

Department of Animal Sciences

Program: M.Sc. in Life Sciences (Specialization: Animal Sciences)

(Academic Session 2018 - 19)

Semester – IV

Course Code	Course Title	Type	L (hr)	T (hr)	P (hr)	Cr
	Course Courses*					
LAS.572	Endocrinology	CC	2	-	-	2
LAS.573	Metabolism	CC	2	-	-	2
LAS.574	Animal Behavior	CC	3	-	-	3
	Discipline Enrichment Course*					
LAS.575	Career Prospects in Life Sciences	DEC	3	1	-	4
	Value Based Elective Foundation					
xxx.xxx	University Level Course	VB	1	-	-	1
xxx.xxx	University Level Course	VB	1	-	-	1
	Research*					
LAS.599	Project (Part – II)		-	-	12	6
	Total Credits					19

L: Lectures; T: Tutorial; P: Practical; Cr: Credits; * Compulsory courses

Examination Pattern

- A: Continuous Assessment: [25 Marks]
- i. Surprise Test (minimum three) - Based on Objective Type Tests (10 Marks)
 - ii. Term paper (10 Marks)
 - iii. Assignment(s) (5 Marks)
- B: Pre-Scheduled Mid Semester Test-1: Based on Subjective Type Test [25 Marks]
- C: Pre-Scheduled Mid Semester Test-2: Based on Subjective Type Test [25Marks]
- D: End-Term Exam (Final): Based on Objective Type Tests [25 Marks]
- E: Discipline Enrichment Course: The final evaluation shall be carried out for 50 Marks based on objective type question paper to be set by the associated faculty members.
An internal evaluation of objective type 25 Marks each for twice shall be conducted.
- F: Project: The final result of the project will be on 5 – point scale and evaluated as Excellent, Very Good, Good, Average, and Unsatisfactory. Which will be mentioned on the mark sheet/transcript but not be counted towards overall Grade Point Average (GPA).

Core Courses:

LAS.572: Endocrinology

2 Credits

Learning Objective: The objectives of this course are to review endocrinology briefly and then introduce the field of molecular endocrinology at large. Students shall understand the basic concepts of hormone receptor action, signal transduction and gene regulation, as well as critically read and discuss the current literature in the field.

Unit	Syllabus	Lectures
1.	Introduction: History, endocrine glands, hormones as chemical messengers, stimulus for hormone release: change in homeostasis, sensory stimulus and others. Hormones: Structure, receptor type, regulation of biosynthesis and release (including feedback mechanism like short, long and ultra-feedback system). Physiological and biochemical actions and pathophysiology (hyper and hypo secretion).	8
2.	Reproductive Hormones: Male and female sex hormones. Hypothalamic hormones: CRH, TRH, GnRH, PRL/PRIH, GHRH/GHRIH. Pituitary hormones - Anterior and posterior pituitary hormones. Molecular mechanism of origin of GnRH cells, migration and site of release, reproductive cycles in females. Role of different guidance molecules involved during early GnRH development and adult GnRH System. Interplay of hormones during reproductive cycle, pregnancy, parturition and lactation: Different pathologies and genes involved. Other organs with endocrine function: heart (ANP), kidney (erythropoietin), liver (angiotensinogen, IGF-1), adipose tissue (leptin, adiponectin).	8
3.	Hormone Biosynthesis and Mode of Action: Steroid hormones (estrogens, androgens, progesterone) and their receptors, hormones during aging, hormones and cell death, nuclear receptors and hormones. Thyroid hormones, growth hormones, adrenal hormones and catecholamines, glucocorticoid hormones.	7
4.	Non-genomic Actions of Steroid Hormones: Endocrine disrupting compounds and environmental estrogens. Estrogens and breast cancer, androgens and prostate cancer.	7

Suggested Reading:

1. Norris, D. O., and Carr, J. A. (2012). Vertebrate Endocrinology, 5th Edition. Academic Press.
2. Nelson, D. L., and Cox, M.M. (2008). Lehninger Principles of Biochemistry, 5th Edition. WH Freeman & Company, New York

