VEL TECH MULTI TECH
Dr RANGARAJAN Dr.SAKUNTHALA ENGINEERING COLLEGE

(An ISO 9001: 2008 Certified Institution)
(Owned by 'VEL Shree R. Rangarajan
Dr. Sakunthala Rangarajan Educational Academy)
(Approved by AICTE, New Delhi &
Govt. of Tamil Nadu and affiliated to Anna University)

SYLLABUS

WEEKLY SCHEDULE

VI SEMESTER 2014 - 2015

DEPARTMENT OF BIO MEDICAL

IV DEGREE COURSE

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SEM : VI YEAR : III

ACADEMIC YEAR: 2015

Sl.No	WEEKS	DATE	
		FROM	TO
1	WEEK1	02.01.15	09.01.15
2	WEEK2	12.01.15	16.01.15
3	WEEK3	19.01.15	23.01.15
4	WEEK4	27.01.15	30.01.15
5	WEEK5	02.02.15	06.02.15
6	WEEK6	09.02.15	13.02.15
7	WEEK7	16.02.15	20.02.15
8	WEEK8	23.02.15	27.02.15
9	WEEK9	02.03.15	06.03.15
10	WEEK10	09.03.15	13.03.15
11	WEEK11	16.03.15	20.03.15
12	WEEK12	23.03.15	27.03.15
13	WEEK13	30.03.15	01.04.15
14	WEEK14	06.04.15	10.04.15
15	WEEK 15	13.04.15	17.04.15
16	WEEK16	20.04.15	24.04.15
17	WEEK17	27.04.15	30.04.15

CONTENTS

TEST SCHEDULE

SL.NO	SUBJECT CODE	SUBJECT NAME	UNIT TEST I	UNIT TEST II	UNIT TEST III	UNIT TEST IV	UNIT TEST V
1	BM2351	Radiological Equipments	22.01.15 FN	11.02.15 FN	03.03.15 FN	23.03.15 FN	13.04.15 FN
2	BM2352	Biomechanics	22.01.15 AN	11.02.15 AN	03.03.15 AN	23.03.15 AN	13.04.15 AN
3	BM2353	Diagnostic and Therapeutic Equipments II	23.01.15 FN	12.02.15 FN	04.03.15 FN	24.03.15 FN	15.04.15 FN
4	CS2361	Internet and Java	23.01.15 AN	12.02.15 AN	04.03.15 AN	24.03.15 AN	15.04.15 AN
5	BM2022	Biometric System	24.01.15 FN	13.02.15 FN	05.03.15 FN	25.03.15 FN	16.04.15 FN
6	GE2071	Intellectual Property Rights	24.01.15 AN	13.02.15 AN	05.03.15 AN	25.03.15 AN	16.04.15 AN

MODEL THEORY

Sl. NO	DATE	SUB.CODE	SUBJECT
1	20.04.2015	BM2351	Radiological Equipments
2	21.04.2015	BM2352	Biomechanics
3	22.04.2015	BM2353	Diagnostic and Therapeutic Equipments II
4	23.04.2015	CS2361	Internet and Java
5	24.04.2015	BM2022	Biometric System
6	27.04.2015	GE2071	Intellectual Property Rights

BM2351 RADIOLOGICAL EQUIPMENT

UNIT I MEDICAL X-RAY EQUIPMENT

WEEK 1:
Nature of X-Rays - X-ray Absorption - Tissue Contrast. X-Ray Equipment (Block Diagram) – X-ray Tube, the collimator, Bucky Grid,

WEEK 2:
Power supply. Digital Radiography - discrete digital detectors, storage phosphor and film Scanning. X-Ray Image intensifier tubes Fluoroscopy – Digital Fluoroscopy.

WEEK 3:
Angiography, Cine angiography. Digital Subtraction Angiography. Mammography.

UNIT II COMPUTER TOMOGRAPHY

WEEK 4: UNIT TEST-1
Principles of Tomography - First to Fourth generation scanners – Image reconstruction technique- Back projection and Iterative method.

WEEK 5:
Spiral CT Scanning - Ultra fast CT Scanners- X-Ray Sources – Collimation – X-Ray Detectors – Viewing System.

UNIT III MAGNETIC RESONANCE IMAGING

WEEK 6:
Fundamentals of Magnetic Resonance- Interaction of nuclei with static Magnetic Field and Radio frequency wave –

WEEK 7: UNIT TEST-2
Rotation and Precession –induction of a magnetic resonance signal – bulk Magnetization

WEEK 8:
Relaxation Processes T1 and T2. Block diagram approach of MRI system- System Magnet (Permanent, Electromagnet and uper conductors) , generation of Gradient magnetic Fields , Radio Frequency coils (sending and receiving) Shim coils, Electronic components.

