The Department of Mathematics  
2019–20–B term

Course Name  Vector calculus for Electric Engineering
Course Number  201.1.9631
Lecturer  Dr. Yosef Strauss, <strauss@bgu.ac.il>, Office 109-
Office Hours  [https://www.math.bgu.ac.il/en/teaching/hours](https://www.math.bgu.ac.il/en/teaching/hours)

Requirements and grading

Course topics

1. Lines and planes. Cross product. Vector valued functions of a single vari-
   able, curves in the plane, tangents, motion on a curve.

2. Functions of several variables: open and closed sets, limits, continuity, dif-
   ferentiability, directional derivatives, partial derivatives, the gradient, scalar
   and vector fields, the chain rule, the Jacobian. Implicit differentiation and
   the implicit function theorem. Extremum problems in the plane and in
   space: the Hessian and the second derivatives test, Lagrange multipliers.

3. Line integrals in the plane and in space, definition and basic properties,
   work, independence from the path, connection to the gradient, conserva-
   tive vector field, construction of potential functions. Applications to ODEs:
   exact equations and integrating factors. Line integral of second kind and
   arclength.

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

5. Parametric representation of surfaces in space, normals, the area of a parametrized surface, surface integrals including reparametrizations.

6. Curl and divergence of vector fields. The theorems of Gauss and Stokes.