

1/27/2012

**GEORGE MASON UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT**

EDUC500.621: Basics of Real Time Polymerase Chain Reaction (1 credit)

Spring/2012

Tuesday - Saturday/12-6pm

January 17th – January 21st 2012

Loudoun Academy of Science– Dominion High School, Sterling, VA..

Instructor: Dr. Geraldine Grant

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Manassas VA.

COURSE DESCRIPTION: (35 words or less; should begin with a verb)

To introduce the student to the theory and practice of current gene expression analysis using real time quantitative Polymerase chain reaction (qRT-PCR). This course will include the hands on experience.

COURSE PURPOSE AND INTENDED AUDIENCE:

The purpose of this course is to introduce the audience to the theory and practice of state of the art gene expression analysis tool – quantitative real time polymerase chain reaction (qRT-PCR). This course is designed to expose the audience, with hands on experience, from isolation of RNA through its conversion to cDNA and quantification using qRT-PCR. This course will introduce each of the steps of the experimental design including design of PCR primers and analysis of qRT-PCR data. The ultimate goal of this course is to leave the audience competent to carry out qRT-PCR in their home laboratory.

COURSE FORMAT:

The course format will include Lectures which will discuss the principles of

1. RNA isolation and quantization of.
2. Generation of cDNA from RNA
3. Primer design for qRT-PCR
4. PCR V qPCR – the principle differences
5. Analysis of qRT-PCR data

Each of these topics will be followed by laboratory exercises where each of the class participants applies the learned techniques in real time.

Class discussion will follow each stage.

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STUDENT OUTCOMES:

The intended outcome is that each participant will be familiar with, understand the principles of, and be capable of carrying out a successful gene expression analysis experiment utilizing qRTPCR

PROFESSIONAL STANDARDS (if applicable):

Course required for teacher recertification – college credit sufficient.

National Board for Professional Teaching Standard, Core Proposition 2
INTASC Standard __4 and 5 Content knowledge, Application of content_

REQUIRED/SUPPLEMENTAL/RECOMMENDED TEXTS AND/OR READINGS:

Required Texts:

Print outs of paper will be supplied to the class

Masafui Kubota, et al., Upregulation of the lysyl hydroxylase 2 gene by acetaminophen and isoniazid is modulated by transcription factor c-Myb.

Journal of Pharmacy and Pharmacology 2010 62: 477-484

Additional Resources (if applicable):

Ambions: RTPCR The Basics.

<http://www.ambion.com/techlib/basics/rtpcr/index.html>

Applied Biosystems: qPCR (real time PCR)

<http://www.appliedbiosystems.com/absite/us/en/home/applications-technologies/real-time-pcr.html>

University of South Carolina School of Medicine

Online tutorial on Real time PCR by Dr. Margaret Hunt.

<http://pathmicro.med.sc.edu/pcr/realtime-home.htm>

COURSE REQUIREMENTS, PERFORMANCE-BASED ASSESSMENTS, EVALUATION CRITERIA, AND GRADING SCALE:

Participants are required to be present and carry out each stage of the laboratory sections

Course Requirements: Participants are required to be present and to keep a laboratory notebook for the duration of the class which will detail the daily laboratory practical experiences (20% of overall grade)

Evaluation will be in the form of a final take home exam (80% of overall grade) due Saturday the 28th by email to ggrant1@gmu.edu by midnight.

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GRADING SCALE:

»90.0% and above A
»86.7 to 89.9% A-
»83.4 to 86.6% B+
»80.0 to 83.3% B
»76.7 to 79.9% B-
»73.4 to 76.6% C+
»70.0 to 73.3% C
»60.0 to 69.9% D
»less than 59% F -

COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT STATEMENT OF EXPECTATIONS:

The Graduate School of Education (GSE) expects that all students abide by the following:

Students are expected to exhibit professional behavior and dispositions. See gse.gmu.edu for a listing of these dispositions.

Students must follow the guidelines of the University Honor Code. See http://www.gmu.edu/catalog/apolicies/#TOC_H12 for the full honor code.

Students must agree to abide by the university policy for Responsible Use of Computing. See <http://mail.gmu.edu> and click on Responsible Use of Computing at the bottom of the screen.

Students with disabilities who seek accommodations in a course must be registered with the GMU Disability Resource Center (DRC) and inform the instructor, in writing, at the beginning of the semester. See www.gmu.edu/student/drc or call 703-993-2474 to access the DRC.

PROPOSED CLASS SCHEDULE:

LAST DAY TO DROP CLASS WITHOUT ACADEMIC/FINANCIAL PENALTY IS BEFORE 20% OF THE CLASS SESSIONS HAVE MET; please designate which class session this is for this particular course.

Date	Topic/Learning Experiences	Readings/Assignments
1/17/2011	<u>Lecture:</u> Introduction to Gene expression analysis PCR vs RT-PCR - concepts involved in PCR	
1/18/2011	<u>Lecture:</u> RNA, its extraction, quantification. <u>Lab:</u> Extraction of RNA, quantification by OD	
1/19/2011	<u>Lecture:</u> Generation of cDNA from RNA. Primer design <u>Lab:</u> Gel of RNA, make cDNA and dilute	
1/20/2011	<u>Lecture:</u> CFX-Connect software – setting up plates/tubes and run <u>Lab:</u> Set up and Run Real time PCR.	
1/21/2011	<u>Lecture:</u> Data analysis: Factors affecting analysis and statistical significance. <u>Lab:</u> Data Analysis	

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ASSIGNMENT RUBRIC

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