TEXAS A&M UNIVERSITY

Graduate Council Meeting Agenda

Electronic Vote

January 3, 2012

1. **New Course Requests:**
   a. AERO 670 Turbulence Modeling
   b. ENTO 645 Arthropods as Vectors of Plant Pathogens
   c. VTPP 652 Fetal and Embryo Physiology

New Courses

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GRADUATE STUDIES

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ESSAP

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
• Submit original form and attach a course syllabus.•

1. Request submitted by *(Department or Program Name)*: Department of Aerospace Engineering

2. Course prefix, number and complete title of course: AERO 670 Turbulence Modeling

3. Catalog course description (not to exceed 50 words):

Identification of physical features that render Navier-Stokes equation difficult to compute or model; includes; Reynolds-averaged and filtered Navier-Stokes equations for unresolved stresses; development of closure models for pressure-strain correlation, dissipation and turbulent transport Reynolds; algebraic Reynolds stress modeling, Large Eddy Simulations (LES) and hybrid methods are presented; validation and prediction studies.

4. Prerequisite(s): AERO 640 and graduate classification or approval of instructor.

Cross-listed with: _____ Stacked with: _____

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

5. Is this a variable credit course? ☐ Yes ☑ No If yes, from _____ to _____

6. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken _____ times.
Will this course be repeated within the same semester? ☐ Yes ☐ No

7. This course will be:

a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
MENGR, MS, PHD in Aerospace Engineering or related fields of study

8. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**

9.

Prefix	Course #	Title (excluding punctuation)
AERO	670	TURBULENCE MODELING

Lect.	Lab	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
03	00	03	14020100 0 06	0100	13-14	003632

Level: 6

Approval recommended by:

Rodney D. Bowersox — 12-7-12
Department Head or Program Chair *(Type Name & Sign)* Date

Scott Miller — 12/13/12
Chair, College Review Committee Date

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

Scott Miller — 12/13/12
Dean of College Date

Submitted to Coordinating Board by:

Mark Zoran
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 – 3/10

TEXAS A&M UNIVERSITY

SYLLABUS

AEROSPACE ENGINEERING

AERO 670 - Turbulence Modeling
Spring 2015
Date/Time/Place: TBA

Course Description and Prerequisites

Identification of physical features that render Navier-Stokes equation difficult to compute or model; includes; Reynolds-averaged and filtered Navier-Stokes equations for unresolved stresses; development of closure models for pressure-strain correlation, dissipation and turbulent transport Reynolds; algebraic Reynolds stress modeling, Large Eddy Simulations (LES) and hybrid methods are presented; validation and prediction studies.

Prerequisites: AERO 640 and graduate classification or approval of instructor.

Learning Outcomes

At the end of this course, the students will be able to:

1. Understand closure model development for: slow and rapid pressure-strain correlation, dissipation, turbulent transport and near-wall behavior.
2. Develop turbulence constitutive relations using algebraic Reynolds stress modeling technique.
3. Develop closure models for arbitrary decomposition filters.
4. Understand and use Large Eddy Simulations and hybrid turbulence methods.
5. Perform a series of calibration, validation and prediction computations.

Instructor Information

Instructor: Dr. Sharath S. Girimaji, Professor, Aerospace Engineering Dept.
Office: HRBB 607B
Phone: (979)-845-1674
Office Hours: TBA
Email: girimaji@aero.tamu.edu

Textbook and/or Resource Materials

Textbook: None
Reference: `Turbulence Modeling for CFD' by D. C. Wilcox

Grading Policies

Method of Evaluation:

Assignments and projects (3 X 25%)	75%
Take home mid-term/final	25%

Grades: Grades are based on the weighted average following the schedule above.
A 90 – 100%
B 80 – 89%
C 70 – 79%
D 60 – 69%
F below 60%

Attendance Policy and Exam Schedules

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line at http://student-rules.tamu.edu/rule07.

All semester examinations are given in accordance with the schedule published by the Office of the Registrar. Currently available at: http://admissions.tamu.edu/Registrar/General/FinalSchedule.aspx

Course Topics

	Hrs
1. Fundamentals	4
a) On the nature of turbulence	
b) Governing equations	
c) Spectral Description	
d) Transformation and invariance properties	
2. Averaging and Filtering	6
a) Reynolds-averaged Navier-Stokes equations	
b) Filtered Navier-Stokes equations	
c) Realizability and other modeling constraints	
3. Reynolds stress closure modeling	14
a) Rapid pressure-strain correlation modeling	
b) Slow pressure-strain correlation modeling	
c) Dissipation equation modeling	
d) Turbulent transport modeling	
e) Near-wall modeling	
4. Algebraic Reynolds stress modeling	6
a) Weak-equilibrium assumption and representation theory	
b) Non-linear algebraic constitutive relation	
5. Large-eddy simulations and hybrid turbulence Modeling	8
a) Large-eddy simulations	
b) Zonal methods	
c) Bridging Methods including Partially-averaged Navier-Stokes method	
Model for non-linear advection and pressure effects	
6. Spectral closures	4
Total Hours:	42

Contributions to Professional Component:

1. Helps understand turbulence modeling process.
2. Enables students to perform CFD computation with turbulence models.
3. Empowers students to develop new turbulence models for novel complex flows.
4. Prepares students for a career of research/application in turbulence.

