

III Semester BSc Zoology Core Course Content

Course Title/Code: Molecular Biology, Bioinstrumentation & Techniques in Biology	Course Credits: 4
Course Code: DSCC5ZOOT3	L-T-P per week: 4-0-0
Total Contact Hours: 56	Duration of ESA: 3 Hours
Formative Assessment Marks: 40	Summative Assessment Marks:60
Model Syllabus Authors:	

Course Outcomes (COs):

<p>At the end of the course the student should be able to understand:</p> <p>After successful accomplishment of the course, the learners will be able to acquire better understanding and comprehensive knowledge regarding most of the essential aspects of Molecular Biology subject which in turn will provide a fantastic opportunity to develop professional skill related to the field of molecular biology.</p> <p>The course will mainly focus on the study of principal molecular events of cell incorporating DNA Replication, Transcription and Translation in prokaryotic as well as eukaryotic organisms.</p> <p>Acquiring knowledge on instrumentation and techniques in biology.</p>

Semester III- Zoology Core Course III Content:

Content	Hours
Unit I	14
Chapter 1: Process of Transcription <ul style="list-style-type: none"> • Fine structure of gene (Cistron, Recon, Muton) • DNA and RNA polymerases - types and functions • Transcription in prokaryotes and eukaryotes 	8
Chapter 2: Process of Translation <ul style="list-style-type: none"> • Genetic code and its salient features • Translation in prokaryotes and eukaryotes 	6
Unit II	14
Chapter 3. Regulation of gene expression-I <ul style="list-style-type: none"> • Regulation of gene expression in prokaryotes- lac operon (inducible) and trp operon (repressible) in <i>E. coli</i> • Regulation of gene expression in eukaryotes - Role of chromatin (euchromatin and heterochromatin) in gene expression • Post-transcriptional modification: capping, splicing, polyadenylation • Concept of RNA editing (mRNA), gene silencing, and, RNAi interphases • 	9


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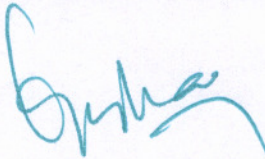
Chapter 4. Regulation of gene expression-II	5
<ul style="list-style-type: none"> • Post-translational modifications: purpose, advantages, and significance; glycosylation, methylation, phosphorylation, and acetylation. • Intracellular protein degradation (lysosomal autophagy and ubiquitin proteasome pathway). 	

Unit III	14
Chapter 5: Microscopy	9
<ul style="list-style-type: none"> • Principles and applications of Light microscopy, Dark field microscopy, Phase contrast microscopy, Fluorescence microscopy, Confocal microscopy and Electron microscopy (SEM and TEM). 	
Chapter 6: Centrifugation and Chromatography	5
<ul style="list-style-type: none"> • Centrifugation: Principles, types, and applications (High speed and Ultracentrifugation) • Chromatography : Principle and applications of: TLC, HPLC, GC and CC 	
Unit IV	14
Chapter 7: Biochemical Instrumentation	6
<ul style="list-style-type: none"> • Principles and applications of Colorimetry and Spectrophotometry: Beer-Lambert's law, Absorption spectrum, UV-VLSpectrophotometer. • pH meter, measurement of pH • Principle, applications and safety measures of Radio-tracer techniques - Autoradiography. 	
Chapter 8: Molecular Techniques	8
<ul style="list-style-type: none"> • Principle and applications of Agarose gel-electrophoresis, SDS-PAGE, DNA Sequencing (Sanger's Dideoxy method) • ,PCR, DNA Fingerprinting, ELISA, Northern Blotting Southern Blotting and Western Blotting. 	

Suggested Readings:

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test	15
Written Assignment/Presentation/Project / Term	15
Class performance/Participation	10
Total	40


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Semester III (Practical III)
Zoology

Core Course Lab Content

Course Title: Molecular Biology, Bioinstrumentation and Techniques in Biology	Course Credits: 2
Course Code: DSCC5ZOOP3	L-T-P per week: 0-0-4
Total Contact Hours: 56	Duration of ESA: 3 Hours
Formative Assessment Marks: 25	Summative Assessment Marks: 25

Course Outcomes (COs):

<p>At the end of the course the student should be able to:</p> <ul style="list-style-type: none"> At the end of the course, students will be able to understand the applications of biophysics and principle involved in bio-instruments. Understand the methodology involved in bio techniques. Students can Demonstrate knowledge and practical skills of using instruments in biology and medical field. They can perform techniques involved in molecular biology and diagnosis of diseases.
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Lab Course Content

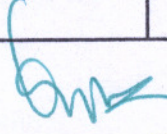
List of experiments	14 units (1unit- 4hrs)
1. To study the principle and applications of simple, compound and binocular microscopes.	1
2. To study the principle and applications of various lab equipments- pH meter, Electronic balance, Vortex mixer, use of glass and micropipettes, Laminar air flow, Incubator, shaker, Water bath and centrifuge.	2
3. To prepare Buffer solutions (Phosphate, Citrate, Tris-HCl buffer)	1
4. To estimate amount of RNA by Orcinol method.	2
5. Demonstration of differential centrifugation to fractionate components in a given mixture.	1
6. To estimate amount of protein by Lowry's method.	2
7. To identify different unknown amino acids using ascending paper chromatography.	1
8. Extraction of DNA from the given animal tissue sample.	2
9. To estimate amount of DNA by di-phenyl amine (DPA) method.	2

Suggested Readings:

1. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter. Molecular Biology of the Cell, 4th edition. New York: Garland Science (2002).
2. Daniel L. Hartl and Maryellen Ruvolo. Genetics: Analysis of Genes and Genomes, 8th Edition. Burlington, Mass.: Jones & Bartlett Learning (2012).
3. Gerald Karp. Cell and Molecular Biology: Concepts and Experiments, 5th Edition. Wiley Publication (2008).
4. Harvey Lodish, Arnold Berk, Paul Matsudaira, Chris A. Kaiser, Monty Krieger, Freeman. Molecular Cell Biology, 5th edition. W. H. & Company (2003).
5. James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Losick. Molecular Biology of the Gene, 5th edition. Cold Spring Harbor Laboratory Press (2003).
6. Stryer, Lubert. Biochemistry, 2nd Edition. W. H. Freeman and Company, New York (1981).

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test	05
Written Assignment/Presentation/Project /Term papers/Seminar	10
Class performance/Participation	10
Total	25


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Semester: III Zoology

Open Elective Course Content

Course Title: **ENDOCRINOLOGY**

Course Code: **OEC5ZOOT3**

Course Credits: **3**

Total Contact Hours: **42**

Duration of ESA: **3 Hours**

Formative Assessment Marks: **40**

Summative Assessment Marks: **60**

Course Outcomes (Cos):

At the end of the course the student should be able to:

Differentiate among endocrine, paracrine and autocrine systems.

Describe the different classes and chemical structures of hormones.

Identify the glands, organs, tissues and cells that synthesize and secrete hormones, hormone precursors and associated compounds.

Identify and discuss the integration of the endocrine system in general with focus on specific interactions.

Explain the consequences of under- and overproduction of hormones.

Course Content

Content	Hrs.
Unit I	14
Chapter 1. About Endocrine glands <ul style="list-style-type: none">• Endocrine glands and classifications of hormones.• Characteristics and Transport of Hormones.• Chapter 2. Hypothalamus-Hypophysis <ul style="list-style-type: none">• Hypothalamus as a neuroendocrine organ• Pituitary – Structure and functions• Chemical nature, mode of action, and functions.• Pituitary disorders Chapter 3. Pineal gland <ul style="list-style-type: none">• Structure and functions of Pineal gland.• Hypo- and hyperactive states of the gland.	
Unit II	14
Chapter 4. Thyroid and parathyroid <ul style="list-style-type: none">• Histological structure of the glands.• Chemical nature, mode of action, and functions of the hormones.• Hypo- and hyperactive states of the glands. Chapter 5.: Adrenal cortex and medulla – <ul style="list-style-type: none">• Histological structure of the gland. Chemical nature, and functions• Hypo- and hyperactive states of the gland. Chapter 6. Prostaglandins	
Unit – III	14


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Chapter 7: Pancreas:

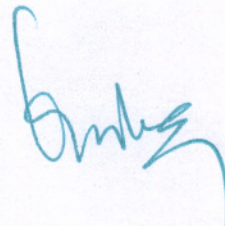
- Pancreatic islets - histological structure. Chemical nature, and function. Hormonal control of blood sugar.
- Hyperinsulinism and diabetes mellitus.

Chapter 8: Gastro-intestinal hormones –

- Functions and regulation of secretion of the hormones.

Chapter 9: Different types of Rhythms –

- Ultradian, circadian, infradian. Different zeitgebers and their relation with circadian clock
- Neural basis of biological clock and role of suprachiasmatic nuclei. Sleep-wakefulness cycle. Time keeping genes. Jet-lag and shift work.



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Text Books & Suggested Readings:

1. William's Text Book of Endocrinology Larsen et al.: An Imprint of Elsevier.
2. Endocrinology, Mac E. Hadley, Pearson Education.
3. The Kidney-An outline of Normal and Abnormal Functions, by H.E. Dewardener, ELBS.
4. Vander's Human Physiology, E.P. Widmaier et al., McGraw-Hill, Higher Education.
5. Concise Medical Physiology by S.K. Chaudhuri, New Central Book Agency.
6. Endocrinology. Vols.I, II and III by L.O. DeGroot. W.B. Saunders Co.
7. The Physiology of Reproduction, Vols.I & II, by E. Knobil and J.D. Neil. Raven Press.
8. Guyton and Hall. Textbook of Medical Physiology. 13th Edition.
9. Histology: A Text and Atlas. Sixth Edition. Ross & Pawlina. Lippincott Williams & Wilkins.
10. Vertebrate Endocrinology by David O. Norris.

