GRANDE PRAIRIE REGIONAL COLLEGE

SCIENCE DEPARTMENT

COURSE: ZOOLOGY 2530 - THE INVERTEBRATES II

SECTION: Winter 93 Lecture Section A3 (MWF 1300-1350)
Lab Section L1 (T 1500-1750)

TRANSPERABILITY:
U of A - Zoology 253 (3)
U of C - Senior Zoology (3)
U of L - Zoology 3xxx (3)

INSTRUCTORS:
Mr. Terry R. Shewchuk Dr. Philip Johnson
Office - J 221 J 222
Telephone - 539-2986 (Office) 539-2827
- 539-2953 (Lab)

DESCRIPTION: Zoology 2530 is an introduction to the functional anatomy and life cycles of the major invertebrate protostome taxa. Topics covered will include the classification, functional morphology and life cycles of the major invertebrate groups including: Annelida, Mollusca, and Arthropoda. Laboratories are correlated with the lecture material, with major dissections and living and preserved demonstration materials.

PREREQUISITE: Zoology 2520

REQUIREMENTS:
A. Since presence at lectures and laboratories, participation in classroom discussion and projects, and the completion of assignments are important components of this course, students will serve their interests best by regular attendance. Those who choose not to attend must assume whatever risks are involved. In this connection, the attention of the students is directed to the Academic Guidelines of the College.
B. MidTerm Exam
C. One final Lecture Exam (Scheduled by the Registrar's Office during Term Exam Week)
D. Final Lab Exam
E. Occasional Lecture and Lab Quizzes and Reports

EVALUATION:

A. Lecture/Lab Quizzes	- 20%
B. MidTerm Exam	- 30%
C. Final Lab Exam	- 20%
D. Final Lecture Exam	- 30%

RESOURCES:

(* denotes main resources)

Elson. 1982. The Zoology Coloring Book. Fitzhenry and Whiteside Limited.

*Barnes. 1986. Invertebrate Zoology. Saunders.

Pearse, et. al. 1987. The Living Invertebrates. Blackwell Scientific Publications.

*Wallace, et. al. 1989. Beck and Braithwaite's Invertebrate Zoology: A Laboratory Workbook. Macmillan.

LECTURE OUTLINE ZOOLOGY 2520 AND ZOOLOGY 2530
(Numbers in parentheses refer to page numbers in Barnes)

PROTOZOA

Importance to humans
Sizes
Difficulties in defining the phylum
Phylum Sarcomastigophora
- Subphylum Mastigophora (the flagellates) (14-24)
  - Locomotion
  - Nutrition
  - Reproduction and life cycles
  - Examples:
    - Free-living: Choanoflagellates, Dinoflagellates
    - Parasitic: Trypanosomes - species, vectors, diseases
      Giardia
- Subphylum Sarcodina (the amoebae) (24-34)
  - Locomotion and types of pseudopodia
  - Nutrition
  - Reproduction and life cycles
  - Amoebae as research animals
  - Examples:
    - Free-living
    - Parasitic: Entamoeba

The Sporozoans (split into three phyla in the lab manual) (34-37)
- General features
- *Plasmodium* - species, vectors, life cycles
- Quinine, chloroquinone, newer drugs
- A vaccine?

Phylum Ciliophora (the ciliates) (37-56)
- Form and structure
- Locomotion
- Nutrition
- Water Balance
- Reproduction and life cycles

PORIFERA (71-91)

General features
The three types: asconoid, syconoid, leuconoid
General features of an asconoid type
General features of a syconoid type
Feeding in sponges
The three classes of sponges
The commercial bath sponge
Asexual and sexual reproduction in sponges
- Fragmentation
- Gemmule formation

CNIDARIA (92-163)

General features
The classes
Alternation of generations (?)
    Polyps and medusae
    Polymorphism
Cell types of a polyp
Polyp morphology - differences between classes
Medusa morphology - differences between classes
Nematocysts: Anatomy, function, how discharged, independent effectors,
    dual stimuli, penetration of prey, miscellaneous
Feeding and digestion by *Hydra*
Typical life cycle of a Hydrozoan: *Obelia*
Atypical life cycle of a hydrozoan: *Hydra*
Reproduction
Coral reefs

PLATYHELMINTHES (164-202)

General features
The classes
Symbiosis and free-living
    Obligate versus facultative relationships
    Dispersal and colonization
    Typical class life cycles
        Fecundity
        Sexual and asexual reproduction
Class Turbellaria
    Distribution, orders
    Dugesia tigrina detail
    Ectocommensal examples
Class Monogenea
    Distribution, orders
    Anatomy
    Life history
Class Digenea
    Distribution, major orders
    Anatomy
    Life history of selected examples: *Schistosoma*, *Alaria*, *Clonorchis*
    Swimmer's itch
Class Cestoda
    Distribution, major orders
    Anatomy
    Life history of selected examples: *Diphyllobothrium*, *Taenia*, *Echinococcus*, *Proteocephalus*, *Triaenophorus*

THE PSEUDOCOELOMATES (217-262)

The pseudocoelomate phyla
- General features
- The phyla

Phylum Nematoda
- General features
- Hydrostatic skeleton
- Growth, moulting, life cycle, the L_3 stage
- "Excretory" system
- Sensory structures
- Importance to man
  - Free-living
  - Plant parasitic
  - Animal/human parasites: *Necator*, *Ascaris*, *Enterobius*, *Dracunculus*, *Trichinella*, *Wuchereria*, *Onchocerca*, *Parelaphostrongylus*, *Pseudoterranova*

