1.	Title of the course	Mathematical Modelling
2.	Course number	MA621L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To MA6026/12
6.	To be offered by	Department of Mathematics and Statistics
7.	To take effect from	July 2022
8.	Prerequisite	CoT
9.	**Course Objective(s):** To vivify the real problems through mathematical models. To develop simple models. To add more complexity to existing models and identify their significant parameters. To apply mathematical techniques to solve models.	
10.	**Course Content:** System, models, simulations, physical models, input-output systems, open and closed systems; Mathematical models, state variables, black box system, classification, characterization, limitations, properties, source of errors, dimensional analysis, applications, non-uniqueness; Real problems, parameter identification, reduced system, reduction of an open problem to a closed problem, conversion of a real problem into a mathematical problem; Analytical and numerical solutions, physical interpretation, well-posedness; Mechanistic models, ordinary differential equations, partial differential equations, Navier-Stokes equation, traffic flow, difference equations, cellular automata, optimal control problems, inverse problems.	
11.	**Textbook(s):** 1. Dym C L, *Principles of Mathematical Modeling*, 2nd Edition, Elsevier (2004). 2. Velten K, *Mathematical Modeling and Simulation: Introduction for Scientists and Engineers*, 1st Edition, Wiley-VCH, Verlag (2009).	
12.	**Reference(s):** 1. Bender E A, *An Introduction to Mathematical Modeling*, 1st Edition, Dover Publications (2012). 2. Fowler A C, *Mathematical Model in Applied Sciences*, 1st Edition, Cambridge University Press (1997). 4. Meyer W J, *Concepts of Mathematical Modeling*, 1st Edition, Dover Publications (2014).	