

GAMS Courses 2012 – Modeling and Optimization with GAMS Fundamentals –

IMPORTANT UPDATE

To accommodate customer needs we decided to re-schedule the course to take place on a May weekend (2 days).

The new date is:

**F121C, May 19–20, 2012
Vienna, Austria**

The venue stays the same:

Hotel am Konzerthaus
Am Heumarkt 35-37 | 1030 VIENNA | AUSTRIA
Tel: +43-1-71616 0 | Fax: +43-1-71616 844
Mail: H1276@accor.com
Web: <http://www.hotelamkonzerthaus.com/>

In order to fit the original four-day curriculum into the two days we may:

- Shorten the lunch breaks to 1 hour max
- convert the coffee breaks partially into “working snacks”
- Cut the exercises short, depending on participants’ needs
- Shorten or omit sessions not relevant to participants

New session schedule for both days Sat, May 19 and Sun, May 20, 2012:

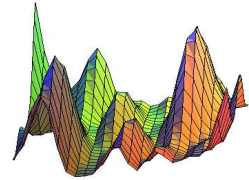
09:00 – 12:30	Morning session, coffee break 10:30
12:30 – 13:30	Lunch break
13:30 – 18:00	Afternoon session, coffee break 15:30

At the beginning of the first session we will discuss and agree on the curriculum and the session schedule and will keep the proceeding of the course very interactive!

For more information please see the original announcement on the following pages.

Fees and registration

For fees and registration instructions, please refer to the updated registration form (last page of this document).



Venue and Travel Information

The course will be held at a hotel in the historic city center of Vienna right around the corner of The Wiener Konzerthaus, one of the premier institutions in international musical life.

Venue: **Hotel am Konzerthaus**
Am Heumarkt 35-37 | 1030 VIENNA | AUSTRIA
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Mail: H1276@accor.com
Web: <http://www.hotelamkonzerthaus.com/>

Special room rates are available (139.00 EUR per room excl. breakfast, mention "GAMS Course")

Airport transfer tips:

Taxis are available at the airport (approx. 40 EUR one way)

Alternatives: pre-booked transfer (e.g., <http://www.ck-airportservice.at/>, not affiliated with us in any way) or the City Airport Train (CAT, <http://www.cityairporttrain.com/>)

Offering

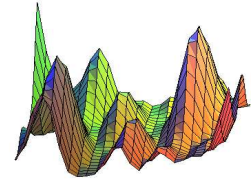
- Course material on USB-stick (GAMS, presentations, examples, literature)
- Full GAMS software with several solvers (temporary license)
- One copy of a business and/or optimization book (select on the registration form)
- Business lunches during the course
- "Free initial consultation": analysis of participants' problems (send them in early)
- Participants may, on request, obtain the course material prior to the course

Fees and Registration

- For fees and registration instructions, please refer to the registration form (last page of this document)
- There are discounts on early registrations
- Limited seats available; registrations are considered in the order they are received

We also offer in-house courses tailored to the client's needs.

Contact us for further details at
thomas.maindl@dr-maindl.com or josef_kallrath@yahoo.de!



– Modeling and Optimization with GAMS Fundamentals –

Summary: GAMS Fundamentals Course

This 4-day course helps the novice to become familiar with GAMS and to obtain the knowledge using GAMS to model and solve optimization problems. The participants will get an orientation on mathematical optimization, i.e., modeling and solution algorithms. Many exercises help with consolidating the course content. After the course the participants will be able to map decision problems in business and science to the basic objects of optimization models: indices, data, variables, constraints and objective functions. The course does not assume the participants have any GAMS knowledge.

Besides presentations, examples, and hands-on activities the course leaves enough time for discussions and own problems of the participants to be analyzed.

