



The Hashemite University

Course Syllabus

Endocrine System (ES)

1	Course title	Endocrine System (ES)
2	Course number	111501302
3	Credit hours (theory, practical)	4 hours
	Contact hours (theory, practical)	Theory: 62 Practical: 24 hours/Student
4	Course meeting time	A module type on daily basis for four weeks
	Course location	Faculty of Medicine stadium
5	Program title	Doctor of Medicine (MD)
7	Awarding institution	The Hashemite University
8	Faculty	Faculty of Medicine
9	Department	Basic medical sciences
10	Level of course	Third year medical students
11	Year of study and semester (s)	2018/2019 First semester
12	Final Qualification	MD degree
13	Other department (s) involved	None
14	Language of Instruction	English
15	Date of production/revision	1/9/2018

Course Coordinator:

Mohammad A. Shaban. MD. PhD.

Room 3020. Office hours 11:00 a.m-1:00 p.m. on Sun, Mon and Tue and on any other time on appointment with the department secretary. Phone # 5433. email mshaban54@yahoo.com

Course Description:

This course describes the endocrine system as a regulator of different important growth, metabolic and developmental body functions. It covers the origin, microscopic and gross structures. It describes its role and the integration with nervous system on maintaining the harmony of the internal function adaptation to the variability of the external environments.

Intended Learning Outcomes (ILOs):

By the end of this module, students are expected to fulfill the following general objectives:

- ***Know** what are the endocrine system means and its role in regulation of different body function compared to other regulatory systems
- ***Identify** location, gross and microscopic appearance of various endocrine glands, their development, relation to neighboring structures
- ***Know** how this system regulates itself
- ***Know** different types of hormones produced by this system and to **compare** and group them according to the embryological and microscopic structure of different endocrine glands
- ***Know** effects of hormones on different tissues
- ***Know** different structural and functional changes and the effect of this change on other glands or tissues
- ***Use** these information to **explain** findings in different pathological conditions
- ***Use** these information in understanding how drugs (hormonal and non-hormonal) are used in correction of abnormal function
- ***Formulate** an evaluation plan for diagnosis and correction of endocrine disease
- ***Prepare** the student for clinical years to use these information and apply it once he faces an endocrine disease

Topic Outline and Schedule:**SPECIFIC (LEARNING) OBJECTIVES:**

After studying the material covered in lectures & practical sessions of this course, using his/her private self learning time in a productive way, the student is expected to achieve the following specific objectives:

A. LECTURES:

Lecture (L) Number, Subject, & Title	LECTURE OBJECTIVES
Endocrine Anatomy, Histology & Embryology: 6 Lectures & 4 Practical's: The Dean, Professor Dr. Darwesh Badran, PhD.; Professor Dr. Ashraf Ramsi Yusuf PhD.; Associated Professor Dr. Reith Alsaffar, PhD., & Dr. Mustafa Saad, MSc.	

