# Cardiovascular Fluid Mechanics : Foundations

…………………………………………………………………………………………………………………………

## Overview

Development of advanced devices and products in Cardiovascular systems require, appropriate analysis tools that enable an accurate understanding of the human circulatory system.  The design and development of prosthetics such as, stents, valves, IABP's, VAD's, ECMO's etc are thoroughly influenced by the hemodynamic aspectsand the associated fluid-structure interaction effects.   To this end, an accurate understanding of cardiovascular fluid mechanics is central to the design and development of prosthetics.

Engineers are often endowed with mathematical modelling and simulation tools to design and develop their products.  They often resort to computational fluid dynamics and finite element based tools with ease in a more engineered settings.  Prior to such tools and techniques, it is important to have comprehensive understanding of the cardiovascular physiology and its coupled interaction with the device designs.  The proposed module aims to cover aspects of Cardiovascular Fluid Mechanics for the design engineers and researchers.

Course participants will learn these topics through lectures and hands-on tutorials. Also case studies will be discussed to stimulate research motivation of participants.

| | |
|---|---|
| **Dates for the Course** | **5th December to 10th December  2016** |
| **Host Institute** | **IIT Madras** |
| **No. of Credits** | **1** |
| **Maximum No. of Participants** | **50** |
| **You Should Attend If…** | <ul><li>You are a Scientist/ CFD Engineer with specific interest in Bio-Fluid Mechanics</li><li>You are involved in the design of cardiovascular prosthetics such as, VAD, ECMO etc.</li><li>you are a student  or faculty  from academic  institution  interested Cardio-Vascular Fluid Mechanics</li><li>Doctors with a reasonable liking for Applied Mathematics</li></ul> |
| **Course Registration Fees** | The participation fees for taking the course is as follows:<br><br>**Student Participants:** Rs.1000<br>**Faculty Participants:** Rs.5000<br>**Government Research Organization Participants**: Rs.10000<br>**Industry Participants:** Rs.12000<br><br>The above fee is towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges.<br><br>**Mode of payment: Demand draft in favour of "Registrar, IIT Madras" payable at Chennai** |
| **Accommodation** | The participants may be provided with hostel accommodation, depending on the availability, on payment basis.   Request for hostel  accommodation  may  be  submitted  through  the  link: http://hosteldine.iitm.ac.in/iitmhostel |

# Course Faculty

**Prof. K B Chandran** is currently working as Emeritus Professor at the University of Iowa. He held Lowell G. Battershell Chair in Biomedical Engineering and was professor and chair of biomedical engineering till 2014.Prof K B Chandran has produced about 18 doctoral students and 18 masters graduates. To his credit he has published 4 books, 6 book chapters and owns a patent. He has published 135 manuscripts in archival journals and 270+ presentations in conferences. He is invited as a plenary speaker in a number of prestigious conferences. He has received several honours including Fellow of ASME, BES and AIMBE. His lucid book on the "Biofluid Mechanics--The Human Circulation," is very popular. He has applied the principles of Mechanics (both solid and fluid) to understand artificial heart valves, ventricular assist devices, vascular grafts etc, to benefit the man kind.

**Prasad Patnaik BSV** is currently Professor in the Department of Applied Mechanics at IIT Madras, Chennai. He specializes in the development of CFD tools for fluid-structure interaction in a variety of problems ranging from vortex induced vibrations to filament FSI in microflows. His current interests are in FSI application to the human circulatory systems using both mesh based and meshfree simulations.

**Prof B V Rathish Kumar** is currently Professor in the Department of Mathematics and Statistics at IIT Kanpur. He has made seminal contributions through the development of Numerical Methods for solving PDEs. He developed high performance computing strategies using parallel algorithms. He has designed and developed a wide spectrum of numerical solvers that employ Finite element, Finite volume and Wavelet based techniques for solving fluid dynamics, biomechanics problems of interest to both nature and technology.

# Course Coordinator

**Name: Prasad Patnaik BSV**
Phone: 91-44-2257-4068
E-mail: bsvp@iitm.ac.in

........................................................................

URL:
https://apm.iitm.ac.in/fmlab/bsvp/index.html