

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY  
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	Computational Fluid Dynamics	Course No <i>(will be assigned)</i>				
Specialization		Structure (LTPC)	3	0	0	3
Offered for	UG/PG/Ph.D	Status	Core <input type="checkbox"/>		Elective <input checked="" type="checkbox"/>	
Faculty	Dr. Jayavel S.	Type	New <input checked="" type="checkbox"/>		Modification <input type="checkbox"/>	
Pre-requisite	Fluid Mechanics & Heat transfer	To take effect from	Jan 2011			
Submission date	November 2010	Date of approval by AAC				
Objectives	<p>To introduce numerical techniques and its role in the field of heat transfer and fluid flow.</p> <p>To enable the students to understand the various discretization methods and solving methodologies.</p>					
Contents of the course <i>(With approximate break up of hours)</i>	<p>Basics of computational fluid dynamics - governing equations of fluid mechanics and heat transfer - physical boundary conditions - elliptic, parabolic and hyperbolic equations. Finite difference formulation - stability analysis.</p> <p>Solution methodologies: direct and iterative methods, Thomas algorithm, relaxation method, alternating direction implicit method.</p> <p>Finite difference and finite volume formulation of steady/transient one-dimensional conduction equation.</p> <p>Finite volume formulation of steady one-dimensional convection and diffusion problems, central, upwind, hybrid and power-law schemes - discretization equations for two dimensional convection and diffusion.</p> <p>Numerical methods for the Navier-Stokes equation - Turbulence models: mixing length model, Two equation (k-epsilon) models - Grid generation.</p>					
Text and References	<p><b>Text Books</b></p> <ol style="list-style-type: none"> <li>PradipNiyogi, Chakrabartty S.K., Laha M.K., Introduction to Computational Fluid Dynamics, Pearson Education, 2009, 2<sup>nd</sup> Edition.</li> <li>VersteegHenkKaarle, MalalasekeraWeeratunge, An introduction to computational fluid dynamics: The finite volume method, Pearson Education, 2007.</li> </ol> <p><b>References</b></p> <ol style="list-style-type: none"> <li>Patankar, S.V., Numerical Heat Transfer and Fluid Flow, McGraw-Hill, 1980.</li> <li>Muralidhar, K., Sundarajan T., Computational Fluid Flow and Heat Transfer, Narosa Publishing House, New Delhi, 1995.</li> <li>Anderson, J.D., Computational fluid dynamics - the basics with applications, McGraw-Hill, 1995.</li> </ol>					