

SYLLABUS

Course:

ENTO 689, Special Topics in Experimental Approaches for Modifying Genomes and Analyzing Gene Expression (3-0), Credit 3

This course will be taught in the Spring of alternate years beginning with 2001

Professor:

Dr. Craig J. Coates

Department of Entomology

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Office Hours:

Room 110A, Heep Center

WED 12:30pm-1:30pm

THUR 11:00am-12:00pm

THUR 3:00pm-4:00pm

Other times by APPOINTMENT ONLY

Lecture Times:

TR 9:35am-10:50pm, Heep Center, Rm. 208

Recommended Textbook:

1. Insect Transgenesis. Methods and Applications. A.M. Handler & A.A. James

Grades:

Grades will be determined as follows.

Mid-term Exam - 20%

Proposal Abstract - 5%

Database search and Analysis - 10%

Grant Proposal - 40%

Final Exam - 25%

Assessment Schedule:

Mid-term Exam - **March 6**

Proposal Abstract due - **April 8**

Database search and analysis due - **April 15**

Grant Proposal due - **May 1**

Final Exam - **TBA**

Absences:

If you miss the Mid-term exam, for any reason, your final exam will count for 45%. No make-up exams will be given.

Course Description:

This course is intended to introduce students to the vocabulary and experimental procedures routinely used for molecular genetic studies, using arthropod systems as model examples. This will include discussions of germ-line transformation, transient gene expression, and the analysis of tissue-specific and genome-wide gene expression. Prerequisites: GENE 301 or equivalent.

General Objectives:

This course is aimed at both graduate students pursuing molecular biology-orientated projects and also those using non-molecular techniques.

1. The overall objective of this course is to ensure that all students are fully aware of the potential of Molecular Genetic Procedures to advance their research objectives.
2. At the completion of this course, students will have a robust understanding of the vocabulary and jargon associated with common molecular biology procedures as applied to the modification of genomes and the analysis of gene expression. Along these lines, students who are pursuing non-molecular research projects will be able to read relevant scientific articles and attend research presentations on molecular genetic studies and have a comprehensive understanding of the methodologies used.
3. Students will have a clear understanding of genetic transformation and the potential applications of transformation technologies.
4. The most recent advances in molecular genetic techniques will be presented, such that students are fully aware of the most up to date procedures that are available and can consider applying them to their own research.
5. Students will be able to make full use of the available nucleotide and protein databases, conduct database searches and complete analysis of the relevant data.
6. Students will be able to write a research grant proposal describing at least one molecular genetic technique that can be applied to understanding an aspect of biology that is relevant to their own field of study.

Lecture Schedule

Jan	14	Introduction to Germ-line transformation
	16	Micro-injection, Electroporation, or Lipofection? Embryos, Sperm, or Ovaries?
	21	The <i>P</i> element paradigm
	23	<i>P</i> in other insects - excision and transposition assays
	28	<i>Hermes</i> , <i>Mariner</i> , <i>Minos</i> , <i>PiggyBac</i>
	30	Viral alternatives
Feb	4	Analysis of Transgenics - Genetics, Southern, Genomic Libraries, IPCR
	6	Transient Systems - Plasmids, Antisense RNA, dsRNA, Sindbis virus, Baculovirus
	11	Non-Drosophilid transformation using eye color and GFP marker genes
	13	Applications of germ-line transformation in <i>Drosophila</i>
	18	Applications of germ-line transformation in non-drosophilids

	20	Future non-drosophilid applications
	25	Wolbachia and transformation of symbionts
	27	Gene spread in natural populations
Mar	4	Regulations and risk assessment for transgenic arthropods
	6	Mid-term Exam
	11	Spring Break
	13	Spring Break
	18	Analysis of Gene Expression - traditional methods
	20	Analysis of Gene Expression using SSH
	25	Example system - Honey Bee caste determination
	27	Gene expression arrays
Apr	1	Example System - <i>Anopheles</i> immune system
	3	Database searches and analysis
	8	Title and Abstract Due
		Genomics and genome projects
	10	Proteomics
	15	Database search and analysis due
		Presentation and Discussion of Grant Proposals
	17	Presentation and Discussion of Grant Proposals
	22	Presentation and Discussion of Grant Proposals
	24	Presentation and Discussion of Grant Proposals
May	1	Grant Proposals due
	TBA	Final Exam