

7. Field trip: Industries/Institutes/herbal garden/ medicinal gardens/ nurseries/tribal museum.
8. e-presentations (System of medicine, Conservation strategies, propagation of medicinal plants, folk medicines, application of natural products to certain diseases listed in the syllabus)

Essential readings:

1. Abdin, M. Z. and Abrol, Y. P., (2006). *Traditional Systems of Medicine*. Narosa Publishing House, New Delhi.
2. Kumar, S., (2018). *Ethnobotany*. Kojo press, New Delhi.
3. Purohit and Vyas, (2008). *Medicinal Plant Cultivation: A Scientific Approach*, Agrobios.
4. Trivedi, P. C. (2006). *Medicinal Plants: Ethnobotanical Approach*. Agrobios.

Additional Readings

1. Colton, C. M., (1997). *Ethnobotany: Principles and Applications*. John Wiley and Sons.
2. Jain, S. K., (1990). *Contributions to Indian Ethnobotany*. Scientific publishers, Jodhpur.
3. Jain, S. K., (1995). *Manual of Ethnobotany*. Scientific Publishers, Jodhpur.

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

DISCIPLINE SPECIFIC ELECTIVE COURSE –DSE-2

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Hormone biochemistry (BS-DSE-2)	4	2		2	Class XII pass with Biology and chemistry, as one of the papers in Class XII	NA

Learning Objectives:

The course is designed to enable the students to understand and appreciate the delicate network and balance of hormones required for the healthy functioning of the human body. The course emphasizes on studying the different types of hormones along with their physiological action.

The students will be taught the consequences of any hormonal imbalances (over and underproduction of hormones) with special emphasis on human diseases. It provides an understanding of the different endocrine factors that regulate metabolism, growth, electrolyte and mineral homeostasis, glucose homeostasis, stress physiology and reproductive function. It also prepares a student for postgraduate studies in any course related to molecular medicine.

Learning Outcomes:

On successful completion of the course, a student will:

- Understand the role of endocrine system in maintaining ionic and glucose homeostasis
- Should be able to describe molecular, biochemical and physiological effects of all hormones and factors on cells and tissues.
- Understand the integrative communications that regulate, growth, appetite, metabolism and reproduction
- Prepares the student for interpreting clinical parameters in a real-life situation.

Course Contents -Theory

Unit 1: Introduction to hormones and Hypothalamic-hypophyseal system : 5 Hours

Introduction to hormones; Hypothalamic - pituitary axis- anatomy, histology, vasculature, and secretions. Physiological and biochemical actions of hypothalamic hormones and Anterior pituitary hormones; Hormone feed- back regulatory cascade. Posterior pituitary hormones –structure, physiology and biochemical actions of AVP and Oxytocin; Diabetes insipidus

Unit 2: Hormones regulating growth, energy metabolism and calcium homeostasis 10 Hours

Regulation of Growth: growth hormone and somatomedin, Endocrine disorders - gigantism, acromegaly, dwarfism, pygmies. Thyroid gland- Biosynthesis of thyroid hormone and its regulation: Role of TRH, TSH in T₄ synthesis and response. Physiological and biochemical action of Thyroxine. Pathophysiology of thyroxine secretion: Goiter, Graves' disease, cretinism, myxedema. Regulation of calcium homeostasis: PTH, Vitamin D and calcitonin. Mechanism of Ca²⁺ regulation involving bone, skin, liver, gut and kidneys. Pathophysiology - rickets, osteomalacia, osteoporosis.

Unit 3: Hormones regulating glucose homeostasis, stress physiology and electrolyte balance: 10 Hours

Hormones of the Pancreas: structure, synthesis, regulation of release, incretins, physiology and biochemical actions of insulin and glucagon. Role of these hormones in blood glucose homeostasis; Pathophysiology - diabetes type I and type II. GIT hormones: Secretin, gastrin and incretins. Physiology and action of Aldosterone; the Renin Angiotensin System. Physiology and Biochemical actions of Cortisol; Role of POMC and CRH in cortisol synthesis;

Adrenal medullary hormones: epinephrine and norepinephrine. The Fight or flight response; Dual receptor hypothesis. General adaptation syndrome: acute and chronic stress response. Pathophysiology – Addison's disease, Conn's syndrome, Cushing syndrome.

Unit 4: Reproductive hormones:

5 Hours

Male and female sex hormones. Role of testosterone in male secondary sexual characteristics. Interplay of hormones during ovarian and uterine phases of menstrual cycle; Placental hormones; role of hormones during parturition and lactation. Hormone based Contraceptives.

PRACTICAL

Credit: 2

Total Hours- 60

1. Glucose tolerance test.
2. Estimation of serum Ca^{2+} by o-CPC method
3. Determining the thyroid profile by estimating T_4 and TSH under normal and pathophysiological conditions.
4. Estimation of estrogen during different days of the menstrual cycle.
5. HCG based pregnancy test.
6. Estimation of serum electrolytes.
7. Presentation on GI Tract hormones and Adipokines
8. Case studies: Diabetes Insipidus, Acromegaly and dwarfism, Diabetes Mellitus, Rickets, Osteoporosis, Cushing syndrome

Essential readings:

1. Vander's Human Physiology (2008) 11th ed., Widmaier, E.P., Raff, H. and Strang, K.T. McGraw Hill International Publications, ISBN: 978-0-07-128366-3.
2. Sherwood, L. (2012) Introduction to Human Physiology 8th edition; Brooks/Cole, Cengage Learning. ISBN-13: 978-1133104544.
3. Victor Rodwell, David Bender, et al. (2018) ISE Harper's Illustrated Biochemistry Thirty-First Edition, McGraw Hill (A and L Lange series), ISBN-10. 1259837939 ; ISBN-13. 978-1259837937

Suggested readings:

1. Endocrinology (2007) 6th ed., Hadley, M.C. and Levine, J.E. Pearson Education (New Delhi), Inc. ISBN: 978-81-317-2610-5.
2. Guyton, A.C. and Hall, J.E., (2016) Reed Textbook of Medical Physiology 13th ed., Elsevier India Pvt. Ltd. (New Delhi). ISBN: 978-1455770052

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