Course Changes
Texas A&M University

Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
- Submit original form and attachments -

Form Instructions
1. Course request type:
   □ Undergraduate  □ Graduate  □ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by (Department or Program Name): Department of Electrical and Computer Engineering
3. Course prefix, number and complete title of course: ECEN 762 Ultrasound Imaging
4. Change requested
   a. Prerequisite(s): From: ________ To: ________
   b. Withdrawal (reason): ________________________________
   c. Cross-list with: ________________________________
      Cross-listed courses require the signature of both department heads.
   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. Attach a course syllabus.
5. Is this an existing core curriculum course?
6. If grade type is changing for existing course, indicate the new grade type: □ Grade □ S/U □ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course:
   □ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
8. Complete current course title and current catalog course description:
   ECEN 762 Ultrasound Imaging - Please see attached.
9. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
   ECEN 762 Advanced Ultrasound Imaging Techniques - Please see attached.

10. Complete proposed course title and proposed course description:

11. a. As currently in course inventory:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (excluding punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEN</td>
<td>762</td>
<td>Ultrasound Imaging</td>
</tr>
<tr>
<td>Lect.</td>
<td>Lab</td>
<td>Other</td>
</tr>
<tr>
<td>3.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

b. Change to:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (excluding punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEN</td>
<td>762</td>
<td>Adv Ultrasound Imaging Techn</td>
</tr>
<tr>
<td>Lect.</td>
<td>Lab</td>
<td>Other</td>
</tr>
<tr>
<td>3.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Approval recommended by: ____________________________
See attached documents: ____________________________

Department Head or Program Chair (Type Name & Sign) Date
Chair, College Review Committee Date

Dean of College Date
Chair, GC or UCC Date

Submitted to Coordinating Board by:
Associate Director, Curricular Services Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14
Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
Submit original form and attachments.

Form Instructions
1. Course request type: [ ] Undergraduate [ ] Graduate [ ] First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by (Department or Program Name): Department of Electrical and Computer Engineering
3. Course prefix, number and complete title of course: ECEN 762 Advanced Ultrasound Imaging Techniques
4. Change requested
   a. Prerequisite(s): From: ____________________________ To: ____________________________
   b. Withdrawal (reason):
   c. Cross-list with: ____________________________
   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. Attach a course syllabus.
5. Is this an existing core curriculum course? [ ] Yes [ ] No
6. If grade type is changing for existing course, indicate the new grade type: [ ] Grade [ ] S/U [ ] P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ____________________________
8. I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
    ECEN 762 Advanced Ultrasound Imaging Techniques—Fundamental concepts at the basis of ultrasound imaging. Including: mathematical analysis of wave propagation, scattering of ultrasound in biological tissues, electronic transducer arrays for the beam forming, models of the received signals and signal and image processing methods for medical ultrasound imaging of tissues; focus on the fundamental understanding of advanced ultrasound imaging methods and techniques and their applications; State-of-the-art ultrasound imaging techniques that will be covered.
11. a. As currently in course inventory:
    Prefix   Course #   Title (excluding punctuation)
    ECEN    762   Ultrasound Imaging
    
    | Lecture | Lab | Other | SCH | CIP and Fund Code | Admin. Unit | FICE Code | Level |
    |---------|-----|-------|-----|------------------|-------------|-----------|-------|
    | 3.00    | 0.00| 0.30  | 1410010006 | 0936          | 0 0 3 6 3 2| 6       |
    b. Change to:
    Prefix   Course #   Title (excluding punctuation)
    ECEN    762   Adv Ultrasound Imaging Techn
    
    | Lecture | Lab | Other | SCH | CIP and Fund Code | Admin. Unit | Acad. Year | FICE Code |
    |---------|-----|-------|-----|------------------|-------------|------------|-----------|
    | 3.00    | 0.00| 0.00  | 3.00| 1410010006      | 0936        | 17 - 18    | 0 0 3 6 3 2 | 6 |

Approval recommended by: ____________________________
M. Begovic
Department Head or Program Chair (Type Name & Sign) Date

Department Head or Program Chair (Type Name & Sign) Date
(if cross-listed course)

Submitted to Coordinating Board by: ____________________________
Associate Director, Curricular Services Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14
**ECEN 762 Ultrasound Imaging** - Covers mathematical analysis of wave propagation, scattering of ultrasound in biological tissues, electronic transducer arrays for the beam forming, models of the received signals and signal processing methods for medical ultrasound imaging of tissues. Research papers related to fundamental ultrasound imaging concepts are discussed throughout the course. Prerequisite: Approval of instructor

