ADVANCED FLUORESCENCE MICROSCOPY
BIOL 8250

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Course aim
• Learn fundamental knowledge and practical application of modern advanced fluorescence microscopy
• Understand diverse types of newly-developed microscopy techniques
• Understanding how the image content is related to three-dimensional (3D) and multi-D subjects

Instructional strategies
• Journal club
• Active learning and discussion.

Student learning activities
• Comparing different kinds of microscopy and pointing out the practical application
• Understanding the fundamental features of each microscopy and knowing how to select for different research projects
• Evaluating optical system performance for conventional (2-D) and confocal (3-D) microscopes
• Organizing scientific context for posing research questions

Procedures for evaluating student performance
• Quizzes and oral presentations

Schedule
1. Introduction

2. Fluorescence Microscopy

3. Fluorescent Proteins

4. Fluorescence Recovery After Photobleaching

5. Foster Resonance Energy Transfer

6. Laser Scanning Confocal Microscopy

7. Spinning Disk Microscopy

8. Total Internal Reflection Fluorescence Microscopy
9. **Light Sheet Microscopy**

10. **Multiphoton Microscopy**

11. **Polarized light microscopy**

12. **Structured Illumination Microscopy**

13. **STORM/PALM super-resolution microscopy**

14. **STED super-resolution Microscopy**

15. **SPEED microscopy and 2D to 3D conversion algorithms**

16. **Live-Cell Imaging**