

ANEQ581A3 - Molecular Methods in Animal Genetics 2017

[Prerequisites – ANEQ 330/334 or graduate standing]

Course Description: Hands-on learning exercises to help develop technical skills and conceptual understanding for critical evaluation of animal genetics at the molecular level. Practical experience in classical and modern genetics laboratory techniques as well as an appreciation for when these techniques should be applied and how to interpret the results.

Course Dates: August 22nd, 2017 through December 8th, 2017
Course Times: Tuesdays and Thursdays – 9:00am to 11:50am
Course Location: Animal Science 232 (unless we're somewhere else)

Instructor: Stephen Coleman MS Ph.D.
Office: Animal Sciences 10
Office Phone: (970) 491-2681
Mobile Phone: (859) 619-1863
E-mail: stephen.coleman@colostate.edu (the best way to reach me)
Office Hours: Mondays and Fridays from 8:30am to 10:00am

What does this mean? – unless I state otherwise in class, if you need to ask me a question (or you have something else you need or want to talk about) you should be able to find me in my office during these times.

What it does not mean? – These are not the only times you can meet with me. I have an open-door policy – if the door is open, please come in! If you need to talk with me, come see me. If you'd like some guarantee that I'll be in my office when you need me, please make an appointment (by e-mail or by phone).

TA: Kaysie Jennings MS
Office: Animal Science 53
E-mail: kaysie.jennings@colostate.edu (the best way to reach Kaysie)
Office Hours: Tuesdays and Thursdays from 1:00pm to 3:00pm

References:

There are no required text books for this class. Required material will be presented in class, though I may also provide/assign readings that I think will support what we are learning in class through Canvas. The following books may be useful references to supplement in class materials:

Molecular Cloning - Volumes 1,2,3

Course Materials:

Course material and messages will be hosted on the Canvas e-learning management site (<http://info.canvas.colostate.edu/login.aspx> - Course ID = 2017FA-ANEQ-581A3-L01). Unless otherwise indicated, all assignments and assessments will be completed or submitted through Canvas. If you cannot access the course through Canvas, please contact me immediately so that we can get the issue resolved.

Course Objectives:

- Objective #1 – You should be able to accurately communicate knowledge of molecular genetics techniques.
- Objective #2 – You should be able to think critically about molecular genetics data and results.
- Objective #3 – You should become familiar with basic molecular techniques in genetics as it relates to experiments with DNA, RNA, Protein.
- Objective #4 – You should gain an understanding of the concepts and terminology of molecular genetics.

Academic Integrity:

I take academic integrity very seriously. Acts of academic dishonesty and misconduct destroy the possibility of meaningful learning and discussion. We all must do and take credit for our own work.

Here is what you can expect from me:

- I will attend every class period and arrive on time. I will make every effort to inform of any exceptions to this.
- I will come to class with a good attitude, this means:
 - o I will be respectful of your ideas and the diversity you bring to the classroom.
 - o I will be open to ideas and dialogue that challenge me.
 - o I will answer any appropriate questions that you have (in class or in office hours).
- I will do my best to make sure that each student is given an equal opportunity to succeed in my course:
 - o I will provide the course material presented in class for all students on Canvas.
 - o I will do my best to minimize disruptions and distractions in the classroom.
 - o I will consistently apply grade adjustments (should any be required) for all students.
- I will not tolerate cheating of any form in the classroom (this includes acts of plagiarism, using unauthorized sources of information on exams or assignments, unauthorized possession or distribution of academic materials, or the facilitation of academic dishonesty by any students). I will try to be reasonable, fair and understanding when circumstances beyond your control impact your academic performance in my course.

Here is what I expect from you:

- I expect that you show up to class and work hard in my class. You are entirely responsible for the grade you earn at the end of the semester.
- I expect you to complete the assignments and participate actively in class.
- I expect you to be respectful of me, yourself and your fellow classmates.
- I expect you to be honest both in how you interact with me and the work you turn in.
- I expect you to maintain a high level of academic integrity and adhere to the Colorado State University General Catalog Academic Integrity Policy and Student Conduct Code (<http://www.catalog.colostate.edu/>).

Grading Policy: The grade distribution for ANEQ 334 is as follows:

Lab Work/Participation/Attendance	70%
Journal Discussions	30%

Total	100%

I understand that circumstances (planned and unplanned) may prevent everyone from attending every class session. If you have a planned absence requiring you to miss class - come and see me prior to missing class. For unplanned and un-excused absences (life happens – I get that), I need you to come see me as soon as possible after the absence (within 24 hours would be nice - at the very least e-mail/call/text me). We will work out a plan to keep you current with material from class

The grading scale is as follows. You will be guaranteed at least those letter grades in you have those percentages.

Grade Percentage

- A 90-100%
- B 80-89%
- C 70-79%
- D 60-69%
- F Below 60%

Accommodations:

Any student eligible for academic adjustments because of a learning disability or medical condition should contact the Office of Resources for Disabled Students for development of appropriate accommodations. I can only make accommodations after receiving appropriate documentation from the Office of Resources for Disabled Students (<http://www.rds.colostate.edu/>).

Course Outline:

Molecular Methods in Animal Genetics will (tentatively) cover the following topics:

DNA Analysis

- isolation of nucleic acids (cells, tissues, hair, etc...)
- PCR basics
- restriction endonucleases
- gel electrophoresis
- DNA methylation
- probing for specific sequences
- recombinant DNA technologies
- DNA sequencing
- fragment analysis

RNA Analysis

- isolation of nucleic acids (differences from DNA)
- RNA gels
- northern blots/RNase protection assays
- reverse transcription (cDNA)
- RT-PCR, qRT-PCR, digital PCR

Protein Analysis

- isolation of protein

- protein gel electrophoresis
- western blots

Genomics

- gene mapping
- genome-wide association studies
- SNP-chips
- SNP panels (fine mapping)
- data analysis

Transcriptomics

- microarrays/oligonucleotide arrays
- data analysis
- functional analysis (GO, KEGG, etc...)

Proteomics

- Mass-spec
- data analysis

Next-generation sequencing

- DNA-seq, RNA-seq, etc...
- sample handling, library prep
- data analysis

Metagenomics

- DNA/RNA isolation from environmental samples
- targeted DNA sequencing
- shotgun metagenomics
- shotgun metatranscriptomics
- analysis