NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	**M-TECH VLSI**		
Course Title	**DIGITAL IMAGE PROCESSING**		
Course Code	**EC615**	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**ECPC10** **Signals and Systems**	**ECPC15** **Digital Signal Processing**	
Session	**January 2019**	**Section (if, applicable)**	**NA**
Name of Faculty	**B.NAGA SIVA PRASAD**	**Department**	**ECE**
Official Email	**naga@nitt.edu**	**Telephone No.**	**6301079936**
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		**Telephone No.**	
Course Type (please tick appropriately)	☐ **Core course**	☑ **Elective course**	

Syllabus (approved in BoS)

Elements of Visual perception. Image sensing and Acquisition. Imaging in different bands. Digital Image Representation. Relationship between pixels. Image transformations: 2D-DFT, DCT, DST, Hadamard, Walsh, Hotelling transformation, 2D-Wavelet transformation, Wavelet packets.

Image Enhancements in spatial domain and Frequency domain. Image Restoration techniques. Color Image processing.

Error free compression: Variable length coding, LZW, Bit-plane coding, Lossless predictive coding Lossy compression: Lossy predictive coding, transform coding, wavelet coding. Image compression standards (CCITT, JPEG, JPEG 2000) and Video compression standards.

Summary of morphological operations in Binary and Gray Images. Image segmentation: Point, Line and Edge segmentation. Edge linking and Boundary detection. Segmentation using thresholding, Region based segmentation. Segmentation by morphological watersheds. Use of motion in segmentation.

Feature Extraction from the Image: Boundary descriptors, Regional descriptors, Relational descriptors. Dimensionality reduction techniques, Discriminative approach and the Probabilistic approach for image pattern recognition.

Text Books

1. R. C.Gonzalez, R.E.Woods," Digital Image processing", Pearson edition, Inc3/e, 2008.
2. A.K.Jain," Fundamentals of Digital Image Processing", PHI,1995

Reference Books

1. J.C. Russ," The Image Processing Handbook", (5/e), CRC, 2006
2. R.C.Gonzalez& R.E. Woods; "Digital Image Processing with MATLAB", Prentice Hall, 2003
3. E.S.Gopi, "Digital Image processing using Matlab", Scitech publications, 2005
4. Recent literature in Digital Image Processing.

COURSE OBJECTIVES

To explore various techniques involved in digital image processing

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. understand the need for image transforms different types of image transforms and their properties.	1,2
2. develop any image processing application.	1,2,3
3. understand the rapid advances in Machine vision	1,3
4. learn different techniques employed for the enhancement of images.	1,3,4
5. learn different causes for image degradation and overview of image restoration techniques.	1,2,3,4
6. understand the need for image compression and to learn the spatial and frequency domain techniques of image compression.	1,2,4
7. learn different feature extraction techniques for image analysis and recognition.	1,4

COURSE PLAN – PART II

COURSE OVERVIEW

After finishing the course, the students can be able to :

1. Analyze various Imagetransformations.
2. Different enhancement techniques both in spatial and frequency domains.
3. Data compression standards and coding.
4. Feature extaraction from images
5. Segmentation operations on images
6. Morphological operations on binary and gray level images
7. Overview on colour imaging

COURSE TEACHING AND LEARNING ACTIVITIES			(Add more rows)
S.No.	**Week/Contact Hours**	Topic	**Mode of Delivery**
1	Jan _week-2 3 contact hours	Elements of Visual perception. Image sensing and Acquisition. Imaging in different bands. Digital Image Representation.	Lecture, C&T/PPT or any suitable mode
2	Jan _week-3 3 contact hours	Relationship between pixels. Image transformations:	Lecture, C&T/PPT or any suitable mode
3	Jan _week-4 3 contact hours	2D-DFT, DCT, DST, Hadamard, Walsh, Hotelling transformation, 2D-Wavelet transformation, Wavelet packets.	Lecture, C&T/PPT or any suitable mode
4	Feb_week-1 3 contact hours	Image Enhancements in spatial domain Image Enhancements Frequency domain.	Lecture, C&T/PPT or any suitable mode
5	Feb_week-2 3 contact hours	Image Restoration techniques Color Image processing. Assessment-1	Lecture, C&T/PPT or any suitable mode
6	Feb_week-3 3 contact hours	Error free compression: Variable length coding, LZW, Bit-plane coding,	Lecture, C&T/PPT or any suitable mode
7	Feb_week-4 3 contact hours	Lossless predictive coding Lossy compression: Lossy predictive coding, transform coding,	Lecture, C&T/PPT or any suitable mode
8	Mar_week-1 3 contact hours	wavelet coding. Image compression standards (CCITT, JPEG, JPEG 2000) and Video compression standards.	Lecture, C&T/PPT or any suitable mode
9	Mar_week-2 3 contact hours	Summary of morphological operations in Binary and Gray Images.	Lecture, C&T/PPT or any suitable mode
10	Mar_week-3 3 contact hours	Image segmentation: Point, Line and Edge segmentation. Edge linking and Boundary detection.	Lecture, C&T/PPT or any suitable mode

11	Mar_week-4 3 contact hours	Segmentation using thresholding, Region based segmentation. Segmentation by morphological watersheds. **Assessment-2**	Lecture, C&T/PPT or any suitable mode
12	Apr_week-1 3 contact hours	Use of motion in segmentation. Feature Extraction from the Image: Boundary descriptors, Regional descriptors, Relational descriptors.	Lecture, C&T/PPT or any suitable mode
13	Apr_week-2 3 contact hours	Dimensionality reduction techniques, Discriminative approach and the Probabilistic approach for image pattern recognition. **Compensation assessment**	Lecture, C&T/PPT or any suitable mode

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	**Assessment-1**	Feb_week-2	60 min	15
2	**Assessment-2**	Mar_week-4	60 min	15
3	Assignments/seminars	NA		10
4	Project/paper publication	Apr_week-1		10
CPA	Compensation Assessment*	Apr_week-2	60 min	
5	Final Assessment *	Apr_week-4	180 min	50

***mandatory; refer to guidelines on page 4**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

1. Feed back from students during class committee meetings.
2. Anonymous feedback through questionnaire.

COURSE POLICY (including compensation assessment to be specified)

1. All the students are advised to check their NITT WEBMAIL/group mail/suggested by the course faculty, class representative regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information regarding this course) will be done through them only.
2. Queries (if required) to the course teacher shall only be emailed to the email id specified by the teacher.

3. Valid reasons for student's absence in eitherbor both of the assessments would be taken for consideration of compensation assessment.
4. Improvement in marks will not be considered a criterion for compensation assessment.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

FOR APPROVAL

Course Faculty _____ **CC- Chairperson** _____ **HOD** _____