

SYLLABUS

QUARTER: SPRING 2009

NAME OF COURSE: Endocrinology PHYS-220

LENGTH OF COURSE: 4 units, 44 hours (4 hrs lecture/week)

COURSE DESCRIPTION: This is a comprehensive study of the endocrine system, which will allow the student to integrate the functions of the other systems of the body. The relationship of the nervous system to the endocrine system is explored in the context of signaling within a multicellular organism. Also, the pathological conditions and diagnostic procedures associated with endocrine imbalance are investigated.

PREREQUISITES: PHYS-122, PhPa-212,

COURSE OFFERED BY: Physiology & Pathology Dept.
Suzanne L. Ray, M.S., Chair

COURSE INSTRUCTOR: [Sue Ray, M.S.](#)
Phone: 510-780-4500 ext 2135
Email: sray@lifewest.edu
Room: 134

OFFICE HOURS: Mon 11:40-12:40 & Wed 11:40-12:40
Other times by appointment only

REQUIRED TEXT: Marieb EN. *Human Anatomy and Physiology*.
(7th ed. 2007)

RECOMMENDED TEXT: Goodman HM. *Basic Medical Endocrinology*. 3rd ed. 2003

REFERENCE TEXTS: Guyton AC. *Textbook of Medical Physiology*. 11th ed. 2006

MATERIALS: Class notes with illustrations are available in the bookstore.

METHODS OF INSTRUCTION: Lecture \ Discussion, visual presenter.

OBJECTIVES: The student will learn and understand the role of the endocrine system in maintaining homeostasis and the relationship of the nervous system to the endocrine system; will recognize the pathological conditions associated with endocrine imbalance, and will appreciate how a study of endocrinology facilitates an understanding of other systems.

GRADES AND METHOD OF GRADING:

A - 4.0	90 - 100%
B - 3.0	80 - 89%
C - 2.0	70 - 79%
D - 1.0	Poor The student must repeat the course
F - 0.0	Fail – The student must repeat the course

In order to maintain satisfactory Academic Progress, a student must maintain a 2.0 or better in each and every course. Any grade less than a C must be remedied by repeating the class.

COURSE GRADE:	Midterms = 25 % for each of two
	Final = 50%

MAKE-UPS:

Students are expected to take all examinations and complete assignments as scheduled.

Students who have missed an exam due to a documented emergency or other excusable reason must pick up a “Request for Alternative Testing” form in the Dean’s Office. At that time, they will explain the circumstances of their emergency and provide documentation to the Dean of the College. If the Dean authorizes the exam, the student must then present the form to his/her instructor to complete the necessary information. The student must then take the completed and signed request to the Student Services Office to schedule a time for the exam to be proctored. As indicated near the top of the form, Student Services requires a minimum of 5 working days to set up and schedule the approved exam.

Documented emergencies include hospitalization, accidents, or death in the family. Undocumented illness, not “feeling well,” weddings, events, extended vacations or school holidays, non-school scheduled seminars, etc., are not excusable reasons for making-up an exam or assignment.

EXTRA CREDIT: There will be no extra credit work accepted in this class.

ATTENDANCE:

Instructors are required to record student attendance. Roll can be taken at any time during the class period. The instructor may call names, pass a roll sheet, use submitted classroom assignments, or observe the students. If the instructor calls roll, a student who is not present when his or her name is called is absent. If the instructor uses a roll sheet, students have 15 minutes to sign in.

If a student arrives after attendance has been taken but within the first 15 minutes of the start of the class session, the student must see the instructor at the end of the class hour to request that his or her absence be changed to a tardy. Three tardies attendance constitute one hour of absence. Failure to notify the instructor will result in the absence mark remaining on the attendance sheet. This cannot be changed later. **No additional assignments can be used to compensate for absences except as outlined in the college course overlap policy.**

If a student leaves after attendance has been taken, the instructor can change the attendance record to indicate an absence for the class period. Any request to leave class early must be approved by the instructor before the class session.