1st Lecture	<ul style="list-style-type: none"> - List all endocrine glands. - Describe the location, gross and microscopic structure of hypothalamus, and pituitary
2nd Lecture	<ul style="list-style-type: none"> - Describe the location, gross and microscopic structure of the thyroid, parathyroid
3rd Lecture	<ul style="list-style-type: none"> - Describe the location, gross and microscopic structure of the suprarenal, and endocrine pancreas
4th Lecture	<ul style="list-style-type: none"> - Describe the relation, blood, nerve supply and lymphatic drainage of hypothalamus, pituitary, thyroid, parathyroid, suprarenal, and endocrine pancreas
5th Lecture	<ul style="list-style-type: none"> - Describe the hypothalamic-pituitary axis and the hypothalamic-hypophyseal portal circulation
6th Lecture	<ul style="list-style-type: none"> - Describe fetal development of the endocrine system
Endocrine Physiology: 12 Lectures: Assistant Professor Dr. Mohammad Shaban, PhD.	
1st Lecture	<ul style="list-style-type: none"> - Outline the role of hormones as an integral part of the control mechanism used to regulate different metabolic, developmental, growth and reproductive functions in the human body - Describe how feedback relationship is important in determining the level of circulating hormones - Characterize the major hormonal bio rhythms - Describe intracellular, molecular and functional changes as a result of hormone binding to target tissue receptors - Identify hormones working through membrane receptors and nuclear receptors - Justify the site of hormone receptor to its hormone structure, transport modality and hormone duration of action - List adenohypophyseal & neurohypophyseal hormones - Describe the regulation of anterior pituitary hormones by the hypothalamus. - Explain physiological role of portal circulation - Design an experiment to show the importance of pituitary gland in close proximity to the hypothalamus
2nd Lecture	<ul style="list-style-type: none"> - Describe regulation of growth hormone secretion - List the physiological factors which stimulates and inhibits growth hormone secretion - Describe the role of the hypothalamus, growth hormone releasing hormone and somatostatin in the control of growth hormone secretion - Describe the growth and metabolic functions of growth hormone in different age periods
3rd Lecture	<ul style="list-style-type: none"> - Describe the regulation of prolactin secretion - Explain the importance of inhibitory mechanism in prolactin regulation - Illustrate the pattern of prolactin secretion in different age period and its importance in breast development and function
4th Lecture	<ul style="list-style-type: none"> - Describe the posterior pituitary gland relationship with the hypothalamus - Compare antidiuretic hormone and oxytocin in relation to their structure - List the physiological effects of antidiuretic hormone - Describe the regulation of antidiuretic hormone secretion

5th Lecture	<ul style="list-style-type: none"> - List the major physiological effects of oxytocin - Describe the regulation of oxytocin secretion
6th Lecture	<ul style="list-style-type: none"> - Describe the regulation of thyroid stimulating hormone by thyroid releasing hormone and T4, T3, somatostatin and dopamine - Discuss T4 and T3 transport and duration of action - Describe physiological aspects related to the formation and secretion of thyroid hormones - Characterize physiological consequences of thyroid hormones binding to transporting proteins - List the main physiological actions of thyroid hormones - Describe the regulation of thyroid hormones secretion - Explain the physiological basis of signs and symptoms seen in hypo and hyperthyroid state
7th Lecture	<ul style="list-style-type: none"> - Assess the physiological importance of ionized calcium in different physiological functions - Illustrate calcium compartments in the body - Illustrate calcium and phosphate absorption, metabolism and excretion - Describe the role of vitamin D in calcium and phosphate absorption - Outline the effect of calcium ion concentration on the regulation of the active form of vitamin D levels
8th Lecture	<ul style="list-style-type: none"> - List the major physiological effects of PTH - Explain the regulation of PTH secretion - List the major physiological actions of calcitonin - Illustrate the regulation of calcitonin secretion - Compare between PTH and calcitonin as regulators of calcium levels
9th Lecture	<ul style="list-style-type: none"> - Describe plasma glucose level in well fed and poor fed state - Illustrate plasma pattern of glucose, Insulin and glucagon after a meal and in between meals - Explain principal hormones that affect blood glucose concentration in well and poor fed state - Explain metabolic effects of presence and absence of insulin - Explain the regulation of insulin secretion - Explain physiological effects of glucagon - Describe the regulation of glucagon secretion - Explain metabolic, short- and long-term physiological changes of high level of plasma glucose
10th Lecture	<ul style="list-style-type: none"> - Describe physiological changes in diabetes mellitus type I and type II - Discuss complications of diabetes from physiological perspective
11th & 12th Lectures	<ul style="list-style-type: none"> - Describe the role of adrenal in preparing the body to face stress - List the catecholamines secreted by the adrenal medulla - Describe the actions of catecholamines in human body - List the factors that regulate adrenal medullary secretion - Describe the hypothalamic pituitary adrenal axis - Describe the role of the adrenal cortex in regulation of plasma sodium, potassium and blood volume - Describe the major physiological effects of mineralocorticoids - Describe the regulation of mineralocorticoids secretion