Relationship to Program Outcomes:

Objectives	Assessment Method
Understand and model various turbulence processes	Projects and Exam
Hierarchical modeling of turbulence	Projects and Exam
Representation theory, linear theory and dynamical system analysis	Projects and Exam
RSCM, ARSM computations	Projects
LES and PANS computations	Projects

Americans with Disabilities Act (ADA) Policy Statement

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 accommodations of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity Statement and Policy

For additional information, please visit: http://aggiehonor.tamu.edu/

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

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

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GRADUATE STUDIES

1. Request submitted by *(Department or Program Name)*: Department of Entomology

2. Course prefix, number and complete title of course: ENTO 645 Arthropods as Vectors of Plant Pathogens

3. Catalog course description (not to exceed 50 words):

Concepts on transmission of plant pathogens, discussion of transmission mechanisms, characteristics of insect vectors and their consequences for plant protection.

4. Prerequisite(s): Graduate classification or approval of instructor

Cross-listed with: _____ Stacked with: _____

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

5. Is this a variable credit course? ☐ Yes ☑ No If yes, from _____ to _____

6. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken _____ times.
Will this course be repeated within the same semester? ☐ Yes ☑ No

7. This course will be:
   a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
   b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
   M.S. & Ph.D. in entomology

8. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**

9.

Prefix	Course #	Title (excluding punctuation)
ENTO	645	Arth Vector Plant Path

Lect.	Lab	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
03	00	03	26070200021050	13-14	003632		6

Approval recommended by:

David Ragsdale — Department Head or Program Chair *(Type Name & Sign)* — 11/5/12 — Date

David Reed — Chair, College Review Committee — 11/30/12 — Date

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

Dean of College — 11/30/12 — 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 – 3/10

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	ENTO 445/645 *Arthropods as Vectors of Plant Pathogens*
Credit hours	3
Term	Spring 2013
Meeting times	MWF : 12:40 – 1:30
Class location	HPCT205

Course Description and Prerequisites

Concepts on transmission of plant pathogens, discussion of transmission mechanisms, characteristics of insect vectors and their consequences for plant protection. Prerequisite: Approval of instructor

Learning Outcomes

On completion of this course, students will:

1. Describe and explain different transmission mechanisms
2. Relate transmission mechanisms with methods of plant protection
3. Discover techniques used to explore vector-pathogen interactions
4. Relate different aspects of vector biology to their impact on pathogen transmission
5. Summarize scientific papers related to transmission of plant pathogens
6. Critically analyze scientific publications related to vector biology: problems with scientific design, gaps in knowledge (**ENTO 645 Graduate students only**)

Instructor Information

Name	Cecilia Tamborindeguy
Telephone number	979 845 7072
Email address	ctamborindeguy@ag.tamu.edu
Office hours	By appointment or one hour following class
Office location	Heep Center 516

Textbook and/or Resource Material

There is no textbook. Scientific papers will be used as resource material and will be made available two weeks prior to their use.

Grading Policies

This course will consist of lectures and student-led discussions based on current literature. **Each graduate student will lead the discussion for at least one paper**. All students (graduate and undergraduate) must read the paper and participate in the discussion. **Each student will write a discussion paper for 3 (graduate) or 4 (undergraduate) of the discussed publications**. There will be 2 exams.

Grading for **graduate students (ENTO 645)** will be based on participation in class, paper discussion, 3 paper analyses and 2 exams.

- Exams 50% (25 points each)
- Paper discussion 20% (20 points)
- In-class participation 15% (15 points)
- Paper analyses 15% (5 points each)

Total Points Available = 100

A=90-100% of cumulative points; B=80-89; C=70-79; D=60-69; F=<60.

Grading for **undergraduate students (ENTO 445)** will be based on participation in class, 4 paper analyses and 2 exams.

- Exams 50% (25 points each)
- In-class participation 10% (10 points)
- Paper analyses 40% (10 points each)
  Total Points Available 100

A=90-100% of cumulative points; B=80-89; C=70-79; D=60-69; F=<60.

Attendance Policy

The attendance policy followed will be as stated in Section 7 of Texas A&M University, Student Rules 2000-2001 (http://student-rules.tamu.edu/rule07).

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, i Cain Hall, Room B118, 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."

Week	Topic
1	Introduction, syllabus review Review and new concepts: plant disease, vector Vector-borne pathogens: description, classification, identification
2	Vector specificity, transmission efficiency, factors affecting transmission Transmission mechanisms: description, assessment
3	Hemipterans as vectors: importance of piercing-sucking mouth parts, feeding strategy, EPG Aphids life cycle, aphid phloem feeding adaptations. Xylem feeding.
4	Non-persistent and semi-persistent transmission of viruses: capsid strategy, helper strategy Approaches to study virus transmission Whiteflies
5	Circulative transmission: generalities, example: aphids – luteovirids Propagative transmission: generalities, example: thrips - tospoviruses
6	Transmission of bacterial pathogens: mechanisms Examples: Pierce's disease (xylem restricted), Zebra Chip and Huanglongbing (phloem restricted), Mollicutes
7	Other vectors (mites and beetles): mechanisms of transmission **Revision**
8	Other insect-bacteria associations: primary and secondary endosymbionts, effects on vector populations **First Exam**
9	Cost and benefits of pathogen transmission: direct and indirect effects. Negative effects of pathogen transmission, insect response to microorganisms
10	Positive effects of pathogen transmission: plant defense pathways, plant metabolism modifications
11	Control of vector-borne pathogens: Plant defense mechanisms: constitutive, inducible, indirect Improving plant defense mechanisms: symbioses, antibiotics, transgenics
12	Control of vector-borne pathogens: IPM strategy. Limitations of approaches
13	Emergent diseases and outbreaks Definitions, mechanisms of emergence **Revision**
14	**Second Exam**