A student who misses more than 10% of the class hours will be over-cut from the class. If the student presents documentation to the dean verifying a documented emergency or other excusable reason that prevented attendance for 15% of the class hours, the dean may permit him or her to continue attending the class. In determining whether or not to permit a student to continue attending a class, the dean will consider the student's overall attendance record and academic standing. Under no circumstances, regardless of any personal situation, will a student who misses 20% of the class hours receive course credit. Excused absences still count toward total absences, they only may entitle a student to make-up assignments and examinations.

A student is responsible for keeping track of his or her own attendance and absences. Instructors may but are not required to provide courtesy notices indicating that a student is approaching or has reached over-cut status.

Documented emergencies include hospitalization, accidents, or death in the family. Undocumented illness, not "feeling well," weddings, events, extended vacations or school holidays, non-school scheduled seminars, etc., are not considered excusable reasons for missing class.

CONDUCT AND RESPONSIBILITIES

It is the student's responsibility to maintain professional standards of behavior and attire while on campus. Students are expected to be prepared for instructional activities. They must bring required supplies/equipment and dress appropriately in accordance with the instructor's directions. Failure to do so can result in the student being marked absent for the class session. Any disruptive activity (e.g. use of cell phones, side conversations) in the classroom is prohibited. If the instructor requires a disruptive student to leave the classroom, the student remains responsible for all information and will be marked absent for the class session. The dean will impose sanctions for unprofessional behavior. Any form of deceit, fraud, plagiarism, unauthorized collaboration, or theft will result in failure of the course and referral to the dean for disciplinary sanctions.

INDEPENDENT STUDENT WORK

All exams must be the product of the individual student's original efforts for this class. Collaboration on other class assignments is permitted as defined by the instructor.

PROCEDURES FOR REVIEWING EXAMS

The instructor has authorized access to old exams, which are available in the library and may be used for study purposes. Students may share copies of their exams with other students after the instructor has returned them.

REQUEST FOR TESTING ACCOMMODATIONS

The student must notify the instructor of any authorized testing accommodations at least one week prior to the exam. Once arrangements have been made, they cannot be changed without approval from the instructor and the office of student services.

The student must notify the instructor of any schedule conflicts during final exam week at least one week prior to the beginning of final exams. Appropriate paperwork must be completed and submitted to the office of student services. Once arrangements have been made, they cannot be changed without approval from the instructor and the office of student services.

Addendum to Syllabi

- ❑ **Late to an Exam:** A student may not take an exam if they arrive after another student has completed the exam. The student will receive a zero on the exam.
- ❑ **Class Concerns:** It is important to follow the proper chain of command when handling class concerns. Please bring concerns relating to the course to the instructor first. Unresolved situations will then be referred to the department chair and finally to the Dean's office if required.

COURSE OUTLINE:

Week 1 Introduction to hormones, the endocrine system, and signalling molecules

Neuroendocrinology (neurosecretion, neuropeptides, neurotransmitters)
Assignment of the basic overview of the system through the Guyton chart

- Week 2 Continue the survey of Gland – Hormone – Target/ General effect
- Week 3 General topics of Endocrinology – pages 1-12 of the notes
Biochemistry of hormones (peptides, steroids prostaglandins, etc)
Measurement of hormones, bioassay and radioimmunoassay
- Week 4 Control of secretion by nervous, endocrine, and humoral factors
Mechanisms of hormone action: synergism, antagonism, permissive effects
Target receptors-up and down regulation, dose-responsiveness, mimicry
Routes of excretion

MIDTERM #1

- Week 5 Begin page 12 details and diseases
Pineal Gland-traditional and current concepts
Pituitary Gland and Hypothalamus
Posterior pituitary gland
 ADH – (vasopressin) – diabetes insipidus
 Oxytocin-positive feedback
General points on intracranial pathology-adenomas and ischemia
Anterior Pituitary Gland and Hypothalamic Releasing Factors
Target organs of LH, FSH, TSH, GH, PR, ACTH, MSH
- Week 6 Pathology of hypopituitarism-Sheehan's syndrome- and hyperpituitarism
Growth hormone and its mechanism of action
Pathology: acromegaly, gigantism, dwarfism, and progeria
Prolactin and associated paths
Cushing's disease and proopiomelanocortin
TSH and negative feedback
Gonadotropins demystified
- Week 7 Thyroid Hormones – thyroxine and triiodothyronine
Gland, iodine, thyroglobulin, target of hormones, and regulation by TSH
Mechanism of action of thyroid hormones
Pathology of goiter, cretinism, Grave's disease, and myxedema
Physical characteristics of patients with thyroid disorders
Parafollicular cells – calcitonin
Parathyroid hormone – calcium and phosphate concentrations
Vitamin D, bone synthesis and hormonal control and effects of deficiencies and excesses.
Primary and secondary hyperparathyroidism
Hypoparathyroidism
Terms: nephrocalcinosis, osteoporosis, rickets, and osteomalacia

