



**VELTECH MULTI TECH Dr. RANGARAJAN
Dr. SAKUNTHALA ENGINEERING COLLEGE**

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Tamilnadu & Affiliated to Anna University



**SYLLABUS
WEEKLY SCHEDULE**

SEMESTER VII

2013- 2014

DEPARTMENT OF BME

IV YEAR COURSE

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BM2406 DIGITAL IMAGE PROCESSING LAB**WEEK 1:** 1. Display of Grayscale Images.**WEEK 2:** 2. Histogram Equalization.**WEEK 3:** 3. Non-linear Filtering.**WEEK 4:** 4. Edge detection using Operators.**WEEK 5: CYCLE TEST I****WEEK 6:** 5. 2-D DFT and DCT.**WEEK 7:** 6. Filtering in frequency domain.**WEEK 8:** 7. Display of color images.**WEEK 9:** 8. Conversion between color spaces.**WEEK 10: CYCLE TEST II****WEEK 11:** 9. DWT of images.**WEEK 12:** 10. Segmentation using watershed transform.**WEEK 13: REVISION****WEEK 14: ICD CLASSES****WEEK 15: CYCLE TEST II****REFERENCE:**

1. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,'
 Digital Image Processing
 using MATLAB', Pearson Education, Inc., 2004.

LIST OF EQUIPMENTS:

Computer, Software MATLAB

CONTENTS

S.NO	SUB. CODE	SUBJECT
1	BM2401	Pattern recognition and neural networks
2	BM2402	Medical informatics
3	BM2403	Medical optics
4	BM2404	Digital image processing
5	EC2352	Computer networks
6	BM2038	Nano electronics
PRACTICAL		
7	BM2405	Hospital training
8	BM2406	Digital image processing

**VELTECH MULTITECH Dr.RANGARAJAN
Dr.SAKUNTHALA ENGG. COLLEGE
DEPARTMENT OF BIOMEDICAL ENGINEERING**

WEEKLY SCHEDULE

**SEM : VII YEAR : IV
ACADEMIC YEAR: 2013– 2014**

Sl.No	WEEKS	DATE	
		FROM	TO
1	WEEK1	24.06.2013	28.06.2013
2	WEEK2	01.07.2013	05.07.2013
3	WEEK3	08.07.2013	12.07.2013
4	WEEK4	15.07.2013	19.07.2013
5	WEEK5	22.07.2013	26.07.2013
6	WEEK6	30.07.2013	02.08.2013
7	WEEK7	05.08.2013	08.08.2013
8	WEEK8	12.08.2013	16.08.2013
9	WEEK9	12.08.2013	16.08.2013
10	WEEK10	19.08.2013	23.08.2013
11	WEEK11	26.08.2013	30.08.2013
12	WEEK12	02.09.2013	06.09.2013
13	WEEK13	09.09.2013	13.09.2013
14	WEEK14	16.09.2013	21.09.2013
15	WEEK15	23.09.2013	28.09.2013
16	WEEK16	30.09.2013	06.10.2013
17	WEEK17	07.10.2013	12.10.2013

WEEK 12: Protocol (TCP) – Congestion Control – Quality of services (QoS) – Techniques to improve QoS.

UNIT V APPLICATION LAYER

WEEK 13: Domain Name System (DNS) – E-mail – FTP – WWW – HTTP – Multimedia Network Security: Cryptography – Symmetric key and Public Key algorithms - Digital signature –Management of Public keys – Communication Security – Authentication Protocols.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST II

TEXT BOOKS:

1. Behrouz A. Foruzan, “Data communication and Networking”, Tata McGraw-Hill,: Unit I – IV, 2006.
2. Andrew S. Tannenbaum, “Computer Networks”, Pearson Education, Fourth Edition, : Unit V, 2003.

REFERENCES:

1. Wayne Tomasi, “Introduction to Data Communication and Networking”, 1/e, Pearson Education.
2. James .F. Kurouse & W. Rouse, “Computer Networking: A Topdown Approach Featuring”,3/e, Pearson Education.
3. C.Sivaram Murthy, B.S.Manoj, “Ad hoc Wireless Networks – Architecture and Protocols”, Second Edition, Pearson Education.