UNIT IV NUCLEAR MEDICINE SYSTEMS

WEEK 9: UNIT TEST-3
Radio isotopes- alpha, beta and gamma radiations. Radio pharmaceuticals. Radiation detectors -
.
WEEK 10:
Gas Filled, ionization Chambers, proportional counter, GM counter and Scintillation Detectors

WEEK 11:
Gamma Camera- Principle of operation, Collimator, Photo multiplier tube, X-Y Positioning Circuit, Pulse height Analyzer. Principles of SPECT and PET.

WEEK 12: UNIT TEST-4
UNIT V RADIATION THERAPY AND RADIATION SAFETY

WEEK 12:
Radiation therapy-Linear accelerator, betatron, cesium and cobalt. Radiation Protection in Medicine –Radiation Protection principles, Radiation measuring instruments- Dosimeter

WEEK 13:

Film Badges, Thermo luminescent dosimeters – Electronic dosimeter-ICRP regulation Practical reduction of dose to staff and visitors.

WEEK 14: UNIT TEST-5 REVISION FOR FIVE UNITS

WEEK 15: MODEL THEORY

WEEK 16: MODEL PRACTICAL EXAMS

TEXT BOOKS

1. Steve webb, Physics of Medical Imaging, , Taylor and Francis, 1988.
2. R. Hendee and Russell Ritenour "Medical Imaging Physics"– William,Wiley, Fourth Edition 2002.

REFERENCES

1. Physics and Radiobiology of Nuclear Medicine –Third edition – Gopal B.Saha – Publisher – Springer, 2006.
2. Medical Physics and Biomedical Engineering –B.H Brown , PV Lawford, R H Small wood , D R Hose , D C Barber , CRC Press, 1999.

BM2352 BIOMECHANICS

UNIT I INTRODUCTION

WEEK 1:

Scope of mechanics in medicine, mechanics of bone structure, determination of in-vivo

WEEK 2

Elastic modulus. Biofluid mechanics, flow properties of blood.

UNIT II MECHANICS OF PHYSIOLOGICAL SYSTEMS

WEEK 3: UNIT TEST-1

Heart valves, power developed by the heart, prosthetic valves.

WEEK 4:

Constitutive equations forsoft tissues, dynamics of fluid flow in cardiovascular system and effect of vibration –

WEEK 5:
Shear stresses in extra-corporal circuits.

UNIT III ORTHOPAEDIC MECHANICS

WEEK 6:
Mechanical properties of cartilage,.

WEEK 7: UNIT TEST-2

WEEK 7:
Diffusion properties of articular cartilage,

WEEK 8:
Mechanical properties of bone, kinetics and kinematics of joints, Lubrication of joints

UNIT IV MATHEMATICAL MODELS

WEEK 9: UNIT TEST-3
Introduction to Finite Element Analysis, Mathematical models –

WEEK 10:
Pulse wave velocities in arteries,

WEEK 11:
Determination of in-vivo elasticity of blood vessel, dynamics of fluid filled catheters.

WEEK 12: UNIT TEST-4

UNIT V ORTHOPAEDIC APPLICATIONS 9

WEEK 13:
Dynamics and analysis of human locomotion – Gait analysis (determination of instantaneous joint reaction analysis),

WEEK 14:
Occupant response to vehicular vibration. Mechanics of knee joint during standing and walking.

WEEK 15: UNIT TEST-5

WEEK 16: MODEL THEORY

TEXT BOOKS

1. Dhanjoo N. Ghista, "Bio-mechanics of Medical Devices", Marcel Dekker, 1980.
2. Haufred Clynes, "Bio-medical Engineering Systems", McGraw Hill, 1998.

REFERENCES

1. Y.C. Fung, "Bio-Mechanics- Mechanical Properties of Tissues", Springer-Verlag, 1998.
2. Dhanjoo N. Ghista, "Orthopaedic Mechanics", Academic Press, 1990.

BM 2353 DIAGNOSTICS AND THEREPEUTIC EQUIPMENTS

UNIT I ULTRASONIC TECHNIQUE

WEEK 1:
Diagnosis: Basic principles of Echo technique, display techniques A, B and M mode,

WEEK 2:
Application of ultrasound as diagnostic tool – Echocardiogram, abdomen,

WEEK 3:

Obstetrics and gynaecology, ophthalmology.

UNIT II PATIENT MONITORING AND BIOTELEMETRY

WEEK 4: UNIT TEST-1
ICU/CCU Equipments, Infusion pumps, bed side monitors,

WEEK 5:
Central consoling controls.Radio Telemetry (single, multi), Portable and Landline

WEEK 6:
Telemetry unit, Applications in ECG and EEG Transmission.