**ECEN 762 Advanced Ultrasound Imaging Techniques** - Fundamental concepts at the basis of ultrasound imaging, including: mathematical analysis of wave propagation, scattering of ultrasound in biological tissues, electronic transducer arrays for the beam forming, models of the received signals and signal and image processing methods for medical ultrasound imaging of tissues; focus on the fundamental understanding of advanced ultrasound imaging methods and techniques and their applications; State-of-the-art ultrasound imaging techniques that will be covered include: ultrasound contrast agents and harmonic imaging, 3D and 4D imaging, micro-ultrasound imaging, intravascular ultrasound, elasticity imaging, photoacoustic imaging, advanced Doppler imaging methods, 2D arrays, C-MUT and HIFU technologies. Performance will be assessed by means of one midterm exam, one final exam and one final project.
Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
Submit original form and attachments

Form Instructions
1. Course request type: □ Undergraduate □ Graduate □ First Professional (OBG, MA, JD, PhD)
2. Request submitted by (Department or Program Name): Department of Electrical and Computer Engineering
3. Course prefix, number and complete title of course: ECEN 762 Advanced Ultrasound Imaging Techniques

4. Change requested
   a. Prerequisite(s): From: To:
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department chairs.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.

   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. Attach a course syllabus.

5. Is this an existing core curriculum course?
   □ Yes □ No

6. If grade type is changing for existing course, indicate the new grade type: ☑ Grade ☑ S/U ☑ P/F (CLMD)

7. If this course will be stacked, please indicate the course number of the stacked course:
   ☑ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-control/export-control-basics-for-distance-education).

8. Complete current course title and current catalog course description:
   ECEN 762 - Ultrasound Imaging: Ultrasound is a non-invasive medical imaging modality that has a wide range of clinical applications, both as a primary modality and as an adjunct to other diagnostic procedures. Its utility in medicine is in large part due to some unique characteristics, such as real-time imaging capabilities, low cost, nonionizing radiation and portability. The purpose of this course is to present methods for characterizing and analyzing ultrasound imaging systems. Our goal is to present, with enough mathematical rigor, an integrated

   Complete proposed course title and proposed catalog course description (not to exceed 50 words):
   ECEN 762 - Advanced Ultrasound Imaging Techniques. This course will cover a review of the fundamental concepts at the basis of ultrasound imaging. This includes mathematical analysis of wave propagation, scattering of ultrasound in biological tissues, electronic transducer arrays for the beam forming, models of the received signals and signal and image processing methods for medical ultrasound imaging of tissues. We will then focus on the fundamental understanding of advanced ultrasound imaging methods and techniques and their applications: State-of-the-art

9. a. As currently in course inventory:

   Prefix Course # Title (excluding punctuation)
   ECEN 762 Ultrasound Imaging
   3.00 0.00 0.30 1410010006 0940 0 0 3 6 3 2 6

   b. Change to:

   Prefix Course # Title (excluding punctuation)
   ECEN 762 Advanced Ultrasound Imaging Techniques
   3.00 0.00 0.00 3.00 1410010006 0940 16 17 0 0 3 6 3 2

   Approval recommended by:

   Department Head or Program Chair (Type Name & Sign) Date
   Chair, College Review Committee Date

   Department Head or Program Chair (Type Name & Sign)
   (If cross-listed course)
   Date
   Dean of College Date

   Submitted to Coordinating Board by:
   Chair, GC or UCC Date

   Associate Director, Curricular Services Date

   Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Curricular Services – 08/14
Course title and number: ECEN 762 Advanced Ultrasound Imaging Techniques
Semester: Fall 2016
Meeting times and location: Lectures: TBA

Course Description and Prerequisites

This course will cover a review of the fundamental concepts at the basis of ultrasound imaging. These include: mathematical analysis of wave propagation, scattering of ultrasound in biological tissues, electronic transducer arrays for the beam forming, models of the received signals and signal and image processing methods for medical ultrasound imaging of tissues. We will then focus on the fundamental understanding of advanced ultrasound imaging methods and techniques and their applications. State-of-the-art ultrasound imaging techniques that will be covered include: ultrasound contrast agents and harmonic imaging, 3D and 4D imaging, micro-ultrasound imaging, intravascular ultrasound, elasticity imaging, photoacoustic imaging, advanced Doppler imaging methods, 2D arrays, C-MUT and HIFU technologies. Performance will be assessed by means of one midterm exam, one final exam and one final project.

Learning Outcomes and Course Objectives

It is the intent of this course that students will:

1. understand the underlying principles at the basis of fundamental ultrasound imaging techniques;
2. become familiar with the image formation process leading to an ultrasound image;
3. understand fundamental image quality factors of ultrasound images;
4. understand and be able to solve problems, which relate to linear array and phased array instruments, pulse-echo and Doppler instrumentation;
5. be able to recognize artifacts in ultrasound images as they relate to fundamental physical concepts;
6. understand methods for characterizing and analyzing ultrasound imaging systems;
7. have knowledge of selected state-of-the-art ultrasound techniques - their advantages, limitations, potentials and current and future developments;
8. have an appreciation for the capabilities and advantages of ultrasound imaging in a multiplicity of applications.

