

TSCI 5073
Integrating Molecular Biology with Patient-Oriented Clinical Research

Spring 2023

CLASS DAYS and TIME: Mondays, Tuesdays and Thursdays (May 15, 2023 – June 15, 2023), 3:00-5:00 p.m.

CLASSROOM: ALTC 2.211 (Lecture-Mondays and Tuesdays), (Laboratory-Thursdays)

COURSE DIRECTOR: Teresa L. Johnson-Pais, Ph.D.

OFFICE LOCATION and HOURS: MED 5.573C, Hours by appointment

EMAIL: paist@uthscsa.edu

TELEPHONE: 210-567-6571

READ THIS DOCUMENT CAREFULLY – YOU ARE RESPONSIBLE FOR ITS CONTENTS

COURSE DESCRIPTION AND OBJECTIVES

This interdisciplinary course is designed to train participants on integrating molecular biology methods into patient-oriented clinical research. Students will have the opportunity to learn to: (1) appropriately use molecular terms in clinical investigation; (2) describe the events involved in protein synthesis; (3) describe the principles involved in molecular techniques (e.g., polymerase chain reactions); (4) identify the appropriate specimens, collection, and handling requirements for each molecular technique; (5) identify and correct common sources of error in performing molecular techniques; (6) cite examples of clinical applications of molecular techniques in clinical medicine; and (7) apply molecular techniques in the laboratory to specific clinical problems.

Pre-requisites – There are no prerequisites for this course.

Semester credit hours – 1.0 SCH

By the end of this course, each student should be able to:

- Appropriately use molecular research terms in clinical investigation.
- Describe the principles involved in molecular research techniques.
- Identify common sources of error in performing molecular techniques.

COURSE ORGANIZATION

The main teaching modalities used in this course include:

1. Lectures
2. Laboratory experiments requiring active student participation

Materials:

No special materials are required for this course.

Computer Requirements:

Students are required to have a laptop computer that can connect to and operate over a wireless network.

Software required:

- Microsoft Office Suite (A personal copy of the latest version can be purchased at The UTHSCSA bookstore at student pricing with a student ID)

Laptops with an Apple based Operating System must be able to also operate using a Windows based Operating System. It may be necessary to purchase Windows (student pricing available at The UTHSCSA bookstore with a student ID) and virtualization software.

All laptops will connect to The UTHSCSA network via the HSCwave broadcast wireless connection. Authentication for wireless use is based on The UTHSCSA domain username and password.

Verification of proper operation **prior** to the start of class is highly recommended.

Assistance is available thru the IMS Service Desk

- Telephone:(567-7777
- E-mail (ims-servicedesk@uthscsa.edu)

Assistance is also available at the IMS Student Support Center (ALTC 106).

Reading Assignments – Reading assignments will be listed in the individual class sections of this syllabus.

ATTENDANCE

Attendance at scheduled classes and examinations is crucial to meeting course objectives. Therefore, regular attendance in class is expected of each student.

- Attendance is defined as being present within 15 minutes after the scheduled beginning of the class and until 15 minutes before the scheduled ending of the class.
- Excused absences may be granted by the Course Director in cases such as formal presentations at scientific meetings, illness, or personal emergency.
- Excused absences are considered on an individual basis and require electronic communication with the Course Director to request an excused absence. The e-mail request to the Course Director for consideration of an excused absence must provide details regarding the circumstances and specific dates.
- It is expected that students will provide *advanced notice* of absence for scheduled events.
- If a student has excessive unexcused absences in a given course, they will automatically receive a grade of *unsatisfactory* unless *makeup* has been approved by the Course Director.
- Makeup of absences (both excused and unexcused) is allowed at the discretion of the Course Director.
- Allowable unexcused absences will be determined by the credit hours of the course as follows:

Course Semester Credit Hours	Allowable Unexcused Absences
3.0	3
2.0	2
1.0	1

TEXTBOOKS

Required:

None

GRADING POLICIES AND EXAMINATION PROCEDURES

1. Class attendance is essential for anyone who wishes to obtain credit for the course. You must attend 8 of the 9 lectures and 4 of the 5 laboratory sessions in order to obtain credit for the course. You can make up any sessions missed due to unexpected schedule conflicts, professional travel, or other extenuating circumstances, provided you contact your course director as soon as you know you will need to miss a class. Any student who fails to meet this requirement will receive an UNSATISFACTORY grade for the course.
2. A student who receives an INCOMPLETE must meet with the Course Director and develop a plan of action to complete the outstanding work. All outstanding work must be completed within 6 months after the end of the course; otherwise the grade will be changed to UNSATISFACTORY.
3. A student who receives an UNSATISFACTORY grade must retake the course in order obtain a change of grade.

Grading System

The grading will be conducted on a pass fail basis and both assignments need a Satisfactory in order to pass the course.

