CSE 4733
Digital Image Processing

COURSE TEACHER

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Course Syllabus: 3.0 Credits

- Introduction to Signal Processing, Pattern Processing, Computer Graphics, Artificial Intelligence, Human Visual System, Digital Image Representation : Acquision, Storage & Display, Sampling and Quantization, Uniform and Non-uniform Sampling Image Geometry : Perspective Transformation, Synthetic Camera Approach, Stereo Imaging, Image Transform : FFT, PFT, Sine Transformation, Cosine Transformation, Image Enhancement : Spatial and Frequency Domain, Smoothing and Sharpening, Edge Detection, Histogram : Grey Level, Binary Image, Thresh Holding, Half-toning, Image Segmentation : Mathematical Morphology, Dilation and Erosion, Opening and Closing, Image Restoration : Gradation Model, Constrain and Unconstraint Restoration, Inverse Filtering, Wieners Filtering, Image Compression : Source Coding-decoding, Channel Coding-decoding, Practical Image Processing : Electronic Formation of Images, Speed / Memory Problem, Architectures, Decompositions and Algorithms, Computer Implementations for Image Processing Task.

Note: Course Content will change based on several parameters, e.g.:

- Previous knowledge
- Need
- Pace of class performance

Course Objectives & Program Outcomes

After completion of the course, students will be able to:

- CO1. Master the basic techniques of image processing, including image enhancement, restoration, color image processing, morphological operations, filtering, compression, etc.
- CO2. Apply and implement algorithms to perform basic image processing.
- CO3. Design and develop solutions/algorithms for small to medium scale problems.
- CO4. Assess the shortcomings of the digital image processing algorithms.

Program Outcomes (BAETE/ABET)

(a) **Engineering knowledge:** Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems.

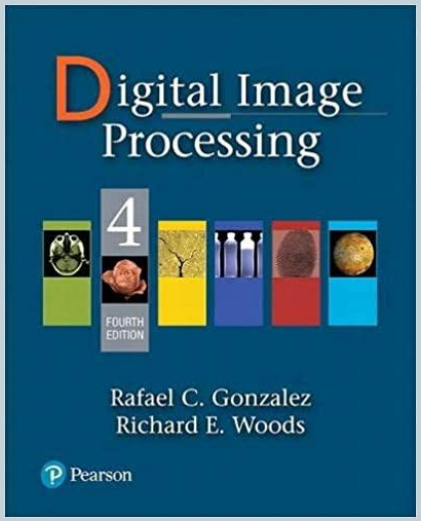
(b) **Problem analysis:** Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (K1 to K4)

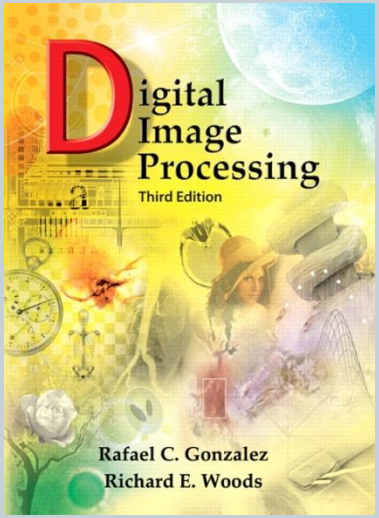
(c) **Design/development of solutions:** Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (K5)

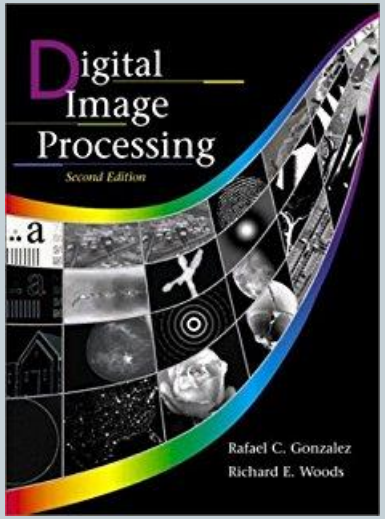
Books to Read

Text Book:

- Digital Image Processing (4^{th}/3^{rd}/2^{nd} Edition) Pearson Prentice Hall
  - R. C. Gonzalez and R.E. Woods







- Digital Image Processing Using MATLAB
  - R.C. Gonzalez *et al.*
- Digital Image Processing (Implementation Using MATLAB)
  - Ashish Jain

Course Evaluation

As per guidelines set by Academic Regulations of IUT.

- Attendance - 10%
- Quizzes (Best 3 out of 4) - 15%
- Assignments (and/or Term Project) -
- Examinations (Mid, Final) - 25%, 50%

Course Material & Announcement:

- Google Classroom Code: 2hiikrp

Lecture Mode

- Face2Face / Online if physical class is not possible.
  - Class Room 105, Third Academic Building
- Online Class platform: *Zoom*
  - https://bdren.zoom.us/j/7115003635
- Attendance through Google form (online).
  - Randomly open only once during the class.

Let's begin……