



### Introduction to Cardiovascular Fluid Mechanics

Chemical Engineering

**Instructor Name:** Dr. Raghvendra Gupta

**Institute:** IIT Guwahati

**Department:** Chemical Engineering

**About Instructor:** Dr. Raghvendra Gupta is an Assistant Professor in the Department of Chemical Engineering at Indian Institute of Technology Guwahati. His research interest lies in understanding transport phenomena in complex systems. He has been teaching an elective course on Biofluid Mechanics for last two years.

**Pre Requisites:** : A basic course in fluid mechanics at UG level, A UG course in Mathematics covering Ordinary Differential Equations

**Core/Elective:** : Elective

**UG/PG:** : Both

**Industry Support** : GE Healthcare, Johnson and Johnson and other biomedical companies (The list is only tentative and no consent/opinion has been sought from the companies)

**Course Intro:** : This course aims to provide an overview of the important problems in human circulatory system. The course would provide introduction to cardiovascular systems and important fluid flow problems in large arteries. The goal is to provide students with the necessary background to apply the knowledge of fluid mechanics to analyse the flow behavior in biological systems in general and human circulatory system in particular. It is hoped that with this course, the students would be able to develop a perspective towards the design and development of diagnostics and medical device development.

#### COURSE PLAN

SL.NO	Week	Module Name
1	1	Introduction, Motivation, Organisation of Cardiovascular System
2	2	Blood: Its constituents and rheology
3	3	Blood Flow in Arteries-1: Hagen Poiseuille Flow, Flow Bifurcation, Flow in Curved tubes
4	3	Blood Flow in Arteries-2: Pulsatile Flow in Rigid Tubes, Womersley Solution
5	4	Blood Flow in Arteries-2: Pulsatile Flow in Rigid Tubes, Womersley Solution
6	4	Blood Flow in Arteries-3: Wave Propagation in Blood Vessels