BIOLOGY 298 – REPRODUCTION AND DEVELOPMENT

Course description: This biology major course will cover both classic and current topics related to animal reproduction and development. Although mammalian (especially human) reproduction and development will be the primary focus, critical historical research involving other organisms will be used to demonstrate the historical pathways Which have lead to current ideas and concepts. Emphasis will be placed on evolutionary conservation of reproductive design and strategies (gamete formation, fertilization events, endocrine regulation, and early development events). Current topics will include scientific assessment of sexually transmitted disease, medical treatment of infants with ambiguous genitalia, assisted reproductive technologies, stem cell and cloning procedures, and effective methods of birth control. The designated lab time will include situational discussions, guest speakers, field trips, as well as more traditional lab exercises.

Instructor: Dr. Karen Kurvink

Scheduled time: Lecture - Tuesday and Thursday 3b (10:20- 11:30 AM)
Collier Hall of Science – Room 200
Lab - Thursday afternoon – Thursday 12:45- 3:45
Collier Hall of Science – Room 302

Texts:
1. HUMAN SEXUALITY TODAY 5th edition by Bruce M King (2005)
2. BIOETHICS AND THE NEW EMBRYOLOGY – Springboards for debate by Scott F. Gilbert, Anna L. Tyler, and Emily J. Zackin (2004)
3. HUMAN EMBRYONIC STEM CELLS by Ann A. Kiessling and Scott Anderson (2003)

TENTATIVE LECTURE AND LAB SCHEDULE

Tuesday – August 29

Lecture: Introduction to the course
Overview of human reproduction and development

Reading assignment: 1 - Reproductive anatomy – Ch 2
1 - Hormones and sexuality – Ch 3 (58-61)

Thursday - August 31

Lecture: Hormonal aspects of reproduction
Hormones associated with the menstrual cycle
Hormones associated with the estrus cycle

Lab: Fetal pig reproductive dissection
In the Womb (National Geographic video)

Reading assignment: 1 - Sexual physiology – Ch 4
3 - The egg – Ch 3
3 – The activated egg – Ch 4

Tuesday - September 5

Lecture: Evolutionary reproductive variability and "conservation of design" in mammals
Gamete formation
Spermatogenesis – basic process
sperm – shape variation
- abnormalities
- movement
Oogenesis – basic process
egg - size and shape variation
- protective barriers
- maturation
Fertilization events
Parthenogenesis

Reading assignment: 3 - The zygote – Ch 5
3 - Blastomere cleavage – Ch 6
3 - Organogenesis – Ch 9

Thursday - September 7

Quiz 1 - Topics covered – reproductive anatomy and hormones, gametogenesis)

Lecture: Evolutionary aspects of early development
Development of major body structures (face)

Lab: Gametogenesis
Early developmental stages
Placentas – various mammalian types
Virtual embryo web site
Discussion on "When does life begin?

Reading assignment: 2 - An outline of human development – Ch 1
2 - Philosophical, theological, and scientific arguments – Ch 2

Tuesday – September 12

Lecture: Twins
Multiples pregnancies in one uterus
Chimeras

Reading assignment: 3 - Early nuclear transfer - Ch 7
3 -The blastocyst and inner cell mass cells – Ch 8

Thursday - September 14

Lecture: Genetic aspects of sexual determination and differentiation
Prenatal genetic diagnosis (PGD)
Imprinting

Lab: Field trip to Lehigh University - visit Dr. Barry Bean's lab - research concerning human sperm

Reading assignment: 2 - Genetics of Sex Determination – Ch 5
2 - Sex selection – Ch 6

Tuesday - September I9

Lecture: Infertility
Humans
Animals
Assisted reproductive technologies (ART)

Reading assignment: 2 - Fertilization and assisted reproduction – Ch 3
2 – ART – safety and ethical issues – Ch 4

Thursday - September 21

Quiz 2 - Topics covered - Early development, genetic aspects of sex determination. sperm research

Lecture: ART

Lab: Field trip to Lehigh Valley Hospital IVF lab

Reading assignment: 2 - The science of cloning – Ch 7
2 - Ethics and policies for human cloning – Ch 8
3 - Early nuclear transfer technology – Ch 10

Tuesday - September 26

Lecture: Mammalian cloning

Reading assignment: 3 - The nature of stem cells – Ch 1
2 - Stem cell differentiation – Ch 11
2 - Regenerating deficient organs through stem cells – Ch 9

Thursday - September 28

Lecture: Stem cells and potential therapeutic applications
Ethical aspects of stem cell research

Lab: Student presentations on applications of stem cell research
(l0 minute – if possible power point presentation)

Reading assignment: 3 - The nature of stem cells – Ch 1
3 - Stem cell differentiation – Ch 11
3 - Religious, legal, ethical and scientific debate – Ch 14
2 - Ethical dilemmas in stem cell therapy – Ch 10

Tuesday – October 3
Quiz 3: Topics covered - Infertility, ARTs, cloning, stem cells

Lecture: Estrus cycle in mammals
Reproductive technologies in small and large mammals

Reading assignment: Readings on the estrus cycle

Thursday – October 5

Lecture: Reproductive problems in small and large mammals

Laboratory: Field trip - Veterinary facility for small/large animals

Reading assignment: 2 - Gene therapy – Ch 11
2 - Should we allow the genetic engineering of humans? - Ch 12

Tuesday – October 10 No class – Fall Break

Thursday – October 12

Lecture: Reproductive gene therapy in humans and animals

Laboratory: Visit a reproductive endocrinology lab at local hospital.