EC2352 COMPUTER NETWORKS

UNIT I PHYSICAL LAYER

WEEK 1: Data Communications – Networks - Networks models – OSI model – Layers in OSI model –

WEEK 2: TCP / IP protocol suite – Addressing – Guided and Unguided Transmission media switching:

WEEK 3: Circuit switched networks – Data gram Networks – Virtual circuit networks Cable networks for Data transmission: Dialup modems – DSL – Cable TV – Cable TV for Data transfer.

UNIT II DATA LINK LAYER

WEEK 4: Data link control: Framing – Flow and error control –Protocols for Noiseless and Noisy Channels – HDLC

Multiple access: Random access – Controlled access

WEEK 5: CYCLE TEST I

WEEK 6: Wired LANS: Ethernet – IEEE standards – standard Ethernet changes in the standard– Fast Ethernet – Gigabit Ethernet. Wireless LANS: IEEE 802.11– Bluetooth. Connecting LANS: Connecting devices - Backbone networks - Virtual LAN Virtual circuit networks: Architecture and Layers of Frame Relay and ATM.

UNIT III NETWORK LAYER

WEEK 7: Logical addressing: IPv4, IPv6 addresses Internet Protocol: Internetworking –

WEEK 8: IPv4, IPv6 - Address mapping – ARP, RARP,BOOTP, DHCP, ICMP, IGMP, Delivery - Forwarding - Routing – Unicast, Multicasting protocols.

UNIT IV TRANSPORT LAYER

WEEK 9: Process-to-Process delivery - User Datagram Protocol (UDP) – Transmission Control

WEEK 10: CYCLE TEST II

TEST SCHEDULE

CYCLE TEST - I

Sl. NO	DATE	SUB.CODE	SUBJECT
1	30.07.2013	BM2401	Pattern Recognition and Neural Networks
2	31.07.2013	BM2402	Medical Informatics
3	01.08.2013	BM2403	Medical Optics
4	02.08.2013	BM2404	Digital Image Processing
5	05.08.2013	EC2352	Computer networks
6	06.08.2013	EC2038	Nano Electronics

CYCLE TEST II

Sl. NO	DATE	SUB. CODE	SUBJECT
1	16.09.2013	BM2401	Pattern Recognition and Neural Networks
2	17.09.2013	BM2402	Medical Informatics
3	18.09.2013	BM2403	Medical Optics
4	19.09.2013	BM2404	Digital Image Processing
5	20.09.2013	EC2352	Computer networks
6	21.09.2013	EC2038	Nano Electronics

– block truncation coding schemes – facet modeling.
Image

WEEK 13: segmentation – detection of discontinuities – edge linking and boundary detection thresholding – region based segmentation – segmentation by morphological watersheds – use of motion in segmentation.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

TEXT BOOK:

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing" Pearson education, 2007.

2. Anil K. Jain, "Fundamentals of Digital Image Processing", PHI, 1997

REFERENCES:

1. William K. Pratt, "Digital Image Processing", John Wiley, NJ, 1987.

2. Sid Ahmed M. A., "Image Processing Theory, Algorithm and Architectures", McGraw Hill, 1995

3. Scott E. C. Umbaugh, "Computer Vision and Image Processing", Prentice Hall, Eaglewood Cliffs, NJ, 1998.

BM2404 DIGITAL IMAGE PROCESSING

WEEK 1: Elements of digital image processing systems - Elements of visual perception

WEEK 2: image Sampling and quantization – basic relationships between pixels

WEEK 3: matrix and singular value representation of discrete images.

UNIT II IMAGE TRANSFORMS

WEEK 4: 1-D DFT - 2-D DFT – DCT – DST – Walsh Hadamard –

WEEK 5: CYCLE TEST I

WEEK 6: Haar – Slant – KL – SVD and their properties.

UNIT III IMAGE ENHANCEMENT

WEEK 7: Gray level transformation – Histogram processing – enhancement using arithmetic/logic operation –

WEEK 8: spatial filtering – smoothing and sharpening spatial filter – smoothing infrequency domain filter – homomorphic filtering

UNIT IV IMAGE RESTORATION AND RECOGNITION

WEEK 9: Image degradation models – unconstrained and constrained restoration – inverse filtering

WEEK 10: CYCLE TEST II

WEEK 11: LMS filter – geometric mean filter – geometric transformation – pattern classes– optimal statistical classifier – neural networks and its uses in image processing.

UNIT V IMAGE COMPRESSION

WEEK 12: Image compression models – elements of information theory – error free compression –lossy compression – run-length – Huffman coding – shift codes – arithmetic coding – bit plane coding –

transform coding – JPEG standards – MPEG standards - wavelet transform predictive techniques

MODEL EXAM

Sl. NO	DATE	SUB. CODE	SUBJECT
1	21.10.2013	BM2401	Pattern Recognition and Neural Networks
2	22.10.2013	BM2402	Medical Informatics
3	23.10.2013	BM2403	Medical Optics
4	24.10.2013	BM2404	Digital Image Processing
5	25.10.2013	EC2352	Computer networks
6	26.10.2013	EC2038	Nano Electronics

BM2401 PATTERN RECOGNITION AND NEURAL NETWORKS

UNIT I INTRODUCTION AND SIMPLE NEURAL NET

WEEK 1: Elementary neurophysiology and biological neural network-Artificial neural network

WEEK 2: Architecture, biases and thresholds,

WEEK 3: Hebb net, Perceptron, Adaline and Madaline.

UNIT II BACK PROPOGATION AND ASSOCIATIVE MEMORY

WEEK 4: Back propagation network, generalized delta rule, **WEEK 5: CYCLE TEST I**

WEEK 6: Bidirectional Associative memory, Hopfield network

UNIT III NEURAL NETWORKS BASED ON COMPETITION

WEEK 8: Kohonen Self organizing map Learning Vector Quantisation, counter propagation network.

UNIT IV UNSUPERVISED LEARNING AND CLUSTERING ANALYSIS

WEEK 9: Patterns and features, training and learning in pattern recognition, discriminant functions, different types of pattern recognition.

WEEK 10: CYCLE TEST II

WEEK 11: Unsupervised learning- hierarchical clustering, partitional clustering. Neural pattern recognition approach – perceptron model

UNIT V SUPERVISED LEARNING USING PARAMETRIC AND NON PARAMETRIC APPROACH

WEEK 12: Bayesian classifier, non parametric density estimation, histograms, kernels, window estimators,

WEEK 13: k-nearest neighbor classifier, estimation of error rates.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

TEXT BOOKS:

1. Tuan Vo Dirh, “Biomedical photonics – Handbook”, CRC Press, Boca Raton, 2003.

2. Mark E. Brezinski., Optical Coherence Tomography: Principles and Applications, Academic Press, 2006.

REFERENCES:

1. Leon Goldman, M.D., & R. James Rockwell, Jr., “Lasers in Medicine”, Gordon and Breach, Science Publishers Inc., New York, 1971.

2. R. Splinter and B.A Hooper, An Introduction to BioMedical Optics, Taylor and Francis, 2007.

BM2403 MEDICAL OPTICS

UNIT I OPTICAL PROPERTIES OF THE TISSUES

WEEK 1: Refraction, Scattering, absorption, light transport inside the tissue,

WEEK 2: tissue properties, Light interaction with tissues, optothermal interaction,

WEEK 3: fluorescence speckles.

UNIT II INSTRUMENTATION IN PHOTONICS

WEEK 4: Instrumentation for absorption, scattering and emission measurements, excitation light sources – high pressure arc lamp, solid state LEDs,

WEEK 5: CYCLE TEST I

WEEK 6: Lasers, optical filters, polarizer, solid state detectors, time resolved and phase resolved detectors.

UNIT III APPLICATIONS OF LASERS

WEEK 7: Laser in tissue welding, lasers in dermatology,

WEEK 8: lasers in ophthalmology, otolaryngology, urology.

UNIT IV OPTICAL TOMOGRAPHY

WEEK 9: Optical coherence tomography, Elastography,

WEEK 10: CYCLE TEST II

WEEK 11: Doppler optical coherence tomography, Application towards clinical imaging.

UNIT V SPECIAL OPTICAL TECHNIQUES

WEEK 12: Near field imaging of biological structures, in vitro clinical diagnostic,

WEEK 13: fluorescent spectroscopy, photodynamic therapy.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

WEEK 16: CYCLE TEST III

TEXT BOOKS:

1. Hagan, Demuth and Beale, "Neural network design", Vikas Publishing
2. House Pvt. Ltd., New Delhi , 2002
3. Freeman J.A., and Skapura B.M, " Neural networks, algorithms, applications and programming techniques", Addison – Wesley,2003
4. Duda R.O, Hart P.G, "Pattern classification and scene analysis", Wiley Edition,2000
5. Earl Gose, Richard Johnsonbaugh, Steve Jost, "Pattern Recognition and Image Analysis", Prentice Hall of India Pvt. Ltd., New Delhi, 1999.

