MASTER AND PhD PROGRAMME IN
OPERATIONS RESEARCH

Information Guide 2010/2011

June 2010
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Preface

The education programme of the LNMB provides high quality teaching in the broad field of interest in the mathematics of operations research, including new interesting areas. The programme consists of 25 courses for Master and PhD students. This year seven Master courses and nine PhD courses are scheduled (the PhD courses have a cycle of two years). It is allowed that Master students attend PhD courses and, vice versa, that PhD students attend Master courses. The lectures are taught in the Uithof buildings of the Utrecht University.

The education programme for the academic year 2010/2011 consists of the following courses.

**Master courses:**

Fall 2010:
- Introduction to Stochastic Processes;
- Continuous Optimization;
- Discrete Optimization;

Spring 2011:
- Advanced linear programming;
- Scheduling;
- Queueing theory.

**PhD courses:**

Trimester 1:
- Convex Analysis for Optimization;
- Combinatorial Optimization 1a;
- Robust Optimization.

Trimester 2:
- Combinatorial Optimization 1b;
- Interior point methods;
- Inventory management in supply chains.

Trimester 3:
- Cooperative Games;
- Stochastic programming;
- Service Operations Management.

Besides information about the LNMB courses, this guide contains:
- Organizational and administrative affairs;
- Information about the operations research groups at the Dutch universities;
- Lists of members, PhD students and alumni.

The information is also available via the LNMB website www.lnmb.nl

In addition to the courses, the LNMB organizes the 36th Lunteren Conference on the Mathematics of Operations Research. This conference will be held 18 - 20th January 2011.

The LNMB gladly acknowledges the financial support by the universities. This enables the LNMB to continue its activities.

Johann Hurink,
Scientific director LNMB
June, 2010
1. Dutch Network on the Mathematics of Operations Research (LNMB)

The Dutch Network on the Mathematics of Operations Research (in Dutch: Landelijk Netwerk Mathematische Besliskunde; abbreviated LNMB) is an interuniversity co-operation in which all Dutch universities and the Centre for Mathematics and Computer Science (CWI) in Amsterdam participate. The LNMB has been established in July 1987. From 1987 until 2001 the University of Groningen was its administrator, from 2002 until 2006 the University of Maastricht, and from January 2007 the University of Twente acts as administrator of the LNMB.

The tasks of the LNMB are twofold. Firstly, the LNMB offers courses for PhD and Master students, and is responsible for the annual Lunteren Conference on the Mathematics of Operations Research. Secondly, the LNMB is an organization of full and associate professors in the field of Operations Research. The universities and the CWI are represented in the General Board out of whom an Executive Board is chosen.

The LNMB has 107 members and 156 PhD students. The LNMB courses are also accessible, on payment, to other interested people. An independent judgment by NWO (Netherlands Organization for Scientific Research) has proven that the LNMB graduate education programme is of a high international standard.

2. PhD courses and diploma requirements (general information)

The programme of the LNMB PhD courses consists of a biennial cycle and in each cycle 18 courses are offered. The subjects of the courses are in the following areas: Combinatorial Optimization, Stochastic Operations Research, Mathematical Programming, Game Theory and Applications of OR.

The programme is flexible in the sense that new PhD students can start with their programme at the beginning of any trimester. Furthermore, the individual programmes can vary; each student can choose his or her own parts of the education programme. In each trimester a combination of various subjects is taught. In general one can follow each of the courses without any prerequisites of the other courses. The courses take place on Monday in Utrecht.

The courses are intended for PhD students in Operations Research. However, Master students in mathematics, econometrics or computer science who acquired enough prerequisites are also welcome. Further information can be obtained from the director of the LNMB or from the lecturers of the courses. Furthermore, government and/or business employees who want to follow a course may participate. Participants are expected to make exercises (homework) during or at the end of the course to show that they have understood the contents of the course. The credits (including for the attendance of the course) for participants who have passed the exercises successfully have been set at 4 EC per course. In case the courses are only attended (or when the exercises are not passed successfully), the workload is set at 1 EC.

At the end of each course the participants receive a certificate with the grade and the credits involved.

The following regulation holds for the course fee. Participants from the departments of the Dutch universities which finance the LNMB don't pay any course fee. Other participants pay for each course a fee of 500 euro. The director of the LNMB is authorized to grant a reduction of this fee at occurring situations.

Application to a LNMB PhD course can be done by filling in the online application form available at the website http://www.lnmb.nl/pages/courses/. PhD students who participate for the first time in LNMB courses, also have to fill in the form for New PhD Students, which also can be found on the mentioned website.

In addition to the courses, the PhD programme includes the Lunteren Conference on the Mathematics of Operations Research. During this conference prominent - usually foreign - researchers lecture on special topics or on recent research. PhD students can give a so-called PhD presentation. In such a presentation one can present his or her research results. Attendance in the Lunteren Conference is credited by 1 EC.

PhD students who have sufficiently participated in the LNMB PhD programme and have given a PhD presentation will receive a diploma. Here, ‘sufficiently’ means total credits of 25 EC. Under certain circumstances the supervisor may submit a motivated request to give the diploma to a PhD student although he or she did not meet the requirement of the PhD presentation. After consultation with the director, it is possible that credit points from a related PhD network also count as credit points for the LNMB diploma.
3. Master courses (general information)

From September 2004, the LNMB provides Master courses in Operations Research. These courses are intended for Master students in Mathematics or Econometrics who want to take one or more courses in Operations Research. Usually, the Master thesis adviser will propose or decide that a student will participate in LNMB Master courses.

Due to the small number of Master students in Operations Research at each individual university, a national concentration is efficient and can help to guarantee a qualitatively high education. This is the main purpose of the LNMB Master courses. An additional advantage for the students is the contact with professors and students from other universities. The LNMB Master courses are part of the Dutch Master Programme in Mathematics, which is a coordinated programme of the Departments of Mathematics of the Dutch universities.

In each semester (Fall and Spring) three or four LNMB Master courses are given. The subjects of the courses are taken from the following areas: Mathematical Programming, Combinatorial Optimization and Stochastic Operations Research. The programme is flexible in the sense that new Master students can start with their programme at the beginning of any semester. Furthermore, the individual programmes can vary; each student can choose his or her own courses. The courses take place on Monday in Utrecht.

Although the courses are intended for Master students, PhD students are also welcome. It is up to their thesis adviser to propose or decide that a PhD student will attend such a course. Further information can be obtained from the director of the LNMB.

The students are subjected to an examination that usually will consist of making exercises during the course and also a written or oral examination. The credits for participants who have passed the examination successfully have been set by the LNMB at 6 EC per course. A final decision about the credits and the grade is formally up to the university of the student.

The organisational part of the Master courses is done by the Dutch Master’s Degree Programme in Mathematics (Mastermath). Therefore, Master- as well as PhD-students have to register for the Master courses of the LNMB via the website of Mastermath (http://www.mastermath.nl/). Mastermath distribute the results of the Master students to the corresponding universities and the PhD students get a certificate via LNMB.

4. PhD courses 2010/2011

During the academic year 2010/2011 nine courses will be taught in three trimesters; each trimester has a duration of nine weeks.

Trimester 1 (September 13 – November 8):
- CAO (Convex Analysis for Optimization);
- CO1a (Combinatorial Optimization 1a);
- RO (Robust Optimization).

Trimester 2 (November 15 – December 13 & January 24 – February 14):
- IPM (Interior Point Methods);
- CO1b (Combinatorial Optimization 1b);
- IMSC (Inventory Management in Supply Chains).

Trimester 3 (February 21 – April 18):
- CG: Cooperative Games;
- SP: Stochastic Programming;
- SOM: Service Operations Management.
The courses are given on Monday according to the following schedule:

<table>
<thead>
<tr>
<th>Time</th>
<th>Trimester 1</th>
<th>Trimester 2</th>
<th>Trimester 3</th>
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<tbody>
<tr>
<td>10.15 - 11.00</td>
<td>Course CAO</td>
<td>Course IPM</td>
<td>Course CG</td>
</tr>
<tr>
<td>11.15 - 12.00</td>
<td>Course CAO</td>
<td>Course IPM</td>
<td>Course CG</td>
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<td>12.00 - 13.00</td>
<td>Lunch break</td>
<td>Lunch break</td>
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<tr>
<td>13.00 - 13.45</td>
<td>Course CO1a *</td>
<td>Course CO1b</td>
<td>Course SP</td>
</tr>
<tr>
<td>14.00 - 14.45</td>
<td>Course CO1a *</td>
<td>Course CO1b</td>
<td>Course SP</td>
</tr>
<tr>
<td>15.00 - 15.45</td>
<td>Course RO</td>
<td>Course IMSC</td>
<td>Course SOM</td>
</tr>
<tr>
<td>16.00 - 16.45</td>
<td>Course RO</td>
<td>Course IMSC</td>
<td>Course SOM</td>
</tr>
</tbody>
</table>

* = in cooperation with EIDMA/DIAMANT

Location
The courses are given in the Uithof (buildings of the Utrecht University), in the Mathematical Building, Room 611AB, Budapestlaan, Utrecht.

Credits
The credits (including for the attendance of the course) for participants who have passed the exercises successfully are 4 EC per course. In case the courses are only attended (or when the exercises are not passed successfully), then the workload is set at 1 EC. At the end of each course the participants receive a certificate with the grade and the credits involved.

Registration
Anyone interested in these courses is invited to fill in the online registration form on the webpage of the LNMB (http://www.lnmb.nl/pages/courses/phdcourses/). For each of the three trimesters a separate form is given. If you are a new PhD student, please also fill in the ‘Form for New PhD students’ on that webpage.

Course CAO: “Convex Analysis for Optimization”

Time: Monday 10.15 – 12.00 (September 13 – November 8).
Location: Mathematical Building, Room 611AB, Budapestlaan, Utrecht (De Uithof).
Lecturer: Prof.dr.ir. E.J. Balder (University of Utrecht).

