	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**Master of Technology in Mechanical Engineering**	Year of Regulation	**2018**
Department	**Mechanical Engineering**	Semester	**II**

Course Code	Course Name	Credit Structure				Marks Distribution		
		L	T	P	C	Continuous evaluation	Quiz/Viva	Total
ME 556	**Computational Laboratory-II**	**0**	**0**	**2**	**1**	**70**	**30**	**100**

Course Objectives	1. To develop students' ability to program using C/Matlab.	Course Outcomes	CO1	Understand basic concepts of FDM and FVM dicretization schemes for steady/unsteady fluid flow and heat transfer problems. (Understand).
	2. To develop students with some knowledge of solving 1-D and 2-D heat transfer and fluid flow problems subjected to different types of boundary conditions using FDM and FVM		CO2	Classify and compare different boundary conditions and its implementation in FD and FV frameworks. (Understand and Apply)
			CO3	Implement variable flow properties, boundary layer and moving wall problems. (Understand and Apply)
	3. To develop students' ability to use commercial or open source softwares for numerical simulations and flow visualtizations.		CO4	Solve fluid flow and heat transfer problems using commercial/open-source softwares alongwith flow visualization. (Apply)

SYLLABUS

No.	Content	Hours	COs
I	**Introduction** Brief review of computer programming, XY and surface contour plots, Plot digitization.	**10**	**CO1**
II	**Solution of Heat Transfer and Fluid Problems** 1-D and 2-D heat conduction problems in Cartesian-cylindrical-spherical co-ordinates, FDM vs. FVM, Boundary conditions and its implementation, Conditions at the interface of two materials, Problems with variable properties, Natural convection problems in horizontal and vertical heated plates.Boundary layer problems, 2-D fluid flow with moving wall, Flow over Aerofoil.	**12**	**CO2** **CO3**
III	**Modeling & Simulation in CFD** CREO, ANSYS workbench, ANSYS Fluent, MATLab Simulink.	**06**	**CO1** **CO2** **CO4**
	Total Hours	**28**	

Essential Readings

1. E. Balagurusamy, "Programming in ANSI C", Tata McGraw-Hill Education
2. H.K. Versteeg and W. Malalasekera, "An Introduction to Computational Fluid Dynamics: The Finite Volume Method", Pearson.
3. R. Pratap, "Getting Started With MATLab: A Quick Introduction for Scientists and Engineers", Oxford University Press
4. Y.Kanetkar, "Let us C", Bpb Publications.

Supplementary Readings

1. J. D. Anderson Jr., "Computational Fluid Dynamics", McGraw-Hill.
2. J. D. Anderson Jr., "Fundamentals of Aerodynamics", McGraw Hill.