Reading assignment: 1 - Pregnancy and childbirth - Ch 7

Tuesday - October 17

Quiz 4: Topics covered – estrus, animal reproductive technologies, reproductive gene therapies

Lecture: Pregnancy and birth related events
Labor
Normal and abnormal delivery
C-sections

Reading assignment: 2 - Genetic essentialisms - Ch 14

Thursday - October 19

Lecture: Prematurity and problematic births - "How small is too small?"
In utero screening technologies
Teratogenesis
Newborn screening
Associated counseling

Lab: Visit NICU/ perinatal testing at local hospital

Reading assignment: Readings on circumcision

Tuesday - October 24

Lecture: Male circumcision
Female circumcision

Reading assignment: Human population growth article from Scientific American, September 2005
1 - Birth control – Ch 6

Thursday – October 26

Quiz 5: Topics covered – Pregnancy and birth related events, *In utero* and newborn screening

Lecture: World population growth and birth control

Lab: Birth control methods - Guest speaker – Jay Kirkpatrick – animal contraception (especially in the deer population)

Reading assignment: 1 – Sexually transmitted diseases – Ch 5 (99-114; 127-134)

Tuesday – October 31

Lecture: Sexually transmitted diseases - general review

Reading assignment: Readings on HPV and HPV vaccine

Thursday - November 2

Lecture: HPV and HPV vaccine

Laboratory: Guest speaker- Planned Parenthood – Sexually transmitted disease and birth control technologies

Reading assignment: 1 – HIV/AIDS – Ch 5 (114-126, 134)

Tuesday - November 7

Lecture: HIV/AIDS

Reading assignment: Readings on teratocarcinomas

Thursday – November 9

Lecture: Male and female cancers
Teratocarcinomas

Lab: Guest speaker: Kara Sykes – Merck Pharmaceutical – HIV research and HPV vaccine

Reading assignment: Readings on genetic testing for familial reproductive cancers

Tuesday - November 14

Quiz 6 - Topics covered - regulation of population growth and sexually transmitted diseases

Lecture: Familial aspects of reproductive cancers
Genetic testing

Reading assignment: 1 –sexual disorders Ch 15 (384-398)
1 - sexual disorders Ch 3 (66-69)

Thursday - November 16

Lecture: Disorders of the reproductive system
Impotence drugs – safety issues
Reproductive counseling

Lab: St Luke's hospital – Pat Herman – Breast and ovarian cancer screening; technologies associated with cancer treatment.

Reading assignment: 1 – puberty – Ch 12 (301-304)

Tuesday – November 21

Quiz 7 - Topics covered - reproductive cancers and disorders

Lecture: Puberty and related issues
Menstruation (normal and abnormal)
Sexuality and sports

Reading assignment: 1 - Gender identity – Ch 10
1 - Sexual orientation – Ch 11

Thursday November 23 No class – Thanksgiving vacation

Tuesday – November 28

Lecture: Gender related issues – sexual orientation
Hormones and the brain
Human genetic "intersex" syndromes and chimeras

Reading assignment: 1 - Menopause – Ch 12 (321-328)
2 - What is normal? Ch 13

Reflection papers due.

Thursday – November 30

Quiz 8 – Topics covered - Puberty, menstruation, gender related issues, intersexuality, and menopause.

Lecture: Menopause and hormone replacement therapy (HRT)

Lab: Student presentations: 1, 2, 3, and 4

Tuesday – December 5

Lecture: Student presentations 5 and 6

Thursday - December 7

Lecture: Student presentations 7 and 8

Lab: Student presentations 9, 10, 11 and 12

FINAL: Comprehensive exam during final exam period

GENERAL COURSE GOALS:

1. To integrate specific areas of reproduction and development with other major biological disciplines (genetics, evolution, endocrinology, etc) and with social disciplines (ethics, politics, religion, etc).

2. To selectively focus on areas of reproduction and development which are of current interest and medical importance in today's society.

STUDENT RELATED GOALS:

1. To encourage students to investigate selected topics in reproduction and development by reading, posing pertinent questions and challenging traditional dogma.

2. To develop "hands-on" laboratory skills.

3. To foster student's articulation skills (both verbal and writing).

EVALUATION (tentative):

1. Quiz - Eight quizzes - 50 pts each — 400 pts.
   The quizzes will contain multiple choice and short answer questions.

2. Comprehensive final exam — 100 pts.
   This exam will contain primarily essay questions.

3. Laboratory - (20 pts each except for "out of class" exercise with a brief reactionary paper for 60 pts.) — 260 pts
   Points are based mainly on attendance and participation.

4. Class presentations:
   - 10 minute presentation – summary of topic — 50 pts
   - 20 minute power point presentation with partner — 75 pts each
   - 20 minute power point presentation with partner — 75 pts each
   - 30 minute presentation on selected topic — 100 pts

5. Paper on same topic as 30 minute presentation. — 100 pts

6. Attendance and participation grade (evidence of reading and course involvement). — 100 pts

Total pts — 1260 pts

COURSE GRADE

Earned points/possible points = percentage

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