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 5b
Laboratory - Tuesday morning (9:20-12:00)


TENTATIVE LECTURE/LAB SCHEDULE

Tuesday – August 30

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

Lab: In the Womb (National geographic video)
Gametogenesis
- Sperm anatomy and variation
- Spermiogenesis
- Spermatogenesis

Reading assignment: 1 - Reproductive anatomy – Ch 2
1 - Hormones and sexuality – Ch 3 (58-61)
Thursday – September 1
Lecture:  Hormonal aspects of reproduction
          Hormonal associated with the menstrual cycle
Reading assignment:  1 - Sexual physiology - Ch 4
          3 - The egg – Ch 3
          3 - The activated egg – Ch 4

Tuesday – September 6
Lecture:  Evolutionary reproductive variability and conservation of design in mammals
          eggs – size and shape variation; protective barriers
          egg maturation
          fertilization events
          Parthenogenesis
Lab:      Reproductive systems of selected mammals
          humans (models)
          fetal pig
          cat
          Continue on gametogenesis
          Oogenesis and related events
          Early developmental stages
          Placenta – various mammalian types
          Virtual embryo web site
Reading Assignment:  3 - The zygote - Ch 5
          3 - Blastomere cleavage – Ch 6
          3 - Organogenesis – Ch 9

Thursday – September 8
Lecture:  Evolutionary aspects of early development
          Development of the head, eye, and heart
Reading assignment:  2 An outline of human development - Ch 1
          2 Philosophical, theological, and scientific arguments – Ch 2

Tuesday – September 13
Lecture:  Twins (normal and conjoined)
          Multiple pregnancies in one uterus
          Chimeras
          Teratogenesis
Lab: Field trip to Lehigh University - visit Dr. Barry Bean’s lab - sperm
Research

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

Thursday – September 15

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

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

Tuesday - September 20

Lecture: Infertility
Fertilization and assisted reproductive technologies (ART)

Lab: Visit local hospital to observe prenatal diagnosis technologies

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

Thursday - September 22

Lecture: ART

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 27

Lecture: Mammalian cloning

Lab: Visit Lehigh Valley Hospital IVF lab

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 29

Lecture: Stem cells
Reading assignment:  3 - The nature of stem cells - Ch 1
                   3-   Stem cell differentiation – Ch 11

Tuesday – October 4

Lab: Trip to Philadelphia (research labs working with stem cells)

Reading assignment:  3 - Neurogenerative diseases - Ch 12
                   3 - Tissue systems failures - Ch 13

Thursday - Oct 6

Lecture: Potential therapeutic aspects of stem cells
         Ethical aspects of stem cell research

Reading assignment:  3 - Religious, legal, ethical and scientific debate- Ch 14
                   2 - Ethical dilemmas in stem cell therapy - Ch 10s

Thursday - Oct 13

Lecture: Animal reproductive biology
         Estrus

Reading assignment: - paper on animal reproductive biology

Tuesday - Oct 18

Lecture: Continue on reproductive strategies of animals

Lab: Visit local veterinary clinic

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

Thursday Oct 20

Lecture: Putting it all together: reproduction, development and genetic
         Gene therapy

Reading assignment:  1 - Pregnancy and childbirth – Ch 7

Tuesday Oct 25

Lecture: Birth related events
         Labor
Normal delivery and C-sections

Lab: Trip to NICU at local hospital

Reading assignment: 2- Genetic essentialism - Ch 14

Thursday Oct 27

Lecture: Prematurity and problem births – How small is too small?

Reading assignment: paper on human population growth – Scientific American, Sept. 2005
1- Birth control – Ch 6

Tuesday November 1

Lecture: World population growth and birth control

Lab: Birth control methods (guest or field trip)

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

Thursday November 3

Lecture: Sexually transmitted diseases

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

Tuesday November 8

Lecture: HIV/AIDS

Lab: Visit lab or clinic which specializes in sexually transmitted diseases

Reading assignment: articles on human reproductive cancers

Thursday November 10

Lecture: Male and female cancers
Diagnostic, screening, and treatment methods

Reading assignment: article on teratocarcinoma

Tuesday November 15
Lecture: Teratocarcinomas

Lab: Visit a cancer diagnostic facility

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

Thursday November 17

Lecture: Disorders of the reproductive systems
Reproductive counseling

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

Tuesday November 22

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

Laboratory: Guest speaker or field trip

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

Tuesday November 29

Lecture: Gender related issues – sexual orientation
Hormones and the brain

Lab: Human genetic “intersex” syndromes and chimeras

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

Thursday December 1

Lecture: Menopause and hormone replacement therapy (HRT)

Reading assignment: article on sex education

Tuesday: December 6

Lecture: Sex education

Laboratory: Attend menopause/nutritional health and well being lecture on
December 5 (evening lecture) by Helene Leonetti

Thursday: December 8

Lecture: Balancing reproductive and developmental challenges of the future

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, when appropriate traditional dogma, and development of “hands-on” laboratory skills.

2. To expose students to “real world” topics and research via field trips, guest speakers, current literature and laboratory investigations.

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

EVALUATION (tentative):

1. Exams: Mid-term and final - These exams will be essay exams based on focus questions. 30%

2. Laboratory 30%

3. Evidence of reading, course involvement (presentations) 20%

4. Independent project 20%

GRADING:

Earned points/possible points = percentage
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<td>90-100%</td>
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