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

• Submit original form and attach a course syllabus.•

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GRADUATE STUDIES

Form Instructions

1. Request submitted by *(Department or Program Name)*: Department of Veterinary Physiology and Pharmacology

2. Course prefix, number and complete title of course: VTPP 652 Fetal and Embryo Physiology

3. Catalog course description (not to exceed 50 words): Introduction to the physiologic processes driving embryonic development and pregnancy; focus on embryo implantation, establishment of the placenta, development of the fetal circulatory systems and the molecular processes governing embryo differentiation and development; special emphasis on the major organ systems affected by pediatric disease and on the actions of teratogens.

4. Prerequisite(s): Graduate Classification

   Cross-listed with: _____ Stacked with: VTPP 452

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

5. Is this a variable credit course? ☐ Yes ☒ No If yes, from _____ to _____

6. Is this a repeatable course? ☐ Yes ☒ No If yes, this course may be taken _____ times.
   Will this course be repeated within the same semester? ☐ Yes ☒ No

7. This course will be:
   a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

   b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
   BIMS Majors

8. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**

9.

Prefix	Course #	Title (excluding punctuation)
VTPP	652	FETAL & EMBRYO PHYSIOLOGY

Lect.	Lab	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
03	00	03	26090502	000292	2013-14	003632	6

Approval recommended by:

Dr. Glen A. Laine 12-1-12 — 12-14-12

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 12/14/2012 Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services — 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 – 3/10

COLLEGE OF VETERINARY MEDICINE
& BIOMEDICAL SCIENCES
Department of Veterinary Physiology & Pharmacology

TEXAS A&M UNIVERSITY

VTPP 652 Fetal and Embryo Physiology
Spring Semester 2014
Course Syllabus

3 Credit Hours

Brief Course Description

The purpose of this course is to provide graduate level students with an introduction to the biochemical processes essential to gametogenesis, early embryonic development and pregnancy. This course will provide a framework upon which to build a basic understanding of the physiology of pregnancy and several developmental disorders that arise due to biomedical miss-regulation or environmental agents. Students will be expected to synthesize structural functional relationships between the gametes and reproductive organs and describe the interaction between the developing fetus, placental membranes, maternal tissues and the environment. Graduate level students will also be expected to participate in a weekly journal club, and give oral presentations describing the scientific findings and research strategies detailed within the assigned manuscript.

Prerequisites

Students must be enrolled as graduate students in the life sciences.

Meeting Times & Important Dates

VTPP 652 will meet every **Tuesday and Thursday 8:45 AM - 10:00 AM in Room 120 - National Center for Therapeutics Manufacturing (NCTM).** This building is located off Discovery Dr. and busses run there every 12 minutes. There will be two mid-term examinations and a final. Please note the dates below. Absence from the examination will result in a grade of 0 unless due to a University excused absence (http://student-rules.tamu.edu/rule07)

Midterm 1	**Tuesday February 12th 2012 - In class**
Midterm 2	**Thursday March 28th 2012 - In class**
Writing Assignment	**Due April 1st**
Final Exam	**Monday May 6th 1:00 to 3:00 PM**

Instructor Information

Michael Golding PhD.
Assistant Professor
Department of Veterinary Physiology and Pharmacology
College of Veterinary Medicine and Biomedical Sciences
Texas A&M University
College Station, Texas 77843-4466
979-862-1332
mgolding@cvm.tamu.edu

Charles R. Long. MSc. PhD.
Associate Professor
Department of Veterinary Physiology and Pharmacology
College of Veterinary Medicine and Biomedical Sciences
Texas A&M University
College Station, Texas 77843-4466
979-845-2331
clong@cvm.tamu.edu

Overall Course Objectives

Welcome to VTPP 652 - Fetal and Embryo Physiology. This course is intended to provide Graduate Students with a survey of the molecular and physiologic processes at work during pregnancy. We will begin with the production of sperm and egg and travel through pregnancy to the events initiating labor. The topics discussed in this course are intended to be used as a framework for students to better understand the developmental origins of both birth defects and disease. The specific learning objectives for this course have been distilled from those prescribed by the American Physiological Association, the American Congress of Obstetricians and Gynecologists as well as major areas in Maternal-Fetal medicine highlighted by the National Board of Medical Examiners. This course will draw upon subject matter covered in anatomy, cell biology, genetics, and physiology and will require students to synthesize these separate disciplines into a comprehensive whole. **This course is intended to prompt graduate students to shift from memorization and recitation to the development of skill sets necessary for the life-long learning required of professionals.**