Target Group of Participants

The course is ideal for participants who wish to

- get an overview of mathematical optimization
- become familiar with the basic concepts of index sets, indices, variables, constraints and objective functions, and how to use these objects in GAMS
- get an overview of GAMS and what one can do with it
- learn how to implement optimization problems in GAMS

Things to Do Before the Course

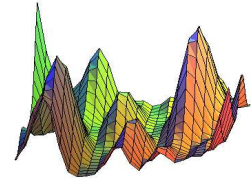
Please bring your laptop - the course will be conducted on laptops of the participants.

In case you do not yet have a GAMS system, the most recent version will be installed on your machine at the beginning of the course. Thus, it is desirable that course participants have administration rights in case some adjustments are needed. Note that the course software, examples, presentations and useful literature will be distributed on a USB stick.

Feel free to tell us about your expectations, fields of interest and problems to be addressed prior to the course!

Course Language

All course material will be in English. The default course language is English. The course language can be switched to German if (and only if) *all* participants prefer it.



Day 1: (09:30-18:00)

Session 1a: Welcome and Introduction (09:30-10:00)

- Introduction, course objectives, expectations of the participants
- Overview, the presentations and other materials
- Course structure on the CD, Preparing the Laptops

Session 1b: Foundations of Mathematical Optimization (10:00-11:45)

- Optimization models and solution algorithms
- Algebraic modeling languages

Coffee break (approx. 11:00-11:15)

- A simple example about cows and pigs

Session 1c: Overview - Modeling with GAMS (Part I) (11:45-12:30)

- The structure of a GAMS Program:
- Indices, variables, constraints and objective functions
- Model declaration, conditional operators, \$, and, or, ...

Lunch break (12:30-14:00)

Session 1c: Overview - Modeling with GAMS (Part II) (14:00-15:45)

- Solve statement, interpretation of *.log and *.lst files and *.log files
- GAMS IDE and the Cows & Pigs Example – Exercise

Coffee break (15:45-16:00)

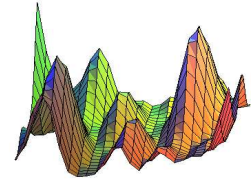
Session 2a: Sets (16:00-17:15)

- Simple Sets and Multi-dimensional sets
- Subsets and domain checking
- Operations on Sets, operations on set elements, Dynamic Sets
- Exercise: sets and set operations

Session 2b: Data Objects (Part I) (17:15-18:00)

- Scalars, parameters and tables
- Exercise: Cows & Pigs using Sets & Parameters

End of day one (18:00)



Day 2: (09:30-18:00)

Session 2b: Data Objects (Part II) (09:30-10:30)

- Operations on scalars and parameters
- Exercises: Demand given per day and product – 6 tasks

Session 3a: Variables (10:30-11:15)

- Declarations
- Attributes and assignment statements
- Display and variables in *.lst files
- Using the solution values of variables

Coffee break (11:15-11:30)

Session 3b: Equations and Inequalities (Part I) (11:30-12:15)

- Declarations & Definitions
- Model declaration, Conditional operators, \$, and, or, ...

Lunch break (12:15-13:45)

Session 3b: Equations and Inequalities (Part II) (13:45-14:45)

- Exercises Boat: Model Building, implementation & debugging, interpretation

Session 3c: Option Statement and Solver Communication (14:45-16:00)

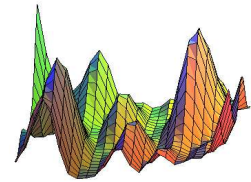
- GAMS Options: Solver (reslim, optcr, optca)
- Feedback mechanisms GAMS & Solver
- What you get after COMPILE / What you get after RUN
- Exercises: NLPexercise

Coffee break (16:00-16:15)

Session 3d: Exercises: Modeling & Debugging (16:15-18:00)

- Exercises Cutstock: Model Building and Implementation
- Exercises Cutstock: Debugging Compilation Errors

End of day two (18:00)



Day 3 (09:30-18:00)

Session 4a: Conditional Expressions (09:30-10:30)