Course Books published in English and Kannada may be prescribed by the Universities and Colleges.

Pedagogy: Chalk and Talk, PPT, Group discussion, Seminar.

At the end of the course the student will be able to:

Demonstrate comprehensive understanding of the structure, function and development of the human body as related to endocrinology physiology.

Demonstrate elementary understanding of the clinical applications of physiology.

Critically evaluate the impact of the recent information on the genesis of current concepts related to various topics of physiology

Formative Assessment	
Assessment Occasion	Weightage in
House Examination/Test	15
Written Assignment / Case Presentation / Project / Seminar	20
Class performance/Participation	05
Total	40

Open Elective Course Content

Semester: IV Zoology

Course Title: Animal Behaviour Course Code: OEC5ZOOT4	Course Credits: 3
Total Contact Hours: 42	Duration of ESA: 3 Hours
Formative Assessment Marks: 40	Summative Assessment Marks: 60
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the students will be able to:

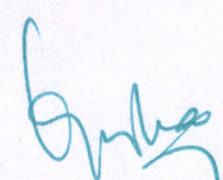
Examine and critically to evaluate the emergence of ideas that have shaped how we observe and collect data on animal behaviour.

Understand the main historical ideas that underpin animal behaviour theory

Critically review hypotheses to explain animal behaviour

Understand different methods for collecting data on animal behaviour

Have advanced their written and oral presentation skills.


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Scheme of Practical Examination
B.Sc. Zoology III Semester
Core Subject: Molecular Biology, Bioinstrumentation and Techniques in Biology

Duration: 3 hours

Max. marks: 25

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|--|--------|
| 1. Extraction of DNA from the given animal tissue | |
| OR | |
| Estimation of DNA / RNA / Proteins | 08M |
| 2. Separate and Identify the given unknown amino acids by using ascending paper Chromatography | 06M |
| 3. Identify and give the working principle of the spotters A and B | 3X2=6M |
| 4. Certified Record Book | 05M |

TOTAL Marks 25M

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Scheme of Practical Examination
BSc. Zoology IV Semester
Zoology Core Subject: Gene Technology

Duration: 3 hours

Max. marks: 25

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|--|-------------|
| 1. Determine the blood group of the given sample and comment | 05M |
| 2. Problem on Chapter 7 | 05M |
| 3. Problem on Chapter 8 | 05M |
| 4. Identify and comment on the given spotters A and B | (2.5X2) 05M |
| 5. M(PCR/PAGE/Restriction enzyme kit/FASTA/BLAST/Database) | |
| 6. Certified Record Book | 05M |
| 7. | |

TOTAL Marks 25M


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Model Question Paper
BSC III Semester Zoology Open Elective (OE)

Molecular Biology,
Bioinstrumentation &
Techniques in Biology

Time: 2.5hours

Max.Marks:60

Instructions to Candidates:

1. All Sections/parts are compulsory.
2. Draw neat labelled diagrams wherever necessary.

PART A

I. Answer any five of the following

(5X2=10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

PART-B

II. Answer any five of the following

(5X4=20)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

PART-C

III. Answer any three of the following

(3X10=30)

- 1.
- 2.
- 3.
- 4.

Note: Proportionate weightage shall be given to each unit based on number of hours prescribed.

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Model Question Paper
BSC III Semester Zoology Open Elective (OE)

ENDOCRINOLOGY

Time: 2.5 hours

Max.Marks:60

Instructions to Candidates:

1. All Sections/parts are compulsory.
2. Draw neat labelled diagrams wherever necessary.

PART A

I. Answer any five of the following

(5X2=10)

5. Mention four examples for endocrine glands
6. What are the neuroendocrine cells of hypothalamus?
7. List out any four functions of melatonin
8. What are the different types of biological rhythms?
9. Mention the 3 hormones of adrenal cortex.
10. What are the types of cells found in parathyroid gland? Mention one function.
11. How does jet lag and shift work contribute to sleep deprivation?

PART-B

II. Answer any five of the following

(5X4=20)

1. Explain the functions and regulations of cholecystokinin.
2. What are time keeping genes? How does it influence sleep?
3. Explain the histological structure of islets of Langerhans.
4. Write a note on prostaglandins.
5. Mention the different types of cells of adenohipophysis with its secretions.
6. Write a note on hypersecretion of parathyroid gland.
7. Write note on Protaglandins

PART-C

III. Answer any three of the following

(3X10=30)

1. What are hormones? Classify the hormones based on chemical nature.
2. Explain the hormonal control of blood sugar.
3. Discuss the functions of thyroid gland. Add a note on its hypersecretion.
4. Explain how zeitgebers affect time signals and reset sleep.

Note: Proportionate weightage shall be given to each unit based on number of hours prescribed.

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