Specific Learning Objectives

- Identify the cell types and anatomical structures necessary to gametogenesis.
- Describe spermatogenesis and the role of Sertoli and Leydig cells in this process.
- Graphically illustrate the timing of changes in blood levels of key sex hormones and correlate these with structural changes in both the uterine endometrium and ovary during the menstrual cycle.
- Explain the physiological basis of steroid hormone contraception ("birth control pill").
- Describe the process of fertilization, including capacitation and the acrosome reaction.
- Illustrate and explain the movement of the blastocyst towards the uterine wall.
- Describe the process of implantation and explain the major physiological functions of the placenta.
- List the protein hormones secreted by the placenta and describe their roles in maintaining pregnancy / controlling gestation length.
- Define the terms: stem cell, differentiation, commitment, and specification and explain their relevance to mammalian development.
- Discuss the maternal physiologic and anatomic changes associated with pregnancy.
- Discuss the diagnosis of pregnancy using biochemical methodologies.
- Diagram the structures of the developing embryo.
- Describe the relationship between fetal and maternal tissues.
- Describe the developmental origins of the circulatory system.
- Trace the flow of blood between maternal and fetal tissues for a given gestational age.
- Define the normal length of gestation and describe how this is established / maintained.
- Discuss anatomical and physiological characteristics for a given gestational age.
- Identify a pregnancy at risk for complications, including poor maternal or fetal outcomes.
- Describe the make up of the uterus and cervix
- List the hormonal changes involved in the onset of labour
- Describe how the cervix and uterus change in response to labour
- Define Epigenetics and describe the relationship between gene expression and environmental factors.
- Define the term teratogen and describe potential mechanisms of action for this class of agents.
- List the major assisted reproductive technologies in agricultural and clinical practice and describe their use and implications.

American Physiological Society - Learning Objectives http://www.the-aps.org/MedPhysObj - Learning Objectives 77 - 105

American Congress of Obstetricians and Gynecologists - Educational Objectives, A Core Curriculum in Obstetrics and Gynecology, Ninth Edition - Learning Outcomes for Sections 1A - D.

National Board of Medical Examiners - Subject Exam for Obstetrics and Gynecology - Learning Objectives pulled from tested materials covered on the SHELF exam.

Learning Outcomes and Goals

The purpose of this course is to follow mammalian development from the earliest stages of gametogenesis, through fertilization, to the point the fetus is ready to begin terrestrial life. We fill focus on the unique physiology of the placenta and its role in both facilitating fetal metabolism and orchestrating the timing of human development. Understanding the nuances of normal fetal physiology is the basis for prenatal diagnosis and the institution of successful therapy.

Learning Outcomes:

By the end of the course, the graduate student will have:

- developed an understanding of basic endocrinology and how hormones regulate physiological processes
- a firm understanding of how cellular differentiation controls organ development
- a better understanding of the developmental origins of
  - the central nervous system
  - the cardiovascular system
  - the reproductive organs
  - the limbs and integumentary system
- exposure to collection and analysis of clinical data
- knowledge of teratogens and their relation to the development of birth defects
- a greater understanding of the relationship between maternal-fetal physiology and complications during pregnancy including:
  - insight into critical thinking in the clinical setting
  - goals and mechanisms of some pharmacologic agents
  - surgical techniques used to correct cardiovascular birth defects
  - the physiological basis of clinical assisted reproductive technologies
- developed skill sets necessary to critically evaluate the scientific literature
- become proficient at giving short - scientific talks detailing the core findings of a given study

Text Book

Primary Text

The Developing Human - Clinically Oriented Embryology 9th Edition
ISBN978-1-4377-2002-0

Secondary Resources

Human Embryology and Developmental Biology
ISBN 978-0-323-05385-3
Larsens Human Embryology
ISBN 978-0-443-06811-9

Grading policies

Grading scale A= 90-100
B= 80-89
C= 70-79
D= 60-69
F= 0-59

Course Breakdown

Midterm 1	25%	Tuesday February 12th
Midterm 2	25%	Thursday March 28th
Writing Assignment	10%	(Due April 1st)
Journal Club Participation	15%	Weekly Meetings
Final Exam	**25%**	**Monday May 6th 1:00 to 3:00 PM.**

Examinations:

Two midterm examinations and a final examination will be written to assess a student's understanding of the information discussed in class with particular emphasis on the **specified learning objectives** and assigned readings. All students enrolled in VTPP 652 will take the examinations at the scheduled lecture days/times on the following dates: **February 12th 2012, and March 28th 2012**. The examinations will be a combination of multiple choice, short answer, and/or essay questions. Seating for examinations is on a random basis.

Students who have withdrawn from or Q-dropped the course are not considered as officially enrolled in the course, and thus, may not take examinations or attend lectures.

Writing Assignment

Wikipedia is is a free, multilingual collaborative encyclopedia, which is quickly becoming the largest and most popular general reference source in the world. In the United States alone, Wikipedia receives 2.7 billion monthly page views from people of all walks of life. The name Wikipedia derives from the fusion of the Hawaiian term Wiki meaning "quick" and encyclopedia. The entries placed on Wikipedia are typically very succinct, pithy and to the point. In the event the reader would like to read more on the subject or verify the information, articles list the reference or source(s) the information being discussed was derived from.

During the semester, students enrolled in VTPP 652, Fetal and Embryo Physiology are required to complete a writing assignment designed to familiarize them with a gene of their choice, controlling a developmental process of interest. Students will submit a "Wikipedia style entry" summarizing what is known about their gene and properly reference the **PRIMARY sources** they derived this information from. This entry will be approximately one paragraph in length - 150 to 250 words and will summarize the research they have conducted on their gene of interest. The text will be written in the students own words and should be understandable to a general audience.

Article Break Down

Below are some loose guidelines on the information that should be included in your article.