Instructor Information

Name: Dr. Raffaella Righetti
Email address: righetti@ece.tamu.edu
Office hours: TBA
Office location: 309D WERC
Course Material: TBA
Textbook and/or Resource Material

Instructor Notes.
Selected journal articles (provided by the instructor).

Grading Policies

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>35%</td>
</tr>
<tr>
<td>Final Project</td>
<td>30%</td>
</tr>
<tr>
<td>Attendance</td>
<td>5%</td>
</tr>
</tbody>
</table>

- Grading Scale: A=90-100, B=80-89, C=70-79, D=60-69, F=below 60.
- If questions regarding grading arise, please raise them with the instructor within 48 hours (weekends excluded) of when the graded assignment is returned. Inquiries made later than 48 hours may not be considered.
- There is a 15% per day late penalty for late assignments and projects if no legitimate excuse is available. Missed tests and labs receive a grade of 0 if no legitimate excuse is available.
- Legitimately late assignments/projects and missed tests/labs require an official document (e.g., doctor's note) to justify the absence and will not be penalized.
- In course assignments, please hand in your own work and remember: "An aggie does not lie, cheat, or steal or tolerate those who do."
- The university views class attendance as an individual student responsibility. Students are expected to attend class and to complete all assignments. For additional information, please visit: http://student-rules.tamu.edu/rule07

Recommendations for Studying
1) Read and review the lecture notes and assigned papers
2) Actively interact with other students and teacher

Course Topics, Calendar of Activities, Major Assignment Dates

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Fundamentals of Ultrasound Imaging</td>
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</tr>
<tr>
<td></td>
<td>1.1 The Wave Equation</td>
<td></td>
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<tr>
<td></td>
<td>1.2 Acoustic Impedance, Power Density, Reflection of Waves at Interfaces</td>
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<tr>
<td></td>
<td>1.3 Tissue Scattering, Speckle, Attenuation of Sound Waves</td>
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<td></td>
<td>1.4 Fundamentals of Ultrasound Fields</td>
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<td></td>
<td>1.5 Fundamentals of Ultrasound Transducers</td>
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<td>1.6 Fundamentals of Pulse-Echo Instrumentation</td>
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<td></td>
<td>1.7 Fundamentals of Doppler Imaging</td>
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<td>1.8 Ultrasound Imaging Artifacts</td>
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<tr>
<td>2</td>
<td>Advanced Ultrasound Imaging Modalities</td>
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<tr>
<td></td>
<td>2.1 Ultrasound Contrast Agents &amp; Harmonic imaging</td>
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<tr>
<td></td>
<td>2.2 Microscanning &amp; Acoustic Microscopy</td>
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<td></td>
<td>2.3 Intravascular Ultrasound imaging</td>
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<td></td>
<td>2.4 3D and 4D Imaging</td>
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<td>2.5 Elasticity Imaging</td>
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<td></td>
<td>2.6 Photoacoustic Imaging</td>
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<tr>
<td></td>
<td>2.7 Advanced Doppler Imaging Methods</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Recent Developments in Ultrasound Instrumentation</td>
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<tr>
<td></td>
<td>3.1 2D Arrays</td>
<td></td>
</tr>
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<td></td>
<td>3.2 C-MUT</td>
<td></td>
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<td></td>
<td>3.3 HiFU</td>
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<tr>
<td></td>
<td><strong>Total Hours</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

Lecture Schedule – 2 meetings/week, 150 minutes total/week.
Other pertinent course information

You are responsible for checking your email (announcements and other information will be sent to the mailing list in howdy) and piazza for up to date information.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1537. For additional information, visit http://disability.tamu.edu.

Academic Integrity

For additional information please visit: http://student-rules.tamu.edu/aggiecode

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System.

Online Advising

Current students should also visit the advising course on eLearning to find out about scholarship, internship and research opportunities.

Login through: http://elearning.tamu.edu/ and navigate to:
Advising for Electrical Engineering Majors or
Advising for Computer Engineering Majors (EE – Track)
MEMORANDUM

TO: Dr. K.L. Butler-Purry
   Dean of Office of Graduate Studies

THROUGH: Dr. P. Enjeti
          Associate Dean, College of Engineering

FROM: Dr. J. Silva-Martinez
      Professor & Graduate Coordinator

SUBJECT: Change in Title for
         ECEN 762 Advanced Ultrasound Imaging Techniques

Dr. R. Righetti has requested to change the title for ECEN 762 to attract a wider band of students.

