNING OUTCOMES FOR BIOLOGY 6:

At the end of the semester, the students should understand and be able to explain the fundamental concepts of the following:

1. the chemical composition of life, including the four organic macromolecules found in organisms
2. the major components of both prokaryotic and eukaryotic cells and the function of eukaryotic organelles

3. the major cellular processes of eukaryotic cells such as membrane transport, cell division/mitosis, DNA replication, RNA transcription, protein translation, cellular organization and secretion and energy production
4. Mendelian genetics and the chromosomal basis of inheritance.

LEARNING OBJECTIVES FOR BIOLOGY 6:

In addition to overall learning outcomes, there are multiple subject and technical objectives that the students should achieve 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. The concept of concentration and molarity, including how to determine molar mass and how to prepare specific solutions if given molarity
2. The structure of an atom and how it influences the creation of a chemical bond
3. The types of chemical bonds and chemical reactions
4. The structure and function of the four major macromolecules: carbohydrates, lipids, proteins and nucleic acids
5. The major components of a cell, both prokaryotic and eukaryotic
6. The structure and function of the plasma membrane, including how the membrane controls transport and the types of transport capable of occurring across a membrane
7. The structure and function of the nucleus, including how DNA is organized in both prokaryotes and eukaryotes, how DNA is replicated and how RNA is transcribed.
8. The composition of the cytoplasm, including the components and function of the cytosol and cytoplasm
9. How cells divide through mitosis, including the roles of the centrioles and spindle
10. The process of protein synthesis, including protein translation, the four levels of protein organization
11. The structure of function of the following organelles: the endoplasmic reticulum, Golgi apparatus, lysosomes and peroxisomes
12. The control of DNA replication and RNA transcription, including the cell cycle and its role in abnormal processes like cancer
13. The control of both prokaryotic and eukaryotic gene expression
14. The role of the mitochondria and ATP in the bioenergetics of a eukaryotic cell, including understanding the steps of glycolysis, Kreb's cycle and the electron transport chain
15. The process of photosynthesis in plants, including the structure of a chloroplast, the role of chlorophylls and other photosynthetic pigments, the photosystems and Calvin cycle
16. How organisms produce gametes through meiosis and how this process results in genetic diversity
17. The concepts of Mendelian genetics: phenotype, genotype, alleles, homozygous and heterozygous
18. How Mendelian genetics can explain how DNA and phenotypic traits are passed through generations
19. The more advanced concepts of genetics and chromosomal inheritance such as co-dominance, multi-allele traits, sex-linked traits and gene linkage
20. How alterations in chromosomal number can occur and result in genetic disorders
21. How cells interact and communicate with one another, including the production and function of hormones, growth factors and the cell signaling pathways
22. How cells interact to produce tissues and the major types of tissues observed in organisms
23. The concepts and stages of embryonic development, including the early stages of cleavage, blastula and gastrula formation, morphogenesis and organogenesis.

TECHNICAL OBJECTIVES: Add the end of the semester, the student should be able to perform the following within a laboratory setting:

1. Weighing a given substance using a balance beam
2. Determining the absorbance of a given solution using a spectrophotometer
3. Detection of a sugar, lipid, protein or nucleic acid using specific stains

4. The proper operation of a compound and dissecting microscope, including being able to properly visualize cells and tissues
5. The identification if some of the major components of a plant and animal cell, such as the cell wall, vacuole and nucleus
6. The set up and performance of an experiment to illustrate the processes of diffusion and osmosis, including being able to determine diffusion rate and how solute concentration can affect osmosis
7. The simulation of DNA replication, RNA transcription and protein translation if given specific DNA sequences
8. The identification of the stages of mitosis and meiosis using both prepared slides and models
9. The completion of genetic problems, including determining allele frequency, genotypes and phenotypes using Punnett squares and a pedigree chart
10. The identification of the major tissue types: epithelial, connective, muscular and nervous, including their subtypes
11. The isolation of DNA using cells taken from the inside of their own cheek
12. The production and analysis of a DNA fingerprint, including being able to make an agarose gel, run the DNA using that gel and analyze the resulting DNA migration pattern

Overview of Covered Topics

- **Lecture #1: An introduction to Science (Chapter 1)**
    - themes in the study of life
    - levels of biological organization
    - Core theme: Evolution accounts for the unity and diversity of life
        - diversity of life
        - 3 domains of life
        - natural selection
        - descent with modification – the tree of life
    - Scientific method: asking questions and testing hypotheses
        - types of data
        - inductive reasoning
        - deductive reasoning & hypothesis testing
        - flexibility of the scientific method
        - proper experimentation – controls and repeatability
        - Theories in science

- **Lecture #2: The chemical context of life (Chapters 2 & 3)**
    - The chemical connection to biology
    - elements and compounds
    - the elements of life
    - atoms and its components
    - isotopes and radioactivity
    - molecules and chemical bonds
    - chemical reactions
    - Water: polar covalent bonds and hydrogen bonding
        - properties of water: cohesion, temperature modification, specific heat, density
        - water as a solvent: hydrophilic vs. hydrophobic
        - solute concentration in water – Molarity
    - Acids & bases: pH scale
        - buffers
        - acidification

- **Lecture #3: Organic molecules (Chapters 4 & 5)**
    - Carbon: the backbone of life
        - properties of carbon
        - hydrocarbns & their isomers
        - functional groups in biology

        - organic molecules
    - macromolecules & polymers:
        - diversity of polymers
        - carbohydrates – types of polysaccharides
        - lipids – fatty acid structure and the types of lipids
        - proteins – amino acids and polypeptides
            - protein structure and levels of organization
            - protein function
            - chaperonins and protein folding
        - nucleic acids – types and structure
            - DNA and RNA structure
            - ATP - a modified nucleotide

- **Lecture #4: Introduction to the cell (Chapter 6)**
    - the cell theory
    - types of microscopes
    - four components of a eukaryotic cell:
        - the plasma membrane – intercellular junctions & adhesions, membrane proteins
        - the cytoplasm & cytoskeleton – cilia and flagella
        - the nucleus – forms of DNA (ch. 12)
        - cytoplasmic organelles – membranous and non-membranous

- **Lecture #5: Cellular processes – the Plasma Membrane**
    - the plasma membrane and transport mechanisms
    - passive mechanisms – diffusion, osmosis and facilitated diffusion
    - active mechanisms – primary and secondary transport, exocytosis, endocytosis

- **Lecture #6: Cellular processes – the Nucleus & DNA replication (Chapter 16)**
    - organization of DNA in the nucleus – chromatin & histones
    - problems with DNA replication
    - the machinery of replication – polymerases
    - DNA repair mechanisms

- **Lecture #7: Cellular processes – from nucleus to cytoplasm – transcription & translation (Chapter 17)**
    - the transcription unit
    - transcription: DNA to RNA
        - types of RNA
        - mechanisms of transcription – the RNA polymerase
        - modifications of mRNA – the cap and the polyA tail
        - promoters
    - translation: mRNA to protein
        - the ribosome
        - tRNA function and structure
        - the genetic code and codon table

- **Lecture #8: Cellular processes – the Cytoplasm (Chapter 12)**
    - cilia and flagella – dynein motors
    - actin microfilaments and cellular movement
    - actin and myosin interactions – muscle contraction
    - non-membranous organelles – the centriole
    - the mitotic spindle
    - mitosis and cytokinesis
    - evolution of mitosis – prokaryotic binary fission

- **Lecture #9: Cellular processes - the Cytoplasm cont….**
  - membranous organelles
  - protein synthesis: ribosomes, the RER and the Golgi
    - protein modifications – folding, glycosylation, proteases
    - protein trafficking – sorting signals
  - lipid synthesis: the SER
    - lipid biosynthesis
  - waste management: peroxisomes and lysosomes
  - functions and diseases
- **Lecture #10: Cellular control – Control of DNA (Chapters 12 & 18)**
  - regulation of DNA replication – chromatin/chromosome structure and histone modification (ch. 18)
  - histone acetylation
  - regulation of DNA replication – the cell cycle (ch. 12)
  - phases of the cell cycle
  - checkpoints
  - cyclins and cdks
  - loss of control – cancer
  - the G0 phase

