**Biomaterials: Materials for Biomedical Applications**

**Total Hours: 24**

**No. of Hours/Week: 2**

**Marks: 50**

**Syllabus**

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| S.N. | Topic | Hours |
| 1 | Introduction of Biomaterials | 1 |
| 2. | Biomaterials Surfaces: Structure and Properties, Surface Energy  Adsorption and Reconstruction at Surfaces, | 3 |
| 3. | Protein-Surface Interactions  Proteins: Structure, Properties, Functions, Protein Adsorption: Complex Phenomena, Measurement | 3 |
| 4. | Cell-Surface Interactions: Host Response to Biomaterials: Cell adhesion mechanism, coagulation cascade, immune response | 3 |
| 5. | Surface Characterization: AES, XPS, AFM, Contact Angle | 2 |
| 6. | Quantifying Cell Behavior: Cell Culture, Cellular Assays | 2 |
| 7. | Biosensors and Diagnostic devices | 2 |
| 8. | Drug Delivery: Controlled Release, Diffusion Controlled and Membrane based devices, Mechanical Pumps | 2 |
| 9. | Biomaterial for Organ Replacement  Mechanical Properties, Bone Substitutes | 2 |
| 10. | Introduction of Tissue Engineering: Cell, Scaffold design, Artificial liver, pancreas, cartilage | 2 |
| 11. | Regulatory overview | 2 |

**Suggested Reading:**

**Ratner, Buddy D., et al. Biomaterials Science: An Introduction to Materials in Medicine. 2nd ed. Burlington, MA: Academic Press, 2004. ISBN: 9780125824637.**