

**ED 504 Human Anatomy, Physiology and Biomechanics****3 0 3 4**

Introduction to systemic Anatomy, anatomicomedical terminology.  
The Skeletal System – classification of bones, structure, joints. Muscular system.  
Anatomy of thorax, abdomen, pelvis and perineum, back, lower and upper limb, head and neck. Physiology of Cardiovascular, respiratory, gastrointestinal etc.  
Introduction to biomechanics – Bio solid mechanics, fluid mechanics.

**Text Books:**

1. A.C. Guyton and J.E. Hall, Textbook of Medical Physiology, Elsevier, 2005
2. K.L. Moore and A.F. Dalley, Clinically Oriented Anatomy, Lippincott 1999
3. J.D. Humphrey and S.L. Delange, An Introduction to Biomechanics, Springer 2004

**References:**

J. D. Bronzino Biomedical Engineering Handbook, CRC and IEEE Press, Boca Raton, FL, 2000

**ED 506 Medical equipment Dissection lab.****0 0 3 1**

Study of various medical equipment by dissection of these equipments.  
Understanding the functions, concepts and features of the product in the product design taxonomy.

**VII Semester:****ED 503 Computational Methods for Biomedical Design****3 0 0 3**

Introduction to Finite Strain Elasticity – Stress and strain measures, constitutive equations in biomechanics.

Introduction to finite elements – Procedure, Types of elements, Isoparametric formulations.

Nonlinear finite elements – Solution procedures

Case studies in biomedical design and biomechanics

Finite Element and Finite volume techniques in Fluid mechanics.

The fluid mechanics of blood flow. Case studies in flow analysis for biomedical design

**Text Books:**

1. J.D. Humphrey and S.L. Delange, An Introduction to Biomechanics, Springer 2004
2. Y.C. Fung Biomechanics: Mechanical properties of living tissues , Springer 1993
3. Y.C. Fung Biomechanics: Motion, Flow, Stress and Growth, Springer 1990

**ED 505 Design of Implantable devices and life support systems 3 0 3 4**

Design and materials of life support systems – An overview

Design and materials considerations of the following implantable devices:

Cardiovascular devices – Heart valves – bioprosthetic and mechanical valves, stents and inflation pumps. pacemakers, implantable defibrillators, VAD.

Implants in Orthopedics – Implants for bone repair, joint replacement. artificial arms, hands and limbs.

Respiratory devices – Pulmonary physiology and gas physics, respiratory measurement systems and devices.

Controlled drug delivery system – Osmotic pump and diffusion controlled systems  
Dialysis system design

**Text Books:**

J.J. Carr and J.M. Brown, Introduction to biomedical equipment technology, Prentice Hall, 1998

**References:**

1. M. Kutz : Standard Handbook of biomedical engineering and Design, McGraw Hill, NY 2003
2. Moore J.E. and Zouridakis G. Editors-in-Chief Biomedical Technology and Devices Handbook CRC Press, 2003.
3. J. D. Bronzino Biomedical Engineering Handbook, CRC and IEEE Press, Boca Raton, FL, 2000

**ED 507 Design of Monitoring and Diagnostic System 3 0 3 4**

Introduction – Types of diagnostic systems – Magnetic, optic, acoustic etc.  
Monitoring systems – Deployment and requirements. Common monitoring devices.  
Biomedical Signal Analysis – Acquisition and Processing with examples from ECG, EEG etc.

Design considerations, concepts and details of equipments for :  
Medical Radiology : X ray equipments and CT Scan devices and software

Imaging Modalities – MRIs including software, ultrasound in medicine, nuclear medical devices etc.

Biosensors – Its application in monitoring and diagnostic equipments. Optics in diagnostic systems

**Text Books:**

1. . M. Kutz : Standard Handbook of biomedical engineering and Design, McGraw Hill, NY 2003

**References:**

1. Moore J.E. and Zouridakis G. Editors-in-Chief Biomedical Technology and Devices Handbook CRC Press, 2003.

2. J. D. Bronzino Biomedical Engineering Handbook, CRC and IEEE Press, Boca Raton, FL, 2000

**ED 509 Bio-mechanics lab – Solid and fluid mechanics 0 0 3 1**

Experiments explaining the concept of fluid flow in biological systems; Experiments to study the effect of surgical procedures.

**ED 511 Product Design Lab. III 0 0 3 1**

A mini project on design of a biomedical equipment, teaching the design procedures learnt in theory.

**VIII semester:**

**ED 450 Design Project in the Industry 0 0 0 9**

Project in the Industry. The student to participate in an industrial design project with well defined responsibility. The project to be completed from end to end, concept to manufacture.

**IX Semester:**

**HS 105 Principles of Economics 3 1 0 4**

This course will provide an introduction to the subject matter of economics which is highly relevant to understanding the functioning of the economy and the world around us. The course will consider basic economic principles that govern consumer and producers behaviour. It will examine how markets work and how supply and demand interact to determine prices, characteristic and types of market, market failure and role of

government in the economy, macro economic issues and measurement, inflation and unemployment, money banking and international trade and macro policies.

Type of Economies and Economic Institutions – Production Possibility Frontiers, opportunity costs and circular flow- Supply and Demand – Theory of the firm, market structure and market failure – The Government in the economy – Macro Economic issues – Macro Policies, Money-International Trade and Finance.

**HS 305 Professional Ethics**

**2 0 0 2**

Concept of Profession and highlight its difference from occupation or job

The vital role of ethics in professions

The importance of ethical codes in professions and the prerequisites of an ethical professional

The nature of engineering ethics, the value of ethnical practices in engineering and the virtues of an ethical engineer

**Texts:**

1. Velasquez, Manuel G: 2002, Business Ethics: Concepts and Cases, Fifth edition, New Jersey, Prentice Hall.
2. Harris, Charles, E Jr., Michael S. Pritchard, Michael J Rabins, 1995, Engineering Ethics : Concepts and Cases, Belmont, Wadsworth Publishing Company.
3. Supplement Reading Materials (SM)

**References:**

1. Sekhar, R.C.,: 1997, Ethical Choices in Business Response Books, New Delhi, Sage Publications.
2. Kitson, Alan and Campebell, Robert: 1996. The Ethical Organisation, Great Britain Macmillan Press Ltd.
3. Pinkus, Rosa Lyun B., Larry J Shulman, Norman Phummon, Harvey Wolfe: 1997, Engineering Ethics New York, Cambridge Uty., Press
4. Erwann, M. David, Williams, Masy B and Guterrez, Claudio: 1990, Computers, Ethics and Society, Oxford, Oxford Uty., Press
5. Langford, Duncan (EDT): 2000, Internet Ethics, London, Macmillan Press Ltd., 2000.

**ED 550 Industrial Lecture**

**0 0 3 1**

**X Semester:**

**ED 590 Project**

**0 0 0 11**

A multidisciplinary project with the student working in a group. Each student has a well defined individual responsibility