UZO-465 Fish Endocrinology Cr. (2)

Course Objectives

The objectives of the course are:-

1. To enhance the understanding of hormones and its significance in the life of fishes.
2. To impart the knowledge of endocrine system and mechanism of hormone action in fishes.
3. To convey the basic knowledge of pheromones and its role in the life of fishes.

Learning outcomes.

Upon successful completion of the course, the student will be able to:

1. **AQUIRE** the knowledge of major neuroendocrine axes that modulate growth, reproduction, and stress.
2. **Understand** the organisms interact with their environments and how environmental conditions modulate physiological regulatory mechanisms.
3. **SOLVE** problems related to unbalancing of the endocrine hormones
4. **ANALYZE** the endocrine hormones of different species of fishes.
5. **FORMULATE** the flow charts of all endocrine hormones for better understanding.
6. **DEMONSTRATE** the induced spawning procedures.

Course Contents:

a) Fish endocrine system

- Differentiate between exocrine and endocrine system
- Fish endocrine system and mechanism
- The evolution of fish endocrinology

b) Pituitary gland

- Origin
- Functions
- Neurohypophysis and its hormones
- Adenohypophysis and its hormones

c) Thyroid gland

- Introduction of thyroid gland
- Functions in fish

d) Pancreas

- Introduction to pancreas of fishes
- Types in fish
- Pancreatic glands
- Pancreatic hormones

e) Gastro-intestinal hormones

- Introduction
- Types
- Function

f) Adrenal cortex (internal tissue), chromaffin tissues and corpuscles stannous

- Brief introduction
- Important functions in fish

g) Sex hormones

- Gonadal hormones in fish;
- Testes and Ovaries (androgenic tissue: structure and chemistry; transport, metabolism and mechanism of action. Ovarian hormones: steroid biochemistry and biosynthesis; transport, metabolism and mechanism of action).

h) Pheromones

- Brief introduction
- Pheromones
- Functions

Teaching-Learning Strategies

Teaching will be a combination of class lectures, class discussions, and group work. Short videos /films will be shown on occasion.

Assignments

The sessional work will be a combination of written assignments, class quizzes, presentation, and class participation/attendance.

Assessments and Examination

Sessional Work:	25 marks
Midterm Exam:	35 marks
Final term Exam:	40 marks

Recommended books

1. Melmed, S., Polonsky, K. S., Larsen, P.R. and Kronenberg, H. M., 2016. WILLIAMS textbook of Endocrinology. 13th ed. Elsevier Inc, USA.
2. Norris, D.O. and Carr, J. A., 2013. Vertebrate Endocrinology .5th ed. Elsevier publishing, USA.
3. Papoutsoglou, S.E., 2012. Test book of Fish Endocrinology.Nova Science, USA.
4. Norris, D.O. and Carr, J.A., 2005. Endocrine Disruption. Oxford University Press. USA.
5. Reinecke, M., Zaccone, G., B.G. Kapoor, B.G., 2006. Fish Endocrinology. (2 volume set) 1st ed. CRS Press, USA.
6. Sloman, K.A., Balshine, S. and Wilson, R.W., 2005. Behaviour and Physiology of Fish. Academic Press. UK.
7. Shammi, Q.J. and Bhatnagar, S. 2002. Applied Fisheries, Agro bios, India.
8. Ali, S.S. 1999. Fresh Water Fisher Biology. Naseem Book Depot, Hyderabad.

UZO-466 Fish Endocrinology (Lab.) Cr. (1)

Course Objectives

The objectives of the course are:-

1. To enhance the practical understanding of hormones and its significance in the life of fishes.
2. To impart the knowledge of endocrine system and mechanism of hormone action in fishes.
3. To convey the basic knowledge of pheromones and its role in the life of fishes.

Learning outcomes.

Upon successful completion of the course, the student will be able to:

1. **AQUIRE** the knowledge of major neuroendocrine axes that modulate growth, reproduction, and stress.
2. **UNDERSTAND** the organisms interact with their environments and how environmental conditions modulate physiological regulatory mechanisms.
3. **SOLVE** problems related to unbalancing of the endocrine hormones
4. **ANALYZE** the endocrine hormones of different species of fishes.
5. **FORMULATE** the flow charts of all endocrine hormones for better understanding.

6. EXTRACTION, preservation and injecting solution of pituitary gland of donor fish for induced spawning.

6. **DEMONSTRATE** the induced spawning procedures with special reference to pituitary gland.

Course contents

1. Extraction, preservation of pituitary gland of fish.
2. Preparation of hormonal injection used for induced spawning of fish.
3. Demonstration of endocrine glands and associated structures in dissections, transparencies, computer projections etc
4. Histological and ultra-structure features of endocrine glands
5. Demonstration of physiological roles of hormones of different endocrine glands
6. Demonstration on functional diversity and endocrine mechanism of hormones in different vertebrates.

Teaching-Learning Strategies

Teaching will be a combination of class lectures, class discussions, and group work. Short videos /films will be shown on occasion.

Assignments

The sessional work will be a combination of written assignments, class quizzes, presentation, and class participation/attendance.

Assessments and Examination

Sessional Work:	25 marks
Midterm Exam:	35 marks
Final term Exam:	40 marks

Recommended books

1. Melmed, S., Polonsky, K. S., Larsen, P.R. and Kronenberg, H. M., 2016. WILLIAMS textbook of Endocrinology. 13th ed. Elsevier Inc, USA.
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6. Sloman, K.A., Balshine, S. and Wilson, R.W., 2005. Behaviour and Physiology of Fish. Academic Press. UK.
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