MAT 675 – Differential Geometry

Course Code & Number	Course Name	Credit Hours	Lec.	Lab.	Tut.	Prerequisites
MAT 675	Differential Geometry	4	3	0	1	

Syllabus:

Plane curves: Curves' parameterizations, Arc length, Curvature and torsion, Frenet formulas, The local canonical form, Global properties of plane curves, Simple closed curves.

Regular Surfaces in $\mathbb{R}^3$: Surfaces' parameterizations, Regular surfaces and regular values, Change of parameters, A regular parameterized Surface, Tangent planes, Tangent spaces and normal vectors, The first fundamental form of a regular surface.

The Geometry of Gauss Map: Gauss map and its properties, Differential of the Gauss map, Meusnier's theorem, The second fundamental form of a regular surface, The maximum and the minimum normal curvatures, Gaussian and Mean curvatures, The Gauss map in local coordinates, Equations of Weingarten, Examples.

References

1. E. Kreyszig; ***Differential Geometry***; Dover Publications, 2012. **(Main Reference)**
2. A. Pressley; ***Elementary Differential Geometry***; 1st Edition, Springer-Verlag, 2010.
3. W. Kühnel; ***Differential Geometry: Curves – Surfaces – Manifolds***; 2nd Edition, American Mathematical Society, 2004.