BIOLOGY 4830- ENDOCRINOLOGY
2009 Serial

1. Instructor. Dr. Robert J. Omeljaniuk, CB-4013, 343-8236

2. Intent. To provide senior undergraduate students with an opportunity to study selected aspects of endocrinology in a directed study approach.

3. Marking Scheme. 10 Assignments and/or seminars valued at 10 final marks each = 100 final marks.

4. Execution.

a. General.

(1) Students will be assigned specific readings from the course textbook and will be prepared to discuss the subject matter and any difficulties they may have with it in group discussions on a weekly basis.
(2) Students' comprehension and mastery of the material will be evaluated on the basis of assignments submitted no later than one week following discussion of the subject matter. Answers to assigned questions may take any neatly presented format including text, figures and tables submitted as a hard copy; paragraph and short-essay answers supported by diagrams of the student's own design will be most appropriate. Page limits refer to narrative and not to figures or tables; assignment answers exceeding page limits will not be marked. In many cases, the preparation of an answer will require sourcing information from several sections of the textbood.
(3) All assignments must be credibly completed; in the event a student completes the course with a mark between 40 and 49 %, they will be eligible to apply for a Special Exam, which covers all course material, to be arranged with Lakehead University Scheduling. Students' term marks will be prorated to 50% of the course mark; the Special Exam will be valued at 50% of the final mark.

b. Tentative Outline.

Serial	Reading	Discussion Date (week of)	Assignment Deadline (week of)
1	Chapter 01: An overview of chemical bioregulation in vertebrates.	07 Sep	14 Sep
2	Chapter 04: Organization of the mammalian hypothalamus-pituitary axes.	14 Sep	21 Sep
3	Chapter 05: The hypothalamus-pituitary system in non-mammalian vertebrates.	21 Sep	28 Sep
4	Chapter 05: The hypothalamus-pituitary system in non-mammalian vertebrates.	28 Sep	05 Oct
5	Chapter 06: The hypothalamus-pituitary-thyroid axis of mammals.	05 Oct	12 Oct
6	Chapter 07: The hypothalamus-pituitary-thyroid axis of non-mammalian vertebrates.	12 Oct	19 Oct
7	Chapter 08: The mammalian adrenal glands: cortical and chromaffin cells.	19 Oct	26 Oct
8	Chapter 09: Comparative aspects of vertebrate adrenals.	26 Oct	02 Nov
9	Chapter 10: The endocrinology of mammalian reproduction.	02 Nov	09 Nov
10	Chapter 11: Comparative aspects of vertebrate reproduction.	09 Nov	16 Nov

5. Textbook. Vertebrate Endocrinology, 4th ed. D.O. Norris. Academic Press. New York. 550 pp. 2007.

Assignment 1.

1. Define and illustrate the requisite characteristics of the chordates. Define and resolve the three sub-phyla. (2 page narrative limit, 2 final marks).

2. Critically discuss the origins and bases for the current phyletic organization of the vertebrates. (3 page narrative limit, 3 final marks).

3. Describe and discuss the modes and integration of chemical communication systems within an organism. Provide abbreviated specific examples in support of each mode. (3 page narrative limit, 2 final marks).

4. Define and discuss homeostasis and illustrate with a suitable example. (3 page narrative limit, 3 final marks).

Assignment 2.

1. Anatomically illustrate the embryogenesis and mature state of the mammalian hypothalamo-hypophysial axis. Contrast this anatomical description with a schematic representation of the functional interrelationships of the hypothalamo-hypophysial-target organ axis. Narrative should be restricted to salient points difficult to convey graphically. (3 page narrative limit, 2 final marks).

2. In detail, resolve the regulation of pituitary hormone secretion in a mammal. Answer needs to include relevant hypophysiotropic factors, their origins, and effects, as well as salient factors associated with speficic hormone synthesis, structure and release. NOTE: This question demands a large synthetic answer predicated by a throrough understanding before putting pen to paper as well as significant editing.. (10 page limit, 8 final marks).

Assignment 3.

1. In many respects, the tetrapod vertebrates represent a disctinct departure from the fishes. Discuss and compare the principle characteristics of the tetrapod and fish hypothalamo-hypophysial axis. (3 page narrative limit, 2 final marks).

2. Fishes are represented by more species and demonstrate greater niche diversity that all other vertebrate groups combined. Discuss the comparative organization of the fish hypothalamo-hypophysial axis. Pituitary structure figures prominently. (4 page narrative limit, 4 final marks).

3. Define and compare the biological activities of hypophysiotrophic factors and pituitary hormones in the non-mammalian vertebrates. Carefully designed and annotated tables could be particularly useful. (5 page narrative limit, 4 final marks).

BONUS: Describe and compare the organization of the hypothalamo-hypophysial axis among the non-mammalian tetrapod vertebrates. (3 page narrative limit, 3 final marks).

Assignment 4.

1. Describe and discuss the biosynthesis and structures of neurohypophysial peptides. Using structural analysis comment on the molecular origin(s) and evolution of these peptides and their bioactivities. (4 page narrative limit, 6 final marks).

2. Describe the biosynthesis and secretion (and regulation thereof) of epiphysial hormones. Describe and compare their biological activities among the vertebrate groups. (4 page narrative limit, 4 final marks).

Assignment 5.

1. Describe and discuss in detail the biosynthesis, secretion mechanisms and regulation, as well as, the metabolism of thyroid hormones. (6 page narrative limit, 10 final marks).

Assignment 6.

1. Consider the phylogenetic variation in thyroid hormone biological activity among the major vertebrate classes. In particular, identify and speculate on recurrent functions (themes) and contrast with class-specific bioactivities. (10 page narrative limit, 10 final marks).

Assignment 7.

1. Define the organization of the mature mammalian adrenal gland from structural and functional perspectives. (2 page narrative limit, 2 final marks).

2. Describe and discuss the biosynthesis, release-regulation and metabolism of

    a. adrenocortical hormones; and
    b. adrenal medullary hormones. (5 page limit, 6 final marks - Bonus included).

3. Establish the principal mechanisms of action and biological activities of

    a. adrenocortical hormones; and
    b. adrenal medullary hormones. (3 page limit, 4 final marks).

NOTE: You will need to consult other sections of the textbook for relevant biosynthetic and metabolic pathways (eg. Chapter 03).

Assignment 8.

1. Describe the phylogenetic variation of "adrenal" gland structure among the vertebrates. Discuss the unifying theme(s) and class-specific anomalies. (5 page narrative limit, 5 final marks).

2. Describe and compare the conservation and pleiotypicity of adrenal hormone biological activity among all the major vertebrate classes. Elements of your answer from Question #3 of Assignment 7 may be helpful. (6 page limit, 5 final marks).

Assignment 9.

1. Define and contrast the three principal reproductive life history patterns within the class mammalia. (3 page narrative limit, 2 final marks).

2. Discuss gonadal embryogenesis, development, maturation and regulation thereof in the male mammal. (4 page narrative limit, 4 final marks).

3. Discuss gonadal embryogenesis, development, maturation and regulation thereof in the female mammal. (4 page narrative limit, 4 final marks).

Assignment 10.

1. Select two classes of non-mammalian vertebrates and define and compare their reproductive strategies. (10 page narrative limit, 10 final marks).