

SEMESTER I
LSM3234 BIOLOGICAL IMAGING OF GROWTH AND FORM

Prerequisite: LSM2233 Cell Biology

Workload: 26 lecture hours + 6 tutorial hours + 10 Practical hours

Growth and form are fundamental to all living organisms, crucial to health and diseases. Development in imaging methods and tools has transformed biological and biomedical sciences. This module will introduce basic concepts in imaging and their applications. The major topics will include: basic optics, light and electron microscopy, fluorescence and related methods. Introduction of each imaging technology will be linked with a set of biological problems of fundamental interests and biomedical implications.

| S/N | Topics | Lecture hours |
|-----|--|---|
| 1. | Lecture 1 -- Basic Optics: how does a microscope work? Magnification and resolution | 2 hr CH |
| 2. | Lecture 2 - The chemistry of cells (Introduction to contrast formation) | 2hr CH |
| 3. | Practical 1 - Basic microscopy | 2 hr CH, MW |
| 4. | Lecture 3 - Cell compartments (Introduction to electron microscopy) | 2hr MW |
| 5. | Lecture 4 - Cytoskeleton (Introduction to confocal microscopy) | 2hr CH |
| 6. | Lecture 5 - Gradient in a cell (FRET and FLIM) | 2hr CH |
| 7. | Practical 2 – Cell fixation | 2hr CH |
| 8. | Practical 3 -- Immunostaining | 2hr CH |
| 9. | Practical 4 – Fluorescence microscopy | 2hr CH |
| 10. | Tutorial 1 -- Lab report writing | 2hr CH, MW |
| 11. | Lecture 6 —Cell polarity | 2 hr Invited |
| 12. | Lecture 7 —Cell shape | 2hr CH |
| 13. | Lecture 8 —Organ size-cell size | 2hr MW |
| 14. | Lecture 9 —Organ size-cell growth cycle | 2 hr MW |
| 15. | Lecture 10 —Organ size- cell proliferation | 2hr MW |
| 16. | Lecture 11 —Tissue pattern 1 | 2hr MW |
| 17. | Field trip | 2 hr |
| 18. | Lecture 12 —Tissue pattern 2 | 2hr MW |
| 19. | Lecture 13 —Tissue pattern 3 | 2hr MW |
| 20. | Field trip presentation | 2 hr CH, MW |
| 21. | Tutorial 2 – Final report writing | 2 hr CH, MW |
| | | Total Lectures: 26hr Tutorial/Presentation: 6 hr Practical: 10 hr |
| | Total hours: | 42 hr |

REFERENCES BOOKS:

MODE OF ASSESSMENT: participation (10%), group presentation (20%), group lab report (20%), field trip presentation (20%), final report (30%)

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