- Week 8 Adrenal Gland – the Medulla and the Acute stress response
 Adrenocortical hormones-the chronic stress response
- Aldosterone; mechanism of action, regulation of secretion, relationship to kidney and renin secretion
 Pathology of primary and secondary hyperaldosteronism
 Glucocorticoids: regulation of ACTH secretion mechanism of actions on carbohydrates, lipid, and protein metabolism
 Cushing’s syndrome and Conn’s disease
- Adrenal Androgens, adrenogenital syndromes
 Addison’s Disease
- Week 9 Hormones of the pancreas
 Insulin
 Glucagon
 Regulation of carbohydrate, lipids, and protein metabolism during the fed and fasting states. Pathology of diabetes mellitus.
 Types I and II

MIDTERM #2

- Weeks 10 Endocrine Control of Reproductive Functions
 Sexual Differentiation and Development
 Sexual Differentiation of the Fetus
 Clinical Conditions of Aberrant Growth and Pubertal development
 Female Reproductive Physiology
 Development of the Female Reproductive System
 Normal Menstrual Cycle
 Variations of the Menstrual Cycle
 Female Reproductive Disorders
- Male Reproductive Physiology
 Male Reproductive Disorders – prostate abnormalities of growth
 Clinical Problems- Laboratory Tests

COURSE OBJECTIVE: The student will, after completion of the course, know and understand the role of the endocrine system in maintaining homeostasis and the relationship of the nervous system to the endocrine system; will recognize the pathological diseases associated with endocrine imbalance, and will appreciate experimental designs used to demonstrate the present status of the science.

SPECIFIC EDUCATIONAL OBJECTIVES:

The student will be able to:

1. Discuss the function of the endocrine system in maintaining homeostasis, and negative feedback mechanisms.
2. Define an endocrine gland and identify the general characteristics and measurement of hormones.
3. Identify the relationship between an endocrine gland, a target organ, and cellular events in the target organ
4. Discuss the major parts of the pituitary gland, their endocrine secretions and the general regulatory mechanisms of their secretion.
5. Define the anatomical and physiological relationship between the pituitary gland and the hypothalamus.
6. Identify the actions, of hypothalamic releasing and inhibitory factors.
7. Define neuro secretion and know the importance of neurotransmitters and inhibitory factors.
8. Know the effect of growth hormone or its effect upon of body tissues, its basic metabolic effects and its specific effects upon protein metabolism.
9. Identify "growth factors" and their roles in the promotion and inhibition of tissue growth.
10. Identify somatostatin as an inhibitor of GH secretion.
11. Identify the major effects of growth hormone upon lipid and carbohydrate metabolism and their consequences.
12. Describe the regulating mechanisms and abnormalities of GH secretion.
13. Know the relationship of neurohypophysis to the hypothalamus, and the pituitary.
14. Identify the chemical nature, target effects and functions of oxytocin and anti-diuretic hormone.
1. Identify the hormones secreted by the thyroid gland's, and the thyroid gland relationship to the autonomic nervous system.
2. Know the functional role of thyroglobulin, the chemistry of thyroxine and triiodothyronine formation.
3. Identify the characteristics of thyroxine (T4) and triiodothyronine (T3) and their transport to tissues.