I appreciate your cooperation in this matter.

CC: Attachments

/tle
Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
• Submit original form and attachments •

Form Instructions
1. Course request type:        ☐ Undergraduate ☒ Graduate ☐ First Professional (DVM, MD, JD, PharmD, DPA)
2. Request submitted by (Department or Program Name): Department of Biochemistry and Biophysics
3. Course prefix, number and complete title of course: GENE 608 Critical Analysis of GENE Literature
4. Change requested
   a. Prerequisite(s): From: ___________________________ To: ___________________________
   b. Withdrawal (reason): ___________________________
   c. Cross-list with: ___________________________
   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. Attach a course syllabus.
5. Is this an existing core curriculum course? ☒ Yes ☐ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMR)
7. If this course will be stacked, please indicate the course number of the stacked course: ___________________________
8. ☒ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-controls/export-control-basics-for-distance-education).
9. Complete current course title and current catalog course description:

   Critical Analysis of GENE Literature
   An introduction to primary literature in the field of genetics which will give students experience in critically evaluating scientific papers and develop an appreciation of how genetics can be used to address important biological questions.

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

   Critical Analysis of Genetic Literature
   Introduction to major Genetic Model Systems (MSS)

11. a. As currently in course inventory:
    
    | Prefix | Course # | Title (excluding punctuation) |
    |--------|----------|------------------------------|
    | GENE   | 608      | CRIT ANALYSIS GENE LIT       |
    | Lect.  | Lab.     | Other | SCH | CIP and Fund Code | Admin. Unit | EIC Code | Level |
    | 01     | 00       | 00    | 01  | 2608040002        | 0420        | 003632  | 6     |

    b. Change to:
    
    | Prefix | Course # | Title (excluding punctuation) |
    |--------|----------|------------------------------|
    | GENE   | 608      | Critical Analysis of GENE Literature |
    | Lect.  | Lab.     | Other | SCH | CIP and Fund Code | Admin. Unit | Acad. Year | EIC Code |
    | 02     | 00       | 00    | 01  | 2608040002        | 0490        | 16-17     | 003632  |

Approval recommended by:
Dorothy E. Shippen
Department Head or Program Chair (Type Name & Sign) Date
Chair, College Review Committee Date
Dean of College Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services Date
Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Curricular Services — 08/14
GENE 608-600
Critical Analysis of Genetic Literature
Introduction to Major Genetic Model Systems (MSs)

Course coordinator: Hubert Amrein (amrein@tamhsc.edu)

Instructors: Michael Polymenis, Marty Dickman, Rene Garcia, Hubert Amrein, Bruce Riley, David Threadgill

Time & Location: Tuesdays 5:00–7:00pm ILSB 3145

Course Description: Gene 608 is designed to introduce first and second year students to the main eukaryotic genetic model systems (MS): yeast, C. elegans, Arabidopsis, Drosophila, zebrafish, mouse. The course is organized in six sections, each dealing with one of the classical MSs, which are all used in numerous laboratories of Genetics faculty.

NOTE: Title of papers to be discussed are subject to change

Credits: This is a 2 hrs credit course

Learning Outcomes:
Goal 1: Acquire basic knowledge of each MS: Students should know
- Basics of development and biology of MSs
- Major discoveries that propelled each MSs into the mainstream
- Major genetic tools of each MS, especially those unique to it

Goal 2: Critical reading and discussion of papers: Students should be able to:
- Succinctly state the goals of the study
- Understand rationale behind experiments
- Identify strengths and weaknesses of the paper

Grading:
Grades for lectures on each of the six model systems (0 – 100 points), composed of participation (40%) and written assay/paper presentation (60%), will be given by each instructor. Points from all instructors will be averaged to provide the final numerical grade, and letter grade will be calculated according to scale: A=90-100, B=80-89, C=70-79 etc).

Attendance:
- Attendance of 14 of 15 classes is essential in order to maintain grade, as participation during class will provide 40% of the grade.
- Unexcused absence of part or a whole additional class results in reduction of 5 points in numerical final grade and corresponding reduction in final letter grade.
- Missing more than 4 classes will result in failing grade (if three or more absences are unexcused) or incomplete grade (if 2 or fewer absences are unexcused).
- Examples of excused absences are severe illness or family emergency. For further information, see student rule 7: [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07)

There are several "How to Read a Scientific Article" resources online. Students are encouraged to consult these websites. Here are two good ones:

[http://www.owlnet.rice.edu/~cainproj/courses/HowToReadSciArticle.pdf](http://www.owlnet.rice.edu/~cainproj/courses/HowToReadSciArticle.pdf)  

### Class schedule:

<table>
<thead>
<tr>
<th>Lecture/model</th>
<th>Date</th>
<th>Lecturer</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>8-30</td>
<td>PM DM</td>
<td>Introduction of lecturers and model systems</td>
</tr>
<tr>
<td>Intro of lecturers</td>
<td></td>
<td>GR RB TD</td>
<td></td>
</tr>
<tr>
<td>1 Yeast</td>
<td>9-6</td>
<td>PM</td>
<td>Human-yeast gene replacements</td>
</tr>
<tr>
<td>2 Yeast</td>
<td>9-13</td>
<td>PM</td>
<td>Genetic screens with conditional alleles, classic and modern</td>
</tr>
<tr>
<td>3 Arabidopsis</td>
<td>9-20</td>
<td>MD</td>
<td>Introduction to Arabidopsis</td>
</tr>
<tr>
<td>4 Arabidopsis</td>
<td>9-27</td>
<td>MD</td>
<td>Paper discussion: Harnessing the power of Arabidopsis genetics</td>
</tr>
<tr>
<td>5 Caenorhabditis</td>
<td>10-4</td>
<td>GR</td>
<td>See below</td>
</tr>
<tr>
<td>6 Caenorhabditis</td>
<td>10-11</td>
<td>GR</td>
<td>See below</td>
</tr>
<tr>
<td>7 Caenorhabditis</td>
<td>10-18</td>
<td>GR</td>
<td>See below</td>
</tr>
<tr>
<td>8 Drosophila</td>
<td>10-25</td>
<td>AH</td>
<td>Classical Genetics</td>
</tr>
<tr>
<td>9 Drosophila</td>
<td>11-1</td>
<td>AH</td>
<td>Modern Molec Genetics</td>
</tr>
<tr>
<td>10 Drosophila</td>
<td>11-8</td>
<td>AH</td>
<td>Paper discussion</td>
</tr>
<tr>
<td>11 Zebrafish</td>
<td>11-15</td>
<td>RB</td>
<td>Introduction to zebrafish</td>
</tr>
<tr>
<td>12 Zebrafish</td>
<td>11-22</td>
<td>RB</td>
<td>Combining zebrafish tools to resolve core issues in early vertebrate development.</td>
</tr>
<tr>
<td>13 Mouse</td>
<td>11-29</td>
<td>TD</td>
<td>Introduction to Mouse</td>
</tr>
<tr>
<td>14 Mouse</td>
<td>12-6</td>
<td>TD</td>
<td>Paper discussion</td>
</tr>
</tbody>
</table>

**Lecturers**

PM: Polymenis, Michael, PhD  
DM: Dickman, Marty, PhD  
GR: Garcia, Rene, PhD  
AH: Amrein, Hubert, PhD  
RB: Riley, Bruce, PhD  
TD: Threadgill, David, PhD

**American with Disabilities Act (ADA)**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that students with disabilities be guaranteed a learning environment that provides for reasonable accommodation
of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B1188, or call 845-1637. For additional information visit http://disability.tamu.edu.

Academic Integrity
For additional information please visit: http://www.tamu.edu/aggiehonor
“An Aggie does not lie, cheat, or steal, or tolerate those who do.”

Information about specific lectures

Yeast (Michael Polymenis)

Lecture 1:
- Overview of the life cycle of S. cerevisiae.
- Highlight advantageous experimental properties, such as:
  1. High efficiency of homologous recombination
  2. Isolation of all gametes from an individual meiosis
  3. Conservation of basic cellular processes
  4. Unique morphological features, allowing non-invasive monitoring of cell cycle progression.

Lecture 2:
- Case studies for the above:
  1. A genome wide replacement of yeast genes with human orthologs, (see http://www.sciencemag.org/content/348/6237/921.long). This paper uses many of the tools available for gene replacement, and demonstrates the conservation of fundamental eukaryotic cellular machines.
  2. Genetic dissection of the cell cycle. The Hartwell cdc screen (http://www.sciencemag.org/content/183/4120/46.long). This is the Nobel Prize winning screen. An excellent example of using conditional mutants to probe processes essential for life, and a demonstration of the unique cell cycle morphology of yeast. The accompanying paper (http://www.ncbi.nlm.nih.gov/pubmed/16943325), is an illustration of how one goes about the same problem with the tools of the post-genomic era.
*Arabidopsis thaliana* (Marty Dickman)

**Lecture 1: Introduction to Arabidopsis**

**Class Format: Lecture**

1. Arabidopsis life cycle with emphasis on flower development
2. Genetic and molecular tools in Arabidopsis
3. The impact of Arabidopsis on human medicine

**Assigned reading:**


**Lecture 2: The awesome power of Arabidopsis genetics**

**Class format: Collaborative Presentation.**

Each student will be assigned a specific section/aspect of the primary research paper and must give a presentation to the class on that topic. Additionally, they must turn in a written essay re-explaining the assigned topic.