Course description:
Convexity plays an important role in optimization, particularly in nonlinear optimization. Many applications of optimization problems are nonlinear but have the convexity property. For convex optimization an elegant mathematical theory can be developed, including a duality theory and algorithmic aspects.

Key words for the course are: convex sets and functions; separation theorems; subdifferential calculus; polarity; Karush-Kuhn-Tucker theorem; duality; minimax results in game theory; optimal consumption and investment in economics.

Literature: Lecture notes will be provided. In addition (also as indication for the level):
- Borwein, J. and A.S. Lewis, Convex analysis and nonlinear optimisation, 2nd edition, Springer-Verlag, New York, 2006;

Prerequisites:
Basic knowledge (bachelor level) of analysis and linear algebra.

Examination:
Take home problems.

Address of the lecturer:
Prof.dr.ir. E.J. Balder
Mathematical Institute, University of Utrecht, P.O. Box 80.010, 3508 TA Utrecht
Phone: 030 - 2531458
E-mail: balder@math.uu.nl
Course CO1a: Combinatorial Optimization 1a

**Time:** Monday 13.00 – 14.45 (September 13 – November 8).

**Location:** Mathematical Building, Room 611AB, Budapestlaan, Utrecht (De Uithof).

**Lecturers:** Prof.dr. M. Laurent (CWI and Tilburg University).

**Course description:**
Combinatorial optimization problems are concerned with the efficient allocation of limited resources to meet desired objectives when the values of the variables are restricted to be integral.

Combinatorial problems arise in various applications, e.g. airline crew scheduling, manufacturing, network design, cellular telephone frequency design and optimization problems on graphs.

The course deals with polynomial-time solvable combinatorial optimization problems. Many of these problems are special cases of linear programming problems.

The following subjects are discussed:
- Shortest paths and trees;
- Polytopes, polyhedra, Farkas' lemma and linear programming;
- Matchings and covers in bipartite graphs;
- Menger's theorem, flows and circulations;
- Non-bipartite matchings.

**Literature:**
- Lecture notes: *A Course in Combinatorial Optimization*, A. Schrijver, CWI (chapters 1-5);

**Prerequisites:**
Basic knowledge (bachelor level) of linear algebra and graph theory.

**Examination:**
Take home problems.

**Address of the lecturer:**
Prof.dr. M. Laurent
CWI, P.O. Box 94079, 1090 GB Amsterdam.
Phone: 020 - 5924105.
E-mail: m.laurent@cwi.nl

Course RO: Robust Optimization

**Time:** Monday 15.00 – 16.45 (September 13 – November 8).

**Location:** Mathematical Building, Room 611AB, Budapestlaan, Utrecht (De Uithof).

**Lecturer:** Prof. Aharon Ben-Tal (Technion – Israel Institute of Technology) and Prof.dr.ir. D. den Hartog (Tilburg University).

**Course description:**
Optimization problems often contain parameters that are uncertain. The recent methods developed in Robust Optimization try to find solutions that are robust against these uncertainties. The idea is to define a so-called uncertainty region for the uncertain parameters, and then require that the constraints should hold for all parameter values in this uncertainty region. For several optimization problems, and for several choices of the uncertainty region, it has been shown that this so-called robust counterpart problem can be reformulated as tractable optimization problems. The main focus of this course is on robust linear optimization (LO).

The main topics treated are:
- Uncertain LO problems:
  - Data uncertainty in LO;
  - Tractability of robust counterparts;
  - Non-affine perturbations;
  - Applications in logistics, marketing, finance, engineering, etc.
- Robust counterpart approximations of scalar chance constraints:
  - How to specify an uncertainty set?
  - Chance constraints;
  - Safe tractable approximations.
- Globalized robust counterparts of uncertain LO problems:
  - Motivation and definition of globalized robust counterpart;
  - Computational tractability;
  - Alternative formulation.
- Data-driven uncertainty regions and their tractability:
  - Phi-divergence distance and goodness-of-fit;
  - Tractability of robust LO problem with phi-divergence based uncertainty region.
- Robust adjustable multistage optimization:
  - Adjustable robust counterpart;
  - Restriction to affine decision rules.

**Literature:**
Selected parts of:
- Handouts.

**Prerequisites:**
- Knowledge of basic linear algebra;
- Knowledge of linear programming and duality;
- Basic knowledge of non-linear optimization.

**Examination:**
Project in which the student applies different aspects of Robust Optimization to her/his own optimization problem (preferably chosen from own research topic). Final deliverable is a report on this project.

**Addresses of the lecturers:**
Prof. Aharon Ben-Tal
Technion - Israel Institute of Technology
E-mail: abentalie.technion.ac.il

Prof.dr.ir. D. den Hertog
Tilburg School of Economics and Management
Tilburg University, P.O. Box 90153 LE Tilburg
Phone: 013 -4662122
E-mail: d.dehertog@uvt.nl

**Course IPM: “Interior Point Methods”**

*Time:* Monday 10.15 – 12.00 (November 15 – December 13 & January 24 – February 14).
*Location:* Mathematical Building, Room 611AB, Budapestlaan, Utrecht (De Uithof).
*Lecturer:* Prof.dr. E. de Klerk (Tilburg University).

**Course description:**
The field of optimization, particularly linear, convex and semi-definite optimization, has been given a new impulse by the development of interior point methods. Besides the existence of a new theory, there is a tremendous activity in new applications, especially in semi-definite programming.

The topics for this course include:
- interior-point methods for conic programming;
- classical duality theory for conic programming;
- symmetric cones;
- primal-dual interior-point algorithms;
- semidefinite programming.
Literature:
- Main course notes (students: please buy or borrow this book before the course starts. If you order the book from Amazon.com, then allow enough time for delivery);

Prerequisites:
Basic knowledge (bachelor level) of analysis (multivariate calculus) and linear algebra, as well as a first course in linear and nonlinear programming.

Examination:
Take home problems.

Address of the lecturer:
Prof.dr. E. de Klerk
Department of Econometrics & Operations Research, Tilburg University, P.O. Box 90153, 5000 LE Tilburg.
Phone: 013 - 4662031.
E-mail: e.deklert@uvt.nl

Course CO1b: “Combinatorial Optimization 1b”

Location: Mathematical Building, Room 611AB, Budapestlaan, Utrecht (De Uithof).
Lecturer: Dr.ir. C.A.J. Hurkens (Eindhoven University of Technology).

Course description:
Combinatorial optimization problems are concerned with the efficient allocation of limited resources to meet desired objectives when the values of the variables are restricted to be integral. Combinatorial problems arise in various applications, e.g. airline crew scheduling, manufacturing, network design, cellular telephone frequency design and optimization problems on graphs. The course deals with polynomial-time solvable combinatorial optimization problems. Many of these problems are special cases of problems that are intrinsically hard to solve - in general.

The following subjects are discussed:
- problems, algorithms and running time; cliques, co-cliques and colouring;
- integer linear programming and totally unimodular matrices; multicommodity flows and disjoint paths;
- matroids.

Literature:
- Lecture notes: A Course in Combinatorial Optimization, A. Schrijver, CWI (chapters 6-10);

Prerequisites:
Basic knowledge (bachelor level) of linear algebra and graph theory.

Examination:
Take home problems.

Address of the lecturer:
Dr.ir. C.A.J. Hurkens
Dept. of Mathematics & Computer Science
Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven
Phone: 040 – 2474771
E-mail: c.a.j.hurkens@tue.nl
Course IMSC: “Inventory Management in Supply Chains”

**Time**: Monday 15.00 – 16.45 (November 15 – December 13 & January 24 – February 14).
**Location**: Mathematical Building, Room 611AB, Budapestaan, Utrecht (De Uithof).
**Lecturers**: Prof.dr. A.G. de Kok (Eindhoven University of Technology) and prof.dr.ir. G.J.A.N. van Houtum (Eindhoven University of Technology).

**Course description**:
This course consists of two parts. In the first part, we study classical supply chains, in which multiple parties cooperate in order to satisfy the requirements of the clients against minimal total costs. The cooperation becomes operational by coordinating the orders in the chain.

By a better coordination between inventory and production, costs may be saved in the total chain. We study various coordination strategies. We start with strategies for individual items at single locations and we end with strategies for multiple items in whole networks of production and inventory points. In the second part, we study spare parts networks.

Many advanced technical systems require high uptime percentages. For most of these systems, a repair-by-replacement concept is used and then a smart method for the spare parts provisioning is essential to realize high uptime percentages against reasonable costs. Key issues are the use of multi-item models which are directly focussed on the availability of the technical systems, the use of lateral transshipments to create pooling effects, and differentiation between customers with different uptime requirements. In both parts, we treat the fundamental mathematical models, we discuss various modelling aspects, and we present applications in real-life situations.

**Literature**:
- Course reader;

**Prerequisites**:
Basic knowledge (bachelor level) of analysis and linear algebra, as well as probability theory.

**Examination**:
Take home problems.

**Addresses of the lecturers**:
Prof.dr. A.G. de Kok
Department of Technology Management, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven.
Phone: 040 - 2473849.
E-mail: a.g.d.kok@tm.tue.nl

Prof.dr.ir. G.J.A.N. van Houtum
Department of Technology Management, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven.
Phone: 040 - 2475163
E-mail: g.j.v.houtum@tm.tue.nl

Course CG: “Cooperative Games”

**Time**: Monday 10.15 – 12.00 (February 21 – April 18).
**Location**: Mathematical Building, Room 611AB, Budapestaan, Utrecht (De Uithof).
**Lecturers**: Prof.dr. P.E.M. Borm (Tilburg University).

**Course description**:
Game theory studies interactive decision situations involving conflict and/or cooperation. In cooperative games binding agreements are allowed and the players may form coalitions. The focus is on the question how to reallocate the resulting joint coalitional payoff among the players in a fair way.

