Course Code: EE-813

Title: Computational Pathology

Credit hours: (3-0)

1. Objectives. Oncology and Pathology Informatics is a developing discipline that focuses on the management and analysis of clinical and research oncology and pathology data using modern computing and communications techniques. The field includes the components of Medical Informatics and Bioinformatics that relate to clinical oncology and cancer research. The aim of this course is to provide an in-depth coverage of the advanced techniques used in this area and familiarize students with the latest research trends in the area.

2. Text Books: No specific text book will be followed. Few reference books have been mentioned at para 5 below.

3. Course Outline

Topics	Periods
Introduction to Bioinformatics, imaging informatics, clinical informatics, and public health informatics	4
Introduction to Pathology • Anatomical Pathology • General Pathology • Hematopathology • Medical Microbiology • Medical Biochemistry • Neuropathology	4
Microscopy • Digital microscopy • Digital Pathology • Remote robotic microscopy • Whole slide imaging	8
Standards in Laboratory Information Systems (LIS) and imaging systems.	2

Pathological image analysis • Color segmentation • Nuclear segmentation • Feature Extraction • Pattern recognition / classification • Synthetic images	20
CAD & Clinical Decision support systems	2
Case study Renal cell carcinoma grading / classification system	6
Total	46

4. Course Outcomes:

By the end of the course, each student will

- be able to identify anatomical / pathological features, noise and artifacts in images.
- be able to choose an appropriate image processing technique for a given dataset.
- be able to extract salient features from the images
- be able to select and apply appropriate classification methods to the extracted features
- have an appreciation of the challenges posed by the field of computational pathology, identify appropriate research areas to pursue and address these challenges.

5. Recommended Reading

- Pathology Informatics: Theory & Practice, Liron Pantanowitz, MD
- Practical Pathology Informatics, John H. Sinard MD, PhD