Course Description
Fortran is one of the principal languages used in scientific, numerical and engineering programming, and many students and researchers will sooner or later have to work with Fortran codes. With the two recent revisions of the language, the power of the language has been progressively enhanced, and most vendors provide highly optimizing Fortran compilers, based on more than 50 years of experience.

MPI (Message Passing Interface) is the de-facto standard for programming portable message-passing parallel applications on networked computers (also known as clusters). MPI has bindings to C/C++ and Fortran, and it is available on all massively-parallel supercomputers.

This Ph.D. course consists of 3 parts and will be held in the period from January 7-25, 2008 (at DTU for a 3 weeks period):

Part I: Programming Fortran 95/2003
Part II: Message Passing Interface (MPI)
Part III: Project work

An integral part of the course is computer exercises and also the project work in the third week. The projects will be supervised by teachers from different DTU departments and are related to on-going research.

Language
All lectures will be given in English

Organizers
Bernd Dammann, Informatics and Mathematical Modelling, DTU.
Jens Walther, Department of Mechanical Engineering, DTU.

This course is offered as part of the activities of the DCAMM International Graduate Research School, see www.dcamm.dk.

Internet resources
For information about teaching and research at the DCAMM departments: see http://www.dcamm.dk.
For facts on the Technical University of Denmark and visitor's information see: http://www.dtu.dk
For information on the University of Aalborg see: http://www.aau.dk.

Participants
The course is designed for Ph.D. students and final-year Graduate students being familiar with the basic concepts of Scientific Computing. Some experience with programming is required.

Work Load
A total of approximately 120 hours, including work during the 7th-25th January course period at DTU (lectures, exercises, discussions).

Study Material
Fortran: Ian Chivers and Jane Sleightholme, Introduction to Programming with Fort4ran. Springer, 2006.
Message Passing Interface (MPI): Handouts of the lecture notes.

Evaluation and Diplomas
To pass the course, active participation in all activities is required; this includes the exercises and the project work in the 3rd week.
Grades: Pass/Fail. ECTS 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: dcamm@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 EURO. This covers hand-outs, coffee and social events. For all other participants the registration fee is 1500 EURO.

Deadline:
Applicants should submit their registration to course secretariat no later than December 4th, 2007. You will receive confirmation within a week after this date.

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 EURO 25 Euro per night. Accommodation in hostels/hotels can also be arranged by the participants themselves, see the Wonderful Copenhagen website at www.woco.dk.

Scholarships:
For Ph.D.-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 EURO. Travel expenses will not be covered. Your CV and a short letter of recommendation from your Ph.D.-supervisor should be sent in together with the application form.

Program outline (TENTATIVE):

Monday, January 7th:
08:30-09:00 Registration, coffee and rolls.
09:00-09:15 Welcome – practicalities
09:15-12:00 Fortran
12:00-13:00 Lunch break
13:00-17:00 Fortran

Tuesday, January 8th – Friday, January 11th:
09:00-12:00 Fortran
12:00-13:00 Lunch break
13:00-17:00 Fortran

Teachers: Ian Chivers and Jane Sleightholme, King's College, London.

Monday, January 14th – Friday January 18th:
09:00-12:00 Message Passing Interface (MPI)
12:00-13:00 Lunch Break
13:00-17:00 Message Passing Interface (MPI)

Teacher: Maya Neytcheva, Uppsala University, Sweden.

Monday, January 21st – Friday January 25th:
Project work in groups.

Project work:
The projects will be supervised by teachers from different DTU departments, and will be related to on-going research. The participants can choose their favorite programming language for the projects (Fortran, C or C++). The main goal is to implement a solution using MPI

Students who want to do a project related to their own research work are welcome to do so, if the project has been accepted by the organizers. Please send a proposal for the project (not more than two A4 pages) to the organizers, no later than the registration deadline (see above).

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:

- Dept. of Informatics & Mathematical Modelling, DTU
- Dept. of Mathematics, DTU
- Dept. of Mechanical Engineering, DTU
- 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 (FUU).

DANISH CENTER FOR APPLIED MATHEMATICS AND MECHANICS

Ph.D.-course / Advanced school

Scientific Computing: Fortran and MPI

at

Technical University of Denmark,
Lyngby, Denmark

January 7th – 25th, 2008

Organized by:
Department of Mathematics,
Informatics and Mathematical Modelling
and
Department of Mechanical Engineering,
Technical University of Denmark

Technical University of Denmark
University of Aalborg