4. Know the major physiological effects of thyroid hormone upon general body mechanisms.
 5. Identify the regulatory mechanisms controlling thyroid hormone secretion, the characteristics, mechanisms of secretion and target actions of thyrotropin.
 6. Identify the effects of thyroid gland secretion upon the secretion of other endocrine glands.
 7. Identify the principal causes, symptoms and consequences of hypothyroidism and hyperthyroidism.
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1. Identify the anatomical and histological parts of the adrenal gland.
 2. Characterize the major types of endocrine secretions of the adrenal glands.
 4. Identify the significance of adrenal mineralocorticoids and the primary and secondary effects of aldosterone upon renal function.
 5. Define the effects of aldosterone upon fluid volumes, cardiovascular dynamics, sweat and salivary gland secretion and intestinal absorption.
 6. Describe the regulatory mechanisms of aldosterone secretion and the cellular mechanisms of action of aldosterone.
 7. Identify the major glucocorticoids, their general significance, and the effects of cortisol upon carbohydrate, protein and fat metabolism.
 8. Identify the actions and functions of cortisol during states of stress and upon inflammatory responses and bodily functions.
 9. Discuss the regulatory mechanisms of cortisol secretion.
 10. Identify the loci and general chemical features of adrenocortical hormone synthesis, the nature of CRF and ACTH, the mechanisms of target action of ACTH, and the mechanisms of transport and excretion of adrenocortical hormones.
 11. Identify Addison's disease, its causes and consequences.
 12. Identify Cushing's syndrome, primary aldosteronism, adrenogenital syndrome and their causes and consequences.
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1. Recognize the endocrine and exocrine function of the pancreas.

2. Identify the effect of insulin upon glucose transport through cellular membranes.
3. Understand the extra hepatic affects of insulin upon glucose utilization, glycogen storage and fat storage, and the hepatic effects of insulin upon glucose metabolism.
4. Know the effect of insulin on lipid metabolism, protein metabolism and growth.
5. Identify and characterize the regulatory mechanism and factors which enhance insulin secretion.
6. Know the target actions of glucagon, its means of regulation and factors influencing its secretion.
7. Identify diabetes mellitus, its potential causes and major pathophysiological consequences.
8. Contrast the characteristics of diabetic coma with the characteristics of hyperinsulinism.
1. Compare: dietary origins, intestinal absorption, and excretion characteristics for Ca^{++} and PO_4^- .
2. Identify the sequence of events leading to the formation of Vitamin D_3 , and its regulator role in Ca^{++} metabolism.
3. Know the altered states of Ca^{++} and PO_4^- concentrations of the body fluids.
4. Identify the factors involved in bone and ectopic calcification.
5. Identify the mechanisms, functional significance and characteristics of bone remodeling.
6. Know the effects of parathyroid hormone and its effects upon bone, the kidneys, intestinal epithelium and extracellular concentrations of Ca^{++} and PO_4^- .
7. Identify the effects of Vitamin D upon bone deposition and reabsorption and regulatory mechanisms for PTH secretion.
8. Identify the target action of calcitonin, its regulatory mechanisms and its functional significance.
9. Summarize the relative roles of hormonal control, intestinal and renal control in the regulation of the Ca^{++} ion concentrations of the body fluids.
10. Identify the consequences of hypo and hyperparathyroidism.
11. Identify the causes and symptoms of rickets, osteomalacia, osteoporosis.

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1. Identify the anatomy of male sexual organs with special focus on testicular histology: Sertoli and interstitial cells of Leydig.
 2. Identify testosterone as the principle androgen in the male, and its relationships to dehydrotestosterone.
 3. Know the pre-and post-natal functions of testosterone and its target functions.
 4. Describe the regulatory mechanisms in the male with respect to gonadotropic hormones, their target actions and functional roles.
 5. Identify the changes in males occurring with puberty and associated pathology.
 6. Know the role of hormones in benign prostatic hyperplasia.
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1. Review physiologic anatomy of the female sexual organs with special focus on the development of the Graafian follicle and corpus luteum.
2. Note the sources of various female hormones and releasing factors.
3. Describe the general characteristics of the female sexual cycle with its dependence upon gonadotropic hormones. Note the proliferative and secretory phases.
4. Identify the major estrogens and progestin hormones and exogenous sources.
5. Describe the functions of estrogens and progesterone and their target effects.
6. Know the role of hormones in the following female pathologies:
 - a. breast cancer
 - b. uterine cervical cancer
 - c. fibroid tumors
 - d. endometriosis
 - e. ovarian cancer
7. Know the presentation of ovarian cysts and distinguish polycystic ovarian disease from follicular cysts and luteal cysts.