

The Department of Mathematics

2016–17–B term

Course Name Differential Geometry

Course Number 201.1.0051

Course web page

<https://www.math.bgu.ac.il/en/teaching/spring2017/courses/differential-geometry>

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Office Hours <https://www.math.bgu.ac.il/en/teaching/hours>

Abstract

Requirements and grading¹

Course topics

- .1 Geometry of Curves. Parametrizations, arc length, curvature, torsion, Frenet equations, global properties of curves in the plane.
- .2 Extrinsic Geometry of Surfaces. Parametrizations, tangent plane, differentials, first and second fundamental forms, curves in surfaces, normal and geodesic curvature of curves.
- .3 Differential equations without coordinates. Vector and line fields and flows, frame fields, Frobenius theorem. Geometry of fixed point and singular points in ODEs.
- .4 Intrinsic and Extrinsic Geometry of Surfaces. Frames and frame fields, covariant derivatives and connections, Riemannian metric, Gaussian curvature, Fundamental Forms and the equations of Gauss and Codazzi-Mainardi.
- .5 Geometry of geodesics. Exponential map, geodesic polar coordinates, properties of geodesics, Jacobi fields, convex neighborhoods.

¹Information may change during the first two weeks of the term. Please consult the webpage for updates



.6 Global results about surfaces. The Gauss-Bonnet Theorem, Hopf-Rinow theorem, Hopf-Poincaré theorem.