

Zoology Core Lab Course Content

Semester I

Course Title: Cell Biology & Cytogenetics Lab	Course Credits: 2
Course Code: DSCC5Z00P1	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
Model Syllabus Authors:	

Course Outcomes (COs):

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

1. To use simple and compound microscopes.
2. To prepare stained slides to observe the cell organelles.
3. To be familiar with the basic principle of life, how a cell divides leading to the growth of an organism and also reproduces to form new organisms.
4. The chromosomal aberrations by preparing karyotypes.
5. How chromosomal aberrations are inherited in humans by pedigree analysis in families.
The antigen-antibody reaction.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	CC P1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11
I Core competency	X										
II Critical thinking	X										
III Analytical reasoning	X										
IV Research skills	X										
V Team work	X										

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Lab Course Content

List of labs to be conducted	56 Hrs.
<ol style="list-style-type: none"> Understanding of simple and compound microscopes. To study different cell types such as buccal epithelial cells, neurons, striated muscle cells using Methylene blue/any suitable stain (virtual/ slaughtered tissue). To study the different stages of Mitosis in root tip of <i>Allium cepa</i> (Permanent slides and squash preparation). To study the different stages of Meiosis in grasshopper testis (virtual or permanent slides). To check the permeability of cells using salt solution of different concentrations. Study of parasites in humans (e.g. Protozoans, Helminthes in compliance with examples being studied in theory) permanent microslides (<i>Plasmodium</i> signet ring and <i>Microfilaria</i>). To learn the procedures of preparation of temporary and permanent stained slides, with available mounting material.(Coelenterate colony or crustacean/insect larva) Study of mutant phenotypes of <i>Drosophila</i> sp. (from Cultures or Photographs) (any four). Preparation of polytene chromosomes (<i>Chironomus</i> larva or <i>Drosophila</i> larva). Preparation of human karyotype and study the chromosomal structural and numerical aberrations from the pictures provided. (Virtual/optional). To prepare family pedigrees. https://www.vlab.co.in https://zoologysan.blogspot.com www.vlab.iitb.ac.in/vlab www.onlinelabs.in www.powershow.com https://vlab.amrita.eduhttps://sites.dartmouth.edu/ 	

Suggested Readings:

- Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
- Alberts et al: Molecular Biology of the Cell: Garland (2002).
- Cooper: Cell: A Molecular Approach: ASM Press (2000).
- Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).
- Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W HFreeman (2007).
- Kesar, Saroj and Vasishta N.2007 Experimental Physiology: Comprehensive Manual. Heritage Publishers, New Delhi.

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

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test	10
Project*	05
Practical class performance	05
Record writing and timely submission	05
Total	25

*Topic for the project may be selected from the practical syllabus

Date:

Course Co-ordinator

Subject committee Chairperson

**Course Title/Code: Cell Biology & Cytogenetics Lab
(BSCC5ZOOP1)
Scheme of Practical Examination**

Time: 3 hours

Max. marks: 25

- I.** Identify and comment on the permanent slides **A & B** with labeled diagrams. 2 x 3 = 06
(1- mitosis and 1- meiosis)
(Identification - ½ Mark; Labeled diagram – 1 Mark; Comments - 1½ Marks)
- II.** Squash - Make a stained squash preparation of onion root tip and Report. = 05
(Stained slide preparation with at least one dividing stage - 3 Marks; Report - 2 Marks)
or
Make a stained squash preparation of Polytene chromosomes and Report. = 05
(Stained slide preparation of Polytene chromosome - 3 Marks; Report - 2 Marks)
- III.** Identify the *Drosophila* mutant **C** with reasons. = 02
(Identification - ½ Mark; Chromosome number and site - ½ Mark; Characters -1 Mark)
- IV.** Identify the parasite **D** with reasons. = 02
(Identification - ½ Mark; Report - 1½ Mark)
- V.** Study of permeability of animal cells using salt solutions of different concentrations and report (experiment - 3 Marks; report- 2 Mark)
or
Prepare a stained slide of the buccal epithelial cells and report. = 05
(Slide preparation - 3 Marks; report- 2 Mark)
- VI.** Class Records. = 05

Zoology Semester II Core Course Lab Content

Course Title/Code: Biochemistry and Physiology Lab	Course Credits: 2
Course Code: DSCC5Z00P2	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
Model Syllabus Authors:	

Course Outcomes (COs):

