INTERNSHIP PROGRAMME FOR UG DEGREE (SEMESTER-V)

(For the students admitted under New Curriculum and Credit Framework from the academic session 2023-24)

Course Title: Microscopy in Plant Science	
Internship Providing Organization (IPO):	**Department of Botany Bankura Sammilani College**
Category of Course:	**For UG DEGREE (SEM-V)**
Duration:	**60 Hours**
Course Coordinator and Contact Details:	**Dr. Arup Karmakar Mob: 8101712861**
Mentors:	**Dr. Bandana Pradhan Dr. Ranjan Ghosh Dr. Tripti Bouri Mr. Animesh Karmakar Mr. Samir Jana**
Intake Capacity:	**55 Students**
Course Fees:	**Rs. 100/- (Students from Host Institution) Rs. 400/- (Students from Other Institution)**

SYLLABUS

Course Title: Microscopy in Plant Science
[50 Marks/2 Credits/60 Hours]

Learning Outcomes (LO)

- Learn about principles and functioning of different types of microscopes used for studying plant specimen.
- Develop skill for sectioning, staining and preparation of permanent slides of different plant specimens.
- Know the process of sample preparation for fluorescence and electron microscopy.
- Able to take proper measurement and images of plant specimen using conventional methods as well as modern computerized software.

(Theory)

Unit 1. Types of Microscopies **[8 Hours]**

Principle and functioning of- Bright field microscope (Simple and Compound); Dark Field Microscope; Phase contrast Microscope; Confocal Microscope; Fluorescent Microscope; Stereo Microscope; Electron Microscope (SEM and TEM).

Unit 2. Sectioning and Staining **[14 Hours]**

Free hand and Microtome sectioning; Types of Section- TS, LS, RLS, TLS etc.; Process and application of simple staining and differential staining; Cytological staining techniques; Preparation of permanent slides; Fluorescent labelling; Sample preparation for electron microscopy (fixation, dehydration, critical point drying (CPD), gold coating etc.)

Unit 3. Measurement and Imaging **[8 Hours]**

Cell size measurement; Area calculation; Calculation of magnification; Use of scale bar; Camera Lucida drawing; Imaging and measurement through camera attachment and computerized software.

(Practical)

[30 Hours]

1. Proper handling of Simple and Compound Microscope.
2. Demonstration of images taken by different types of microscopes.
3. Free hand sectioning of different types of plant specimens.
4. Simple staining of algae or other plant materials.
5. Double staining of plant specimen for anatomical studies.
6. Dehydration and Permanent slide preparation of plant specimens.

7. Acetocarmine staining and squashed preparation of *Alium* root tip.

8. Sample preparation for SEM (Fixation and Dehydration)

9. Cell size measurement using Ocular and Stage micrometer and calculation of magnification.

10. Camera Lucida drawing of algae or any other plant specimen.

11. Imaging and measurement of plant specimen through camera attachment and computerized software.

Suggested Reading

Singh, D.R., 2018. Principles and Techniques in Histology, Microscopy and Photomicrography (2nd Edition), CBS Publishers & Distributors Pvt. Ltd.

Marimuthu, R., 2011. Microscopy and Microtechnique, MJP Publishers.

Lawlor, D., 2019. Introduction to Light Microscopy: Tips and Tricks for Beginner, Springer.

Ruizen S.E., 1999. Plant Microtechnique and Microscopy, Oxford University Press.