REFERENCES:

1. Robert Schalkoff, " Pattern recognition, Statistical, Structural and neural approaches" John Wiley and Sons(Asia) Pte. Ltd., Singapore, 2005
2. Laurene Fausett , " Fundamentals of neural networks – Architectures, algorithms and applications", Prentice Hall, 1994

BM2402 MEDICAL INFORMATICS

UNIT I MEDICAL INFORMATICS

WEEK 1: Introduction - Structure of Medical Informatics
Internet and Medicine -Security issues,

WEEK 2: Computer based medical information retrieval,
Hospital management and information system,

WEEK 3: Functional capabilities of a computerized HIS,
e-health services, Health Informatics – Medical
Informatics, Bioinformatics

UNIT II COMPUTERISED PATIENT RECORD

WEEK 4: Introduction - History taking by computer,
Dialogue with the computer, Components and
Functionality of CPR,

WEEK 5: CYCLE TEST I

WEEK 6: Development tools, Intranet, CPR in Radiology-
Application server provider, Clinical information system,
computerized prescriptions for patients.

UNIT III COMPUTERS IN CLINICAL LABORATORY AND MEDICAL IMAGING

WEEK 7: Automated clinical laboratories-Automated
methods in hematology, cytology and histology, Intelligent
Laboratory Information System - Computerized ECG,
EEG and EMG,

WEEK 8: Computer assisted medical imaging- nuclear
medicine, ultrasound imaging ultrasonography-computed
X-ray tomography, Radiation therapy and planning,
Nuclear Magnetic Resonance

UNIT IV COMPUTER ASSISTED MEDICAL DECISION- MAKING

WEEK 9: Neuro computers and Artificial Neural Networks
application, Expert system - General model of CMD,

WEEK 10: CYCLE TEST II

WEEK 11: Computer –assisted decision support
system-production rule systemcognitivemodel,
semester networks, decisions analysis in clinical
medicine-computers

in the care of critically patients-computer assisted
surgery-designing

UNIT V RECENT TRENDS IN MEDICAL INFORMATICS

WEEK 12: Virtual reality applications in medicine,
Computer assisted surgery, Surgical simulation,
Telemedicine - Tele surgery computer aids for the
handicapped,

WEEK 13: computer assisted instrumentation in
Medical Informatics - Computer assisted patient
education and health

Medical education and health care information.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

TEXT BOOKS:

1. 1.R.D.Lele Computers in medicine progress in
medical informatics, Tata Mcgraw Hill
Publishing computers Ltd,2005, New Delhi.
2. Mohan Bansal, Medicl informatics Tata Mcgraw Hill
Publishing computers Ltd,
2003 New Delhi.

EC2038 NANO ELECTRONICS

UNIT I INTRODUCTION TO NANOTECHNOLOGY

WEEK 1: Background to nanotechnology: Types of Nanotechnology and nanomachines – periodic table – atomic structure – molecules and phases – energy – molecular and atomic size – surface and dimensional space – top down and bottom up,

WEEK 2: Molecular Nanotechnology: Electron microscope – scanning electron microscope – atomic force microscope – scanning tunnelling microscope – nanomanipulator – nanotweezers

WEEK 3: Nanomaterials: preparation

UNIT II FUNDAMENTALS OF NANOELECTRONICS

WEEK 4: Fundamentals of logic devices:- Requirements – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices – coulomb blockade devices – spintronics

WEEK 5: Computing, measurement of performance processing

WEEK 6: CYCLE TEST I

UNIT III SILICON MOSFETS & QUANTUM TRANSPORT DEVICES

WEEK 7: Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices- scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions & contacts – advanced MOSFET concepts.

WEEK 8: Quantum transport devices based on resonant tunneling

UNIT IV CARBON NANOTUBES

WEEK 9: Carbon Nanotube: Fullerenes - types of nanotubes – formation of nanotubes –

WEEK 10: CYCLE TEST II

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WEEK 11: purification of carbon nanotubes – electronic properties – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications – prospects of an all carbon nanotube nanoelectronics.

UNIT V MOLECULAR ELECTRONICS

WEEK 12: Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design

WEEK 13: fabrication; Future applications: MEMS – robots – random access memory – mass storage devices

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

TEXT BOOKS:

1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002
2. T. Pradeep, NANO: The Essentials – Understanding Nanoscience and Nanotechnology, TMH, 2007
3. Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Wiley-VCH, 2003