1) What type of molecule is your gene of interest?

i.e. transcription factor vs signaling molecule or structural protein...

2) What does this molecule do? i.e. what is its biological role?

3) What organ system or developmental structure is this gene involved in patterning?

4) Are there any diseases or defects associated with this gene? Have scientists generated a gene "knockout" model?

Students will compile and summarize the above information into a single paragraph, and upload this information onto Wikipedia. A copy of this entry should be sent to Dr. Golding - mgolding@cvm.tamu.edu by April 1st 2012. Other than these loose guidelines, the content of the article and the subjects discussed are wide open and subject to the students creativity and interests.

Journal Club

The journal club section of this course will provide graduate level students with a weekly seminar style class focusing on the most current research in Developmental Biology as it relates to biomedical sciences and disease. This section of the class will meet once a week in the auditorium of the TIPS building. The purpose of this section is to prompt graduate level students to become familiar with the nuances of giving formal presentations while at the same time enhancing their abilities to critically evaluate the scientific literature. Students will be assigned two weekly papers taken from the most current primary literature. Each student will be expected to synthesize the data and research strategies outlined in each paper. For each manuscript discussed, one student will be expected to give an oral presentation detailing the research findings while another student will be assigned to lead the discussion of the paper. Each week, two papers will be discussed and marks will be assigned based on the quality of the oral presentations and active group participation.

Journal Club Meeting Times & Important Dates

The VTTP 652 Journal Club will meet once a week in the TIPS Auditorium from 1:00 to 3:00 PM. (Day to be determined)

Journal Club Marking Breakdown - of 15% total

Overall Class Room Participation	4%
Presentation Design and Communication skills	7%
Performance as Discussion Leader	4%

TEXAS A&M UNIVERSITY

VTPP 652 Course Topics

Week 1 January 15 & 17

Lecture 1 - Differentiation & Cell Specialization (Golding)

Molecular Basis for Embryonic Development
Differentiation & Cell Specialization
Stem Cells and Niches

Lecture 2 - Mechanisms Controlling Gene Expression (Golding)

Organization of Mammalian Genes
Transcription Factors & Developmental Control of Gene Expression
RNA Interference and microRNA control of Gene Expression

Week 2 January 22 & 24

Lecture 3 - Epigenetic control of Gene Expression (Golding)

Chromatin Structure
DNA Methylation and Post-Translational Histone Modification
Epigenetic Programming, Cellular Identity, Development and Disease

Lecture 4 - Cell Signaling (Golding)

Signaling Molecules & Hormones
Receptor Molecules and Signal Transduction
Regulatory Systems & Cross Talk

Week 3 January 29 & 31

Lecture 5 - Spermatogenesis I (Long)

Germ Cell Origins & Development
Sexual Differentiation
Male Reproductive Anatomy

Lecture 6 - Spermatogenesis II (Long)

Male Reproductive Endocrinology
Spermatogenesis
Sperm Production

Week 4 February 5 & 7

Lecture 7- Meiosis & Oogenesis I (Long)

Meiosis
Germ Cell reprogramming
Oogenesis

Lecture 8 - Meiosis & Oogenesis II (Long)

Hormone Signaling and Ovarian Function
Follicular Development and Estrous
Oocyte Growth, Maturation and Ovulation

Week 5 February 12 & 14

Lecture 9 - Midterm 1 (February 12 2013)

Lecture 10 -- Ovulation (Long)

Ovulation
Oocyte Growth
Cell Signaling Mechanisms Regulating Oocyte Growth and Ovulation

Week 6 February 19 & 21

Lecture 11 Fertilization I (Long)

Transport of Gametes and Fertilization
Fertilization
Sperm / Egg Interactions

Lecture 12 - Fertilization II (Long)

Embryo Development
Embryo Polarity
Epigenetic Programming

Week 7 February 26 and 28

Lecture 13 - Assisted Reproductive Technologies & Epigenetics (Long)

Assisted Reproductive Technologies in Humans and Livestock
Epigenetic Regulation of Development and X-Inactivation
Developmental Anomalies associated with ARTs

Lecture 14 - Implantation & Maternal Recognition of Pregnancy (Golding)

Uterine Endometrium & Embryo Implantation
Twinning and Conjoined Fetuses
Maternal Recognition of Pregnancy

Week 8 March 5 & 7

Lecture 15 - Placental Physiology I (Golding)

Placental Differentiation & Physiology
Blood Flow in the Placenta
Placenta and Membranes in Multiple Pregnancies

Lecture 16 - Placental Physiology II (Golding)

Placentation and Extraembryonic Membranes
Extraembryonic Tissues – Yolk Sac and Blood Islands
Preeclampsia and Complications

March 11th - 15 - SPRING BREAK

Week 9 March 19 & 21

Lecture 17 - The Mammalian Body Plan (Golding)

Gastrulation and the Mammalian Organizer
Formation of the Primitive Streak and Notochord
Axis specification and Embryo Symmetry

Lecture 18 - The Mammalian Body Plan II (Golding)

Molecular Properties of the Mammalian Organizer
Morphogenic Gradients and Embryonic Specification
Induction and the formation of the three Germ Layers

Week 10 March 26 & 28

Lecture 19 - The Mammalian Body Plan III

Formation of the Neural Tube and body Segments
Lateral Folding and the formation of the Gut Tube
Establishment of the 4-Week Old Embryo

Lecture 20 - Midterm 2 (March 2012)

