[A-3]COURSE SYLLABUS

1. Course Description (Approximately 100 words)

This course covers the basic optical principles, techniques and instruments used in biomedical research and clinical medicine. It includes in-depth coverage of optical imaging and spectroscopy systems for biomedical research and clinical diagnosis, details of light interaction with tissue, and advanced optical therapeutic instruments as well as optical reporter development. The objective of this course is to learn about the emerging field of biophotonics which deals with the application of optics based technologies for life science applications such as biosensing, imaging and cell manipulation. This course is intended for advanced graduate students in optical sciences or engineering with a suitable background in optics and imaging.

2. Course Goals and Objectives (Approximately 100 words)

Expected Learning Outcomes:
Upon completion of this course students will be able to:
1. Understand working principles and key performance specifications of biomedical optical instruments,
2. Identify biomedical applications, specify the performance requirements, and find adequate optics solutions.

Course Objectives:
During this course students will:
1. Review geometrical optics, wave optics, digital imaging concepts relevant to biomedical applications,
2. Learn optical imaging technologies used in life science research,
3. Learn optical imaging technologies used in medical applications

3. Textbook (Title, Author, Publisher, Year of Publication, etc.)

1. Bahaa Saleh and Malvin Teich, Fundamentals of Photonics, Wiley & Sons (1991).

2. Paras N. Prasad, Introduction to Biophotonics, Wiley & Sons (2003).

4. Reference

Bahaa Saleh and Malvin Teich, Fundamentals of Photonics, Wiley & Sons (1991).

5. Course Requirements and Grades

examination = 70
assignment = 10
C.A.T. = 20

Total = 100

6. Course Calendar

Week	Main Content
1	Introductory Optics
2	Light-matter interactions: Energy level picture of materials.
3	Light-matter interactions: Stimulated emission of photons.
4	Optical Imaging I: Basic imaging theory and concept of diffraction limit.
5	Optical Imaging I: Nanoparticle fluorescence.
6	Super-resolution techniques
7	C.A.T.
8	Optical Imaging II: Biomedical (Physiological Imaging).
9	Optical Imaging II: Tomographic techniques
10	Other applications: Optical biosensors
11	Other applications: Optical manipulation of biological materials.
12	Other applications: Optical manipulation of biological materials. CONTINUED
13	SUMMARY, REVISION AND ASSIGNMENTS
14	EXAMINATION