The following subjects are discussed:
- Games in characteristic form (TU games);
- Shapley value, compromise value and nucleolus;
- Core concepts;
- Convexity and compromise stability;
- Some classes of ORGames: flow games and linear production games.

**Literature:**
Lecture notes will be provided.
NOT compulsory (just as an indication):

**Prerequisites:**
Basic knowledge of analysis and linear algebra.

**Examination:**
Take home problems.

**Address of the lecturer:**
Prof.dr. P.E.M. Borm
Department of Econometrics & Operations Research, Tilburg University, P.O. Box 90153, 5000 LE Tilburg.
Phone: 013 - 4663026.
E-mail: p.e.m.borm@uvt.nl

**Course SP:** “Stochastic Programming”

**Time:** Monday 13.00 – 14.45 (February 21 – April 18).

**Location:** Mathematical Building, Room 611AB, Budapestlaan, Utrecht (De Uithof).

**Lecturer:** Prof.dr. M.H. van der Vlerk (University of Groningen).

**Course description:**
Stochastic programming (see also http://stoprog.org) is a framework for modelling optimization problems that involve uncertainty. Whereas deterministic optimization problems are formulated with known parameters, real world problems almost invariably include some unknown parameters. When the parameters are known only within certain bounds, one approach to tackling such problems is called robust optimization. Here the goal is to find a solution which is feasible for all such data and optimal in some sense. Stochastic programming models are similar in style but take advantage of the fact that probability distributions governing the data are known or can be estimated. The goal here is to find some policy that is feasible for all (or almost all) the possible data instances and maximizes the expectation of some function of the decisions and the random variables. More generally, such models are formulated, solved analytically or numerically, and analyzed in order to provide useful information to a decision-maker.

The most widely applied and studied stochastic programming models are two-stage linear programs. Here the decision maker takes some action in the first stage, after which a random event occurs affecting the outcome of the first-stage decision. A recourse decision can then be made in the second stage that compensates for any bad effects that might have been experienced as a result of the first-stage decision. The optimal policy from such a model is a single first-stage policy and a collection of recourse decisions (a decision rule) defining which second-stage action should be taken in response to each random outcome.

The following subjects are discussed:
- Concepts and examples of stochastic programming;
- Stochastic linear programming;
- Recourse models;
- Chance constraints;
- SP calculus (e.g. convexity; approximation of distributions);
- Algorithms;
- Stochastic integer programming;
- Multi-stadia recourse models;
- Case study.

**Literature:**
Lecture notes will be provided.
Indication for the level:
- J.R. Birge and F. Louveaux, Introduction to stochastic programming, Springer, 1997;
Prerequisites:
- Basic knowledge of probability theory: S.M. Ross, Introduction to probability models, 8th edition, Academic Press, 2003 (chapters 1-3);
- Basic knowledge of linear programming: V. Chvatal, Linear programming, Freeman, 1983.

Examination:
Take home problems, case study.

Address of the lecturer:
Prof.dr. M.H. van der Vlerk
Department of Operations, University of Groningen, P.O. Box 800, 9700 AV Groningen.
Phone: 050 - 3633816.
E-mail: m.h.van.der.vlerk@rug.nl

Course SOM: “Service Operations Management”

Time : Monday 15.00 – 16.45 (February 21 – April 18).
Location: Mathematical Building, Room 611AB, Budapestlaan, Utrecht (De Uithof).
Lecturers: Prof.dr. G.M. Koole (VU University Amsterdam) and Dr. R. Bekker (VU University Amsterdam).

Course description:
We study applications of stochastic models in the service sector, mainly revenue management and applications in call centers. Although the emphasis is on the stochastic models, we discuss also relevant statistical and mathematical programming problems.

Literature:

Prerequisites:
Basic probability theory, Markov processes, elementary queueing theory (Erlang B and C, Pollaczek-Khintchine).

Examination:
Take home problems.

Addresses of the lecturers:
Prof.dr. G.M. Koole
Vrije Universiteit Amsterdam, De Boelelaan 1081a, 1081 HV Amsterdam
Phone: 020 - 5987755
E-mail: koole@few.vu.nl

Dr. R. Bekker
Vrije Universiteit Amsterdam, De Boelelaan 1081a, 1081 HV Amsterdam
Phone: 020 - 5987755
E-mail: rbekker@few.vu.nl
5. Master courses 2010/2011

During the academic year 2010/2011 seven courses will be taught in two semesters; each semester has a duration of 12 weeks. The courses are part of the Dutch Master Programme in Mathematics (http://www.mastermath.nl).

Fall 2010:
- ISP (Introduction to stochastic processes; September 6, 7, 13 and 14);
- CO (Continuous optimization; September 20 – December 6);
- DO (Discrete optimization; September 20 – December 6);
- HEU (Heuristic Methods in Operations Research; September 20 – December 6).

Spring 2011 (January 31 – April 18):
- ALP (Advanced linear programming);
- SCH (Scheduling);
- QT (Queueing theory).

The courses are given on Monday according to the following schedule:

<table>
<thead>
<tr>
<th>Time</th>
<th>Fall 2010*</th>
<th>Spring 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00 - 11.45</td>
<td>Course CO</td>
<td>Course ALP***</td>
</tr>
<tr>
<td>12.00 - 12.45</td>
<td>Course CO</td>
<td>Course ALP***</td>
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<td>12.45 - 13.15</td>
<td>Lunch break</td>
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<tr>
<td>13.15 - 14.00</td>
<td>Course DO</td>
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<td>14.15 - 15.00</td>
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<tr>
<td>15.15 - 16.00</td>
<td>Course HEU</td>
<td>Course QT</td>
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<td>16.15 - 17.00</td>
<td>Course HEU</td>
<td>Course QT</td>
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</tbody>
</table>

* The course ISP is taught on September 6, 7, 13 and 14 (10.15 – 12.00 and 13.00 – 14.45 each day).
** In cooperation with EIDMA/DIAMANT

Location
The courses are given in the Uithof (buildings of the Utrecht University). Detailed information on the location can be found on the website of the Dutch Master Programme in Mathematics (MasterMath): http://www.mastermath.nl/locations.

Credits
The credits for students who have passed the exercises successfully are 6 EC per course, except the short course ISP (4 EC).

Detailed information about the courses
The registration and administration of the master courses is done by the Dutch Master Programme in Mathematics. Anyone interested in these courses is invited to register via http://www.mastermath.nl.

Course ISP: “Introduction to Stochastic Processes”

Time : Monday 10.15 – 12.00 and 13.00 – 14.45 (September 6, 7, 13 and 14).
Location: Utrecht (De Uithof).
Lecturers: Prof.dr.ir. I.J.B.F. Adan (Eindhoven University of Technology) and Prof.dr.ir. O.J. Boxma (Eindhoven University of Technology).

Aim:
To provide an introduction in the basic notions of stochastic processes as applied in stochastic operations research topics like queueing theory and Markov decision processes.

Description:
The following subjects will be treated:
- Discrete time Markov chains, including classification of states and long run behaviour and branching processes;
- Exponential distribution and Poisson Processes;
- Generating functions and Laplace-Stieltjes transforms;
- Continuous time Markov chains and birth-and-death processes;
- Renewal theory, including renewal theorem, renewal reward processes and regenerative processes.

Literature:
**Examination:**
Written examination.

**Prerequisites:**

**Addresses of the lecturers:**
Prof.dr.ir. I.J.B.F. Adan
Dept. of Mathematics & Computer Science, Eindhoven University of Technology
P.O. Box 513, 5600 MB Eindhoven
Phone: 040-2472932
E-mail: i.j.b.f.adan@tue.nl

Prof.dr.ir. O.J. Boxma
Dept. of Mathematics & Computer Science, Eindhoven University of Technology
P.O. Box 513, 5600 MB Eindhoven
Phone: 040-2472858/3130
E-mail: o.j.boxma@tue.nl

**Course CO: “Continuous Optimization”**

**Time:** Monday 11.00 – 12.45 (September 20 – December 6).

**Location:** Utrecht (De Uithof).

**Lecturer:** Dr. G.J. Still (University of Twente).

**Aim:**
The course aims to provide an advanced introduction into the basics and methods of nonlinear continuous optimisation (also called nonlinear programming).

**Course description:**
The course starts with some historical examples and an introduction into convex sets and convex functions. Then, optimality conditions in unconstrained and constrained optimization are discussed with emphasis on convex problems. Duality in convex optimization is the next topic followed by an introduction into the basic algorithms for unconstrained and constrained problems. Finally as a special topic, LP-, Lagrange- and semidefinite-relaxations of integer programs are studied.

**Literature:**
- Lecture notes "Nonlinear Optimization", by E. de Klerk, C. Roos, T. Terlaky;

**Prerequisites:**
Basic knowledge of linear algebra and multivariate analysis.

**Examination:**
Written examination.

**Remark:**
More information and study material is to be found at http://wwwhome.math.utwente.nl/~stillgj/conopt/index.html.

**Address of the lecturer:**
Dr. G.J. Still
Department of Applied Mathematics, University of Twente, P.O. Box 217, 7500 AE Enschede
Phone: 053-4893404
E-mail: g.j.still@utwente.nl / URL: http://wwwhome.math.utwente.nl/~stillgj/conopt/index.html
**Course DO: “Discrete Optimization”**

**Time:** Monday 13.15 – 15.00 (September 20 – December 6).

**Location:** Utrecht (Uithof).

**Lecturer:** Prof.dr. M. Uetz (University of Twente).

**Aim:**
To provide a solid foundation in Discrete Optimization, with an eye on algorithm design and algorithm analysis, including the basics of computational complexity.

**Course description:**
In Discrete Optimization, as opposed to Continuous Optimization, we deal with objects which are finite or at most countable. An archetypical problem is the notorious traveling salesman problem (find the shortest of a finite number of possible tours), but also linear programming can be seen as a discrete problem (find the best among a finite number of vertices of a polyhedron). The course introduces some of the most relevant problems from the area, as well as algorithms to solve them.

