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## Vector Analysis

MATH-227\*

This course is taken by second year engineering students in Engineering Physics and Geological Engineering students. It introduces some mathematical tools for dealing with electromagnetic fields, fluids, and elasticity. It extends the discussion of multivariable calculus begun in APSC-172\*, and makes substantial use of vector algebra and geometry and some linear algebra from APSC-174\*.

**Textbook:** *Calculus, Early Transcendentals*, 4th Edition  
by James Stewart (Brooks/Cole)

**Prerequisite:** APSC 171\* and APSC-172\* and APSC-174\*.

**Instructor:** O. Bogoyavlenskij

<b>Evaluation:</b>	Final Examination	60%
	Midterm Test	30%
	Assignments	10%

### Outline:

- Differentiation of vector functions, curves, velocities; acceleration, curvature, planar motion in polar coordinates
- Scalar fields, level sets, gradient
- Interpretation of gradient
- Double and triple integrals, change of variables (Jacobian), spherical coordinates
- Vector fields, flow lines
- Line integrals, Green's Theorem, circulation and curl
- Conservative fields
- Surfaces and surface integrals, flux and divergence
- Vector identities
- Divergence theorem, Stokes' Theorem, further discussion of div, curl
- Applications selected from potential theory, fluids, Maxwell's equations and solid angles