	<ul style="list-style-type: none"> - Describe the major physiological effects of glucocorticoids - Describe the regulation of glucocorticoids secretion - Describe defects and consequences of enzymatic deficiency in the pathway of steroid synthesis (BP, blood volume, androgens and blood glucose)
Endocrine Biochemistry: 8 Lectures: Professor Dr. Thana Bilal, PhD.	
1st and 2nd Lectures	<ul style="list-style-type: none"> - Identify the nature of different hormones. - Classify hormone types (steroids, proteins and short peptides, and amino acids) - Describe hormone biosynthesis, storage, secretion and transport of different hormone groups. - Compare life span of different hormones and effect on duration of hormone action - Illustrate targeting, delivery and response of hormones. - Illustrate hormonal interactions (systemic, cellular, synergistic and inhibitory). - Describe general aspects, governs regulation of hormone secretion - Describe intracellular and molecular changes as a result of hormone binding to target tissue receptors
3rd Lecture	<ul style="list-style-type: none"> - Define the concept of second messenger and list all second messengers - Illustrate PIP2 turnover (Ca²⁺/protein kinase C systems) - List actions of diacylglycerol (DAG) - Characterize cAMP as a second messenger - List intracellular actions of Camp
4th and 5th Lectures	<ul style="list-style-type: none"> - Define the concept of second messenger and list all second messengers - Illustrate PIP2 turnover (Ca²⁺/protein kinase C systems) - List actions of diacylglycerol (DAG) - Characterize cAMP as a second messenger - List intracellular actions of cAMP - Describe thyroid hormone biosynthesis: monoiodotyrosines, diiodotyrosines, T3, T4 and reverse T3 - Describe metabolism of iodide and iodine - Discuss the role of peroxidase, iodinase, coupling, protease, dehalogenase and thyroglobulin - Explain thyroid stimulating hormone action via cAMP
6th Lecture	<ul style="list-style-type: none"> - Describe the synthesis and storage of insulin - Describe enzymatic changes of glucose metabolic pathways in the well-fed state and during starvation in various tissues (liver, brain, muscle and adipose tissues) - Describe the regulation of glycogen metabolism, glycolysis, hexose monophosphate pathway and gluconeogenesis by insulin/counter-regulatory hormones ratio
7th Lecture	<ul style="list-style-type: none"> - Describe the biosynthesis of epinephrine
8th Lecture	<ul style="list-style-type: none"> - Explain how hormonal lab tests are used to reach a clinical diagnosis. - Describe the importance of dynamic hormonal testing in the evaluation of hormone functions
Endocrine Pathology: 8 Lectures: Associated Professor Dr. Mohammad Kamel Mohammad Alwiswasi, PhD, FRCPath.	

1st Lecture	<ul style="list-style-type: none"> - List the causes & effects of anterior pituitary gland diseases (hyper- & hypopituitarism) - Classify adenomas of the anterior lobe of pituitary gland according to their (i) functional status & (ii) type of hormone production - Describe the pathogenesis, gross & microscopic features of pituitary adenomas in general
2nd Lecture	<ul style="list-style-type: none"> - Describe the pathologic & clinical effects of: prolactinomas, growth hormone-producing, corticotroph cell (cushion disease), & gonadotroph, & thyrotroph adenomas - Describe the causes & clinical manifestations of hypopituitarism - Enumerate the Types, causes, & effects of diabetes insipidus - Define the syndrome of inappropriate anti diuretic hormone (SIADH) secretion - Enumerate the causes & diagnostic criteria of: thyrotoxicosis & hypothyroidism - Describe cretinism & myxedema
3rd Lecture	<ul style="list-style-type: none"> - Classify diseases of the Stomach - Describe the Pathogenesis, Pathologic Features, & Complications Of (I) Chronic Gastritis (H Pylori-Induced & Drug-Induced Gastritis), & (Ii) Acute Gastritis. - Describe the Etiology, Pathogenesis, & Pathological Features, & Complications Of Both Acute & Chronic Peptic Ulcers
4th Lecture	<ul style="list-style-type: none"> - Enumerate the main types of thyroiditis - Describe the etiology, pathogenesis, gross & microscopic features & diagnosis of: <ul style="list-style-type: none"> (1) thyroiditis: including hashimoto's, de quervain, subacute lymphocytic, & riedel (2) graves disease (3) diffuse multinodular goiters, both endemic & sporadic
5th Lecture	<ul style="list-style-type: none"> - List the main types of thyroid tumors - Describe the etiology, pathogenesis, pathological features & diagnosis of benign thyroid adenomas - Describe the etiology, pathogenesis, pathological features, diagnosis & rotes of spread of each type of the thyroid carcinomas (papillary, follicular, medullary, & anaplastic) - List the causes & effects of primary hyperparathyroidism
6th Lecture	<ul style="list-style-type: none"> - List the causes & effects of primary hyperparathyroidism - Describe the molecular pathogenesis, types, pathological changes (in the parathyroid glands, bones, & kidneys), & the clinical features of parathyroid tumors - List the causes of hypercalcemia - List the causes of secondary hyperparathyroidism - Describe the causes & effects of hypoparathyroidism
7th Lecture	<ul style="list-style-type: none"> - Describe the pathogenesis of: <ul style="list-style-type: none"> (1) Type 1 & 2 diabetes mellitus (DM) (2) The complications of DM - Describe the pathological changes of: <ul style="list-style-type: none"> (1) DM in the pancreas

	<p>(2) DM Late complications, including diabetic macrovascular disease, microangiopathy, nephropathy, neuropathy, & the ocular complications of DM</p> <p>- Describe the pancreatic endocrine neoplasms, including insulinomas, gastrinomas, glucagonomas, VIPoma [vasoactive intestinal peptide (VIP) producing tumor]</p>
8th Lecture	<p>- Describe the causes & pathological features of the different forms of:</p> <p>(1) hypercortisolism (cushing syndrome)</p> <p>(2) hyperaldosteronism</p> <p>- Describe the causes & pathological features of primary (acute & chronic) & secondary adrenocortical insufficiency (hypoadrenalism)</p> <p>- Describe the pathological features & effects of the main adrenal tumors (adenomas, carcinomas, & pheochromocytomas)</p> <p>- Describe the multiple endocrine neoplasia syndromes (Type 1, Type 2A & 2B)</p>
Endocrine Pharmacology: 10 Lectures: Professor Dr. Ahmad Shaban Abo-Sief, PhD.	
1st & 2nd Lectures	<p>- List synthetic analogs of hypothalamic hormones</p> <p>- Describe mechanism of action of these synthetic analogs</p> <p>- Illustrate their clinical uses and routes of administration</p> <p>- List side effects hypothalamic synthetic analogs</p>
3rd & 4th Lectures	<p>- Describe growth and metabolic effects of growth hormone</p> <p>- List the principal insulin-like growth factors and describe their relationship to the actions of growth hormone</p> <p>- Describe pharmacology of anterior pituitary hormones, review their pharmacological actions</p> <p>- List synthetic analogs and describe their routes of administration</p> <p>- Describe their clinical uses and adverse reactions</p>
5th & 6th Lectures	<p>- Illustrate the pharmacology of thyroid hormones</p> <p>- Describe the pharmacology of antithyroid drugs</p> <p>- Describe the clinical uses, routes of administration and adverse reactions of antithyroid drugs</p> <p>- Characterize the pharmacology of the parathyroid hormone, vitamin D and calcitonin</p> <p>- List synthetic analogs and describe their routes of administration, clinical uses and their adverse reactions</p> <p>- Integrate growth hormone vit.D and parathyroid gland roles in growth</p>
7th & 8th Lectures	<p>- Explain the pharmacology of insulin</p> <p>- Illustrate the pharmacology of oral hypoglycemic drugs</p> <p>- Describe clinical uses, administration and adverse reactions</p> <p>- Describe the synthetic analogs and their routes of administrations</p>
9th & 10th Lectures	<p>- Explain the rationale of replacement therapy.</p> <p>- Illustrate the pharmacology of glucocorticoids in terms of pharmacokinetics, mechanism of action and adverse reactions.</p> <p>- Describe the synthetic analogs and their routes of administration.</p> <p>- Explain the rationale of replacement therapy</p>
Endocrine Community Medicine: 2 Lectures: Associated Professor Dr. Emman Alkamel, PhD.	
1st Lecture	<p>- Describe epidemiology of diabetes mellitus (DM)</p> <p>- Classify DM</p>

