

OPEN ELECTIVES

INTRODUCTION TO MEDICAL INSTRUMENTATION

Course Code: MLOE01

Credit: 3:0:0:1

Pre-requisite: Nil

Contact Hours: 42

Course Coordinator(s): Prof.P.G.Kumaravelu, Mrs. Purnima B R

Course contents:

UNIT I

Measurement Systems: Introduction to biomedical engineering, the need for bioinstrumentation, instrumentation system, system characteristics, Errors in measurements, statistics.

Basic concepts of Electronics: Electronic components and circuit analysis, Amplifiers, Filters, ADC & DAC, Digital signal processing, microcomputers, software and programming languages, display devices, recording devices.

UNIT II

Clinical Lab Instruments: Spectrophotometry, oxygen saturation, bilirubin, lactate, creatinine, urea, Amperometric Biosensors for oxygen and glucose, Flame Photometry, Mass Spectrometry, Carbon dioxide concentration measurement by infrared transmission spectroscopy, Nitrogen by emission Spectrometry, Drugs by Flurometry and Chromatography, Electrophoresis, DNA sequencing.

UNIT III

Diagnostic Instruments: Cell potential, Brain, EEG & evoked potentials, Brain imaging: X-ray, CT, MRI. Nuclear imaging: SPECT, PET, Bio-magnetism. Eye-ERG, EOG & visual field, Ears & Audiometry, Muscles.

UNIT IV

Heart & Circulation: Cardiac anatomy & physiology, Cardiac bio-potentials, Cardiac pressures, cardiac output, Radionuclide angiography, Cardiac sounds, myocardial viability, circulation, blood flow, blood pressure, vessel distension, vessel volume flow.

UNIT V

Electrical safety: Physiological effects of electricity, important susceptibility parameters, distribution of electric power, macroshock hazards, microshock hazards, electrical safety codes & standards, basic approaches to protection against shock, equipment design, electrical safety analyzers, tests of electric appliances.

Text Book/s:

1. Bioinstrumentation by John G. Webster, John & Wiley publications- 2009.
2. Medical Instrumentation – applications & Design by John G. Webster, John & Wiley publications- 2009

Reference Book:

1. Biomedical Instrumentation & Measurements, 2e, PHI/Pearson Education by Cromwell et. al.(2011)

Course outcomes (COs):

At the end of the course, students will be able to

1. Reminisce the basics of instrumentation and relate the same to medical equipments used in healthcare(PO-1,2,4,6,12, &PSO-1,2,3)
2. Explore the features involved with the generation and applications of bioelectric potentials (PO-2,3 &PSO-1)
3. Accent the working and uses of biotelemetry in hospitals(PO-1,3,5,12 &PSO-1,2,3)
4. Quote the fundamentals of instrumentation and comprehend the features of electrical safety in medical equipments(PO-2,3,5 &PSO-1,2)
5. Emphasize on the recent trends in computers and their applications in healthcare(PO-1,4,5,6,12 & PSO1,2,3)

BIOMECHANICS

Course Code: MLOE02

Credit: 3:0:0:1

Prerequisite: Nil

Contact Hours: 42

Course Coordinator(s): Dr.Sanjay H.S, Mrs. Tejaswini. S

Course contents:

UNIT I

Introduction to Biomechanics: A brief history of biomedical fluid mechanics, Fluid characteristics & viscosity, Fundamental methods to measure viscosity, Pipe flow, Bernoulli Equation, Mass conservation, Fluid statistics

UNIT II

Exercise Biomechanics: Introduction, Physics of movement, Energy cost of movement, Walking & running, Carrying loads, Sustained work

UNIT III

Application of Aerodynamics in Sports: Introduction, Lateral force on the spinning ball of a soccer kick, Analysis of soccer kick, Analysis of basketball foul throw

UNIT IV

Application of hydrodynamics in swimming: Buoyancy & flotation, Resistance & propulsion, Resistive & Propulsive forces in swimming, Swimming efficiency & speed

UNIT V

Fundamental concepts of Gait: gait cycle, Gait phases, Gait variables, Gait analysis: Observational techniques, Instrumental analysis, Video based analysis, electromagnetic & Electromyographic analysis

Textbook/s:

1. Duane Knudson, "Fundamentals of Biomechanics", 2nd edition, Springer publications, 2007

Reference Book:

2. Lee Waite, Jerry Fine, “Applied Biofluid Mechanics”, McGraw Hill publications, 2007 edition
3. Arthur T Johnson, “Biomechanics & exercise physiology”, John Wiley & Sons publications
4. Dhanjoo N Ghista, “Applied Biomedical Engineering Mechanics”, CRC Press, 2008 edition
5. Anthony Blazeovich, “Sports Biomechanics – Optimizing human performance”, A & C Black Publications, 2007 edition
6. Donald R Peterson, Joseph D Bronzino, “Biomechanics-Principles & Applications”, CRC press, 2008 edition

Course outcomes (COs):

At the end of the course, students will be able to

1. Recall the basic mechanical concepts and relate the same to human physiology (PO-,12 &PSO-1)
2. Interpret the biomechanical concepts involved with exercise physiology and its importance in healthcare(PO2,PO5,PO12,PSO2)
3. Understand and apply the basics of biomechanics to illustrate the aerodynamics in sports (PO-1,3,4 & PSO-2)
4. Correlate the biomechanical aspects of human body to evaluate the hydrodynamics in swimming(PO-1,2,5,12 &PSO-2)
5. Comprehend the basics of biomechanics and apply the same to basics of gait (PO-1,2,4,12 &PSO-1)

HOSPITAL MANAGEMENT

Course Code:MLOE03

Credit: 3:0:0:1

Prerequisite: Nil

Contact Hours: 42

Course Coordinator(s): Dr.Prabha Ravi, Mr. S J Mahendra

Course contents:

UNIT I

Introduction to Hospital Management & Administration: Introduction, definition, classification, nature and scope of a hospital, difference between a hospital and an industry, functions of a hospital, hospital ethics, leadership, challenges in hospital administration, administrative conditions in hospitals, branding emotions, succession planning, feedback in planning, branded benefits

UNIT II

Human Resource Management in Hospitals: Introduction, nature/characteristics & assumptions, fundamental principles, utilization factors, outsourcing, retention of top performers, characteristics of HR management, development & personal management, functions and importance of HR management, machines v/s human resources in hospitals, causes for poor HR management, good HR practices,

UNIT III

Man Power Planning: introduction, nature & scope of man power planning, need for man power planning, Benefits of manpower planning, objectives of manpower planning, manpower planning steps, work load ratio

Recruitment: introduction, recruitment, selection, induction, confirmation, probation & termination

UNIT IV

Organizational Development & Management by Objectives (MBO): nature & scope, goals and characteristics, phases and limitations, definition & need for MBO, establishment of objectives, appraisal interview, practice, limitations and advantages of MBO

Communication in Hospitals: Introduction, nature and scope, purpose, barriers, planning communication, effective communication, directions, styles and modes of communication

UNIT V

Counseling in Hospitals: Introduction, nature and scope, role of listening, counseling service, effective listening, types, techniques and functions of counseling

Biomedical Waste Management In Hospitals: Introduction, environmental act 1986, hazardous waste rules 1989, the municipal solid waste rules 2000, the Bio-medical waste rules 2000

Text Book/s:

1. D K Sharma & R C Goyal, Hospital Administration & Human Resource Management, PHI 5th edition (2013)
2. A V Srinivasan, Managing A Modern Hospital, SAGE publications, 2nd edition (2008)

Reference Books:

1. Robert Carroll, Risk Management for Healthcare Organizations, Wiley Publications, 2009 edition
2. Kenneth G Simone, Hospitalist recruitment & Retention, Wiley Publications, 2010 edition

Course outcomes (COs):

At the end of the course, students will be able to

1. Explain and compare the organizational elements, structure, performance, terminology, and delivery modalities for Indian. and global healthcare systems. (PO-1,6,7 &PSO-2)
2. Understand and apply resource management concepts (personnel, finance, and material resources) and the processes and strategies needed in specific hospital sectors. (PO-7,11 &PSO-2)
3. Develop innovative solutions to strategic, tactical and operational issues in managing healthcare systems and associated information technology through the combined use of information, organizational knowledge, talent management and critical thinking. (PO-5,7& PSO-2)
4. Apply modern change management and innovation management concepts to optimise structures as well as communicate effectively and develop their leadership and teambuilding abilities. (PO-9,12 &PSO-3)
5. Evaluate the ethical, legal, and regulatory requirements of the healthcare industry towards counselling in hospitals and the biomedical waste management. (PO-6,8&PSO-3)