1.	Title of the course	Distributions and Sobolev Spaces
2.	Course number	MA627L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To MA6027/15
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 develop a series of tools instrumental in the applications of functional analysis to partial differential equations. To introduce the notion of weak derivatives and Sobolev spaces. To solve elliptic partial differential equations for substantiating the capabilities of the weak derivatives.	
10.	**Course Content:** Hilbert spaces and operator theory; Introduction to the theory of distributions, test functions, calculus on distributions, localization, supports and singular support, convolutions, Fourier transform, tempered distributions, fundamental solutions and Malgrange-Ehrenpreis theorem; Sobolev spaces: generalized derivatives, smooth functions, traces and extension theorems, Poincare inequality, embedding and Rellich-Kondrasov compactness embedding theorems, dual spaces, fractional spaces and elements of trace theory; Applications to elliptic equations, Lax-Milgram theorem, existence of weak solutions, L2-regularity theory, maximum principles, eigenvalues of Laplacian.	
11.	**Textbook(s):** 1. Adams R A and Fournier J F, *Sobolev Spaces*, 2nd Edition, Academic Press (2003). 2. Kesavan S, *Topics in Functional Analysis and Applications*, 3rd Edition, New Age International Private Limited (2019).	
12.	**Reference(s):** 1. Brezis H, *Functional Analysis, Sobolev Spaces and Partial Differential Equations*, 1st Edition, Springer (2011). 2. Leoni G, *A First Course in Sobolev Spaces*, 2nd Edition, American Mathematical Society (2017). 3. Rudin W, *Functional Analysis*, 2nd Edition, McGraw-Hill (2006). 4. Strichartz R S, *A Guide to Distribution Theory and Fourier Transforms*, World Scientific (2003).	