- Using the \$ Symbol in Conditional Expressions
- Logical Operators
- Exercises: Modifying the transport problem

Coffee break (10:30-10:45)

Session 4b: Procedural Language Elements (Part I) (10:45-12:15)

- For, If, Loop, Repeat and While
- Exercise on FOR/WHILE: Complete Enumeration (Cows-Pigs)

Lunch break (12:15-13:45)

Session 4b: Procedural Language Elements (Part II) (13:45-15:00)

- \$Exit, \$Goto and \$Label Statement
- Exercises on IF/WHILE : Analyzing the points collected by a soccer team

Session B5a: Input Simple Text Files (15:00-17:00)

- Feeding data into GAMS
- Reading csv-files (\$ondelim, \$offdelim)

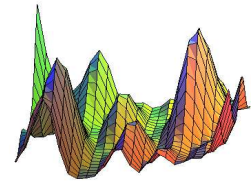
Coffee break (approx. 16:00-16:15)

- Exercises: Read the data from the "Cutstock" example from file

Session B5b: Output of Simple Text Files (Part I) (17:00-18:00)

- Put & Write facilities (with exercises)
- Formatted output

End of day three (18:00)



Day 4 (09:30-17:30)

Session B5b: Output of Simple Text Files (Part II) (09:30-10:30)

- Recap: formatted output
- *Report Generation: Put & Write-Facilities, Advanced Formatting, Put_Uilities*
- Exercises: Output the results from the “Cutstock” example to files

Session 6: GAMS Usage (10:30-12:30)

- GAMS Special Functions

Coffee break (approx. 11:00-11:15)

- Compile-time versus Runtime Commands – the \$ command
- Calling GAMS from Command Shells
- A Larger Application Example: Energy Portfolio Optimization

Lunch break (12:30-14:00)

Session 7: Exercises: Modeling & Debugging (14:00-16:00)

- Exercises: Model Building and Implementation
- Exercises: Debugging Compilation Errors
- Diagnosing Infeasibilities

Coffee break (16:00-16:15)

Session 9: Demonstration of an Example Application (16:15-16:45)

- Supply chain example application with file input and output
- Formulating the model
- Placing the input data in files, creating input files from Excel
- Writing the optimization result into flat files and csv files (Excel)

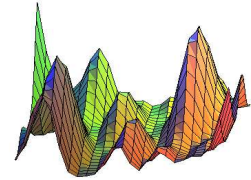
Session 8: GAMS Resources & Final discussion (16:45-17:15)

- GAMSlib, GAMS Utilities, GAMS Web, GAMS WiKi-Support
- Outlook into the Advanced Course
- Discussion of participants' problems
- Final discussion

Fill in and return questionnaires (17:15-17:30)

End (17:30)

The agenda may change slightly!



About the Lecturers

Thomas I. Maindl earned his PhD in astronomy from the University of Vienna (Austria) in 1994. He started his career as an astronomer applying scientific computing to a multitude of challenges and publishing numerous research papers and moved on to industry where he held expert and management positions in the chemical and software industries for over 15 years. During this time he successfully developed, implemented, and deployed numerous optimization-based advanced planning applications with measurable ROI for customers in several industries in Europe, the USA, and Asia. A large part of his projects focuses on implementing real cost savings by optimal supply chain planning; other projects involve optimized energy production and trading, applied artificial intelligence (expert systems), optimal chemical formulation and blending, solving assignment problems in the field of education, or developing alternative medical diagnostic methods. In 2009 he founded Dr. Maindl Consulting (www.dr-maindl.com) offering Seminars and Training, Consulting (business consulting, implementation consulting, and project management related to modeling specific business requirements, planning processes, process validation, and selecting the right methodology and the right planning system) and Mathematical Optimization / Operations Research services.

Thomas Maindl wrote the book

Real Optimization with SAP APO (J. Kallrath and T. I. Maindl, 2006, