

## Course Description

We offer a PhD course on Iterative Methods for Large Linear Systems.

The course is offered with support from the DTU Informatics Graduate School (ITMAN) and the Danish Center for Applied Mathematics and Mechanics (DCAMM) at Technical University of Denmark.

The aim of the course is to introduce the students to some of the most widely used techniques for solving large linear systems of equations, and let the students get some practical experiences working with the methods.

The PhD course covers several widely used numerical linear algebra techniques for solving problems in a number of different scientific areas with focus on the methods and illustrated with Matlab examples. The goal is to give the student a set of “tools” that may be tried as they are, and also can be modified to be useful for particular applications.

## Course Homepage

<http://www2.imm.dtu.dk/~apek/ITSOL2011/>

## Organizers and Lecturers

Assistant Professor Allan P. Engsig-Karup  
DTU Informatics  
Technical University of Denmark.

Drexel Professor of Mathematics C. T. Kelley  
Department of Mathematics  
North Carolina State University

This course is offered as part of the activities of the DTU Informatics Graduate School ([ITMAN](http://www.imm.dtu.dk)) and of the DCAMM International Graduate Research School, see [www.dcammm.dk](http://www.dcammm.dk).

## Participants

The course is intended for PhD students and MSc students with a fundamental knowledge of numerical analysis and linear algebra and must be able to program Matlab. They

are expected to read the first five chapters of the book before participating in the course.

## Work Load

Approximately 35 scheduled hours (lectures, discussions and computer exercises) during the course and approximately 40 hours for the completion of an assignment problem after the duration of the course. Also, to prepare for the course it is required that participants read the first few chapters of the course literature.

## Course Contents

The following topics will be covered in the course

1. Introduction and Fundamentals
2. Krylov Methods
3. Projection Methods and Domain Decomposition
4. Multigrid Solvers and Preconditioners
5. Applications, Newton-Krylov Methods for Nonlinear Problems

See the course homepage for more details.

## Course Literature

C. T. Kelley (1995) Iterative Methods for Linear and Nonlinear Equations. SIAM.

## Language

All lectures will be given in English.

## Evaluation and Diplomas

To pass the course, active participation and the satisfactory completion of an assignment problem after the duration of the course are required. ETCS points: 5.

## Registration

Ask for a registration form from the DCAMM-course secretariat, attn.: Kari Haugland, Department of Mathematics, Technical University of Denmark, Building 303S, DK-2800 Lyngby, Denmark. Tel.: (+45) 45253031, Fax: (+45) 45881399, E-mail: [dcammm@mat.dtu.dk](mailto:dcammm@mat.dtu.dk).

## Registration Fee

There is no registration fee for students enrolled at universities and public research institutions. For researchers employed at universities and public research institutions the registration fee is €500. For all other participants the registration fee is €1500. Payment information will be given upon signing up for the course.

## Deadline

The submitted request for registration must be received by the course secretariat no later than **June 1<sup>st</sup>, 2011**. Information on enrollment will be posted within a week after this date.

## Lunch

ITMAN is sponsoring a daily lunch for participants that are enrolled at universities and public research institutions.

## Housing

There are a limited amount of rooms available on the premises of the Technical University of Denmark (DTU). These will be offered free of charge to students and otherwise at a cost of €25 per night. Accommodation in hostels/hotels can also be arranged by the participants themselves, see e.g. the Wonderful Copenhagen website at [www.woco.dk](http://www.woco.dk) and course webpage.

## Scholarships

For PhD students enrolled at non-Danish universities and research institutions outside the EU, we can offer a limited number of scholarships in order to facilitate participation, covering lodging (see above) and extra living costs with a per diem amount of €25. Travel expenses will not be covered. Your CV and a short letter of recommendation from your PhD supervisor should be sent in together with the registration form.

## Internet Resources

For facts on the Technical University of Denmark and visitors' information: See <http://www.dtu.dk>. Information about teaching and research at DTU Informatics can be found at <http://www.imm.dtu.dk>, and for DCAMM at <http://www.dcammm.dk>.

### About ITMAN

The DTU Informatics Graduate School ITMAN (ITMAN) administers the PhD program at DTU Informatics. ITMAN promotes cross-disciplinary research, matching information technology and mathematical modelling with other disciplines, often in collaboration with external collaborators: Other research institutions and private companies.

ITMAN is based on the idea of optimizing the relationship man - knowledge - IT as a key to growth for Danish companies in the global innovation and productivity competition. If one is to understand the role of IT, it is essential to view IT as more than "computers and software": IT is always a factor in the intricate net of machine, man and market.

ITMAN aims to strengthen research education through a series of initiatives: Specialized PhD courses and summer schools, quality assurance of supervision, PhD processes and procedures, research environment, implementation of a mentor program, help with IPR, social activities, etc.

### About DCAMM

The Danish Center for Applied Mathematics and Mechanics, DCAMM is an informal framework for internationally oriented scientific collaboration between staff members at a number of departments at the Technical University of Denmark (DTU) and Aalborg University (AAU). The departments cooperating within DCAMM are:

- DTU Informatics
- DTU Mathematics
- DTU Mechanical Engineering
- Dept. of Civil Engineering, AAU
- Dept. of Mechanical Engineering, AAU

DCAMM is an informal construction. The day to day activities are coordinated by the secretary of the Center, while the formal governing body of DCAMM is the Scientific Council.

The DCAMM International Graduate Research School functions within the standard framework of the Ph.D.-education at the Technical University of Denmark (DTU) and at Aalborg University (AAU). Ph.D.-students associated to the School are full members of DCAMM through their departments and are enrolled in relevant Ph.D. programmes at DTU and AAU.

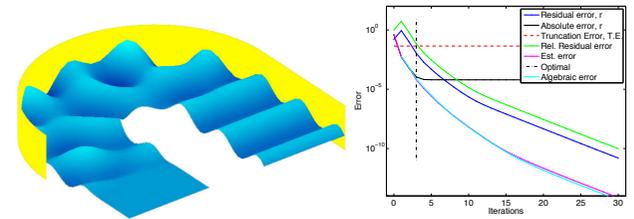
The School's role is to provide for an interdisciplinary framework for education of young researchers in an international research environment, and the activities are supported by Danish Agency for Research, Technology and Innovation (FI).

## The Technical University of Denmark DTU Informatics

### Section for Scientific Computing

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### Danish Center for Applied Mathematics and Mechanics



Ph.D.-course / Advanced school

## Iterative Methods for Large Linear Systems

Kgs. Lyngby, Denmark

June 27<sup>th</sup> to July 1<sup>st</sup>, 2011



DTU Informatik  
Institut for Informatik og Matematisk Modellering