Sample Brief Course Description

Course title	Modelling and Simulation of Physiological Systems
Course code	BME 241
College	Engineering
Department / Program	Biomedical Engineering
Year/ Level	3/9th
Course Type	A. ☐ University ☐ College ☑ Department ☐ Others b. ☑ Required ☐ Elective
Credited Hours	4
Contact Hours	(LT: 3, LB: 2, TR: 0)
Pre-requisites (if any)	BME 240
Co-requisites (if any)	---

Course description	**Basics of physiological control systems** Systems Analysis, examples of physiological control systems, differences between engineering and physiological control systems. Generalized system properties, mathematical approach, electrical analogs, linear models, lung mechanics, muscle mechanics, distributed parameter versus lumped parameter models **Analysis of Physiological Models** Static and dynamic analysis of physiological systems: regulation of cardiac output, blood glucose regulation, chemical regulation of ventilation, electrical model of neural control mechanism **Modelling of Circulatory System** Circulatory System: Physical, chemical and rheological properties of blood, problems associated with extra corporeal blood flow, dynamics of circulatory system. **Modelling of Regulatory System** Thermal Regulatory System: Parameters involved, Control system model etc. Biochemistry of digestion, types of heat loss from body, models of heat transfer between subsystem of human body like skin core, etc. and systems like within body, body, environment, etc. **Modelling of Filteration In Human Body** Ultra-Filtration System: Transport through cells and tubules, diffusion, facilitated diffusion and active transport, methods of waste removal, counter current model of urine formation in nephron, Modeling Henle's loop.
Course Main Objectives	To impart knowledge on 1. Basic ideas related to modeling. 2. Different modelling techniques of physiological systems. 3. Various regulatory systems of the human body.
Learning Outcomes	**Knowledge and Skills:--** 1. Assemble the various concepts in modelling of circulatory system. **Skills:---** 1. Analyze the concepts of modelling 2. Differentiate the dynamics and static characteristics of physiological systems 3. Design and perform the modelling for physio thermo regulatory systems 4. Create various models for human filtration system 5. Evaluate the mass-balance concept for biological system **Values:---** 1. Communicate effectively and write lab report.

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