**Assigned reading:**

**Primary research paper:**


**Commentary/Review articles:**


Caenorhabditis elegans (Rene Garcia)

Lecture 1:
Overview of how different idiosyncratic facets of C. elegans Biology are used to address general biological questions.
1. Invariant developmental program in embryology.
3. Nutritional sensing and diapause developmental programs
4. Hermaphroditic and copulatory sexual mechanisms
5. Post reproductive biology and aging

Lecture 2:
Genetic and molecular tools used in C. elegans research
1. Microscopy inspection of cellular events.
2. Laser ablation analysis
3. Forward genetic analysis using chemical mutagenesis.
   a. Design and analysis
4. Reverse genetic tools.
   a. RNAi and CRISPR knock-outs and knock-ins.
5. Agonist and antagonist pharmacology
6. in vivo Calcium Imaging, optogenetics, and behavioral assays.

Lecture 3:
Collaborative Presentation. Each student will be given a specific section of the paper and must give a 5-8 minute chalk talk presentation on explaining the experiment design of their section. Additionally, they must turn in a written essay re-explaining the methodology, results and interpretation of the section.
Drosophila melanogaster (Hubert Amrein)

Lecture 1: Classic Drosophila genetics
- Overview over basic Drosophila biology: embryonic development, larval growth stage, metamorphosis (imaginal discs, reorganization of body plan)
- Genetic tools (classic genetics): mutations, saturation mutagenesis, balancers, polytene chromosomes, gene/deficiency mapping, P-elements (Morgan, TH, Nobel Prize in Medicine 1915)
- Classic Genetic screen to identify genes controlling early development (Wieschaus EF/Nuesslein-Volhard C, Nobel-Prize in Medicine 1995) and the use of the compound eye as a model system for Genetic screens (Rubin lab et al)

Lecture 2: Modern Molecular Genetics
- Molecular genetic tools: transgenesis, reverse genetic screens, gene traps, repressor/enhancer screens, targeted deletions (piggyback); GAL4 system, Q system
- Homologous recombination, gene-knock outs/knock-ins, CRISPR
- MARCM technique (Molecular Analysis with Repressible Cell Marker): dissecting neural circuitry
- Life imaging techniques: cell migration in embryo (gfp); Ca2+ imaging in vivo in various neurons both in the brain and periphery

Lecture 3: Paper discussion
- Paper discussion (1 or 2 papers selected; depending on number of students).
- Each student gets a specific assignment to discuss specific aspects of the paper in a 1 page brief, to be submitted prior to lecture 3
- Each student is prepared to discuss any of the figures of the assigned paper, as well as respond to more general questions handed out to the entire class after lecture 2.
**Danio rerio** (Bruce Riley)

**Lecture 1**
- Overview of the zebrafish model system
  - Biological attributes
  - Current status
- Evolutionary considerations
  - Whole genome duplications in the vertebrate lineage
  - Common fates of duplicated genes
  - Broad conservation of structure/function
- Forward screens
  - Advantages and historical significance
- Reverse genetics – Morpholinos, TALENs, CRISPRs, Cre-Lox
  - Current status, ongoing debates
- Transgenesis – Reporter lines, gene misexpression
  - Heat shock, Gal4-UAS
- "Chemical genetics" - small molecule screens
  - Regenerative medicine, cancer biology

**Lecture 2**
- Paper discussion (tba)
Mus musculus (David Threadgill)

Lecture 1: Introduction to Mouse

Class Format: Lecture
1. Historical importance of mouse as a model
2. Unique position as a translational model
3. Important genetic concepts for the model including syntenic conservation, genetics, physiology, engineering and mutant screens.

Lecture 2: Paper discussion

Class format: Collaborative Presentation
Each student will be assigned a specific section/aspect of the research papers or background techniques, and must give a presentation to the class on that topic. Additionally, they must turn in a written essay re-explaining the assigned topic.

Assigned readings:
1. Classic George Snell paper where he first described the genetics of histocompatibility using tumor transplants. Snell was awarded the Nobel Prize in Physiology or Medicine in 1980 for this work. This a landmark paper that will bring in the concepts of natural genetic variation, congenics, different types of genetic crosses, and introduction to quantitative genetics.

