



बिरसा मुंडा ट्रायबल युनिवर्सिटी

Birsa Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

School of Science

M.Sc. (Zoology) Programme

Subject Code & Name: - MS01EZOO01 - Histology and Histochemistry

Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				Internal		External	
L	T	P	Total	TH	PWE	TH	PWE
2	--	2	4	25%	25%	25%	25%

Programme Name	M.Sc. Zoology
Semester	I
Course Code	MS01EZOO01
Course Title	Histology and Histochemistry
Course Content Type (Th./Pr.)	Theory + Practical
Course Credit	4
Sessions+ Lab. Per Week	2 + 2
Total Teaching/Lab. Hours	60 Hours
* 2 Laboratory = 1 Session	

Learning Objectives

By the end of this course, students will be able to:

- Describe the microscopic organization of animal tissues and organs.
- Explain the principles fixation, processing, sectioning and staining of biological tissues.
- Interpret histological sections of major organs under the light microscope.
- Correlate tissue structure with physiological function.
- Prepare quality histological slides independently using standard laboratory protocols.

Prerequisites (if any)

Students should have completed undergraduate-level courses in:

- Cell Biology and Cytology, Animal Physiology, Basic Biochemistry and General Zoology/Vertebrate Biology
- Familiarity with light microscopy and basic laboratory techniques is expected.

Learning Outcomes

On the Completion of this course, students will able to:

- Independently prepare, process, section and stain animal tissues using routine and special histochemical techniques, Identify and interpret histological sections of all major organ systems at the light microscopic level.



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Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	Histological Techniques and basic histological structures: • Fixation and Fixatives: Types of fixatives, Chemistry of fixation, Choice of Fixatives • Tissue processing: Dehydration, Clearing and Embedding • Microtomy: Types of microtomes, Sectioning of Paraffin blocks • Staining of paraffin sections: Principle and methods of staining. • Histological stains: Haematoxylin and Eosin • Special stains: PAS reaction (carbohydrates), Sudan stains (lipids), Feulgen reaction (DNA), Methyl Green-Pyronin (DNA/RNA) • Epithelial Tissues: Simple, Stratified and Transitional and Pseudostratified. • General Connective Tissue: Fibres, Cells, Intercellular ground substance, Types of connective tissue. • Muscular Tissue: Types and mechanism of muscle contraction. • Nervous Tissue: Types of neurons and nerves, Neuroglia, Synapse, Ganglia, Cerebral cortex, Cerebellar cortex and Spinal cord.	15
II	Organ Histology • Digestive system: esophagus, stomach (fundic, pyloric regions), small intestine (villi, crypts), large intestine, liver (hepatic lobule, portal triad), pancreas • Respiratory system: trachea, bronchi, alveoli • Urinary system: kidney (cortex, medulla, nephron), urinary bladder • Reproductive system: testis (seminiferous tubules, interstitial cells), ovary (folliculogenesis, corpora lutea), uterus • Endocrine organs: thyroid, adrenal gland, pituitary (adenohypophysis and neurohypophysis) • Integument: skin (thick and thin), hair follicle, sebaceous and sweat glands	15





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Practical(s) (if any)

List of Practical (Practical are demonstrated using charts, models and multimedia videos)

1. Study of epithelial tissue
2. Study of connective tissues
3. Study of Blood and mononuclear phagocyte system
4. Study of muscle tissues
5. Study of nervous tissues
6. Study the histology of Digestive System (Oesophagus, Stomach and Intestines)
7. Study the histology of Respiratory System (Nasal cavities, pharynx, trachea, bronchi and lungs)
8. Study the histology of Urinary System (Kidney, Ureter and urinary bladder)
9. Study the histology of Reproductive System (testis, ovary, uterus)
10. Study the histology of Endocrine organs (thyroid, adrenal gland, pituitary)
11. Study the histology of Integument (skin, hair follicle, sebaceous and sweat glands)

Text Book(s)

1. Textbook of Human Histology by Inderbir Singh, Jaypee Brothers Medical Publishers.
2. Human Histology by B. K. B. Bhuiyan, CBS Publishers & Distributors.
3. A Textbook of Histology by C. S. Prasad & K. Rajalakshmi, New Age International Publishers.
4. Essentials of Histology by Harsh Mohan, Jaypee Brothers Medical Publishers.
5. Textbook of Histology by A. K. Datta, Current Books International.
6. Practical Histology by S. R. Kale & R. P. Kanitkar, Nirali Prakashan.
7. Histology: A Colour Atlas and Textbook by P. R. G. Nair, CBS Publishers & Distributors.
8. Manual of Histological Techniques by N. R. Shetty, CBS Publishers & Distributors.



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Reference Books

1. Introductory Histology by R. K. Gauba
2. Histology an Illustrated Colour Text by Barry S Mitchell and Sandra Peel
3. Junqueira's Basic Histology: Text and Atlas by Anthony L. Mescher, McGraw-Hill
4. Wheater's Functional Histology: A Text and Colour Atlas by Barbara Young, Geraldine O'Dowd & Phillip Woodford, Elsevier.
5. Histology: A Text and Atlas by Michael H. Ross & Wojciech Pawlina, Wolters Kluwer.
6. Color Atlas of Histology by Leslie P. Gartner & James L. Hiatt, Wolters Kluwer.
7. diFiore's Atlas of Histology with Functional Correlations by Victor P. Eroschenko, Wolters Kluwer.
8. Bloom and Fawcett's Concise Histology by Don W. Fawcett, CRC Press.
9. Atlas of Human Histology by Victor P. Eroschenko, Wolters Kluwer.
10. Histology and Cell Biology: An Introduction to Pathology by Abraham L. Kierszenbaum & Laura Tres, Elsevier.
11. Theory and Practice of Histological Techniques by John D. Bancroft & Marilyn Gamble, Elsevier.
12. Cellular Pathology Technique by C. F. A. Culling, Butterworth-Heinemann.
13. Histological and Histochemical Methods by John A. Kiernan, Scion Publishing.
14. Carleton's Histological Technique by R. A. B. Drury & E. A. Wallington, Oxford University

Web Resources

1. Histology Guide (Virtual Microscopy Laboratory) – <https://www.histologyguide.org>
2. Meyer's Histology Online – <https://www.histology-online.com>
3. Meyer's Interactive Histology Atlas – <https://www.meyershstology.com>
4. Histology Online Atlas (WVU/WMU) – <https://histologyonline.hsc.wvu.edu>
5. Western Michigan Histology Atlas – <https://histology.med.wmich.edu>
6. Rowan University Histology Online Atlas – <https://somhistology.rowan.edu/HOL>
7. Interactive Histology Atlas – <https://oer.galileo.usg.edu/biology-textbooks/34>
8. Blue Histology – <https://www.lab.anhb.uwa.edu.au/mb140>
9. Histology World – <https://www.histology-world.com>
10. Loyola University Histology – <https://www.meddean.luc.edu/lumen/meded/histo>

Required Software(s) (if any)

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L:: Lecture, **T::** Tutorial , **P::**Practical

PWE:: Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