The following topics will (most probably) be treated:
- Algorithms & Analysis;
- Shortest Path Algorithms;
- Spanning Trees & Matroids;
- Maximum Flows & Minimum Cuts;
- Minimum Cost Flows;
- P, NP, coNP, NP-completeness;
- Integer Linear Programming & Total Unimodularity;
- Approximation Algorithms;
- Primal-Dual Algorithms;
- Inapproximability & Approximation Schemes.

**Literature:**
We use a reader with selected chapters from several books listed below. The reader can be purchased in the first lecture. Occasionally additional copies will be distributed, if necessary.

**Prerequisites:**
Knowledge of linear algebra and basic graph theory is recommended.

**Examination:**
Take home problems (40%) and a written exam (60%).

**Address of the lecturer:**
Prof.dr. M. Uetz
Department of Applied Mathematics, University of Twente, P.O. Box 217, 7500 AE Enschede
Phone: 053-4893420
E-mail: m.uezt@utwente.nl / URL: http://wwwhome.math.utwente.nl/~uetzm/home.html

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**Course HEU “Heuristic Methods in Operations Research”**

**Time:** Monday 15.15 – 17.00 (September 20 – December 6).

**Location:** Utrecht (De Uithof).

**Lecturers:** Prof.dr. J.L. Hurink (University of Twente) and dr. J.M.J. Schutten (University of Twente).

**Aim:**
This course gives an overview of heuristic solution methods in combinatorial optimization.
Description:
Due to the computational complexity of most of the practical relevant optimization problems, heuristic methods form an important class of solution methods for such problems. In this course we give an overview of different classes of heuristic solution approaches and present examples of their application.

In detail, the following issues are treated:
- Sampling based heuristics;
- Restricted dynamic programming;
- Truncated branch and bound/beam search;
- Relaxations/lower bounds;
- Evaluation techniques;
- Local Search;
- Evolutionary methods;
- Hierarchical and decentralized approaches.

Literature:
Handouts.

Examination:
Oral or written examination and possibly take home problems.

Prerequisites:
Basic knowledge (bachelor level) of analysis, linear algebra and linear programming.

Addresses of the lecturers:
Prof.dr. J.L. Hurink
Department of Applied Mathematics, University of Twente, P.O. Box 217, 7500 AE Enschede
Phone: 053 – 4893447
E-mail: j.l.hurink@utwente.nl / URL: www.math.utwente.nl/~hurinkjl

Dr.ir. J.M.J. Schutten
Department OMPL, University of Twente, P.O. Box 217, 7500 AE Enschede
Phone: 053 – 4894676
E-mail: j.m.j.schutten@utwente.nl / URL: www.mb.utwente.nl/ompl/staff/Schutten/

Course ALP: “Advanced Linear Programming”

Time: Monday 11.00 – 12.45 (January 31 – April 18).
Location: Utrecht (De Uithof).
Lecturers: Prof.dr. L. Stougie (VU University Amsterdam) and Dr. S. Canzar (Centrum Wiskunde en Informatica).

Aim:
To provide insight in theory and development of practical methods for basic and advanced linear programming.

Course description:
Part 1: Basic theory and algorithms of linear optimization:
- Linear optimization; polyhedra and polytopes; the simplex algorithm; duality; linear inequalities and Farkas’ lemma; sensitivity analysis.
Part 2: Advanced linear optimization methods:
- The revised simplex method and column generation; Dantzig-Wolfe- and Benders' decomposition; network flow problems; the ellipsoid method; an interior point method; integer programming formulations and solution methods.

Literature:

Prerequisites:
Basic knowledge (bachelor level) of linear algebra and graph theory.

Examination:
Written examination.
Addresses of the lecturers:
Prof. dr. L. Stougie
Department of Econometrics and Operations Research
Faculty of Economics & Business Administration, VU University Amsterdam
De Boelelaan 1105, 1081 HV Amsterdam
Phone: 020 – 5989391
E-mail: lstougie@feweb.vu.nl

Dr. S. Canzar
CWI, Science Park 123, 1098 XG Amsterdam
Phone: 020-5924017
E-mail: s.canzar@cwi.nl

Course SCH: “Scheduling”

Time : Monday 13.15 – 15.00 (January 31 – April 18).
Location: Utrecht (De Uithof).
Lecturer: Prof. dr. J.L. Hurink (University of Twente).

Aim:
This course gives an introduction into scheduling theory and its applications.

Course description:
The term scheduling represents the assignment of resources over time to perform tasks, jobs or activities. Feasible schedules are compared with respect to a given optimality criterion. Mostly, the optimization problem is combinatorial and very complex. From a computational point of view these problems are hard (NP-hard) and the classical techniques fail in practice In this course an overview on the most classical scheduling models is given and exact as well as heuristic solution methods are discussed for these models.
In detail, the following issues are treated:
- Classification of scheduling models;
- Single-machine models;
- Parallel-machines models;
- Open shop, flow shop and job shop models;
- Timetabling;
- Transportation;
- On-line models.

Literature:
- Handout for special subjects.
The following books can be used as background and further information, but do not have to be bought:

Prerequisites:
Basic knowledge (bachelor level) of analysis and linear algebra.

Examination:
Take home problems and an oral examination.

Address of the lecturer:
Prof. dr. J.L. Hurink
Department of Applied Mathematics, University of Twente, P.O. Box 217, 7500 AE Enschede
Phone: 053 – 4893447
E-mail: j.l.hurink@utwente.nl / URL: www.math.utwente.nl/~hurinkjl
**Course QT: “Queueing Theory”**

*Time*: Monday 15.15 – 17.00 (January 31 – April 18).

*Location*: Utrecht (De Uithof).

*Lecturers*: Dr.ir. W.R.W. Scheinhardt (University of Twente).

*Aim*: To provide insight in the theory of queueing models.

*Course description*: The following subjects will be treated:
- Fundamental queueing relations (Little's law, PASTA property);
- Markovian queues (M/M/1 queue, M/M/c queue, M/E_r/1 queue);
- M/G/1 queue and G/M/1 queue;
- Mean value technique;
- Priority queues;
- Variations of the M/G/1 queue;
- Insensitive queues (M/G/c/c queue and M/G/Infinity queue).

*Literature*: Lecture notes of the course "Queueing Theory" (free available: [http://www.win.tue.nl/~iadan/queueing.pdf](http://www.win.tue.nl/~iadan/queueing.pdf)).


*Examination*: Written examination.

*Address of the lecturer*: Dr. W.R.W. Scheinhardt
Department of Applied Mathematics, University of Twente, P.O. Box 217, 7500 AE Enschede
Phone: 053-4893832
E-mail: w.r.w.scheinhardt@utwente.nl / URL: www.math.utwente.nl/~scheinhardtwrw
6. Financial regulations

LNMB

The following arrangements hold.

1. Only PhD students who are preparing their thesis under supervision of a member of the LNMB (see the list in paragraph 12 of this booklet) are considered for financial aid.
2. The LNMB does not pay the PhD students directly; the payment will be done afterwards to the administration of the university of the PhD student. In order to receive the payment, a form has to be submitted. These forms are available at the LNMB secretary.
3. Reimbursements are intended for education activities such as courses and workshops. For participation in courses, 50% of the price of a second class train return ticket between the university location and Utrecht is reimbursed. For participation in the Lunteren conference there can be given a compensation for lodging with a maximum of 50 euro per conference or workshop.
4. The other expenses will be accounted to the PhD students or their universities.

NWO

NWO provides grants for research. There are grants for working visits and for attending conferences. Information about these grants can be requested from NWO, phone: 070 - 3440624 (Grant Program Office).

NUFFIC

The Netherlands has cultural accords with various countries, which include arrangements for scientific co-operation and exchange. Scientific staff can obtain, under special conditions, a grant for short visits to other countries. The money originates from the Ministry OCW (Education, Culture and Science). NUFFIC takes care of the formalities. See also www.nuffic.nl/studie/beursopener.html

OTHER GRANTS

For information about other grants we refer to the administration of your own university. See also www.vsnu.nl
7. LNMB certificated persons (197)