Week 11 April 2 & 4

Lecture 21 - Lecture 21 - Development of the Nervous System I (Golding)

Induction of the Nervous System
Peripheral vs Autonomic Nervous Systems
Structural Changes in the Central Nervous System

Lecture 22 - Development of the Cardiovascular System I (Golding)

Formation of the Heart Structures
Formation of the heart Chambers & Fetal Shunts
Cardiac Malformations & Treatments

Week 12 April 9 & 11

Lecture 23 - Development of the Cardiovascular System II (Golding)

Cardiac Malformations & Treatments
Development of vascular systems: Early & Late Fetal Circulatory Systems
Developmental regulation of Hemoglobin

Lecture 24 - Limb Development (Golding)

Histogenesis and the Organization of Organ Systems
Formation of the Limb Bud and Positioning in the Body
Outgrowth and Morphogeneic Control.

Week 13 April 16 & 18

Lecture 24 - Organogenesis & Maturation (Golding)

Organogenesis and Maturation - Kidney, Liver, Pancreas & Lungs
Respiratory System Maturation Surfactant
Fetal Adrenal Cortex

Lecture 25 - Birth & Parturition (Golding)

Fetal Endocrinology and Parturition
Fetal Adrenal Cortex and Placental Communication
Positive Feedback and Uterine Contractions

Week 14 April 23 & 25

Lecture 27 -Developmental Disorders (Golding)

General Principles of Congenital Malformations
Developmental Disturbances and Pregnancy Loss
Fetal Nutrition and Birth Defects
Common birth defects & Potential Treatments
Teratogens and Environmental Agents Causing Disease
Fetal Alcohol Syndrome

Lecture 28 - Special Topics (Long)

Special Topics - Stem Cells, Biotechnology and Regenerative Medicine

Final Exam - Monday May 6th 1:00 to 3:00 PM

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Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Request submitted by *(Department or Program Name)*: Department of Veterinary Physiology and Pharmacology

2. Course prefix, number and complete title of course: VTPP 452 Fetal and Embryo Physiology

3. Catalog course description (not to exceed 50 words): Introduction to the physiologic processes driving embryonic development and pregnancy; focus on embryo implantation, establishment of the placenta, development of the fetal circulatory systems and the molecular processes governing embryo differentiation and development; special emphasis on the major organ systems affected by pediatric disease and on the actions of teratogens.

4. Prerequisite(s): BICH 410 (or equivalent) or approval of instructor.

   Cross-listed with: _____ Stacked with: VTPP 652

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

5. Is this a variable credit course? ☐ Yes ☒ No If yes, from _____ to _____

6. Is this a repeatable course? ☐ Yes ☒ No If yes, this course may be taken _____ times.

   Will this course be repeated within the same semester? ☐ Yes ☒ No

7. This course will be:

   a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

   b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*

   BIMS Majors

8. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**

9.

Prefix	Course #	Title (excluding punctuation)
VTPP	452	FETAL & EMBRYO PHYS

Lect.	Lab	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
030	00	03	26090500	0022920	13-14	003632

Level: 4

Approval recommended by:

Dr. Glen A. Laine — 12-6-12
Department Head or Program Chair *(Type Name & Sign)* Date

Chair, College Review Committee — 12/10/12
Date

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

Dean of College — 12-11-12
Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date

RECEIVED
DEC 12 2012
CURRICULAR SERVICES

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 3/10

COLLEGE OF VETERINARY MEDICINE
& BIOMEDICAL SCIENCES
Department of Veterinary Physiology & Pharmacology

TEXAS A&M UNIVERSITY

VTPP 452 Fetal and Embryo Physiology
Spring Semester 2014
Course Syllabus

3 Credit Hours

Brief Course Description

The purpose of this course is to provide junior and senior level students with an introduction to the physiologic processes driving early embryonic development and pregnancy. This course will focus on embryo implantation, establishment of the placenta, development of the fetal circulatory systems and the molecular processes governing embryo differentiation and development. Special emphasis will be made on the major organ systems affected by pediatric disease and focus on developmental disorders that arise due to either biomedical miss-regulation or environmental exposures. This course will cover essential elements underpinning the molecular basis of development and disease, which will be expanded upon in both medical and veterinary professional programs as well as relevant graduate courses.

Prerequisites

BICH 410 (or equivalent) or approval of instructor.

Meeting Times & Important Dates

VTPP 452 will meet every **Tuesday and Thursday 8:45 AM - 10:00 AM in Room 120 - National Center for Therapeutics Manufacturing (NCTM)**. This building is located off Discovery Dr. and busses run there every 12 minutes. There will be two mid-term examinations and a final. Please note the dates below. Absence from the examination will result in a grade of 0 unless due to a University excused absence (http://student-rules.tamu.edu/rule07).

