# CA 838 - Medical Image Analysis

I.   **BREAST IMAGING AND RELATED TECHNOLOGIES**

Fundamentals of Imaging Analysis –Digital Mammography: Fundamentals of Breast Tomosynthesis – Computer-Aided Detection and Diagnosis – Breast Imaging Modalities

II.   **IMAGE SEGMENTATION**

Pixel-Based Direct Classification Methods: Data Clustering, k-Means Clustering, Fuzzy c-Means Clustering, An Adaptive FCM Algorithm - Advanced Segmentation Methods: Estimation-Model Based Adaptive Segmentation, Image Segmentation Using Neural Networks.

III.   **IMAGE REPRESENTATION, ANALYSIS, AND CLASSIFICATION**

Feature Extraction and Representation - Feature Selection for Classification - Feature and Image Classification - Image Analysis and Classification Example: "Difficult-to-Diagnose" Mammographic Microcalcifications.

IV.   **IMAGE REGISTRATION**

Rigid-Body Transformation - Principal Axes Registration - Iterative Principal Axes Registration - Image Landmarks and Features-Based Registration - Elastic Deformation-Based Registration.

V.   **IMAGE VISUALIZATION**

Feature-Enhanced 2-D Image Display Methods - Stereo Vision and Semi-3-D Display Methods - Surface And Volume-Based 3-D Display Methods - Vr-Based Interactive Visualization.

**Text Book:**

1. (For Unit 1) Mammography and Beyond: Developing Technologies for the Detection of Breast Cancer, Sharyl J. Nass, I.Craig Henderson & Joyce C. Lashof, National Academy Press. (e-Book).

2. (For Units 2 - 5) Medical Image Analysis, Second Edition. Atam P. Dhawan, Wiley Publications, 2011.

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