2. Classic Shinya Yamanaka paper describing derivation of induced pluripotent stem cells that have characteristics of embryonic stem cells. Yamanaka won the Nobel Prize in Physiology and Medicine in 2012 for this work. This paper will cover cell-based genetic screens, embryonic stem cells, and the unique aspects of making germ line alterations in mice.
Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
Submit original form and attachments

Form Instructions
1. Course request type: □ Undergraduate  ✔ Graduate  □ First Professional (DO, MD, JD, PharmD, DVM)
2. Request submitted by (Department or Program Name): Department of Biochemistry and Biophysics
3. Course prefix, number and complete title of course: GENE 613 Quantitative Genetics I

4. Change requested
   a. Prerequisite(s): From: GENE 612; STAT 652 To: STAT 651
   b. Withdrawal (reason): ____________________________
   c. Cross-list with: ____________________________
   d. Change in course title and description. Enter complete current course title and course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. Attach a course syllabus.

5. Is this an existing core curriculum course? ☑ Yes  □ No
6. If grade type is changing for existing course, indicate the new grade type: □ Grade  □ S/U  □ P/F (CLAD)
7. If this course will be stacked, please indicate the course number of the stacked course: ____________________________
8. I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-controls/export-control-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

<table>
<thead>
<tr>
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<tr>
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<td>Lab</td>
<td>Other</td>
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b. Change to:

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</tbody>
</table>

Approval recommended by:

[Signature]
Department Head or Program Chair (Type Name & Sign)
Date: 5/13/16

Dean of College
Date: 6/23/16

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Curricular Services – 08/14
GENE 613
Quantitative Genetics I
Texas A&M University
Spring 2017

Instructor: David G. Riley
Associate Professor
Department of Animal Science
432E Kleberg
845-2667
david-riley@tamu.edu

Office hours: Monday & Friday: 10:00 to noon and 1:00 – 3:00 p.m.

These are not the only times available, but times other than these should be confirmed by speaking with me.

Time: 9:35 to 10:50 a.m.

Place: 400 KLCT

Objective: The combination of genetic and statistical principles so that populations of sexually reproducing organisms can be manipulated for genetic improvement and/or to study evolutionary change.

Learning Outcomes:
After completion of the course, students will be able to:
1. Describe single-locus models of inheritance in diploid organisms
2. Algebraically describe the influence of genetic drift, migration, selection, and population size on the population mean of characters.
3. Employ methods of statistical association to estimate genetic merit.
4. Quantify response to selection for characters.
5. Detail the role of linkage disequilibrium in inheritance.

Prerequisite: STAT 651

Attendance: Any required work that is missed due to a university-excused absence (Student Rule 7 http://student-rules.tamu.edu/rule07) may be made up with instructor agreement on a reasonable timeline. Other absences may be excused at instructor discretion with prior notification and proper documentation.

Text: 1. Class note packets will be supplied.

Grade:
Exams (3) 60% A = 89.5 to 100 D = 59.5 to 69.4
Homework (7 or 8) 40% B = 79.5 to 89.4 F = 59.4 and below
C = 69.5 to 79.4
Homework assignments turned in one to six days late will receive an automatic 30% grade reduction; assignments turned in seven days late will automatically receive a grade of zero. Homework assignments are primarily computational in nature. All homework assignments are due by 5:00 PM on their respective dates. Students with excused absences will be allowed to make up missed assignments within a reasonable time line determined by the instructor and the student.

At least the first exam will have an in-class portion, as well as a take home, open notes portion. The last two exams will likely be given as take home exams. Take-home exams will be due by 5:00 pm on the following day after given. The exams have both computational and theory/discussion aspects.

The tentative schedule for graded assignments will be:

<table>
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<tr>
<th>Date</th>
<th>Assignment</th>
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<tbody>
<tr>
<td>Jan 19</td>
<td>Homework 1 – due Jan 26</td>
</tr>
<tr>
<td>Jan 26</td>
<td>Homework 2 – due Feb 2</td>
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<tr>
<td>Feb 2</td>
<td>Homework 3 – due Feb 9</td>
</tr>
<tr>
<td>Feb 16</td>
<td>Exam I</td>
</tr>
<tr>
<td>Feb 23</td>
<td>Homework 4 – due Mar 1</td>
</tr>
<tr>
<td>Mar 1</td>
<td>Homework 5 – due Mar 8</td>
</tr>
<tr>
<td>Mar 14-18</td>
<td>SPRING BREAK</td>
</tr>
<tr>
<td>Mar 22</td>
<td>Homework 6 – due Mar 29</td>
</tr>
<tr>
<td>Apr 5</td>
<td>Exam II</td>
</tr>
<tr>
<td>Apr 12</td>
<td>Homework 7 – due Apr 19</td>
</tr>
<tr>
<td>Apr 19</td>
<td>Homework 8 — due Apr 26</td>
</tr>
<tr>
<td>Apr 28</td>
<td>Last lecture</td>
</tr>
<tr>
<td>May 5</td>
<td>Exam III (12:30 to 2:30 p.m.)</td>
</tr>
</tbody>
</table>

