

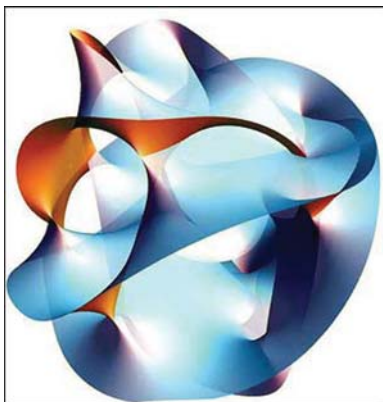
Math 624

Differential geometry provides the essential tools for the study of nonlinear mathematics and physics,

including the theory of relativity and gauge field theories. It can be described as “advanced calculus done right.”

Manifolds, Tensors and Differential Geometry

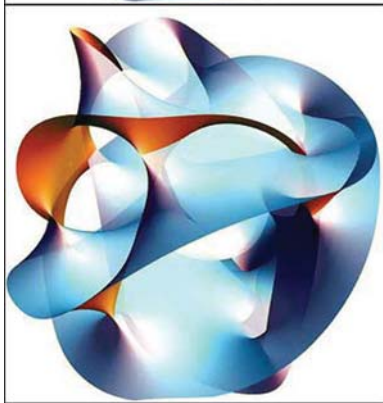
Prereq: Math 501 or 515 or permission of instructor



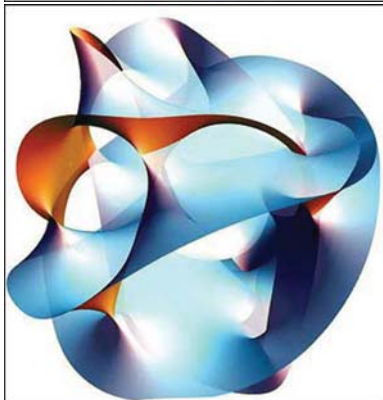
Our textbook begins:

“Manifolds are everywhere.

These generalizations of curves and surfaces to arbitrarily many dimensions provide the mathematical context for understanding space in all of its manifestations.



Today, the tools of manifold theory are indispensable in most major subfields of pure mathematics, and outside of pure mathematics they are becoming increasingly important to ... genetics, robotics, econometrics, computer graphics, biomedical imaging, and, of course ... theoretical physics. ...



Manifold theory is now one of the basic skills that all mathematics students should acquire as early as possible.”

This course will cover the basic theory of manifolds, vector and tensor fields and bundles, Riemannian metrics, exterior differential forms, the generalized Stokes theorem, and an introduction to Lie groups (groups which are also manifolds). Prerequisites are a good understanding of calculus, basic linear algebra, and a little topology (open sets, compact sets). We will minimize the prerequisites by stating some theorems that we need without proof. The proofs that we emphasize will be the ones that are most helpful in clarifying the ideas we study.

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Cr. 3, MWF 3:10-4:00

IOWA STATE UNIVERSITY Department of Mathematics

Please remember to register for your graduate mathematics courses early. Courses that do not receive enough early registrations will be cancelled.