WEEK 7: UNIT TEST-2

UNIT III DIATHERMY

WEEK 8:
IR and UV lamp and its application. Thermography – Recording and clinical application. Short wave diathermy,

WEEK 9:
Ultrasonic diathermy, Microwave diathermy, Electro surgery machine - Current waveforms, Tissue Responses, Electro surgical current level.

UNIT IV EXTRA CORPOREAL DEVICES AND SPECIAL DIAGNOSTIC TECHNIQUES

WEEK 10: UNIT TEST-3
Need for heart lung machine, functioning of bubble, disc type and membrane type oxygenerators, finger pump,
WEEK 11:
Roller pump, electronic monitoring of functional parameter. Haemo Dialyser unit, Lithotripsy, Principles of Cryogenic technique and application, Endoscopy, Laproscopy.

WEEK 12: UNIT TEST-4

UNIT V PATIENT SAFETY

WEEK 13:

Physiological effects of electricity – important susceptibility parameters – Macro shock – Micro shock hazards – Patient's electrical environment – Isolated Power system – Conductive surfaces

WEEK 14:

Electrical safety codes and standards – Basic Approaches to protection against shock, Protection equipment design, Electrical safety analyzer – Testing the Electric system

WEEK 15: UNIT TEST-5

WEEK 16: MODEL THEORY

TEXT BOOK

1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice Hall of India, New Delhi, 2007
2. John G. Webster, "Medical Instrumentation Application and Design", John Willey and sons, 2002

REFERENCES:

1. Principles of Biomedical Instrumentation and Measurement" – Richard Aston, Merril Publishing Company, 1990
2. Principles of Applied Biomedical Instrumentation L.A Geddas and L.E.Baker – 2004
3. John G. Webster, Bioinstrumentation", John Willey and sons, New York, 2004
4. Khandpur R.S, "Handbook of Biomedical Instrumentation", Tata McGraw- Hill, New Delhi, 2003.

CS2361 INTERNET AND JAVA

UNIT I WORLD WIDE WEB

WEEK 1:

HTTP protocol, Web browsers Netscape,

WEEK 2:
Internet explorer, Web site and web pagedesign,XHTML,

WEEK 3:
Dynamic HTML, CSS.

UNIT II JAVASCRIPT PROGRAMMING

WEEK 4: UNIT TEST-1
Introduction, Control statements,

WEEK 5:
Functions

WEEK 6:
Arrays and Objects.

WEEK 7: UNIT TEST-2

UNIT III

WEEK 8:
Micromedia Dream Weaver,

WEEK 9:
XML, Web Servers, Databases – SQL, MYSQL,

WEEK 10:
DBI andADO.NET

UNIT IV JAVA PROGRAMMING

WEEK 11: UNIT TEST-3
Language features, Classes, Object and methods. Sub-classing and dynamic binding,

WEEK 12:

Multithreading, Overview of class library, Object method serialization, Remote method invocation, Java Servelets and Javaserver pages.

UNIT V WEB DESIGN AND MEDICAL STANDARDS

WEEK 13: UNIT TEST-4
Web Design case studies

WEEK 14:
Design and development of Dynamic Hospital Information System Web sites using Macromedia Dreamweaver, Java, XML, Javascript, Programming Techniques. HL7 Standards, DICOM standards.

WEEK 15: UNIT TEST-5 & MODEL THEORY

WEEK 16: MODEL PRACTICAL EXAMS

TEXT BOOKS:

1. Deitel, Internet and World Wide Web, Pearson Education / PHI, 2007
2. Deitel, "Java How to Program", Pearson Education / PHI, 2006.

REFERENCES:

1. Margaret Levine Young, "Internet The Complete Reference", Tata McGraw Hill, 1999.
2. Cay S. Horstmann & Gary Cornell, Core Javatm Volume – I & II, Pearson Education, 2006.

BM 2022 BIOMETRIC SYSTEM

UNIT I BIOMETRIC FUNDAMENTALS

WEEK 1:
Key Biometric terms and Processes – Definitions-verification and identification – matching, Accuracy in Biometric Systems

WEEK 2:
False match rate - False non match rate - Failure to enroll rate – Derived metrics - An Introduction to Biometric Authentication Systems- a taxonomy of application environment,

WEEK 3:
A system model, biometrics and privacy

UNIT II FINGERPRINT IDENTIFICATION TECHNOLOGY

WEEK 4: UNIT TEST-1
History, Components, Application of Fingerprints, The Technology-Finger Scan Strengths and Weaknesses,

WEEK 5:
Criminal Applications, Civil Applications,

WEEK 6:
Commercial Applications, Technology Evaluation of Fingerprint Verification Algorithms.

