Graduate course

Engineering Optimization

28 - 30 June 2006
5 - 7 July 2006

Dr.ir. L.F.P. Etman
Prof. dr. Z. Gürdal
Prof. dr. R.T. Haftka
Prof. dr. ir. F. van Keulen
General

The graduate school Engineering Mechanics, a joint initiative of the Eindhoven and Delft Universities of Technology and the University of Twente, offers a national four years training programme for research students in the field of Engineering Mechanics.

As part of this programme a series of graduate courses is organized, in close connection with the selected research themes:

- Computational Mechanics,
- Mechanics of Materials,
- Structural Dynamics and Control,
- Structural Mechanics.

Objective

Over the last decades, computational modeling has become a standard tool within engineering and design. A next step is, to exploit these computational models via automated optimization. For that purpose, the design problem at hand must be cast into a well-defined optimization problem, and the computational models need to be parameterized and combined with an optimization algorithm. In many cases, it is also needed to extract sensitivity information from the computational models.

The present Engineering Optimization course is partially intended as an introduction to optimization of engineering structures and systems. Consequently, the definition of a well-posed optimization problem and its solution will be the topics for the first lectures. Next, the use of computational models will be discussed, including the associated design sensitivity analysis.

After the students have become familiar with basic engineering optimization techniques, several advanced topics will be presented.

The last advanced topic will be layout or topology optimization. These advanced topics serve three purposes. Firstly, the students become familiar with three important and practical engineering optimization domains. Secondly, the advanced topics are used to demonstrate the relevance of the basic knowledge presented in the first phase of the course. Thirdly, the advanced topics demonstrate typical pitfalls that might be encountered once dealing with practical engineering optimization tasks.

Students who attend this course should be able to cast a standard design problem into a well-defined optimization problem and solve it using standard optimization techniques. They should be aware of complications imposed by the use of computational models and the physics of the problem at hand.

Lecturers

Eindhoven University of Technology
L.F.P. Etman (Pascal)

University of Gainesville (Florida, USA)
R.T. Haftka (Rafi)

Delft University of Technology
Z. Gürdal (Zafer)
F. van Keulen (Fred)

Lecture notes

Lecture notes will be distributed during the course.

Prerequisites

Basic undergraduate courses in Calculus and / or Differential Equations, Linear Algebra, Statics, basic knowledge on computational modelling (e.g. finite element method)
Contents

June 28
Introduction to optimization (Etman)

June 29
Standard optimization techniques (Etman, Van Keulen, Haftka)

June 30
Design sensitivity analysis and reanalysis (Van Keulen)

July 5
Optimization of Composite Structures (Gurdal)

July 6
System Optimization (Haftka)

July 7
Topology Optimization (Gurdal, Haftka)

Location/date

The course will take place in two modules of three days each. The first module will take place at the Eindhoven University of Technology on June 28—30, 2006 and the second module at the Delft University of Technology, on July 5—7, 2006. The course language is English. A list of hotel accommodations in the vicinity of the course locations is available upon request. Participants are required to contact hotels directly.

Further information

• On the contents of the course:
  Prof.dr.ir. Fred van Keulen
  Phone: +31- (0)15- 278.65.15
  Email: A.vanKeulen@tudelft.nl

• On the organization of the course:
  Mrs. W. van den Oever, TU/e
  Phone: +31-(0)40-2474696
  Fax: +31-(0)40 2437175
  Email: EMschool@tue.nl

Fee/Registration

The course is free for registered members of the Graduate School Engineering Mechanics. For registered members of GrasMech the course fee is € 100. For other participants the course fee is € 1000. They will receive an invoice after accepted registration. Participants need to register by completing the enclosed registration form and returning it before 1st June, 2006 to the secretariat of the Graduate School Engineering Mechanics, Mrs. W. van den Oever. Members of the Graduate School Engineering Mechanics receive priority in case of over-subscription.

Upcoming courses

In addition to the present course, the Graduate School Engineering Mechanics organizes graduate courses on:

• Micromechanics
• Computational Methods for Material and Structural Instabilities
• Multibody Dynamics
• Engineering Optimization
• Mechanics of Forming Processes

For further information on these courses and on other activities of the Graduate School Engineering Mechanics please visit the WWW-pages at:

http://www.em.tue.nl

or contact:

Graduate School Engineering Mechanics
c/o Eindhoven University of Technology
Mrs. W. van den Oever, P.O. Box 513
W-hoog 2.113, 5600 MB Eindhoven NL
E-mail: EMschool@tue.nl
Tel.: +31- (0)40-2474696 / 2710
Fax: +31- (0)40-243775
REGISTRATION FORM

EM-Graduate Course: Engineering Optimization

Eindhoven, 28-30 June 2006 and Delft, 5-7 July 2006

Please complete this form and return it **before 1st June, 2006** to:

Secretariat Graduate School Engineering Mechanics
c/o Eindhoven University of Technology
Mrs. W. van den Oever
P.O. Box 513, Building W-hoog 2.113
5600 MB Eindhoven NL
Fax: 040-2437175

♦ Participant:

<table>
<thead>
<tr>
<th>Name + Initials:</th>
<th>Title:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prename:</td>
<td>Date of Birth:</td>
</tr>
<tr>
<td>Office address:</td>
<td></td>
</tr>
<tr>
<td>Phone:</td>
<td>Fax:</td>
</tr>
<tr>
<td>E-mail:</td>
<td></td>
</tr>
<tr>
<td>Date:</td>
<td>Signature:</td>
</tr>
</tbody>
</table>

Members of the Graduate School Engineering Mechanics only:

<table>
<thead>
<tr>
<th>University:</th>
<th>Department:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research adviser (if applicable):</td>
<td></td>
</tr>
<tr>
<td>Signature of research adviser:</td>
<td></td>
</tr>
</tbody>
</table>

If necessary, the registration fee has to be paid in Euro (€) by bank transfer to the account: Foundation DCT, “Engineering Mechanics”, ABN-AMRO Bank, Eindhoven, Bank account No.: 41 50 75 696, SWIFT-Header for international bank transfer: ABNANL2R.
Secretariat Graduate School Engineering Mechanics,
c/o Eindhoven University of Technology,
Mrs. W. van den Oever
P.O. Box 513, Building W-hoog 2.113,
5600 MB Eindhoven NL