Midterm 1	**Tuesday February 12th 2012 - In class**
Midterm 2	**Thursday March 28th 2012 - In class**
Writing Assignment	**Due April 1st**
Final Exam	**Monday May 6th 1:00 to 3:00 PM**

Instructor Information

Michael Golding PhD.
Assistant Professor
Department of Veterinary Physiology and Pharmacology
College of Veterinary Medicine and Biomedical Sciences
Texas A&M University
College Station, Texas 77843-4466
979-862-1332
mgolding@cvm.tamu.edu

Charles R. Long. MSc. PhD.
Associate Professor
Department of Veterinary Physiology and Pharmacology
College of Veterinary Medicine and Biomedical Sciences
Texas A&M University
College Station, Texas 77843-4466
979-845-2331
clong@cvm.tamu.edu

Overall Course Objectives

Welcome to VTPP 452 - Fetal and Embryo Physiology. This course is intended to provide junior and senior Biomedical Science majors with a survey of the molecular and physiologic processes at work during pregnancy. We will begin with the production of sperm and egg and travel through pregnancy to the events initiating labor. The topics discussed in this course are intended to be used as a framework for students to better understand the developmental origins of both birth defects and disease. The specific learning objectives for this course have been distilled from those prescribed by the American Physiological Association, the American Congress of Obstetricians and Gynecologists as well as major areas in Maternal-Fetal medicine highlighted by the National Board of Medical Examiners. This course will draw upon subject matter covered in anatomy, cell biology, genetics, and physiology and will require students to synthesize these separate disciplines into a comprehensive whole. **This course is intended to prompt junior and senior level students to shift from memorization and recitation to the development of skill sets necessary for the life-long learning required of medical professionals.**

Specific Learning Objectives

- Identify the cell types and anatomical structures necessary to gametogenesis.
- Describe spermatogenesis and the role of Sertoli and Leydig cells in this process.
- Graphically illustrate the timing of changes in blood levels of key sex hormones and correlate these with structural changes in both the uterine endometrium and ovary during the menstrual cycle.
- Explain the physiological basis of steroid hormone contraception ("birth control pill").
- Describe the process of fertilization, including capacitation and the acrosome reaction.
- Illustrate and explain the movement of the blastocyst towards the uterine wall.
- Describe the process of implantation and explain the major physiological functions of the placenta.
- List the protein hormones secreted by the placenta and describe their roles in maintaining pregnancy / controlling gestation length.
- Define the terms: stem cell, differentiation, commitment, and specification and explain their relevance to mammalian development.
- Discuss the maternal physiologic and anatomic changes associated with pregnancy.
- Discuss the diagnosis of pregnancy using biochemical methodologies.
- Diagram the structures of the developing embryo.
- Describe the relationship between fetal and maternal tissues.
- Describe the developmental origins of the circulatory system.
- Trace the flow of blood between maternal and fetal tissues for a given gestational age.
- Define the normal length of gestation and describe how this is established / maintained.
- Discuss anatomical and physiological characteristics for a given gestational age.
- Identify a pregnancy at risk for complications, including poor maternal or fetal outcomes.
- Describe the make up of the uterus and cervix
- List the hormonal changes involved in the onset of labour
- Describe how the cervix and uterus change in response to labour
- Define Epigenetics and describe the relationship between gene expression and environmental factors.
- Define the term teratogen and describe potential mechanisms of action for this class of agents.
- List the major assisted reproductive technologies in agricultural and clinical practice and describe their use and implications.

American Physiological Society - Learning Objectives http://www.the-aps.org/MedPhysObj - Learning Objectives 77 - 105

American Congress of Obstetricians and Gynecologists - Educational Objectives, A Core Curriculum in Obstetrics and Gynecology, Ninth Edition - Learning Outcomes for Sections 1A - D.

National Board of Medical Examiners - Subject Exam for Obstetrics and Gynecology - Learning Objectives pulled from tested materials covered on the SHELF exam.

Learning Outcomes and Goals

The purpose of this course is to follow mammalian development from the earliest stages of gametogenesis, through fertilization, to the point the fetus is ready to begin terrestrial life. We fill focus on the unique physiology of the placenta and its role in both facilitating fetal metabolism and orchestrating the timing of human development. Understanding the nuances of normal fetal physiology is the basis for prenatal diagnosis and the institution of successful therapy.

Learning Outcomes:

By the end of the course, the student will have:

- developed an understanding of basic endocrinology and how hormones regulate physiological processes
- a firm understanding of how cellular differentiation controls organ development
- a better understanding of the developmental origins of
  - the central nervous system
  - the cardiovascular system
  - the reproductive organs
  - the limbs and integumentary system
- exposure to collection and analysis of clinical data
- knowledge of teratogens and their relation to the development of birth defects
- a greater understanding of the relationship between maternal-fetal physiology and complications during pregnancy including:
  - insight into critical thinking in the clinical setting
  - goals and mechanisms of some pharmacologic agents
  - surgical techniques used to correct cardiovascular birth defects
  - the physiological basis of clinical assisted reproductive technologies

Text Book

Primary Text

The Developing Human - Clinically Oriented Embryology 9th Edition
ISBN978-1-4377-2002-0

Secondary Resources

Human Embryology and Developmental Biology
ISBN 978-0-323-05385-3
Larsens Human Embryology
ISBN 978-0-443-06811-9

Grading policies

Grading scale A= 90-100
B= 80-89
C= 70-79
D= 60-69
F= 0-59

Course Breakdown

Midterm 1	25%	Tuesday February 12th
Midterm 2	30%	Thursday March 28th
Writing Assignment	15%	(Due April 1st)
Final Exam	**30%**	**Monday May 6th 1:00 to 3:00 PM.**

Examinations:

Two midterm examinations and a final examination will be written to assess a student's understanding of the information discussed in class with particular emphasis on the **specified learning objectives** and assigned readings. All students enrolled in VTPP 452 will take the examinations at the scheduled lecture days/times on the following dates: **February 12th 2012, and March 28th 2012**. The examinations will be a combination of multiple choice, short answer, and/or essay questions. Seating for examinations is on a random basis.

Students who have withdrawn from or Q-dropped the course are not considered as officially enrolled in the course, and thus, may not take examinations or attend lectures.

Writing Assignment

Wikipedia is is a free, multilingual collaborative encyclopedia, which is quickly becoming the largest and most popular general reference source in the world. In the United States alone, Wikipedia receives 2.7 billion monthly page views from people of all walks of life. The name Wikipedia derives from the fusion of the Hawaiian term Wiki meaning "quick" and encyclopedia. The entries placed on Wikipedia are typically very succinct, pithy and to the point. In the event the reader would like to read more on the subject or verify the information, articles list the reference or source(s) the information being discussed was derived from.

During the semester, students enrolled in VTPP 452, Fetal and Embryo Physiology are required to complete a writing assignment designed to familiarize them with a gene of their choice, controlling a developmental process of interest. Students will submit a "Wikipedia style entry" summarizing what is known about their gene and properly reference the **PRIMARY sources** they derived this information from. This entry will be approximately one paragraph in length - 150 to 250 words and will summarize the research they have conducted on their gene of interest. The text will be written in the students own words and should be understandable to a general audience.

Article Break Down

Below are some loose guidelines on the information that should be included in your article.

1) What type of molecule is your gene of interest?

i.e. transcription factor vs signaling molecule or structural protein...

2) What does this molecule do? i.e. what is its biological role?

3) What organ system or developmental structure is this gene involved in patterning?

4) Are there any diseases or defects associated with this gene? Have scientists generated a gene "knockout" model?

Students will compile and summarize the above information into a single paragraph, and upload this information onto Wikipedia. A copy of this entry should be sent to Dr. Golding - mgolding@cvm.tamu.edu by April 1st 2012. Other than these loose guidelines, the content of the article and the subjects discussed are wide open and subject to the students creativity and interests.

VTPP 452 Course Topics

Week 1 January 15 & 17

Lecture 1 - Differentiation & Cell Specialization (Golding)

Molecular Basis for Embryonic Development
Differentiation & Cell Specialization
Stem Cells and Niches

Lecture 2 - Mechanisms Controlling Gene Expression (Golding)

Organization of Mammalian Genes
Transcription Factors & Developmental Control of Gene Expression
RNA Interference and microRNA control of Gene Expression

Week 2 January 22 & 24

Lecture 3 - Epigenetic control of Gene Expression (Golding)

Chromatin Structure
DNA Methylation and Post-Translational Histone Modification
Epigenetic Programming, Cellular Identity, Development and Disease

Lecture 4 - Cell Signaling (Golding)

Signaling Molecules & Hormones
Receptor Molecules and Signal Transduction
Regulatory Systems & Cross Talk

Week 3 January 29 & 31

Lecture 5 - Spermatogenesis I (Long)

Germ Cell Origins & Development
Sexual Differentiation
Male Reproductive Anatomy

Lecture 6 - Spermatogenesis II (Long)

Male Reproductive Endocrinology
Spermatogenesis
Sperm Production

Week 4 February 5 & 7

Lecture 7- Meiosis & Oogenesis I (Long)

Meiosis
Germ Cell reprogramming
Oogenesis

Lecture 8 - Meiosis & Oogenesis II (Long)

Hormone Signaling and Ovarian Function
Follicular Development and Estrous
Oocyte Growth, Maturation and Ovulation

Week 5 February 12 & 14

Lecture 9 - Midterm 1 (February 12 2013)

Lecture 10 -- Ovulation (Long)

Ovulation
Oocyte Growth
Cell Signaling Mechanisms Regulating Oocyte Growth and Ovulation

Week 6 February 19 & 21

Lecture 11 Fertilization I (Long)

Transport of Gametes and Fertilization
Fertilization
Sperm / Egg Interactions

Lecture 12 - Fertilization II (Long)

Embryo Development
Embryo Polarity
Epigenetic Programming

Week 7 February 26 and 28

Lecture 13 - Assisted Reproductive Technologies & Epigenetics (Long)

Assisted Reproductive Technologies in Humans and Livestock
Epigenetic Regulation of Development and X-Inactivation
Developmental Anomalies associated with ARTs

Lecture 14 - Implantation and Maternal Recognition of Pregnancy (Golding)

Uterine Endometrium & Embryo Implantation
Twinning and Conjoined Fetuses
Maternal Recognition of Pregnancy

Week 8 March 5 & 7

Lecture 15 - Placental Physiology I (Golding)

Placental Differentiation & Physiology
Blood Flow in the Placenta
Placenta and Membranes in Multiple Pregnancies

Lecture 16 - Placental Physiology II (Golding)

Placentation and Extraembryonic Membranes
~~Extraembryonic Tissues – Yolk Sac and Blood Islands~~
Preeclampsia and Complications

March 11th - 15 - SPRING BREAK

Week 9 March 19 & 21

Lecture 17 - The Mammalian Body Plan (Golding)

Gastrulation and the Mammalian Organizer
Formation of the Primitive Streak and Notochord
Axis specification and Embryo Symmetry

Lecture 18 - The Mammalian Body Plan II (Golding)

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Morphogenic Gradients and Embryonic Specification
Induction and the formation of the three Germ Layers

Week 10 March 26 & 28

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