Methods of Applied Mathematics
(Fall and Winter 07/08, 32 credits)

Program Description
One of the goals of scientific inquiry is to understand the processes of nature on a quantitative basis. In pursuit of this goal, mathematicians create models to represent the order they observe, and in turn devise mathematical methods for interpreting and solving these models. This program will provide a thorough and engaging introduction to such mathematical methods and the associated techniques of model building. Differential equations will be an important component of the program. We will study both the derivation of these equations from physical and biological models and their solution using analytical, qualitative and computational methods. In addition, we will cover linear algebra and multivariable calculus and their various applications in physics and economics. In winter quarter we will consider non-linear systems and their role in cyclical, chaotic and self-organizing behavior. There will also be an introduction to the calculus of variations with applications to finding optimal curves and surfaces. In addition to the theoretical work, we will also discuss questions of a more philosophical and historical nature. Is mathematics discovered or created? What role do mathematical models play in representing reality, and who were the people behind the important developments in calculus.

Syllabus
Fall: Ordinary Differential Equations, Linear Algebra, Multivariable Calculus, Philosophy of Mathematics
Winter: Partial Differential Equations, Non-linear Dynamics, Vector and Variational Calculus, History of Mathematics.

Schedule

Monday	Tuesday	Wednesday	Thursday	Friday
9:30-11:30 Linear Algebra Lecture Sem II E2109	9:30 -11:00 Differential Equations Lecture 1:00 – 12:00 Multivariable Calculus Lecture Sem II E2109	9:30-12:00 Linear Algebra Lecture and Workshop Sem II E2109	9:30-12:00 Differential Equations Lecture and Workshop Sem II E2109	9:30-12:00 Multivariable Calculus Lecture and Workshop Sem II E2109
Lunch				
1:00-3:00 Seminar and Presentations Sem II E2109	1:00-4:00 Mathematica Lab CAL East	1:00-3:00 Optional Tutorials	1:00-3:00 Optional Tutorials	

Texts for Fall Quarter
(Not available in the book store. You must buy these online)

- Ordinary Differential Equations 2nd Ed.
  Blanchard and Devaney
  ISBN 0534-38514-1
  Brookes Cole

- Linear Algebra and its Applications 3rd Ed.
  Lay, David
  ISBN: 0-201-70970-8
  Pearson Education Inc, (2003)

  (Optional Supplement)
  Student's Study Guide, 3/E
  by Lay
  ISBN: 020177013X

  - Multivariable Calculus; Concepts and Context 2nd Ed.

  Stewart, James
  ISBN: 0534378633
  Brooks/Cole (2001)

  - The Mathematical Experience

  Davis, P. and Hersh R.
  ISBN 0395929687
  Houghton Mifflin Co (1999)

Other Supplies

- Mathematica: We will be making use of Mathematica software in the computer labs. Students can use this software in the Computer Applications Lab which is open 9:00 am -10:00 pm during the week. If you plan to do most of your work at home you should obtain the student version from Wolfram Research.
- Graphing Calculator with Symbolic Algebra (eg TI89)

Faculty Information
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Website
The following program website has much more detailed information and will be updated regularly.: http://academic.evergreen.edu/curricular/methods06/