

MBTCR 8222T/P: Advanced Animal Biology & Advanced RDT Practical

Theory: Advanced Animal Biology [CIA: 10 Marks; End-Sem: 50 Marks],

Practical: Advanced Recombinant DNA Technology [40 marks]

No. of Credits	6
Theory/Composite	Composite
No. of periods assigned	4 Theory + 3 Practical

Course description/objective:

The course is designed to

1. impart a comprehensive overview of the basic principles of animal taxonomy and nomenclature and introduce students to the basic classification scheme of chordates and non-chordates.
2. provide knowledge about complexity and diversity of animals and their evolutionary relationship.
3. familiarize students with an advanced understanding of specific topics in animal biology and enable them to develop an understanding of the holistic animal kingdom.
4. provide a comprehensive overview of certain aspects of animal behaviour and to enable the students to get a strong conceptual understanding of the same.

Module A: (38 marks)

(3 classes / week)

UNIT I: Animal Taxonomy and Bauplan concept

- (a) Basic principles of zoological taxonomy and zoological nomenclature, Levels of taxonomy, Scope of taxonomy.
- (b) Bauplan concept, symmetry and coelom, deuterostomes and protostomes.
- (c) General characters and outline of classification of non-chordates (upto class) and vertebrates (upto subclass), classification of mammals (upto orders).
- (d) Overview of larval forms in non-chordates.

UNIT II: Special Topics in Animal Biology

- (a) Protozoa: Conjugation in *Paramecium*, pathogenic protozoa and host-parasite interaction.
- (b) Porifera: Canal system in sponges
- (c) Coelenterata: Polymorphism in Cnidaria, Coral reefs (types, formation, conservation).
- (d) Platyhelminthes and Aschelminthes: Pathogenic forms, Parasitic adaptations.
- (e) Annelida: Metamerism in Annelida.
- (f) Arthropoda: Neuroendocrine control of metamorphosis in insects, Role of insects as vectors of human diseases. Social insects and social systems (concept of eusociality, characteristics of an insect society with reference to ants and termites).
- (g) Pisces: Concept of parental investment and various strategies of parental care in fish.
- (h) Amphibians: Various strategies of parental care in amphibians, Concept of heterochrony and paedomorphosis (with special reference to *Axolotl* larva).

Module B: (12 marks)

(1 class / week)

UNIT III: Animal Behaviour:

Communication in Animals: mechanisms of communication with reference to bees (bee dances, chemical communication) and birds (song and song development).

Altruism: Prisoner's dilemma, group and kin selection, reciprocal altruism, inclusive fitness.
Aggressive behaviour: Game theory models of aggression, winner, loser, bystander and audience effects.

Sexual Selection: mating systems, intra and intersexual selection and role in determination of mate quality, runaway sexual selection.

Texts & Reading/Reference Lists

1. J.Z. Young. The Life of Vertebrates.
2. E.E. Ruppert, R.S. Fox, R.B. Barnes. Invertebrate Zoology.
3. B.J. Bogitsh, C.E. Carter, TN. Oeltmann. Human Parasitology.
4. Bhatia. Medical Parasitology.
5. Kindt, Goldsby & Osborne. Kuby Immunology.
6. J. Alcock. Animal Behaviour.
7. L.A. Dugatkin. Principles of Animal Behaviour.
8. M.W. Strickberger, B.K. Hall, B. Hallgrimsson. Strickberger's Evolution.
9. Relevant scientific literature.

Practical: Advanced Recombinant DNA Technology Practical: 40 marks (3 classes / week)

1. λ DNA-Hind III Digestion followed by ligation
2. Ni-NTA protein purification (from cell extract, SDS PAGE)
3. Transformation: pBluescript vector/ XL1 Blue
 - i) Recombinant/ non-recombinant vector
 - ii) Linearised/ Circular vector
4.
 - a) Plasmid DNA preparation from recombinant vector
 - b) Release of insert: i) Single digestion ii) Gel extraction
 - c) PCR from purified recombinant vector

Q.Paper Structure for End Sem Theory

Module A (38 marks):

Subjective Questions:

Answer any 1 out of 2 questions. $8 \times 1 = 8$ marks

Answer any 3 out of 5 questions. $10 \times 3 = 30$ marks

Module B (12 marks):

Compulsory Objective Questions: $1 \times 4 = 4$ marks

Subjective Questions: Answer any 1 out of 2 questions (with subparts). $8 \times 1 = 8$ marks