	<ul style="list-style-type: none"> - Describe signs and symptoms - List the causes - Explain pathophysiology - Describe the epidemiological aspects of DM regarding age distribution, incidence and prevalence risk factors and trend - Identify the diagnostic methods - List general public awareness policies
2nd Lecture	<ul style="list-style-type: none"> - Epidemiology of thyroid diseases - Classify goiters, hypo and hyperthyroidism - Describe signs and symptoms - List the causes - Explain pathophysiology - Describe the epidemiological aspects of goiter regarding age distribution, incidence and prevalence risk factors and trend - Identify the diagnostic methods. - Describe public protective measures to prevent neonatal hypothyroidism - List general public awareness policies

B. PRACTICAL LABORATORY SESSIONS:

PRACTICLE SESSION	General Objective
1st anatomy practical session	Identify different parts of the thyroid gland and its relations
2nd anatomy practical session	Identify the adrenal gland and its relations
3rd anatomy practical session	Identify the pituitary gland and its relations
4th anatomy practical session	Identify the ultra-structural components of the following glands and correlate between them: Pituitary gland, Thyroid gland, Parathyroid glands, Pancreas, Adrenal glands
1st pathology practical session	<p>Pathology of the thyroid gland</p> <p>Describe the morphology of various types of thyroiditis</p> <p>Describe the features of nodular colloid goiter</p> <p>Describe the features of adenomas</p> <p>Describe the features of various carcinomas</p>
2nd pathology practical session	<p>Pathology of the pituitary gland</p> <p>Identify various types of adenomas and the significance of using immunological stains in their categorization</p> <p>Describe the morphology of craniopharyngioma</p>
3rd pathology practical session	<p>Parathyroid gland</p> <p>Identify the morphological features of hyperplastic gland and compare with adenoma</p>
4th pathology practical session	<p>Endocrine pancreas</p> <p>Identify the morphological features of the pancreas in diabetes</p> <p>Identify the morphological features of islet cell adenoma</p>
5th pathology practical session	<p>Adrenal gland</p> <p>Identify the morphological features of atrophic and hyperplastic glands</p>

Compare with the features of cortical adenoma Identify the morphological features of pheochromocytoma Identify the morphological features of neuroblastoma
--

Development of ILOs is promoted through the following teaching and learning methods:

Integrated Modular System by:

- Lectures-Power Point presentations
- Departmental hand-outs
- animations, educational movies, illustrations
- Self-readings

Recommended Text Books, Atlases and supporting material**Text book and material:**

NO *SPECIFIC* TEXTBOOK IS RECOMENDEDD. STUDENTS ARE ADVISED TO GO BACK TO INTERNET RESOURCES. HOWEVER, THE LATEST EDITIONS OF THE FOLLOWING EDUCATIONAL MATERIALS MAY BE OF SOME HELP

ANATOMY:

- Principles of Human Anatomy. By G.J. Tortora, Latest edition.
- Clinical Anatomy for Medical Students. By R.S. Snell, Latest edition.
- Basic Histology, by L. Carlos Junqueira. Latest edition.
- Before we are born. By K.L. Moore and T.V.N. Persaud, Latest edition.

BIOCHEMISTRY:

- Harper's Biochemistry. By Robert K. Murray and Co., Latest edition.
- Supplementary Departmental Handouts.

PHYSIOLOGY:

- Textbook of Medical Physiology, by Guyton and Hall, latest edition.
- Review of Medical Physiology, by William F. Ganong.