J.M. van den Akker  M.E. Angün  A. Asadi
E.M. Bázs  R. Bekker  S. Bhulai
M. Bijvank  H.M. le Blanc  J.M. Bloemhof – Ruwaard
C.A. Boer  K.M.J. de Bontrider  N.K. Boots
S.C. Borst  R.J. Boucherie  Y. Boulaksil
G.M. te Brake  R.C.M. Brekelmans  M.P. de Brito Peirera Maduro
J.J.J. van de Broek  J. Bruin  G. Budai
A. Bump  N.C. Büyükkaramikli  D. Chaerani
S.K. Cheung  T.J.M. Coenen  M.B. Combé
U. Corbacioglu  M. Cremers  F.C.A.M. Cruissens
Q. Deng  A.B. Dieker  E.B. Diks
A. Dobber  C. Dobre  M.K. Dogru
D. Dollevoet  A.B. Dragut  R. Egorova
C.A. van Eijl  E. Elabwab  M. Elghami
I. Endrayanto  A. Estevez Fernandez  M. Firat
O. Gabali  S.M. Geervliet  J.R.G. van Gellekom
J.-W. Goossens  F.N. Gouweleeuw  R.M.P. Goverde
A. Grigoriev  E.A. Grigorieva  G. Gu
R. de Haan  A. Haesel  R. Hajjema
C.J.H. Hendriks  D. den Hertog  W. van den Heuvel
B. Heydenreich  W.B. van den Hout  G.-J.J.A.N. van Houtum
D. Huisman  B.G.M. Hisslag  L.J.J. van Iersel
V.C. Ivanescu  I.D. Ivanov  W. van Jaarsveld
B. Jansen  J.B. Jansen  M. Jansen
E. Janssen  F.B.S.L.P. Janssen  R.P. Kampstra
B. Kaynar  O.A. Kilic  B.-E. Klaus
M.J. Kleijn  J. Kleppe  E. de Klerk
F. Klijn  A.L. Kok  G.M. Koole
J. de Kort  P. Korteweg  A.M.C.A. Koster
M. Koster  S. Kovaleva  A.F. van der Kraaij
M.G.C. van Krieken  B.H.M. Kuijpers  C.M.H. Kuijpers
T. Le Anh  T. Le Duc  R.L.M.J. van Leensel
H.L. Liem  P. Lieshout  O. Listes
J.A. Loeve  R.B. Lok  J.M.W. van Loon
F.J.W. Lutgens  M. Mainegra Hing  M.R.H. Mandjes
H. Mansouri  S. Marban  B. Marchal
N.A.A. Marquinie  P.J.M. Meersmans  M.A. Meertens
F.J.C. van Megen  R.D. van der Mei  W.J.M. Meufels
G. Mincsovics  D.I. Miretskiy  M. Mnich
R. Nicolai  L. van Norden  R. Núñez Queija
N.J. Olieman  M. Oosten  D. van Ooteghem
G.J.M. Otten  P. Out  P. Ouwehand
O. Özdemir  U. Özen  K. Pak
O. Passchier  J.J. Paulus  L.W.P. Peeters
N. Piersma  P.C. Pop  E. Porras Musalem
S.A. Pot  D. Potthoff  M. Pourakbar
M. Quant  A.J. Quist  J.H. Reijnierse
G. Rennen  M. Retel Helrich  D. Romero Morales
D. Roubos  J.H.G.C. Rutten  B. Selçuk
A.Y.D. Siem  B.P. Silalabi  A. Spletchenko
M. Slikker  E. Smeltink  J. Smeltink
M.A.J. Smith  S.R. Smits  M. Sol
M.J. Soomer  P.F. Spans  F.C.R. Spieksma
J.M. Spitter  M.H. Streutker  J.F. Sturm †
M. Tennekes  R.H. Teunter  M.J.G. van Uitert
A. Ule  R.J.M. Vaessens  P.T. Vanberkel
S.G. Vanneste  H.J.J. Verheijen  C. Verhoef
M. Verloop  A.J. Vermeulen  A.M. Verweij
A.P.A. Vestjens  M. Vieira  I.F.A. Vis
M. Vlasiou  M.H. van der Vlerk  I. Vliegen
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<tr>
<td>A. van Vliet</td>
<td>J.P.A. van Vliet</td>
<td>Y. Volkovich</td>
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<td>T. Vredevelt</td>
<td>M.J.C.M. Vromans</td>
<td>M. van Vuuren</td>
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<tr>
<td>X. Wang</td>
<td>M. Wennink</td>
<td>W. van der Weij</td>
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<td>A.C.C. van Wijk</td>
<td>R. Wildeman</td>
<td>E.M.M. Winands</td>
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<tr>
<td>R. Yang</td>
<td>Z. Yang</td>
<td>T. Yuan</td>
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<tr>
<td>C.M. Zwaneveld</td>
<td>A.P. Zwart</td>
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</tbody>
</table>
8. Structuurschets interne organisatie LNMB (in Dutch)

Vastgesteld in de algemene ledenvergadering van 16 januari 1991, aangepast in de algemene ledenvergadering van 16 januari 2007

0. Preambule

De juridische structuur van het LNMB is nog niet vastgelegd, en dat gebeurt ook niet door onderstaande structuurschets. Op dit moment is het niet opportuun om de juridische aspecten volledig uit te werken, dat zal te zijner tijd gebeuren in samenhang met de uitwerking van de structurele financiering. Bovendien is het wenselijk om te wachten tot de discussie over "onderzoekscholen" verder gevorderd is. Wel is het op dit moment noodzakelijk om interne gedragsregels af te spreken, onder meer omdat de hoogleraar-directeur is aangesteld.

1. Het Landelijk Netwerk Mathematische Besliskunde

Het LNMB is een organisatie die een landelijke tweede-fase onderzoekersopleiding in de mathematische besliskunde verzorgt. Door landelijke bundeling van internationaal erkende expertise en door inzet van vooraanstaande onderzoekers uit het buitenland wordt gestreefd naar een opleiding van hoge kwaliteit. Het LNMB streeft naar een goede afstemming van activiteiten met de universitaire instellingen en met andere tweede fase opleidingen.

2. Leden

Lid van het LNMB kunnen zijn hoogleraren of UHD's (inclusief emeriti) van de Nederlandse universiteiten of medewerkers van het CWI, die actief onderzoeker zijn op een van de deelgebieden van de mathematische besliskunde, en betrokken zijn bij de begeleiding van aio's/oio's. De ledenlijst staat vermeld in de brochure. Over toelating van nieuwe leden beslist het Algemeen Bestuur.

3. Algemeen Bestuur


Het Algemeen Bestuur heeft tot taak:

a. Het benoemen van nieuwe leden van het LNMB;
b. Het benoemen van de Wetenschappelijk Directeur;
c. Het toezien op de activiteiten van het Dagelijks Bestuur;
d. Het jaarlijks vaststellen van het algemeen en financieel verslag, alsmede van de begroting voor het komende jaar;
e. Alles te doen wat de doelstellingen van het LNMB kan bevorderen.

4. Dagelijks Bestuur


Het Dagelijks Bestuur heeft tot taak:

a. Het vaststellen van het onderwijsprogramma van het LNMB, in het bijzonder de aanwijzing van de docenten;
b. Het vaststellen van regels voor de beoordeling van de deelnemende aio's/oio's door de docenten en het vaststellen van slaagregels;
c. Het vaststellen van cursusgelden, contributies, vergoedingen etc.;
d. Het vaststellen van regelingen voor diploma's, en het afgeven van diploma's aan deelnemers die geslaagd zijn;
e. Het jaarlijks uitbrengen van een begroting, ten behoeve van het Algemeen Bestuur;
f. Het zorgdragen voor de continuïteit van de activiteiten van het LNMB; inhaken op actuele ontwikkelingen, het veilig stellen van structurele financiering etc.;
g. Het adviseren van de Wetenschappelijk Directeur bij diens taakuitoefening;
h. Alles te doen wat de doelstellingen van het LNMB kan bevorderen.

Het Dagelijks Bestuur is verantwoording verschuldigd aan het Algemeen Bestuur en aan de Ledenvergadering.

5. Wetenschappelijk Directeur

De Wetenschappelijk Directeur heeft tot taak:
a. Het voorbereiden en doen uitvoeren van het onderwijsprogramma;
b. Het beslissen omtrent toelating van deelnemers aan het onderwijsprogramma op grond van door het Dagelijks Bestuur vastgestelde regels;
c. Het bijhouden van een administratie van deelnemers aan het onderwijsprogramma, en de door hen behaalde resultaten;
d. Het toezicht houden op het financieel beheer dat namens het LNMB wordt gevoerd;
e. Het voorbereiden van de vergaderingen van het Dagelijks Bestuur, het Algemeen Bestuur en de Ledenvergadering;
f. Het opstellen van voorlichtingsmateriaal voor aio's/oio's en andere belangstellenden;
g. Het verzorgen van goede contacten met de penvoerende instelling, met deelnemende aio's/oio's en hun promotoren, met docenten, met instellingen die bij het LNMB zijn betrokken, en met verwante netwerken.

De Wetenschappelijk Directeur is verantwoording verschuldigd aan het Dagelijks Bestuur.

6. Ledenvergadering
Ieder kalenderjaar, bij voorkeur tijdens de jaarlijkse Lunteren-conferentie, wordt een Ledenvergadering gehouden, waar onder meer aan de orde komen:
a. Het algemeen verslag over het afgelopen kalenderjaar;
b. De plannen voor het komende kalenderjaar.

De Ledenvergadering heeft verder tot taak:
c. De benoeming van de leden van het Dagelijks Bestuur en van het Algemeen Bestuur;
d. Het vaststellen van de gedragregels die binnen het LNMB worden gehanteerd.

7. Financiën
Voor de periode 1989 - 1993 heeft de Minister van Onderwijs en Wetenschappen het LNMB een startsubsidie toegekend. Daarna hebben de instellingen via een jaarlijkse bijdrage gezorgd voor het voortbestaan van het LNMB. De gelden wordt beheerd door de penvoerende instelling. Betalingen behoeven de goedkeuring van de Wetenschappelijk Directeur, die gehouden is aan regels die door het Dagelijks Bestuur zijn vastgelegd.

