

# Fundamentals of Numerical Modelling and Simulation of Multi-Physics and Multi-Domain Systems

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## Overview

This course covers the fundamentals of the mathematical formulations and computational techniques for the modelling and simulation of engineering and other kinds of systems, .e.g., electronic, optical, mechanical, biochemical or multi-domain systems. In contrast with generic courses on numerical analysis and simulation, the topics in the course are covered with a strong emphasis on their use in practical applications, which will be used throughout the course to illustrate the mathematical modelling, formulation and numerical simulation techniques. Numerical modelling and simulation techniques are most effective when domain and problem specific information and physical intuition are exploited in order to customize and improve them. This point of view will be emphasized and illustrated throughout this course when basic numerical techniques are discussed. The course is aimed for diverse backgrounds in engineering or science. The prerequisites for the course are physics and calculus as covered in the freshmen year of any science or engineering curriculum, matrix & linear algebra, differential equations as well as the knowledge of a computer programming language and some programming experience. As such, the course may be taken by junior & senior undergraduates and graduate students enrolled in any engineering or science program.

<b>Dates</b>	2 <sup>nd</sup> January 2017 to 6 <sup>th</sup> January 2017
<b>Host Institute</b>	IIT Madras
<b>Credits</b>	1
<b>Maximum Number of Participants</b>	25
<b>You Should Attend If...</b>	<ul style="list-style-type: none"><li>▪ You would like to acquire a rigorous but also practical understanding that will enable you to figure out which numerical simulation techniques are most suitable in solving your problems.</li><li>▪ You would like to quickly produce effective and customized solutions for your numerical simulation problems by exploiting domain and problem specific intuition and information.</li><li>▪ You would like to become an informed user of numerical modelling and simulation software and tools by acquiring intimate knowledge of the subtleties and problems that can arise.</li></ul>
<b>Course Registration Fees</b>	<p>The participation fees for taking the course are as follows:</p> <ul style="list-style-type: none"><li>▪ <b>Student Participants:</b> Rs. 1,000/-</li><li>▪ <b>Faculty Participants:</b> Rs. 5,000/-</li><li>▪ <b>Government Research Organization Participants:</b> Rs. 10,000/-</li><li>▪ <b>Industry Participants:</b> Rs. 40,000/-</li></ul> <p>The above fees are towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges.</p> <p><b>Mode of payment: Demand draft in favour of “Registrar, IIT Madras” payable at Chennai</b> The demand draft is to be sent to the Course Coordinator at the address given below.</p>
<b>Accommodation</b>	<p>The participants may be provided with hostel accommodation, depending on the availability, on payment basis. Request for hostel accommodation may be submitted through the link: <a href="http://hosteldine.iitm.ac.in/iitmhostel">http://hosteldine.iitm.ac.in/iitmhostel</a></p>

## Course Faculty



**Alper Demir** received the BS degree from Bilkent University in Turkey and the MS and PhD degrees from the University of California at Berkeley in the USA. Dr. Demir previously spent time at Motorola (Summer Intern), Cadence Design Systems (Summer Intern), Bell Laboratories Research (Member of Technical Staff, Area 11), CeLight (Manager for Optical Telecommunication Systems Design), MIT (Visiting Scholar), and UC Berkeley (Visiting Scholar). He has been with Koç University in Istanbul since 2002 as a faculty member in the department of electrical engineering. His work was deemed worthy of several best paper awards: 2002 Best of ICCAD Award, 2003 and 2014 IEEE/ACM William J. McCalla ICCAD Best Paper Award, and the 2004 IEEE Circuits & Systems Society Guillemin-Cauer Award. He was named an IEEE Fellow in 2012 for his contributions to stochastic modelling and analysis of phase noise.

## Course Coordinator

**Name:** Nagendra Krishnapura

Phone: +91-44-2257-4444

E-mail: nagendra@ee.iitm.ac.in

URL: <http://www.ee.iitm.ac.in/~nagendra/>