- **Lecture #11: Cellular control – Control of gene expression (Chapter 18)**
  - control in bacteria – the operon model
    - repressible and inducible – negative regulation
    - cAMP and positive regulation
  - control in eukaryotes – stages of control
    - differential gene expression
    - regulation of transcription – transcription factors & enhancers
    - coordinately controlled expression
  - post-transcriptional control – mRNA degredation
    - splicing and the splicesome
    - initiation of translation – the UTR and the polyA tail
    - protein processing – phosphorylation, cleavage
    - protein degredation – ubiquitin & the proteosome
  - role of non-coding RNAs – miRNA & siRNA

- **Lecture #12: Bioenergetics – Metabolism (Chapter 8)**
  - forms of energy
  - laws of thermodynamics
  - free energy change – stability and equilibrium
  - free energy and metabolism
  - review of ATP and ATP hydrolysis
  - activation energy – exergonic reactions
  - activation energy & enzymes – substrate specificity
  - catalysts and cofactors
  - regulation of enzyme activity – allosteric regulation and regulatory molecules; feedback inhibition

- **Lecture #13: Bioenergetics – Cellular Respiration (Chapter 9)**
  - production of ATP – aerobic respiration vs. fermentation
  - redox reactions
  - NAD+ as an electron acceptor
  - cellular respiration – review of the mitochondria
    - glycolysis
    - citric acid cycle
    - chemiosmosis & the electron transport chain
    - ATP "accounting"
  - anaerobic respiration vs. fermentation

        - types of fermentation
        - anaerobes
    - connections of glycolysis and the citric acid cycle to other metabolic pathways
    - use of fats and proteins as energy
    - connections to biosynthesis (anabolism)
    - control of cellular respiration reactions

- **Lecture #14: Bioenergetics – Photosynthesis (Chapter 10)**
    - chloroplasts – a new organelle
    - the reactions of photosynthesis
    - light reactions – the nature of sunlight
    - chlorophylls and carotenoids
    - photosystems
    - linear and cyclic electron flow
    - chemiosmosis – chloroplasts vs. mitochondria
    - dark reactions – the Calvin cycle
    - reduction of CO_2 to sugar
    - carbon fixation, reduction & regeneration
    - C3, C4 and CAM plants - adaptations

- **Lecture #15: Genetics – Sexual Life Cycles (Chapter 13)**
    - inheritance of genes
    - sexual vs. asexual reproduction
    - chromosome types – diploid vs. haploid, karyotypes
    - variety in sexual life cycles – alternation of generations
    - meiosis – stages
    - comparing mitosis with meiosis
    - genetic variation by meiosis
        - crossing over in recombinant chromosomes
        - independent assortment
        - random fertilization
    - evolutionary significance of meiosis

- **Lecture #16 – Mendelian Genetics (Chapter 14)**
    - Mendel's experiments – pea plants, P and F generations
    - Law of Segregation
    - Mendelian model of inheritance
        - genotypes, phenotypes, alleles
        - Punnet squares and test crosses
    - Law of Independent Assortment – monohybrid vs. dihybrid
    - laws of probability – monohybrid crosses
        - multiplication rule – i.e. the Product rule
        - addition rule – i.e. the Sum rule
        - probability and dihybrid crosses
    - complex inheritance patterns – single genes
        - degrees of dominance
        - multiple alleles – blood groups
        - pleiotropy and multiple phenotypes
    - complex inheritance patterns –multiple genes
        - multiple loci and epistasis
        - polygenic inheritance
    - nature and nuture: the impact of the environment
    - pedigree analysis – analyzing the behavior of human traits

- **Lecture #17 – The Chromosomal Basis of Inheritance (Chapter 15)**

- correlation behavior between a gene allele and its chromosome – Morgan and the fruit fly
- sex-linked genes
- inheritance of X-linked genes
- X inactivation in females
- linked genes and inheritance
- genetic recombination – crossing over
- linkage maps
- alterations in chromosome number
- non-disjunction – aneuploidy and polyploidy
- alterations in chromosome structure
- inversions, deletions and translocations
- genomic imprinting
- inheritance of organelle genes – extranuclear genes

