DISCIPLINE SPECIFIC ELECTIVES (DSE-15): Human Endocrinology Zoo-DSE-15

Credit distribution, Eligibility and Pre-requisites of the Course

Course title &Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Human Endocrinology Zoo-DSE- 15	04	03	Nil	01	Passed Class XII with Biology/ Biotechnology	NIL

Learning Objectives

The learning objectives of this course are as follows:

- to enable students to learn endocrinology with special emphasis on the human endocrine system covering the anatomy, physiology and biochemistry of the system, biological phenomenon at cellular level
- to provide detailed information on the release, effect and functioning of hormones.
- to acquire knowledge about the role of hormones as therapeutic agents.
- to acquaint students with experimental skills used in clinical and research laboratories

Learning Outcomes

By studying this course, students will be able to:

- comprehend the endocrine system and properties of hormones.
- understand the importance of endocrine system and its role in maintenance of homeostasis.
- gain in-depth knowledge of the molecular mechanism of hormone action and its regulation.
- better appreciate the regulation of physiological process and its implication in diseases.
- acquire information about human endocrine disorders.

SYLLABUS OF DSE- 15

UNIT- 1: Introduction to Endocrine Physiology **8 hrs**

Introduction to the endocrine system and major glands (pituitary, pineal, adrenal, thyroid, parathyroid, testis, pancreas, ovaries, and GI tract), Classes of hormones, Modes of hormone secretion.

UNIT- 2: Neuroendocrinology **12 hrs**

General organization of nervous system and neuroendocrine organs; Neurons: Structure, types, distribution and characteristics; Introduction to Neuropeptides, Neurosteroids and neurohormones.

The hypothalamo-hypophyseal axis; Hypothalamo-vascular system; hypothalamic hormones: chemistry, physiology and its regulation. Hypothalamo-hypophyseal interactions with the gonads, adrenal and other endocrine glands.

Neuroendocrine regulation of immune system; Stress hormones and immune response. Neuroendocrine disorders: genetic *versus* environmental causes (sleep apnea, precocious puberty).

UNIT- 3: Molecular Endocrinology **10 hrs**

Hormones as chemical messengers for control and regulation of physiological processes. Structure and biosynthesis of peptide, protein and steroid hormones; Storage, secretion and regulation of hormones; Mechanisms of hormone action: Receptor and non-receptor mediated signalling; Feedback mechanisms in signalling pathways.

UNIT- 4: Hormones as Therapeutic Agents **15 hrs**

Therapeutic use of hormones in health and disease (cancer, biological clock regulation, metabolic dysfunction, stress management, growth hormone disorders).

Current developments in design and production of hormonal contraceptives.

Recombinant protein hormones: production and application in regulation of fertility (Hormone replacement therapy, hypogonadism, PCOS/PCOD, xeno-estrogens and its effects on male fertility).

Practical **(30 hrs)**

(Laboratory periods: 15 classes of 2 hours each)

1. Simulation of dissection and virtual display of endocrine glands in rat model.
2. Study of the permanent slides of the major (pituitary, pineal, adrenal, thyroid, parathyroid, testis, pancreas, ovaries, and GI tract) endocrine glands.
3. Estimation of plasma level of any hormone using Immunoblot/ELISA.
4. Chromatographic separation of steroid hormones using paper chromatography.
5. Visit to endocrine laboratory/hospitals/clinics.
6. Project work/survey-based project on any endocrine disorder.

Essential/recommended readings

1. David O. Norris, James Carr (2021) Vertebrate Endocrinology, V Edition, Elsevier.
2. J. Larry Jameson, Leslie De Groot (2010). Endocrinology, VI Edition, Elsevier.
3. Hadley, M.E. and Levine J.E. (2009). Endocrinology. VI Edition. Pearson Prentice Hall, Pearson Education Inc., New Jersey.
4. Franklin F. Bolander (2004) Molecular Endocrinology. III Edition, Academic Press, USA.

Suggestive readings

1. Handbook of Physiology published by American Physiological Society by Oxford University Press, Section 7: Multiple volumes set, 1998.

2. Endocrinology: An Integrated Approach. BIOS Scientific Publishers (https://www.ncbi.nlm.nih.gov/books/NBK22/).

3. Turner, D. (1977) General Endocrinology. VI Edition, Saunders.

NOTE: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.