WEEK 7: UNIT TEST-2

UNIT III IRIS RECOGNITION

WEEK 8:
Introduction, Anatomical and Physiological underpinnings,

WEEK 9:
Components, Sensing, Iris Scan Representation and Matching, Iris Scan Strengths and Weaknesses,

WEEK 10:
System Performance, Future Directions.

UNIT IV FACE RECOGNITION

WEEK 11: UNIT TEST-3
Introduction, components, Facial Scan Technologies, Face Detection, Face Recognition- Representation and Classification

WEEK 12:
Kernel- based Methods and 3D Models, Learning the Face Spare, Facial Scan Strengths and Weaknesses, Methods for assessing progress in Face Recognition.

UNIT V VOICE SCAN

WEEK 13: UNIT TEST-4
Introduction, Components, Features and Models, Addition Method for managing Variability, Measuring Performance Alternative Approaches,

WEEK 14:
Voice Scan Strengths and Weaknesses, NIST Speaker Recognition Evaluation Program, Biometric System Integration.

WEEK 15: UNIT TEST-5 & MODEL THEORY

WEEK 16: MODEL PRACTICAL EXAMS

TEXT BOOKS:

1. James Wayman & Anil Jain, Biometric Systems – Technology, Design and Performance Evaluation, Springer-verlag London Ltd, USA, 2005

2. Sanir Nanavati, Michael Thieme, Biometrics Identity Verification in a Networked world, Wiley Computer Publishing Ltd, New Delhi,2003.

REFERENCE:

1. John D. Woodword Jr., Biometrics, Dreamtech Press, New Delhi,2003.

GE2071 INTELLECTUAL PROPERTY RIGHTS (IPR)

UNIT I

WEEK 1:

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR

WEEK 2:

Basic types of property (i). Movable Property ii. Immovable Property and iii. Intellectual Property.

UNIT II

WEEK 3: UNIT TEST-1

IP – Patents – Copyrights and related rights

WEEK 4:

Trade Marks and rights arising from Trademark registration –

WEEK 5:

Definitions – Industrial Designs and Integrated circuits

WEEK 6:

Protection of Geographical Indications at national and International levels – Application Procedures.

WEEK 7: UNIT TEST-2

UNIT III

WEEK 8:
International convention relating to Intellectual Property Establishment of WIPO –

WEEK 9:
Mission and Activities – History –

WEEK 10:
General Agreement on Trade and Tariff (GATT).

UNIT IV

WEEK 11: UNIT TEST-3
Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO Patent Ordinance and the Bill

WEEK 12:
Draft of a national Intellectual Property Policy – Present against unfair competition.

WEEK 13: UNIT TEST-4

UNIT V
Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks –

WEEK 14:
Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

WEEK 15: UNIT TEST-5 & MODEL THEORY

WEEK 16: MODEL PRACTICAL EXAMS

TEXT BOOKS

1. Subbaram N.R. “Handbook of Indian Patent Law and Practice “, S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. ww.ipmatters.net/features/000707_gibbs.html.

BM2356 DIGITAL SIGNAL PROCESSING LAB

MATLAB / Equivalent Software Package

1. Generation of sequences (functional & random), correlation and convolution
2. Spectrum Analysis using FFT
3. Filter Design & Analysis
4. Filter Implementation in time-domain & frequency domain
5. Study of Quantization errors in DSP algorithms
6. Multirate Filters
7. Adaptive filter
8. Equalization
9. Echo Cancellation

CS2362 INTERNET AND JAVA PROGRAMMING LABORATORY

1. Programs using basic elements and design of Web pages, hyperlinks and web navigation using HTML, XHTML and CSS.
2. Java script programs using control statements, functions, arrays and objects and applications in web environment
3. Macromedia Dreamweaver platform to design and develop web pages, insert images and links into web pages, create XHTML elements to be able insert script into Dreamweaver pages and site management
4. Programs relating to relational database model, database queries using SQL, MYSQL database server and interfaces
5. Java programming using GUI components, java applet applications, servelets and java server pages.
6. Design and development of a web based dynamic Hospital Information System

BM2355 DIAGNOSTIC AND THERAPEUTIC EQUIPMENT LAB

1. Recording and analysis of ECG signals
2. Recording and analysis of EEG signals.
3. Recording - Fatigue test of EMG signals.
4. Simulation of ECG – detection of QRS complex and heart rate
5. Study of Pacemaker simulator
6. Study of Defibrillator simulator
7. Study of shortwave and ultrasonic diathermy.
8. Study of biotelemetry
9. Electrical safety measurements.
10. Mini project