- **Lecture #18: Animal Development (Chapter 47)**
  - fertilization mechanisms
  - cleavage patterns
  - gastrulation – sea urchin, frog, chick
  - embryonic germ layers
  - neural crest cells and the neural tube
  - mechanisms of morphogenesis
  - the role of the cytoskeleton
  - apoptosis
  - fate determination
  - determination vs. specification
  - fate mapping
  - induction in embryogenesis
  - Spemann's organizer
  - chick limb bud development

Tentative Schedule of Topics

Section	Text Chapters	Date	Lecture Topic	Lab Topic
Introduction	Ch. 1	Feb 4	An introduction to science	***Lab 1: The Metric System***
	Ch. 2 & 3	Feb 6	The chemical context of life	***Lab 2: Molarity*** ***Lab 3: Pipetting***
	Ch. 4 & 5	Feb 11	Organic molecules	***Lab 4: Spectrophotometer and Beer's law***
	Ch. 4 & 5	Feb 13	Organic molecules cont…	***Lab 5: Chemical analysis of Macromolecules***
		Feb 18	*NO CLASS PRESIDENT'S DAY*	
	Ch. 6	Feb 20	An introduction to the cell	***Lab 6: The Microscope and Its Uses***
		Feb 25	**LECTURE EXAM 1**	**LAB EXAM 1 DUE**
	Ch. 6	Feb 27	Cellular processes – the Plasma Membrane	***Lab 7: Diffusion***
The Cell – Cellular Processes and Cellular Control	Ch. 16	Mar 4	Cellular processes – Nucleus + DNA replication	***Lab 8: Osmosis***
	Ch. 17	Mar 6	Cellular processes – DNA replication cont…	***Lab 10: Cell Division - Mitosis***
	Ch. 12	Mar 11	Cellular control – Control of DNA Replication The Cell Cycle	***Lab 9: Isolation of DNA***
	Ch. 6 (in part)	Mar 13	Cellular processes – from the Nucleus to the Cytoplasm Transcription & Translation	***Lab 11: DNA Transcription & Translation***
	Ch. 18	Mar 18	Cellular control – Control of gene expression Control in bacteria – the Operon model of gene expression	***Lab 12: Quantitation of Proteins***
		Mar 20	Cellular control – Control of gene expression Control in eukaryotes – Promoters & Enhancers	**LAB EXAM 2 DUE** ***Lab 13: Restriction Enzymes and Agarose Gel Electrophoresis***
	Ch. 6 & 12	Mar 25	Cellular processes – The Cytoplasm & Cytoplasmic	***Lab 14 - Polymerase Chain Reaction***

			Organelles The Cytoskeleton Non-membranous vs. membranous organelles	
		Mar 27	**LECTURE EXAM 2**	
		Mar 30 – Apr 6	*NO CLASS - SPRING BREAK*	
	Ch. 8	Apr 8	Bioenergetics – An introduction to metabolism	***TBA***
The Cell - Bioenergetics	Ch. 9	Apr 10	Bioenergetics – Cellular Respiration	***TBA***
	Ch. 9	Apr 15	Bioenergetics – Cellular Respiration cont…	***Lab 14: Fermentation and Cellular Respiration***
	Ch. 10	Apr 17	Bioenergetics – Photosynthesis	
		Apr 22	**LECTURE EXAM 3**	**LAB EXAM 3 DUE**
	Ch. 13	Apr 24	Genetics – Sexual life cycles Meiosis & genetic variation	***Lab 15: Meiosis***
Genetics	Ch. 14	Apr 29	Mendelian Genetics	***Lab 17: Genetics Lab - Part 1***
	Ch. 15	May 1	The chromosomal basis of inheritance	***Lab 18: Genetics Lab - Part 2***
		May 6	**LECTURE EXAM 4**	
	Ch. 47	May 8	Animal Development	***Lab 19: Vertebrate development***
Embryology & Development		May 13	Animal Development cont…	
		May 15	Animal Development cont…	
		May 20	**LECTURE EXAM 5**	**LAB EXAM 4 DUE**
		May 22	**PRESENTATION DAY**	
		May 29	**CUMULATIVE FINAL EXAM**	