At the end of the course the student should be able to understand:
 Basic structure of biomolecules through model making.
 Develop the skills to identify different types of blood cells.
 Enhance basic laboratory skill like keen observation, analysis and discussion.
 Learn the functional attributes of biomolecules in animal body.
 Know uniqueness of enzymes in animal body and their importance through enzyme kinetics.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	CC P1	CC P2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11
I Core competency		X									
II Critical thinking		X									
III Analytical reasoning		X									
IV Research skills		X									
V Team work		X									

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content

List of labs to be conducted	Hours
1. Preparation of models of nitrogenous bases- nucleosides and nucleotides. 2. Preparation of models of amino acids and dipeptides. 3. Preparation of models of DNA and RNA. 4. Qualitative analysis of Carbohydrates (Molisch's test, Iodine test, Benedict's test), Proteins (Xanthoproteic test/Biuret test/Ninhydrin test-any 2 tests) and Lipids (Greasy spot test). 5. Qualitative analysis of Nitrogenous wastes – Ammonia, Urea and Uric acid. 6. Separation of amino acids or proteins by paper chromatography.	20
7. Determination of the activity of enzyme (Urease)-Effect of [S] and determination of Km and Vmax. 8. Determination of the activity of enzyme (amylase) - Effect of temperature and time. 9. Action of salivary amylase under optimum conditions. 10. Quantitative estimation of Oxygen consumption by fresh water Crab. 11. Quantitative estimation of salt gain and salt loss by fresh water.	15
12. Estimation of Hemoglobin in human blood using Sahli's haemoglobinometer.	15

13. Counting of RBC in blood using Hemocytometer. 14. Counting of WBC in blood using Hemocytometer. 15. Differential staining of human blood corpuscles using Leishman stain. 16. Recording of blood glucose level by using glucometer.	
Virtual Labs (Suggestive sites) https://www.vlab.co.in https://zoologysan.blogspot.com www.vlab.iitb.ac.in/vlab www.onlinelabs.in www.powershow.com https://vlab.amrita.edu https://sites.dartmouth.edu	06

Text Books

1. Nelson & Cox: Leininger's Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet & Voet: Biochemistry Vols 1 & 2: Wiley (2004)
4. Murray et al: Harper's Illustrated Biochemistry: McGraw Hill (2003) Elliott and Elliott: Biochemistry and Molecular Biology: Oxford University Press
5. Guyton, A.C. & Hall, J.E. Textbook of Medical Physiology, XI Edition, Harcourt Asia PTE Ltd. /W.B.Saunders Company. (2006).
6. Tortora, G.J. & Grabowski, S. Principles of Anatomy & Physiology. XI Edition John Wiley & sons (2006).
7. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Edition, Pearson Education (2016).
8. Hill, Richard W., et al. Animal physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
9. Chatterjee CC Human Physiology Volume 1 & 2, 11th edition, CBS Publishers (2016).

Web References:

- Mammalian Physiology– www.biopac.com

Pedagogy: Lectures, Presentations, videos, Virtual Labs, Assignments, Tests, Individual or group Field oriented Project Report on or visit to a research institute.

TOPICS RECOMMENDED FOR SEMINAR/PROJECT REPORT/ASSIGNMENT/MONOGRAPH

1. Biochemical pathways, their evolutionary background and regulation.
2. Blood groups and their importance.
3. Vital enzymes for human body.
4. Essential and nonessential amino acids.
5. Important body lipids.
6. Significance of animal proteins.
7. Role of carbohydrates in animal body.
8. Nature of proteins and nurture of animal body.
9. Role of lipids in structural and functional organization of body.

Formative Assessment	
Assessment Occasion	Weightage in Marks
Test	10
Project*	05
Participation in practical class	05
Record writing and timely submission	05
Total	25

***Topic for the project may be selected from the practical syllabus**

Date: Coordinator

Subject Committee Chairperson

**Course Title/Code: Biochemistry and Physiology Lab
(BSCC5ZOOP2)
Scheme of Practical Examination**

Time: 3 hours

Max. marks: 25

- I. Biochemistry experiment (by lots). = 08**
 Conduct suitable qualitative tests for the detection of Organic compounds/Nitrogenous Wastes in the sample provided and report.
 (Name of the test - 1 Mark; Principle - 2 Marks; Conducting the test - 2 Marks; Procedure/observation/inference (in tabular form) -2 Marks; Result -1 Mark)
- II. Conduct tests and report the salivary amylase activity of human saliva = 05**
 (Common for all) (Conducting the test - 3 Marks; report – 2 Marks)
- III. Physiology experiment (by lots). = 07**
 Conduct Physiology experiment as per lots and report
 (Conducting the test - 3 Marks; Principle/Procedure/observation/calculation/ Inference - 2 Marks; Result - 2 Marks)
- IV. Class Records = 05**