



BIOL 4130 MOLECULAR DIAGNOSTICS FALL 2018

Lecture: T/R ASCL 230 Time: 1pm -1:50pm

Lab: T ASCL 230 Time 2pm-4:30pm

Instructor	Office Location	Office Hour
Dr. Gloria Preza; GPreza@calstatela.edu	ASCL 227 Please knock before entering	M/W 9:30a -10:30am

Instructional Website: <http://canvas.calstatela.edu>

Required reading: Biol 4130 Course Manual available to students. Lectures and any readings are available through **Canvas**.

Reference textbook: MOLECULAR DIAGNOSTICS: Fundamentals, Methods, & Clinical Applications, Buckingham and Flaws (PDF copy available on Canvas)

Required supplies: Bring Course Manual with you on the day of the planned activity to be able to perform the assays.

Course Description: This course covers a dynamic and transformative area of diagnostics that has helped revolutionize health care. The advent of these techniques has led to insights in research and treatment for many disease states. Molecular diagnostics helps detect and measure the presence of genetic material or proteins associated with specific health conditions or disease, uncovering the underlying mechanisms of disease is what enables clinicians to tailor care at an individual level. Emphasis will be on the techniques required to perform the most commonly-used molecular diagnostics protocols, and in the identification of important parameters in the design of a molecular diagnostic assay. This will include knowing the components of a well-controlled diagnostic test and using critical thinking skills to troubleshoot problems as they occur and to determine possible causes of these problems.

Student learning outcome: Upon completion of this course students will be able to:

- Discuss the molecular characteristics upon which molecular diagnostic techniques are based.
- Explain the purpose of specific steps in molecular diagnostic assays.
- Describe a spectrum of DNA- and immuno-based assays and the molecular techniques used in such assays.
- List several and describe in detail one current application of molecular diagnostic assays in addition to those performed in class.
- Describe the controls for the assays we learn and explain their importance in interpretation of results.
- Discuss the biology underlying the conditions for which our laboratory assays test.
- Write a comprehensive, succinct abstract.
- Formulate a flow chart for an assay.
- Compose an informative, appropriately labeled figure and accompanying figure legend.
- Collaborate on a group term project, conduct research and present a primary article.
- Discuss the career opportunities open to a licensed CGMBS (Clinical Genetic Molecular Biologist Scientist).

COURSE REQUIREMENTS:

I. Grading Policies

Assignment	Points
Two Midterms 50 pts ea	100
Flow chart drafts – 3 at 20pts ea	60
Quizzes 12 at 5 pts ea	60
Participation	10
Unit Assignments:	
Unit I: Final Flow chart for Microarray, and DNA Fingerprinting Sequencing the Human Genome Assignment	60
Unit II: HW assignment, Flow chart	50
Unit III: Abstract, figure/legend	50
Unit IV: Abstract, figures/legends	50
Unit V: Abstract, figures/legends	50
Term Project – Current Molecular Diagnostic Assay	60
Cumulative final exam – (Lecture and Final)	100
Total Points	650

All assignments are due as announced on Moodle/Canvas.
Flow chart drafts must be turned in as a printed Document.

Instructor reserves the right to alter and/or amend the syllabus throughout the semester as necessary.

Final Unit Assignments must be turned in as an electronic document (pdf or word) on Moodle by 11:55pm on the day it is due. All electronic documents must be titled as follows: **YourLastName_Title**. Late or documents labeled incorrectly will not be accepted. It is your responsibility to learn how to make appropriately labeled figures and insert them into a document.

A quiz will be given on most class days at the beginning of the period. It will test preparedness for that period's lab work as well as knowledge of the previous period's lecture and lab work. Quizzes will be answered on Moodle in class please bring a laptop, or tablet, or other device.

There will be no make-ups for the midterm. In the event of an excused, and only an excused, absence from the midterm only the remainder midterms and final will be counted. Excused absences include:

- 1) Notice in advance of a graduate or professional school interview or
- 2) Illness, documented by a physician. After one unexcused absence from class, each additional unexcused absence from class will result in 0 points for that exam.

LAB ASSIGNMENTS

Lab assignments are listed in the schedule at the end of this document.

Further details will be announced in class and in online handouts.

- I. **The oral presentation on a molecular assay** for infectious (or other) disease will serve to introduce you to molecular tests that are variations on the techniques we do in class. More information will be provided during the semester.
- II. **Primary Journal presentation** will be an individual assignment where students will present a current journal publication in the design or usage of a molecular assay. More details to come.
- III. **Laboratory rules.**
 1. Inform instructor if you have any latex allergy
 2. A lab coat must be worn at all times.
 3. No eating or drinking or gum chewing in the lab.
 4. No food or drink in the lab except in a backpack or in the cabinet by the door.
 5. Gloves will be provided and are required for some procedures.
 6. You must bring your laboratory protocols and draft flow charts, either printed out or on your laptop, to each class.

GRADING SCALE:

Grades will be based on an overall percentage:

A: 92-100%	B: 80-84%	C: 70-74%	D : 60- 64%
B+: 85-89%	C+: 75-79%	D+: 65-69%	F : < 60%

ACADEMIC HONESTY: Students are expected to read and abide by the University's Academic Honesty Policy, which can be found at <http://www.calstatela.edu/academic/senate/handbook/ch5a.htm>.