Course content:

Statistical concepts
- Continuous and discrete distributions
- Probability
- Means, variances, covariances
- Regression and correlation as measures of association

Fundamental as a basis
- Allele and genotype frequencies
- Hardy Weinberg Equilibrium
- Additive and nonadditive gene action
- Forces that change allele frequency
- Selection for and against recessive alleles

Quantitative phenotypes and genotypes
- Genetic model for phenotype
- Variation and variances
- Breeding value and heritability
- Producing ability and repeatability

1 lecture

6 lectures

5 lectures
Gene combination value and heterosis

Linkage disequilibrium
- Genetic distance and recombination rate
- Detection of QTL
- Types of resource populations

Inbreeding and relationship as covariances among individuals
- Relationship coefficient
- Inbreeding coefficient
- Numerator relationship matrix
- Inbreeding depression
- Heterosis

Estimation of genetic merit
- Mass selection
- Progeny testing
- Selection Index
- Best Linear Unbiased Prediction (BLUP)

Selection response
- Factors that impact annual selection response
- Correlated selection response—additive genetic correlation
- Pleiotropy
- Genotype assisted selection

Quantitative considerations and recent genetic applications—
- Whole genome association
- Issues related to multiple testing and multicollinearity
- False discovery rate
- Data permutations and probability of results
- Copy number variants
- Genomic prediction of genetic merit
- Estimation of relatedness using marker arrays

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Plagiarism: The handouts used in this course are copyrighted. By “handouts”, I mean all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless I expressly grant permission. As commonly defined, plagiarism consists of claiming the ideas, words,
writings, etc, of another person as your own work. This means you are committing plagiarism if you copy work of another person and turn it in as your own, even if you have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty." Definitions of academic misconduct are also available online at http://www.tamu.edu/aggiehonor.

Aggies do not lie, cheat or steal, or tolerate those who do.
BIOGRAPHICAL SUMMARY

David Greg Riley

Professional Experience:

Associate Professor, Texas A&M University, 2009-present.
Research Geneticist, USDA, ARS, Subtropical Agricultural Research Station, Brooksville, FL 2000-2009

Research Interests:

Applied breeding and genetics in beef cattle. Some specific project areas include:

Identification of quantitative trait loci (QTL) for growth, disposition, feed efficiency, reproductive efficiency and carcass traits based on full sib F2 families and half-sib families.

Investigation of reciprocal differences in Bos indicus-Bos taurus crosses for calf size and growth traits with particular interest on epigenetic influences.

Study of genotype-environment interactions on production efficiency and body composition in live animals and beef carcasses.

Heterosis expression in livestock.

Incorporation of molecular information into prediction of genetic merit.

Education:

Ph.D. Texas A&M University 2000 Genetics
M.S. 1997 Animal Breeding
B.S. 1984 Agricultural Economics
Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
• Submit original form and attachments •

Form Instructions
1. Course request type: □ Undergraduate □ Graduate □ First Professional
2. Request submitted by (Department or Program Name): Department of Statistics
3. Course prefix, number and complete title of course: STAT 647 Spatial Statistics

4. Change requested
   a. Prerequisite(s): From: STAT 601 or STAT 611 or equivalent To: STAT 630 or STAT 611 or equivalent
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.

   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. Attach a course syllabus.

5. Is this an existing core curriculum course? □ Yes □ No
6. If grade type is changing for existing course, indicate the new grade type: □ Grade □ S/U □ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course:

   I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://ypr.tamu.edu/resources/export-
   controls/export-controls-basics-for-distance-education).
8. 
9. Complete current course title and current catalog course description:

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11. a. As currently in course inventory:
    Prefix   Course #   Title (excluding punctuation)
    STAT 647 Spatial Statistics
    Lect.   Lab   Other   SCH   CIP and Fund Code   Admin. Unit   FICE Code   Level
    3.00   0.00   0.00   3.00   27.0501.00   2740   0   3   6   3   2   6

    b. Change to:
    Prefix   Course #   Title (excluding punctuation)
    Lect.   Lab   Other   SCH   CIP and Fund Code   Admin. Unit   FICE Code   Level
    0.00   0.00   0.00   0.00   0.00   0.00   0   3   6   3   2   6

   Approval recommended by:
   Michael Longnecker 6-2-16
   Department Head or Program Chair (Type Name & Sign) Date
   Department Head or Program Chair (Type Name & Sign) (if cross-listed course) Date
   Submitted to Coordinating Board by:
   Chair, Coordinating Committee Date
   Chair, GC or UCC Date
   Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14