8. Slot
In alle gevallen waarin deze regels niet voorzien, beslist het Dagelijks Bestuur.

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Institution</th>
<th>Research Theme</th>
<th>Projectleader(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a.</td>
<td>CWI</td>
<td>Algorithms, Combinatorics and Optimization</td>
<td>Laurent</td>
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<tr>
<td>1b.</td>
<td>CWI</td>
<td>Communication and computer networks</td>
<td>Van der Mei</td>
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<td>2.</td>
<td>EUR</td>
<td>Operations Research</td>
<td>Van der Vorst</td>
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<td>3.</td>
<td>WUR</td>
<td>Operations Research</td>
<td>Van Dam</td>
</tr>
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<td>4a.</td>
<td>UvT</td>
<td>Operations Research</td>
<td>Born/Tijs</td>
</tr>
<tr>
<td>4b.</td>
<td>UvT/RU</td>
<td>Operations Research and game theory</td>
<td>Van Hoesel</td>
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<td>5a.</td>
<td>UM</td>
<td>Combinatorial optimization</td>
<td>Thuijsman</td>
</tr>
<tr>
<td>5b.</td>
<td>UM</td>
<td>Game theory and optimization</td>
<td>Van der Vlerk</td>
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<td>6.</td>
<td>RUG</td>
<td>Operations Research</td>
<td>Kallenman</td>
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<td>7.</td>
<td>UL</td>
<td>Stochastic Operations Research</td>
<td>Roos</td>
</tr>
<tr>
<td>8a.</td>
<td>TUD</td>
<td>Interior point methods</td>
<td>Aardal</td>
</tr>
<tr>
<td>8b.</td>
<td>TUD</td>
<td>Optimization</td>
<td>Prof.dr. M. Laurent.</td>
</tr>
<tr>
<td>9.</td>
<td>TUE/RU</td>
<td>Combinatorial optimization and Stochastic OR</td>
<td>Woeinger/Boxma</td>
</tr>
<tr>
<td>10.</td>
<td>VU</td>
<td>Deterministic and Stochastic Operations Research</td>
<td>Van Dijk</td>
</tr>
<tr>
<td>11.</td>
<td>UT</td>
<td>Discrete Optimization and Stochastic OR</td>
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<td>Balder</td>
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<td>13a.</td>
<td>VU</td>
<td>Combinatorial Optimization and Stochastic OR</td>
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<td>13b.</td>
<td>VU</td>
<td>Optimization of business processes</td>
<td>Koole</td>
</tr>
</tbody>
</table>

Project 1a. Centre for Mathematics and Computer Science (CWI)

**Algorithms, Combinatorics and Optimization**

**Leader**: Prof.dr. M. Laurent.

**Address**: Centre for Mathematics and Computer Science, Science Park 123, 1098 XG Amsterdam.

**Phone**: 020 - 5924105; 020 - 5924189 (secretary).


**Research themes**:  
1. Combinatorics and optimization;  
2. Algorithmic game theory.

Project 1b. Centre for Mathematics and Computer Science (CWI)

**Probability and Stochastic Networks**

**Leader**: Prof.dr. R.D. van der Mei.

**Address**: Centre for Mathematics and Computer Science, Science Park 123, 1098 XG Amsterdam.

**Phone**: 020 - 5924205; 020 - 5924199 (secretary).

**Research staff**: Prof.dr. J. van den Berg (0.8), dr. K. Dzhaparidze (1.0), drs. R. Egorova (1.0), ir. G.J. Hoekstra (0.4), dr. M.C. van Lieshout (1.0), dr. R. Núñez Queija (0.5), dr. A. Saposznikow (1.0), dr. U. Kaymak, dr. D.K. Leegwater, dr. M. Mulder, C. Pince MSc, D. Potthoff MSc, M. Pourakbar MSc, M. Retel Helmrich MSc, R. Spliet MSc, W. van Jaarsveld MSc, prof.dr. A.P.M. Wagelmans.

**Research themes**:  
1. Performance analysis of communication systems;  
2. Spatial stochastics and stochastic processes;  
3. Stochastic geometry.

Project 2. Erasmus University Rotterdam

**Operations Research**

**Leader**: Prof.dr.ir. R. Dekker.

**Address**: Econometric Institute, H11-33, Erasmus University Rotterdam, Postbus 1738, 3000 DR Rotterdam.

**Phone**: 010 – 4081274; 010 – 4081264 (secretary).

Research themes:
1. Railway operations optimization (Budai, Dekker, Huisman, Potthoff, Wagelmans);
2. Maintenance and reliability analysis (Dekker, Budai, Frenk, Nicolai);
3. Revenue management (Dekker, Frenk, Pak);
4. Production planning and inventory control (Dekker, Van de Heuvel, Retel-Helmrich, Wagelmans);
5. Service Logistics (Dekker, Pince, Pourakbar);
6. Lotting strategies in Combinatorial Auctions (Dekker, Kaymak, Waltmans);
7. Container and intermodal logistics (van Asperen, Dekker, Pourakbar);
8. OR in Medical Decision Making (Dekker);
9. Reverse logistics (Dekker, van de Heuvel, Pince);
10. Location and network problems (Mulder).

Project 3. Wageningen University

Operations Research and Logistics Group
Leader : Prof.dr.ir. J.G.A.J. van der Vorst.
Address : Hollandseweg 1, 6706 KN Wageningen.
Phone : 0317 – 485645.

Research themes:
1. Supply chain management and design:
   a. Robust demand-driven Agrifood chain networks;
   b. Quality controlled logistics in fresh networks.
2. Decision support models:
   a. OR-models for Agribusiness and food industry;
   b. Ontology’s and modelling frameworks for simulation studies.
3. Efficient and effective algorithms:
   a. Planning algorithm for Agrifood;
   b. Algorithm for robust design; application of global optimization algorithms.

Project 4a. Tilburg University

Operations Research
Leader : Prof.dr.ir. E.R. van Dam
Address : Department of Econometrics and Operations Research, CentER for Economic Research, Faculty of Economics and Business Administration, Tilburg University, P.O. Box 90153, 5000 LE Tilburg.
Phone : 013 – 4662430

Research themes:
1. Stochastic Operations Research;
2. Deterministic Operations Research;
3. Simulation;
4. Combinatorial mathematics;
5. Cooperative game theory.
Project 4b. Tilburg University

Operations Research and Game theory

Leaders: Prof.dr. P.E.M. Borm.
Address: Department of Econometrics and Operations Research, CentER for Economic Research, Faculty of Economics and Business Administration, Tilburg University, P.O. Box 90153, 5000 LE Tilburg.
Phone: 013 - 4663026; 013 - 4662340 (secretary).

Research themes:
1. Cooperative game theory;
2. Non-cooperative game theory;
3. Mathematical economics;
4. Skill in games;
5. Overt and covert network analysis.

Project 5a. Maastricht University

Combinatorial optimization

Leader: Prof.dr.ir. C.P.M. van Hoesel.
Address: Department of Quantitative Economics, Faculty of Economics, Maastricht University, P.O. Box 616, 6200 MD Maastricht.
Phone: 043 - 3883727; 043 - 3883835 (secretary).
Research staff: Dr. A. Berger, dr. A. Grigoriev, prof.dr.ir. S. van Hoesel, prof.dr. R. Müller, dr. H. Röglin and dr. T. Vredeveld.

Research themes:
1. Mechanisme design, combinatorial auctions;
2. Network optimization;
3. Planning and scheduling;
4. Approximation;
5. Pricing, Revenue Management;

Project 5b. Maastricht University

Game Theory and Optimization

Leader: Dr. F. Thuijsman.
Address: Department of Knowledge Engineering, Maastricht University, P.O. Box 616, 6200 MD Maastricht.
Phone: 043 - 3883489; 043 - 3883496 (secretary).

Research themes:
1. Strategic optimization in networks (network games, Markov games, gene networks, evolutionary models);
2. Systems biology (signal processing, data mining, pattern recognition).

Project 6. University of Groningen

Operations Research

Leader: Prof.dr. R.H. Teunter.
Address: Faculty of Economics and Business, University of Groningen, P.O. Box 800, 9700 AV Groningen.
Phone: 050 - 3638617; 050 - 3637491 (secretary).

Research themes:
1. Decision making under uncertainty and Stochastic programming (Cremers, Klein Haneveld, Streutker, van der Vlerk);
2. Combinatorial optimization and quantitative logistics (Goldengorin, Schakel, Sierksma, Talsma);
3. Reverse logistics, spare parts management, inventory control and forecasting of demand (Caner, Teunter).
Project 7. University of Leiden
Stochastic Operations Research
Leader: Dr. F.M. Spieksma.
Address: Mathematical Institute, University of Leiden, P.O. Box 9512, 2300 RA Leiden.
Phone: 071 – 5277128.
Research staff: Dr. F.M. Spieksma.

Research themes:
1. Markov decision chains with applications in queueing networks;
2. Markov games;
3. Stability properties of parametrised collections of Markov chains with applications to queueing.

Project 8a. Delft University of Technology
Interior point methods
Leader: Prof.dr.ir. C. Roos
Address: Faculty of Electrical Engineering, Mathematics and Computer Science, Delft University of Technology, Mekelweg 4, 2628 CD Delft
Phone: 015 - 2782530; 015 - 2787486 (secretary)
Research staff: A. Asadi MSc., ir. H.N. Post, B.P. Silalahi MSc. and M. Zangiabadi MSc.
Research themes:
1. Interior point methods for linear and non-linear optimization;
2. Randomized (approximation) algorithms;
3. Robust optimization.

Project 8b. Delft University of Technology
Interior point methods
Leader: Prof.dr.ir. K.I. Aardal
Address: Faculty of Electrical Engineering, Mathematics and Computer Science, Delft University of Technology, Mekelweg 4, 2628 CD Delft
Phone: 015 - 2785093; 015 - 2784109 (secretary)
Research themes:
1. Integer and combinatorial optimization;
2. Semidefinite/convex optimization;
3. Harmonic analysis applied to optimization, lattices and optimization.