Students who violate this policy will be subject to disciplinary action, and may receive a failing grade in the course for a single violation.

DROP POLICY: Please see the schedule of classes for information. No exceptions will be made to the established University deadlines and policies. Please see the schedule of classes at <http://web.calstatela.edu/classschedule/fall2016.htm#> for information concerning the established University deadlines and policies.

INCOMPLETE GRADE POLICY: Incomplete grades can only be assigned when the majority of the coursework has been completed and the student is passing the course. The submission of an Incomplete Grade Form is required.

ADA statement: Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation. This website <http://web.calstatela.edu/univ/osd/> provides information about the services available to students with disabilities. Consistent with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, it is the policy of California State University, Los Angeles, that no otherwise qualified person with a disability shall be subjected to discrimination because of that disability under any program or activity conducted or sponsored by the University.

Communication: Your CSULA email address is the primary and official means of communication between the lecturer, and the students. If you verbally discuss a matter with the lecturer or TA, please follow it up with an email. Without a follow up email, it is unlikely that any action will be taken on your concern.

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BIOL 4130 MOLECULAR DIAGNOSTICS SCHEDULE 2018

Week	Day	Date	Lecture T/R 1pm – 1:50pm	Lab Tuesday only 2pm -4:30pm
1	T	8.21	Course Expectations/Attendance Introduction to Molecular Diagnostic Assays Unit I: Personalized Medicine	- Lab rules, lab expectations; The Human Genome Project: Ex.1 Sequencing The Human Genome
	R	8.23	Evolution of Genomic Science	No Lab
2	T	8.28	Introduction to Sequencing Microarrays	- Quiz 1 Basics of Hybridization Ex. 2 DNA/RNA Microarrays
	R	8.30	Next Generation Sequencing	No Lab
3	T	9.04	Introduction to DNA Profiling Agarose Gel Electrophoresis	- Quiz 2 Ex. 3 DNA Fingerprinting Module 1 & 2
	R	9.06	Southern Blot Analysis	No Lab
4	T	9.11	DNA Fingerprinting Analysis	- Quiz 3 - DNA Fingerprinting Module 3
	R	9.13	Unit II: Transplantation Biology Immunological Basis of Non-Self Recognition	- No lab
5	T	9.18	Overview of MHC molecules: MHC I	- Quiz 4 Unit II – HLA-DQA1 Assay: DNA Extraction
	R	9.20	Overview of MHC molecules: MHC Class II	- No Lab
6	T	9.25	PCR Product Clean up	- Quiz 5 - Unit II – HLA-DQA1 Assay - Run and Analyze PCR Products; Set up sequencing rxn
	R	9.27	Spectrophotometric analysis of DNA/RNA	- No Lab
7	T	10.02	Unit III: HIV Introduction to HIV/AIDS	- Quiz 6 - Unit III: HIV Quantitative ELISA (Antigen Ab assay)
	R	10.04	Antibody – Antigen Binding Monoclonal and Polyclonal Antibodies	-No Lab
8	T	10.09	Unit IV: Cell Cycle and Cancer Cell Cycle in Health and in Cancer	- Quiz 7 - Unit IV: p53 Western– Part I SDS/PAGE and electroblot
	R	10.11	p53 Tumor Suppressor Protein	-No Lab
9	T	10.16	Hematological Malignancies and Translocations	- Quiz 8 -Unit IV– p53 Western- Part II- Membrane Ab incubation - Western Imaging
	R	10.18	Midterm II	-No Lab
10	T	10.23	Introduction to Tissue Culture	- Quiz 9 - Tissue Culture basics: Propagating Cell Line
	R	10.25	DNA Ploidy Analysis in Cancer	- No Lab
11	T	10.30	Introduction to Flow Cytometry	- Quiz 10 - Unit IV: DNA Ploidy and Cell Cycle Measurements – Harvesting cells, counting, Fixing cells
	R	11.01	DNA Ploidy and Cell Cycle Data Analysis	- No Lab
12	T	11.06	Unit V: Clinical Microbiology Diagnostics Selected Bacterial Pathogens	- Quiz 11 -Remove fixative, Stain Analyze with Flow Cytometry
	R	11.08	PCR-based Bacterial Species and Antibiotic Resistance Gene Identification	No Lab
13	T	11.13	Real Time PCR Basics	- Quiz 12 Real time PCR (qPCR)
	R	11.15	Real Time PCR Data Analysis	-No Lab
14	T	11.20	Thanksgiving Week no lecture	- Thanksgiving Recess
	R	11.22	Thanksgiving- Happy Holiday	-No Lab
15	T	11.27	Cytotoxicity	- C. difficile cytotoxicity Assay
	R	11.29	Cytotoxicity assay analysis	- No Lab
16	T	12.04	Group Presentations	-Group Presentations

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	R	12.06	Lecture and Lab Final Review	No Lab
	T	12.13	FINAL: Lecture and Lab Course Final	