ECHINODERMATA

Deuterostome & protostome features
Three basic features of echinoderms
Five classes
Aboral & oral surfaces
Five importances to humans
Five characteristics
Deriving classes from a common bilateral ancestor
Larvae of echinoderms (773-776)

Class Stellaroidea

Subclass Asteroidea

Body wall (776-778, 782), pedicellariae
Water-vascular system (778-780)
A functional anterior end?
Regeneration and autotomy (787-788)
Asexual reproduction (787)
Sexual reproduction & embryogeny (788-790)

Subclass Ophiuroidea

Body wall (792-793)
Locomotion (793-795)
Water-vascular system (795)
Nutrition (795-797)
Regeneration & reproduction (799)

Class Echinoidea

Regular echinoids vs. irregular echinoids (800-805)
Body wall (805)
Locomotion (806-808)
Water-vascular system (808-809)
Viscera (809-812)
Reproduction & embryogeny (812-814)

Class Holothuroidea

General features & external structure (816-818)
Water-vascular system (821-823)
Sexual reproduction & embryogeny (825)
Evisceration (824)
Tubules of Cuvier (824)
Respiratory tree (819-821)

Class Crinoidea

External structure (826-829)
Nutrition (829-831)
Regeneration & reproduction (832-833)

Class Concentricycloidea

Features
Relation to Stellaroids

Fossil Echinoderms & phylogeny (834-841)

PHYLUM ANNELIDA

Relationships amongst the Mollusca, Annelida, & Arthropoda
Major taxa
Six features of the phylum
Segmentation (263-267)
Schizocoelom (264-265)
Urogenital system (297)

Prostomium
Dorsal brain & ventral nerve cord (299, 318-319, 333)
Trochophore larva (308-309)

Class Polychaeta (267-311)
Six non-reproductive features
Four reproductive features
Adaptive diversity
Asexual reproduction (302)
Sexual reproduction (302-303)
Typical life cycle
Epitokous reproduction (303-305)

Class Oligochaeta
Six non-reproductive features
Four reproductive features
Aquatic oligochaetes
Terrestrial oligochaetes
Deposit feeders
Anatomy of the gut (315-317)
Accesory gut structures (316)
Asexual reproduction & regeneration (320)
Sexual reproduction (320-325)
Worms are our friends

Class Hirudinea
Six non-reproductive features
Four reproductive features
Proboscis leeches
Jawed leeches
Various aspects of feeding (330-332)
Digestion (332)

Worm-like animals
Phylum Pogonophora (716-719)
Phylum Sipuncula (719-722)
Phylum Echiura (722-725)

PHYLUM MOLLUSCA

General features
Seven classes
Survey of the four minor classes (393-402, 440-442)
Hypothetical archetype molluscan: habitat, mantle, shell, odontophore, radula, gut, protostyle, coelomic structures, route of blood, mantle cavity, gills, nervous system, life cycle (342-347)

Class Gastropoda
Three subclasses
Torsion (347-349)
Subclass Prosobranchia (353-354)
Subclass Opisthobranchia (354-358)
Subclass Pulmonata (358-359)
Locomotion (359-364)
Feeding (364-379)
Reproduction & embryogeny (384-389)

Class Bivalvia
General features (402-406)
Gills & filter-feeding (407-413)

Life cycles (437-439)
Life styles (416-433)
Infauna: shallow burrowers in soft substrate, deep burrowers in soft substrate, boring bivalves in hard substrate
Epifauna: unattached, attached via threads, attached via cement
Pearls

Class Cephalopoda
General features (442-446)
Subclass Nautiloidea
Subclass Ammonoidea
Subclass Coleoidea (446-451)
Orders: **Belemonoidea, Sepiodea, Teuthoidea, Octopoda, Vampyromorpha**
Feeding by squids (452-455)
Cephalopod ink (459-460)
Reproduction (460-463)

PHYLUM ARTHRODPODA

Exoskeleton (474-479)
Metamorphosis
Subphylum Trilobita (487-490)
Subphylum Chelicerata
Class Merostomata (492-497)
Class Arachnida
Tagmata & appendages of an arachnid (497)
Order Araneae (508-529)
General features
Spider silk
General features
Four non-reproductive uses of silk
Four reproductive uses of silk
Spider poison & dangerous spiders
Survey of some arachnid orders:
Scorpiones (503-507)
Palpigradi, Schizomida, Uropygi (507-508)
Amblypygi (529), **Ricinulei** (530), **Pseudoscorpiones** (531-534), **Solifugae** (534)
Spiders vs. opilionids (534-536)
Order Acari
Hard ticks
Soft ticks
Mites
Acari & disease
Class Pycnogonida
Subphylum Crustacea
General features (554-560)
Malacostracans vs. entomostracans
Tagmata & appendages of a generalized crustacean
Survey of the **Class Malacostraca** (592-652)
Subclasses **Phyllocarida, Eomalacostraca**
Superorders **Haplocarida, Peracarida, Eucarida, Syncarida**
Survey of the entomostracans (561-591)
Reproduction in Crustacea

General features (559-560, 653-654)
Reproduction in **Decapoda** (623-629)

Subphylum Uniramia

Class Chilopoda (667-673)
Class Symphyla (673 674)
Class Diplopoda (674-680)
Class Pauropoda (681)
Class Insecta

Body form & locomotion (685-689)
Internal structure (689-697)
Feeding strategies
Reproductive strategies
Medically important insects
Economically important insects