S = Satisfactory U = Unsatisfactory

REQUESTS FOR ACCOMODATIONS FOR DISABILITIES

In accordance with policy 4.2.3, **Request for Accommodation Under the ADA and the ADA Amendments Act of 2008 (ADAAA)**, any student requesting accommodation must submit the appropriate request for accommodation under the American with Disabilities Act (ADA, form 100). To his/her appropriate Associate Dean of their School and a copy to the ADA Coordinator. Additional information may be obtained at <http://uthscsa.edu/eo/request.asp>.

ACADEMIC INTEGRITY AND PROFESSIONALISM

Any student who commits an act of academic dishonesty is subject to discipline as prescribed by the UT System Rules and Regulations of the Board of Regents. Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an exam for another person, signing attendance sheets for another student, and any act designed to give unfair advantage to a student or the attempt to commit such an act. Additional information may be obtained at

<http://catalog.uthscsa.edu/generalinformation/generalacademicpolicies/academicdishonestypolicy/>

TITLE IX AT UTHSCSA

Title IX Defined:

Title of the Education Amendments of 1972 is a federal law that prohibits sex discrimination in education. It reads “no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.”

University of Texas Health Science Center San Antonio’s Commitment:

University of Texas Health Science Center San Antonio (UTHSCSA) is committed to maintaining a learning environment that is free from discriminatory conduct based on gender. As required by Title IX, UTHSCSA does not discriminate on the basis of sex in its education programs and activities, and it encourages any student, faculty, or staff member who thinks that he or she has been subjected to sex discrimination, sexual harassment (including sexual violence) or sexual misconduct to immediately report the incident to the Title IX Director.

In an emergency, victims of sexual abuse should call 911. For non-emergencies, they may contact UPD at 210-567-2800. Additional information may be obtained at <http://students.uthscsa.edu/titleix/>

EMAIL POLICY

All correspondence will be sent to the student using the student’s LiveMail address and CANVAS. All correspondence from the student to the course director should be sent to the course director’s e-mail as listed on the first page of this syllabus.

USE OF RECORDING DEVICES

Only with course director’s or instructor’s permission.

ELECTRONIC DEVICES

Cell phones must be turned off during all class meetings and exams. Computers and electronic tablets are allowed only for participating in classroom activities (*e.g.*, viewing slides presented in lecture or conference materials). No texting, tweeting, e-mailing, web-surfing, gaming, or any use of electronic devices that is not directly connected with classroom activities is permitted.

TENTATIVE CLASS SCHEDULE

TSCI 5073
Integrating Molecular Biology with Patient-Oriented Clinical Research
Spring 2023

Week	Date	Module	Title/Instructor(s)
1	May 15, 2023	Precision Medicine	Teresa Johnson-Pais, Ph.D.
1	May 16, 2023	Sample Biorepositories and Genetic Variation	Teresa Johnson-Pais, Ph.D.
1	May 18, 2023	Laboratory-DNA Isolation	Teresa Johnson-Pais, Ph.D.
2	May 22, 2023	Cell Culture for Molecular Techniques	P. Renee Yew, Ph.D.
2	May 23, 2023	From Advocacy to Microarrays	Jannine Cody, Ph.D.
2	May 25, 2023	Laboratory-RNA isolation	Teresa Johnson-Pais, Ph.D.
3	May 29, 2023	No Class Holiday	
3	May 30, 2023	Next Generation Sequencing	Zhao Lai, Ph.D.
3	June 1, 2023	Laboratory-Real Time PCR and Genotyping	Teresa Johnson-Pais, Ph.D.
4	June 5, 2023	Cytogenetics	Robin Leach, Ph.D.
4	June 6, 2023	Flow Cytometry	Yue Li, Ph.D.
4	June 8, 2023	Laboratory-Real Time PCR and Gene Expression	Teresa Johnson-Pais, Ph.D.
5	June 12, 2023	Single Cell Techniques	Nameer Kirma, Ph.D.
5	June 13, 2023	Microscopy	
5	June 15, 2023	Laboratory-UT Health Core Laboratories	

Week: 1
Date: May 15, 2023 (3:00-4:30 p.m.)
Room: ALTC 2.211
Instructor(s): Teresa Johnson-Pais, Ph.D.
Topic: Precision Medicine
Learning Objectives and Competencies– Participants will be able to:
1. Describe how the understanding of our DNA is revolutionizing healthcare.
2. Describe how precision medicine has had an impact on cancer treatment.
Class Assignment:
Readings:

Week: 1
Date: May 16, 2023 (3:00-4:30 p.m.)
Room: ALTC 2.211
Instructor(s): Teresa Johnson-Pais, Ph.D.
Topic: Sample Biorepositories and Genetic Variation
Learning Objectives and Competencies– Participants will be able to:
1. Describe sample biorepositories and IRB requirements for storage of clinical specimens.
2. Discover how DNA variation can be used in clinical research.
Class Assignment:
Readings:

Week: 1
Date: May 18, 2023 (3:00-5:00 p.m.)
Room: MED 5.573C
Instructor(s): Teresa Johnson-Pais, Ph.D.
Topic: Laboratory-DNA Isolation
Learning Objectives and Competencies– Participants will be able to:
1. Describe the methodology behind DNA isolation.
2. Perform extraction of high molecular weight DNA from cultured mammalian cells.
Class Assignment:
Readings: View following PowerPoint presentation prior to attending class:
http://www.powershow.com/view/f1189-NGZkY/DNA_Purification_powerpoint_ppt_presentation

Week: 2
Date: May 22, 2023 (3:00-4:15 p.m.)
Room: ALTC 2.211
Instructor(s): P. Renee Yew, Ph.D.
Topic: Cell Culture for Molecular Techniques
Learning Objectives and Competencies– Participants will be able to: <ol style="list-style-type: none"> 1. Describe the application of cell culture to research 2. Describe the components necessary for successful cell culturing
Class Assignment:
Readings:

Week: 2
Date: May 23, 2023 (3:00-4:15 p.m.)
Room: ALTC 2.211
Instructor(s): Jannine Cody, Ph.D.
Topic: From Advocacy to Microarrays
Learning Objectives and Competencies– Participants will be able to: <ol style="list-style-type: none"> 1. Describe how molecular techniques can be used to understand the relationship between genotypes and phenotypes. 2. Describe the benefit of genetic advocacy groups.
Class Assignment:
Readings:

Week: 2
Date: May 25, 2023 (3:00-5:00 p.m.)
Room: MED 5.573C
Instructor(s): Teresa Johnson-Pais, Ph.D.
Topic: Laboratory-RNA Isolation
Learning Objectives and Competencies– Participants will be able to: <ol style="list-style-type: none"> 1. Describe procedures for isolating RNA. 2. Perform RNA isolation from cultured mammalian cells.
Class Assignment:
Readings:

Week: 3
Date: May 29, 2023
Room:
Instructor(s):
Topic: No Class Holiday
Learning Objectives and Competencies– Participants will be able to:
Class Assignment:
Readings:

Week: 3
Date May 30, 2023 (3:00-4:15 p.m.)
Room: ALTC 2.211
Instructor(s): Zhao Lai, Ph.D.
Topic: Next Generation Sequencing
Learning Objectives and Competencies– Participants will be able to:
1. Describe the methodology of next generation sequencing and its application in precision medicine
2. Describe how to determine the appropriate methodology for your sequencing project.
Class Assignment:
Readings:

Week: 3
Date: June 1, 2023 (3:00-5:00 p.m.)
Room: MED 5.573C
Instructor(s): Teresa Johnson-Pais, Ph.D.
Topic: Real Time PCR and Genotyping
Learning Objectives and Competencies– Participants will be able to:
1. Describe the basics of real time PCR for single nucleotide variant discrimination analysis.
2. Perform SNP genotyping.
Class Assignment:
Readings:

Week: 4
Date: June 5, 2023 (3:00-4:15 p.m.)
Room: ALTC 2.211
Instructor(s): Robin Leach, Ph.D.
Topic: Cytogenetics
Learning Objectives and Competencies– Participants will be able to:
1. Describe basic cytogenetic nomenclature.
2. Describe methods used for cytogenetic research including FISH and arrayCGH.
Class Assignment:
Readings:

Week: 4
Date: June 6, 2023 (3:00-4:15 p.m.)
Room: ALTC 2.211
Instructor(s): Yui Li, Ph.D.
Topic: Flow Cytometry
Learning Objectives and Competencies– Participants will be able to:
1. Describe the methodology of flow cytometry.
2. Describe how flow cytometry is used in precision medicine.
Class Assignment:

Readings:

Week: 4
Date: June 8, 2023 (3:00-5:00 p.m.)
Room: MED 5.573C
Instructor(s): Teresa Johnson-Pais, Ph.D.
Topic: Laboratory-Real Time PCR - Gene Expression
Learning Objectives and Competencies– Participants will be able to:
1. Describe the theory of real time PCR.
2. Perform a reverse transcription reaction and perform real time PCR with a TaqMan gene expression assay.
Class Assignment:
Readings:

Week: 5
Date: June 12, 2023 (3:00-4:15 p.m.)
Room: ALTC 2.211
Instructor(s): Nameer Kirma, Ph.D.
Topic: Single Cell Techniques
Learning Objectives and Competencies– Participants will be able to:
1. Students will learn about the application of single cell methodology in performing translational research.
Class Assignment:
Readings:

Week: 5
Date: June 13, 2023 (3:00-4:15 p.m.)
Room: ATLC 2.211
Instructor(s):
Topic: Microscopy
Learning Objectives and Competencies– Participants will be able to:
1. Students will learn the use of microscopic methods for various research applications.
Class Assignment:
Readings:

Week: 5
Date: June 15, 2023 (3:00-5:00 p.m.)
Room: MED 5.573C
Instructor(s):
Topic: Tour of UT Health Core Laboratories
Learning Objectives and Competencies– Participants will be able to:
1. Describe the laboratory resources available for research on our campus.
Class Assignment:
Readings: