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| | Advanced Calculus I-Vector Calculus | | | QURESHI  Ali Gul |
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**[           ]**

Based on the knowledge of Calculus with Exercises A/B and Linear Algebra with Exercises A/B , or Calculus A/ B and Liner Algebra A/B, this course explains calculus of multiple variables and vector calculus. The course introduces the concepts of motion and potential in more than 2 dimensions, which are based on partial differentiation and integration related with multiple dimensions (such as line integral and surface integral).

**[       ]**

To learn basics of calculus in functions of two or more variables, which are used in many other courses in natural sciences (such as Physics) and engineering.

**[             ]**

1. Basic operations with vectors (5 Weeks)
- Dot and cross products; derivatives and integration of Vector Valued Functions
2.  Vectors in other coordinate systems (2 Weeks)
- Frenet-Serret frame, Spherical and Cylindrical coordinate systems
3. Vector fields and potentials at n-dimensional Euclidean spaces (2 weeks)
- Operations over the vector fields (gradient, curl and divergence), scalar potential and vector potential
4. Line integrals and surface integrals (5 Weeks)
- Line integrals at 2-dimensional plane, surface integrals at 3-dimensional space, and integral theorems (Divergence theorem of Gauss, the Green's formula and the Stokes's theorem)
5. Feedback    1 Week

**[       ]**

To understand Calculus with Exercises A/B and Linear Algebra with Exercises A/B, or Calculus A/B and Linear Algebra A/B.

**[                ]**

Weekly submission of class examples, class participation and homework (20%), Snap quizzes (15%), Final examination(65%)

**[      ]**

**[         ]**

Gilbert Srang et al.    Calculus Vol. 3    Open Stax    Book is available online at https://openstax.org/ details/books/calculus-volume-3
Joel R. Hass, Christopher E. Heil and Maurice D. Weir    Thomas' Calculus, 14th ed.    Pearson
Erwin Kreyszig    Advanced Engineering Mathematics, 10th ed.    Willey
Frank Ayres Jr. and Elliott Mendelson    Calculus, 6th ed.    McGraw-Hill

**Advanced Calculus I-Vector Calculus(2)**

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Students are encouraged to do assigned homework related to the classes.

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