PATHOLOGY:

- Essential Pathology, by Emanuel Rubin.
- Basic Pathology, by Kumar, Cotran and Robbin.

PHARMACOLOGY:

- Lipincott's Illustrated Reviews: Pharmacology.

Teaching Methods and Assignments:**Grading Policy:**

Grades are based on the following:

Written First or Mid-Term exam at the end of the system: 40%

Practical exam at the end of the system: 20%

Final Course Exam: 40%

Total Points: 100%

Additional information:**Course Policies:**

Late Assignments: According to college policy

Missed exams: According to college policy

Absence : According to college policy

Cheating: According to college policy

Classroom Protocol: According to college policy

Important Dates to Remember: October 4, 2018; and October 7, 2018

Student rights and responsibilities: According to college policy

The semester is 4 weeks: The Course includes 46 theory lectures & 9 practical session, 2 hours each/Student

The Hashemite University– Faculty of Medicine**☺ 2018/2019 endocrine MODULE Time table - 4 Credit Hours –****1st Semester: 3rd Year: 4 Weeks: September 9- October 7, 2018 Coordinator Mohammad A. Shaban.
MD. PhD.**

1st Week Day/ Date-2018	8 - 9	9 - 10	10.30 -11.30	11.30 - 12.30	12.30 - 2.30
Sun 9	PHYS 1	ANAT 1	PATH 1	PHYS 2	
Mon 10	PHYS 3	PHYS 4	ANAT 2	PATH 2	
Tue 11	HOLIDAY NEW YEAR				
Wed 12	PHYS 5	PHYS 6	ANAT 3	BCHM 1	
Thu 13	BCHM 2	PHRM 1	PHRM 2	ANAT 4	

2nd Week Day Date	8 - 9	9 - 10	10.30–11.30	11.30-12.30	12.30 - 3.30
Sun 16	PHYS 7	BCHM 3	ANAT 5	PATH 3	CLIN SKILLS/ANAT LAB
Mon 17	PATH 4	ANAT 6	PHARM 3	PATH LAB ALL GROUPS	
Tue 18	PHYS 8	BCHM 5	PHYS 9	CLINICA SKILLS / ANATOMY LAB	
Wed 19	CM 1	CM 2	PATH 5	PATH 6	
Thu 20	PHARM 4	PHARM 5	BCHM 7	BCHM 8	

3rd Week Day Date	8 - 9	9 - 10	10.30- 11.30	11.30-12.30	12.30 - 3.30
Sun 23	PHYS 10	PHARM 6	PATH 7	PATH 8	CLINICA SKILLS / ANATOMY LAB
Mon 24	PHYS 11	PHARM 7	PHARM 8	PHYS 12	PATH LAB ALL GROUPS
Tue 25		PHARM 9	PHARM 10		CLINICA SKILLS / ANATOMY LAB

Wed 26	OPEN DISCUSSION PHARMACOLOGY				
Thu 27					

4th Week Day Date	8 - 9	9 - 10	10.30- 11.30	11.30-1.30	1.30-3.30
Sun 30	OPEN DISCUSSION BCHM / PHYSIOLOGY				
Mon 1	OPEN DISCUSSION ANAT / PATHOLOGY				
Tue 2					
Wed 3					
Thu 4	MIDTERM/PRACTICAL. 60 MCQ QUESTIONS FOR THE THEORY AND 20 FOR THE PRACTICAL				
5th Week Day Date	8 – 9	9 - 10	10.30- 11.30	11.30-1.30	1.30-3.30
Sun 7	FINAL 60 MCQ QUESTIONS				
Mon 8	GI MODULE				

★ **Summary of Endocrine MODULE teaching:**

**Anatomy:6L + 4P Physiology: 12L Biochemistry: 8L CM: 2L Pathology: 8L+ 5P
Pharmacology: 10L**

Total of 46 Lectures and 9 Practical (Two hours each) / student.

Clinical Skills Labs as above