3. Widmaier, E. P., Raff, H., and Strang, K. T. (2013). Vander's Human Physiology, 13th Edition. McGraw-Hill Higher Education
4. Lodish, H., Berk, A., Kaiser, C. A., Krieger, M., Bretscher, A., Ploegh, H., Amon, A., and Scott, M. P. (2012). Molecular Cell Biology, 7th Edition. W.H. Freeman.
5. Goswami, M. P. (2013). Endocrinology and Molecular Cell Biology.
6. Melmed, S., Polonsky, K., and Larsen, P. R. (2016) Williams Textbook of Endocrinology. Elsevier, 13th edition.
7. Negi and Chandra, S. (2009). Introduction to Endocrinology. Prentice Hall India Learning Private Limited.

LAS.573: Metabolism

2 Credits

Learning Objective: This course is designed to cover the advanced aspects of biochemistry and biological macro molecules, including their biosynthesis and mechanism(s) by which they facilitate biochemical reactions. This course also aims to provide detailed knowledge regarding the biological basis of nutrition and the mechanism(s) by which diet and its components can influence human health.

Unit	Syllabus	Lectures
1.	Metabolism of Carbohydrates: Glycolysis, gluconeogenesis, TCA cycle, hexose monophosphate (HMP) shunt, bioenergetics, disorders of carbohydrate metabolism.	8
2.	Metabolism of Lipids: Biosynthesis and oxidation of saturated and unsaturated fatty acids, glycerides, phospholipids and cholesterol, bioenergetics, lipoproteins and their significance, disorders of lipid metabolism.	7
3.	Amino Acid Metabolism: Biosynthesis of protein, general catabolism of amino acids, deamination, transamination, urea cycle, disorders of amino acid metabolism.	8
4.	Nucleic Acid Metabolism: Biosynthesis of purine and pyrimidine nucleotides, disorders of purine and pyrimidine metabolism - gout, aciduria, xanthinuria.	7

Suggested Reading:

1. Harper H. A. (1997). Review of Physiological Chemistry. Lange Medical Publications, Los Angeles.
2. T. A. Ramakrishnan (1994). Textbook of Clinical Biochemistry. Publications, Chennai.
3. Zilwa, J. E., Pannale, P. A., Philip, R. (1988). Clinical Chemistry in Diagnosis and Treatment, New York.
4. Devlin, D. T. (1997). Textbook of Biochemistry with Clinical Correlations. New York, John Wiley and Sons.
5. Plummer, D. T. (1997). An Introduction to Practical Biochemistry. New Delhi, Tata McGraw

Hill Publishing Company.

6. Cromwell, L., Weibel, F. J. and Pfeiffer, E. A. (1996). Biomedical Instrumentation and Measurements. New Delhi, Prentice Hall.

LAS.574: Animal Behavior

3 Credits

Learning objective: This course aims to explore the variety of different behaviors found in a broad range of animal groups, using a scientific and evolutionary approach. This course will enable participants to apply this knowledge to analyze and understand behavior in both wild and domestic animals.

Unit	Syllabus	Lectures
1.	Approaches and methods in study of behavior: Conceptual, theoretical and empirical; proximate and ultimate causation; altruism and evolution-group selection, kin selection, reciprocal altruism, co-operation	12
2.	Cognition: Neural basis of learning, memory, cognition, sleep and arousal; biological clocks; development of behavior	12
3.	Sociality: Social communication; social dominance; use of space and territoriality; mating systems, courtship behavior, parental investment and reproductive success; parental care; aggressive behavior	11
4.	Foraging: Habitat selection and optimality in foraging; migration, orientation and navigation; domestication and behavioral changes, ageing and disease, animal personalities	10

Suggested reading:

1. Alcock J. Animal Behavior: An Evolutionary Approach, 10th Edition
2. Lee Alan D. Principles of Animal Behavior (Third Edition)
3. Breed M and Moore J. Animal Behaviour (2nd edition)
4. Nichollas et al. (2012). From Brain to Behavior. Sinauer Associates; 5th edition.
5. Griffith et al. (2004). Introduction to Genetic Analysis. W H Freeman & Co Ltd; 8th Revised edition.

Discipline Enrichment Course:

LAS.575: Career Prospects in Life Sciences

4 (3L + 1T) Credits

Learning Objective: The course deals with the scope of career prospects in the field of Life Sciences and allied subjects for higher learning and research. The specific content includes preparation for the national level competitive examinations. The students shall be given exercises, mock tests and practice tests from the previous year's UGC-CSIR - NET examinations.

Unit	Syllabus	Lectures
1	Life Sciences: Scope, importance & career opportunities; classical zoology to modern animal biotechnology; timeline of animal research; and industry needs.	10
2	A revision of concepts in core courses: Cell Biology; Biochemistry; Molecular Biology; Evolution and Developmental Biology; Animal Physiology; and Molecular Biology and Techniques in Biology.	15
3	A revision of concepts in in elective courses: Techniques in Life Sciences, Animal Cell Culture and Applications, Genetic Engineering, Nanobiology, Vascular Biology, and Neurobiology and Degeneration.	10
4	Exercises, Mock Tests, Practice Tests from the previous year's related to UGC-CSIR – NET and ICMR - NET examinations.	10

Suggested Reading:

1. Damron, W. S. (2012). Introduction to Animal Science. Prentice Hall. 5th Edition
2. Lisa AU. et al. (2016). Campbell Biology. Pearson publishers, 11th edition.
3. Voet, D. and Voet, J. G. (2008). Principles of Biochemistry. CBS Publishers & Distributors. New Delhi, India.
4. Urry, L. A. et al. (2016). Campbell Biology. Pearson publishers, 11th edition.
5. Smith, T. M. and Smith, R. L. (2012). Elements of Ecology. Benjamin Cummings Publishing Company, 8th edition.
6. Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K. and Watson, J. D. (2010). Molecular Biology of the Cell. Garland publishers, Oxford.
7. Guyton. (2007). Textbook of Medical Physiology. 11th Edition. Elsevier India Pvt. Ltd. New Delhi.
8. Tizard (2008). Immunology: An Introduction. Cengage Learning, Thompson, USA.
9. Fasman, G. D. (1989). Practical Handbook of Biochemistry and Molecular Biology. CRC Press, Taylor and Francis Group, UK.

10. Snusted, D. P., Simmons, M. J. (2010). Principles of Genetics. John Wiley & Sons, New York.
11. An introduction to genetic engineering, Third edition by Dr. Desmond S.T. Nicholl.
12. Lewin, R. (2004). Human Evolution - An Illustrated Introduction. Wiley-Blackwell, USA.
13. Scott, F. and Gilbert, S. F. (2010). Developmental Biology. Sinauer Associates, Inc. USA.
14. Ford, C. H. J., Casson, A. G. and Macdonald, F. (2004). Molecular Biology of Cancer. Bios Scientific Publishers, USA.
15. Norris, D. O., and Carr, J. A. (2012). Vertebrate Endocrinology, 5th Edition. Academic Press.
16. Devlin, D. T. (1997). Textbook of Biochemistry with Clinical Correlations. New York, John Wiley and Sons.
17. Alcock J. Animal Behavior: An Evolutionary Approach, 10th Edition
18. Lee Alan D. Principles of Animal Behavior (Third Edition)

Note: Previous years question papers of UGC/CSIR-NET; ICMR – NET; any other resource materials as per their availability.

Value Based Elective Foundation Courses:

Opt any two no. of courses from the list (to be circulated) at the university level. 1 Credit

LAS.599: Project (Part – II)

6 Credits

Learning Objective: The objective of project (part II) would be to ensure that the student learns the nuances of the scientific research. Herein, the student will carry out the experiments to achieve the objectives as mentioned in the research project outline (synopsis). The data collected as a result of experiments must be meticulously analysed in light of established scientific knowledge to arrive at cogent conclusions.

Updated on: 30-5-2018