Project 9. Eindhoven University of Technology
Combinatorial optimization; Stochastic Operations Research
Leaders: Prof.dr. G.J. Woeginger and prof.dr.ir. O.J. Boxma.
Address: Department of Mathematics and Computer Science, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven
Phone: 040 - 2472412 (Woeginger); 040 - 2472858 (Boxma); 040 - 2473130 (secretary)

Research themes:
1. Combinatorial optimization;
1.1. Graph and matroid structure theory;
1.2. Complexity and approximation;
1.3. Enumerative optimization;
1.4. Optimization under uncertainty;
2. Stochastic operations research:
2.1. Random walks and queueing theory;
2.2. Performance analysis of computer- and communication systems;
2.3. Performance analysis in operations management and logistics;
3. The EURANDOM program on Queueing and Performance Analysis.
Project 10. University of Amsterdam
Deterministic and Stochastic Operations Research
Leader: Prof.dr. N.M. van Dijk.
Address: Department of Econometrics, Faculty of Economics and Econometrics,
University of Amsterdam, Roetersstraat 11, 1018 WB Amsterdam.
Phone: 020 - 5254215; 020 - 5254217 (secretary)
Research staff: Drs. A. Al-Ibrahim, Prof.dr. N.M. van Dijk, dr. C.W. Duin, ir. J.A.M.Hontelez, drs. P. Joustra,
dr. H.J.J. van der Sluis, dr. A. Volgenant and prof.dr.ir. J. van der Wal.
Research themes:
1. Markov decision theory (Al-Ibrahim, Haijema, van der Wal, van Dijk);
2. Performance analysis of service networks (van Dijk, van der Sluis);
3. Exact and bounding results for queueing networks (van Dijk);
4. Scheduling algorithms and complexity (Duin, van der Sluis);
5. Traveling salesman problem and variants (Volgenant);
6. Graph theory problems (Duin, Volgenant);
7. Polyhedral methods (Volgenant);
8. Inventory models (van der Sluis, van der Wal);
9. Transportation (Al-Ibrahim, Haijema, van Dijk, van der Wal);
10. Daily life applications of stochastic models (van Dijk, van der Sluis);
11. Healthcare (Haijema, Hontelez, van Dijk, van der Wal);
12. OR and simulation (van Dijk, van der Sluis, van der Wal);
13. OR and simulation (van Dijk, van der Sluis).

Project 11. University of Twente
Discrete Optimization and Stochastic Operations Research
Leaders: Prof.dr. R.J. Boucherie and prof.dr. M. Uetz.
Address: Faculty of Electrical Engineering, Mathematics & Computer Science, University of Twente,
P.O. Box 217, 7500 AE Enschede.
Phone: 053- 4893402; 053- 4893434 (secretary).
Research staff: F. Ahmed MSc, J.W.H. van Bloem MSc, ir. M.J. Bomhoff, M.G.C. Bosman MSc, H.C.M.
Bosser MSc, prof.dr. R.J. Boucherie, prof.dr.ir. H.J. Broersma, dr.ir. T.S.H. Driessen, ir.
T. van Essen, Y. Feng MSc, ir. J. Goseling, dr. M. de Graaf, prof.dr. J.L. Hurink, dr. W.
Kern, N. Kortobek MSc, dr. N. Litvak, dr. B. Manthey, dr. J.C.W. van Ommeren, dr.ir. G.
M. Uetz, P. Vanberkel MSc, dr. J.B. Vink-Timmer, J. Wu MSc, M. Zonderland MSc. and
A. Zwartjes MSc.
Research themes:
1. Discrete Mathematics, Mathematical Programming and Stochastic Operations Research:
   - Combinatorial optimization, approximation algorithms, online algorithms, continuous optimization,
     graph theory, scheduling, timetabling, routing, pricing.
2. Game Theory:
   - Cooperative game theory, noncooperative game theory, stochastic game theory, algorithmic game
     theory, mechanism design.
3. Stochastic Operations Research:
   - Telecommunication systems, queuing network analysis, large deviations, fluid models, pricing,
     wireless networks, IP networks.
4. Supply chain management:
   - Manufacturing, scheduling, logistics, inventory models, reliability, maintenance, spare parts planning
     and control.
5. Health care logistics.
Project 12. University of Utrecht
Operations Research
Leader: Prof.dr.ir. E.J. Balder
Address: Department of Mathematics, University of Utrecht, Budapestlaan 6, 3508 TA Utrecht.
Phone: 030 - 2531458; 030 - 2531420 (secretary)
Research staff: Prof.dr.ir. E.J. Balder and dr. A. Gnedin.
Research themes:
1. Generalized solutions in game theory, optimal control and mathematical economics;
2. Probabilistic methods in combinatorics;
3. Search and sorting algorithms.

Project 13a. VU University Amsterdam
Combinatorial Optimization and Stochastic Operations Research
Leaders: Prof.dr. L. Stougie
Address: Department of Econometrics and OR, VU University Amsterdam, De Boelelaan 1105, 1081 HV Amsterdam
Phone: 020 - 5986013
Research themes:
1. Combinatorial Optimisation;
1.1. Algorithms: complexity and approximation;
1.2. Algorithmic game theory;
1.3. On-line algorithms;
1.4. Computational biology;
2. Stochastic Operations Research;
2.1. Markov decision algorithms for controlled queuing systems;
2.2. Analysis and simulation of probabilities for rare events;
2.3. Perturbation analysis and simulation techniques;
2.4. Numerical algorithms based on Taylor series expansion;
2.5. Stochastic programming.

Project 13b. VU University Amsterdam
Optimization of Business Processes
Leader: Prof.dr. G.M. Koole
Address: Department of Mathematics, VU University Amsterdam, De Boelelaan 1081a, 1081 HV Amsterdam
Phone: 020 - 4447755
Research themes:
1. Performance modeling of communication systems;
2. Theory and applications of controlled queueing systems.
# 10. List of PhD Students

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>University/Institute</th>
<th>Department/Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Al-Ibrahim, Drs. A.</td>
<td>Universiteit van Amsterdam</td>
<td>Faculteit Economie en Bedrijfskunde</td>
</tr>
<tr>
<td>2</td>
<td>Alvarez, E.</td>
<td>University of Twente</td>
<td>School of Management and Governance</td>
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<td>3</td>
<td>Arts, Ir. J.J.</td>
<td>Eindhoven University of Technology</td>
<td></td>
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<td>4</td>
<td>Asadi, A.</td>
<td>Delft University of Technology</td>
<td>EWI Room HB 07-160</td>
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<td>5</td>
<td>Banaszewska, MSc. A.</td>
<td>Wageningen University</td>
<td>Dep. Logistics, Decision and Information Sciences</td>
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<td>6</td>
<td>Bierbooms, MSc. J.J.P.H.</td>
<td>Eindhoven University of Technology</td>
<td>Dept. of Mathematics &amp; Computer Science</td>
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<td>7</td>
<td>Bloem, MSc. J.W.H. van</td>
<td>University of Twente</td>
<td>Gebouw Zilverling</td>
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<td>Boer, Drs. A.V. den</td>
<td>CWI Amsterdam</td>
<td>Dept. of Applied Mathematics</td>
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<td>9</td>
<td>Bomhoff, Mattheis</td>
<td>University of Twente</td>
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<td>10</td>
<td>Bosman, Joost</td>
<td>CWI Amsterdam</td>
<td>EWI</td>
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<td>Bossers, MSc. Harm</td>
<td>University of Twente</td>
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<td>Bouma, MSc. Harmen</td>
<td>University of Groningen</td>
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<td>Bouman, N.</td>
<td>CWI Amsterdam</td>
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<td>Bruin, drs. J.</td>
<td>Eindhoven University of Technology</td>
<td>EURANDOM</td>
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<td>15</td>
<td>Büyükkaramikli, Cagdas</td>
<td>Eindhoven University of Technology</td>
<td>Department of Technology Management</td>
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<td>16</td>
<td>Calinescu, MSc. M.</td>
<td>Vrije Universiteit Amsterdam</td>
<td>Business mathematics and informatics</td>
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<td>Caner, Serra</td>
<td>University of Groningen</td>
<td>Fac. of Economics &amp; Business</td>
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<td>Chen, C.M.</td>
<td>Erasmus University Rotterdam</td>
<td>Rotterdam School of Management</td>
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<td>Coenen, Ir. Tom</td>
<td>University of Twente</td>
<td>Capitool E104</td>
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<td>20</td>
<td>Corbacioglu, U. MSc.</td>
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<td>Decision and Information Science</td>
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<td>Cursue, A. MSc.</td>
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<td>Dabia, Ir. S.</td>
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<td>Dickinson, MSc. P.J.C.</td>
<td>University of Groningen</td>
<td>Johann Bernoulli Institute for Mathematics and Computer Science, EWI</td>
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<td>Dimitrova, MSc. D.</td>
<td>University of Twente</td>
<td>Department Quantitative Economics</td>
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<td>Diris, MSc. B.</td>
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<td>Dobre, C.</td>
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<td>Dollevoet, MSc. T.</td>
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<td>Econometric Institute</td>
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<td>Driesen, Drs. B.</td>
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<td>Department of Quantitative Economics</td>
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<td>Eggermont, Drs. C.</td>
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<td>Department of Mathematics &amp; Computer Science</td>
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<td>Ensink, H. Ir.</td>
<td>Maastricht University</td>
<td>Quantitative Economics</td>
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<td>Evers, L. MSc.</td>
<td>Erasmus Universiteit</td>
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<td>University of Twente</td>
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<td>Firat, MSc. M.</td>
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<td>Mathematics and Computer Science</td>
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<td>Frolkova, M.</td>
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<td>Pav. E17</td>
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<td>Gabali, O.</td>
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<td>Gharehgozli, Amir</td>
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<td>Gorissen, BSc. B.</td>
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<td>Groot, Noortje</td>
<td>Delft University of Technology</td>
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<td>Groote Schaarsberg, M. MSc.</td>
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<td>Haensel, Alwin</td>
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<td>Industrial Engineering &amp; Management – Logistics</td>
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<td>Haneyah, Sameh</td>
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<td>Hellings, Ton</td>
<td>CWI/UvA</td>
<td>Pav E 09</td>
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<td>Heuvel, MSc. F.P. van den</td>
<td>Eindhoven University of Technology</td>
<td>Faculty EEMCS</td>
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<td>Heymann, F. von</td>
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<td>Hilbers, MSc. P.</td>
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<td>Pav. E15</td>
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<td>Hoen, MSc. Kristel</td>
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<td>FEWEB</td>
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<td>Hoorn, drs. J. van</td>
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<td>MB-OMPL</td>
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<td>Hulshof, Ir. Peter</td>
<td>University of Twente</td>
<td>School of Management</td>
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<td>Hurk, Evelien van der</td>
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<td>Hutzschneuer, A.</td>
<td>Eindhoven University of Technology</td>
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<td>Ivanovs, MSc. I.</td>
<td>Eindhoven University of Technology</td>
<td>Econometric Institute</td>
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<td>Jaarsveld, W. van</td>
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<td>Rotterdams School of Management</td>
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<td>Jackels, MSc. B.</td>
<td>RSM Erasmus University</td>
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<td>Institute</td>
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<td>Jalil, M.</td>
<td>RSM Erasmus University Rotterdam</td>
<td>Dept. of Decision &amp; Information Sciences</td>
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<td>Jancura, P.</td>
<td>Radboud University Nijmegen</td>
<td>Intelligent systems, FNWI</td>
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<td>Jansen, Bart</td>
<td>University of Utrecht</td>
<td>Dept. of Information &amp; Comp. Sciences</td>
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<td>Jansen, Ir. M.</td>
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<td>Faculty of Management Technology</td>
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<td>Ju, S.</td>
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<td>Kakaarslan, MSc. A. G.</td>
<td>Eindhoven University of Technology</td>
<td>Department of Technology Management</td>
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<td>62</td>
<td>Karel, J.M.H.</td>
<td>Maastricht University</td>
<td>Dept of Knowledge Engineering</td>
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<td>Karsten, F. Msc.</td>
<td>Eindhoven University of Technology</td>
<td>Pav. E11</td>
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<td>Kaynar, MSc. B.</td>
<td>Vrije Universiteit Amsterdam</td>
<td>Faculteit der Econ. Wetenschappen &amp; Bedrijfskunde</td>
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<td>65</td>
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<td>University of Amsterdam</td>
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<td>Eindhoven University of Technology</td>
<td>Operations Research</td>
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<td>Faculty of Management &amp; Governance</td>
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<td>University of Groningen</td>
<td>Faculty of Economics and Business</td>
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<td>Kok, A.L.</td>
<td>University of Twente</td>
<td>Room T 10-34</td>
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<td>Koochaki, J.</td>
<td>University of Groningen</td>
<td>Dept. of Quantitative Economics</td>
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<td>Operations Research &amp; Management Science</td>
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<td>1039 Budapest</td>
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<td>Maastricht University</td>
<td>Quantitative Economy</td>
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<td>University of Maastricht</td>
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<td>ERIM, Faculty of Economics</td>
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<td>Utrecht University</td>
<td>Department of Information and Computing Sciences</td>
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## 11. List Alumni LNMB

