MATH 4701/5403- Topics in Differential Equations: Mathematical Modelling

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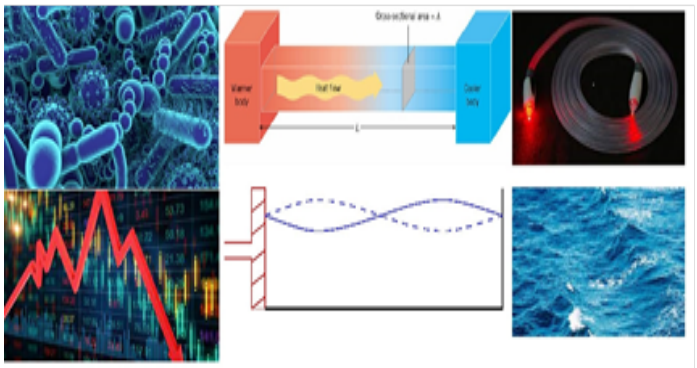
Overview:



From fluid flow and the spread of a virus to the weather and the stock market mathematical models are a crucial component in our understanding of countless real-world settings. However, before mathematical ideas can be applied a key first step lies in the construction of the models themselves. In some cases this may involve application of underlying physical laws, in other cases the process may be more empirical and measurement based. However, in any case certain key ideas and themes emerge. Ideally a model should be sufficiently robust and complex to adequately capture the underlying natural process, yet simple enough to facilitate study and understanding. The focus of this course will be to study the tools and techniques one can use to formulate models and assess their validity across a broad spectrum of areas of application. The primary pre-requisite is an introductory course in techniques for solution of differential equations (e.g. MATH 2454, MATH 2404 or equivalent). Other aspects of real and complex analysis will arise, along with some use of mathematical software. Requisite review or background will be provided.

Related References:

- Methods of Mathematical Modelling – T. Witelski and M. Bowen
- Practical Applied Mathematics – S. Howison
- Mathematical Modelling: A Case Studies Approach – R. Illner *et al.*
- An Introduction to Mathematical Modeling – E.A. Bender

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