MAT 501 PROBABILITY, RANDOM VARIABLES AND STOCHASTIC PROCESSES  [4-0-0-4]

Probability theory: Review of Set theory; introduction to probability, axioms of probability; joint and conditional probability; Bayes theorem.

Random Variables: The concept of a random variable (RV); continuous and discrete RVs; probability distribution and density functions, properties; some standard examples;
Functions of an RV, distribution and densities of functions of an RV, examples; expected value/mean and variance; moments and characteristic functions; two RVs: joint distribution and density functions; correlation, covariance, orthogonality and independence; conditional distribution and density functions.

Elements of Estimation theory: Estimation of mean and variance; Chebyshev inequality; Parameter Estimation, Properties of Estimators; Cramer-Rao bound.

Stochastic Processes: Introduction, Statistics of stochastic processes, correlation and covariance; Stationarity; Autocorrelation, Power density spectrum, and Wiener Khinchin Theorem; Linear Systems with stochastic inputs.

References:

BME 501 ANATOMY AND PHYSIOLOGY  [4-0-0-4]

PART A ANATOMY

Cell and its constituents, Basic Tissues of Body (General), Muscular Tissue (detail), Major Muscles of the Body, Nervous Tissue, Brain, Spinal Cord, Meninges, PNS, Bone Tissue - Structure, Development and Growth, Fracture healing, Bones of Appendicular and Axial Skeleton System in brief, Joints - Classification and Types, Movement at Joints, Respiratory System - Parts and Structure of Lungs, Urinary System - Kidney, Ureter, Bladder, Digestive System – Parts, Special Senses - Eye, Ear, Nose and Skin, Cardio Vascular System - Heart - Chambers, Blood supply and Nerve supply.

PART B – PHYSIOLOGY

Resting Membrane Potential and Action Potential. Synaptic Transmission EEG, Sensory System - Receptor potential, Transducer Function, Sensory

**Reference Books:**
2. Schmidt,"Text book of Human Physiology".
3. R.J.Last, "Human Anatomy".

**BME 503 BIO-INSTRUMENTATION [4-0-0-4]**


**Reference Books:**
BME 505 BIOMEDICAL SIGNAL PROCESSING [3-1-0-4]


Reference Books:

BME 507 BIO-MECHANICS & BIO-DYNAMICS [4-0-0-4]


Reference books:
3. Susan J. Hall, Basic Biomechanics.
HSS 501 Research Methodology and Technical Presentation [1 0 3 2]


References:


BME 511 INSTRUMENTATION LAB [0-0-6-2]

Study of the characteristics of Capacitive pickup transducer, Inductive pickup transducer, pressure cell, Strain sensor, RTD transducer, Linear Variable Differential Transformer (LVDT), Hall effect transducer, LDR / Phototransistor and photodiode, load cell, thermocouple, DC serve motor control, voltage to frequency converter; Realization of a Pacemaker circuit and Instrumentation amplifier.
Demonstration: Study of Electrocardiograph and determining the cardiac vector; study of Audiometer and Air conduction thresholds testing; study of Blood
Pressure meter, Defibrillator, Electrosurgical unit (ESU), Phonocardiograph and to visualize the heart sounds.
Design and implementation of circuits with biomedical applications like QRS detector, Hearing aids, Digital thermometer etc.