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   University of Twente
2. Agatz, Dr.ir. N.A.H.  
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14. Bomans MTD, A.J.  
15. Bontridder, Dr.ir. K.M.J. de  
    Mapscape
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    Advitrae
22. Broens, Dr. D.F.
23. Brouns, Dr.ir. G.A.J.F.
24. Byrka, Dr. J.  
    EPFL SB IMA
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27. Cheung, Dr. S.K.
28. Chodyniecki, PDEng. D.  
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30. Coelho de Pina, Dr. J.  
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33. Cruyssen, Dr. F.C.A.M.  
    TNT Express
34. Dert, Prof. C.L.  
    ABN AMRO Pensionfund
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    INSEAD
36. Dieker, Dr. A.B.  
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64 Gvozdenovic, Dr. N. 
65 Haan, Dr. R. de 
66 Hadianti, Dr. R. Instituut Teknologi Bandung
67 Haijema, Dr. R. Faculty of Mathematics and Natural Sciences
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69 Hendriks, Ir. M.P.M. Eindhoven University of Technology
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71 Heule, Dr.ir. M.J.H. EWI, Delft University of Technology
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74 Hout, Dr. W.B. van den Dept. of Medical Decision Making, J10-S, Leiden University Medical Center
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76 Hunting, Dr.ir. M.M.G. Paragon Decision Technology
77 Husslage, Dr. B.G.M. Dept. of Financial and Industrial Mathematics
78 Iersel, Dr. L.J.J. van Dept. of Mathematics & Statistics, University of Canterbury
79 Jansen, Dr. B. Directie Sanctie en Preventiebeleid Ministerie van Justitie
80 Janssen, Dr. E. Tilburg University
81 Janssen, Dr. M.A. School of Human Evolution & Social change, Arizona State University
82 Joosten, Dr. R.A.M.G. School of Management & Governance, University of Twente
83 Kets, W. Santa Fe Institute and Tilburg University
84 Klerk, Prof.dr. E. de University of Tilburg, Dept. Econometrics & OR CentER
85 Klijn, Dr. F. Institut d'Anàlisi Econòmica, CSIC
86 Klundert, Prof.dr. J. van de Erasmus University Rotterdam, Institute Health Policy & Management
87 Kock, Dr.ir. A.A. Weir Minerals Netherlands
88 Kort, dr. J. de Willemswerf - Boompjes 40, Arthur D. Little
89 Korteweg, Dr. P. APG
90 Koster, Dr. M.A.L. ASE, Dept. of Quantitative Economics, University of Amsterdam
91 Koster, Prof. Dr. ir. A.M.C.A. Lehrstuhl II für Mathematik, RWTH Aachen University
92 Kouwenberg, Dr. R.R.P.
93 Kovaleva, Dr. S. Dept. of Mathematics, Maastricht University
94 Kuipers, Dr. ir. C.M.H. Tilburg School of Economics and Management, Tilburg University
95 Kuipers, Dr. B.H.M. APG All Pensions Group
96 Kuipers, Dr.ir. J. Dept. of Mathematics, Maastricht University
97 Lang, Ir. N.A. Imtech ICT TS
98 Le Blanc - van Krieken, Dr. M. De Lage Landen International B.V.
99 Le Blanc, Dr. I. BG Consumer Luminaires Philips Lightning
100 Leahu, H. Faculty of Economic Sciences, Vrije Universiteit Amsterdam
101 Leeuwaarden, Dr. J.S.H. van Mathematics and CS Department, Eindhoven University of Technology
102 Leeuwen, Dr. E.J. van Afd. Combinatorische Optimalisering, Eindhoven University of Technology
103 Lennartz, Dr. P.
104 Listes, Dr. O.L. Paragon Decision Technology
105 Loeve, Dr. J.A. Progress, Pensioenfonds van Unilever Nederland
106 Lok, Dr. R.B. Statistics Netherlands (CBS)
107 Mainegra Hing, MSc. M. 
108 Mandjes, Prof.dr. M.R.H. University of Amsterdam, Korteweg-de Vries Institute for Mathematics
109 Mansouri, Dr. H. Shahrekord University
110 Marquinie AAG, Drs. N.A.A. ABN-AMRO Verzekeringen
111 Martinez, Dr. A. CWI
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113 Meertens, Dr. M.A. General insurance Actuarial Risk Management, REAAL verzekeringen
114 Mei, Prof.dr. R.D. van der CWI/VU
115 Mes, Dr. M.R.K. School of Management & Governance, University of Twente
116 Mincsovics, Dr. G.Z. TomTom Eindhoven
| 176 | Verweij, Dr. A.M. | OM Partners N.V. |
| 177 | Vestjens, Dr.ir. A.P.A. | CQM |
| 178 | Vinhas de Souza, Dr. L.M. | Unit ECFIN.D3 European Commission |
| 179 | Vis, Dr. I.F.A. | VU University Amsterdam, Afdeling Informatiekunde en Logistiek |
| 180 | Vlasiou, Dr. M. | Dept. of Mathematics & CS, Eindhoven University of Technology |
| 181 | Vlerk, Prof.dr. M.H. van der | University of Groningen, Department of Operations |
| 182 | Vliegen, Dr.ir. I. | School of Management & Governance, University of Twente |
| 183 | Vliet, Dr. A. van | ORTEC Finance BV |
| 184 | Vredevel, Dr. T. | Maastricht University, School of Business and Economics |
| 185 | Vromans, Dr. M.J.C.M. | De Inktpot F1-09 ProRail |
| 186 | Wang, Dr. X |  |
| 187 | Wartenoorst, Dr. P | TNT Post |
| 188 | Weerdt, Dr. M.M. de | Department of Software Technology, Delft University of Technology |
| 189 | Wei, Dr. W. van der |  |
| 190 | Willemse, Dr.ir. R.J. | CQM |
| 191 | Winands, Dr.ir. E.M.M. |  |
| 192 | Witberg, Ir. R.R. | TNO - FEL |
| 193 | Wullink, Dr. Ir. G. | Management Group, Boer & Croon Strategy and Management Group |
| 194 | Yang, F. | Eindhoven University of Technology, Dept. of Technology Management |
| 195 | Yu, M. | Rotterdam School of Management, Erasmus University Rotterdam |
| 196 | Zante, Dr.ir. D.J. van | CQM BV |
| 197 | Zee, Dr.ir. D.J. van der | Faculty of Economics & Business, University of Groningen |
| 198 | Zwart, Prof.dr. A.P. | CWI, PNA2 (Probability and Stochastic Networks) |

(more detailed information available on http://www.lnmb.nl/pages/people)
## 12. Members

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<td>Aardal, Prof.dr.ir. K.</td>
<td>Delft University of Technology</td>
<td>Fac. of Electrical Engineering, Math. &amp; CS</td>
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<td>Erasmus School of Economics</td>
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<td>Dept. Econometric &amp; O.R.</td>
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<td>Tilburg University</td>
<td>CentER en TILEC</td>
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<td>Dept. of Econometrics &amp; OR CentER</td>
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<td>Erasmus University Rotterdam</td>
<td>Erasmus School of Economics</td>
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<td>Amsterdam University</td>
<td>Faculty of Econometrics</td>
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<td>University of Twente</td>
<td>Faculty of EEMCS</td>
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<td>29</td>
<td>Duyn Schouten, Prof.dr. F.A. van der</td>
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<td>Dür, Dr. M.E.</td>
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<td>Fleuren, Prof.dr.ir. H.A.</td>
<td>Tilburg University</td>
<td>Tilburg School of Economics and Management</td>
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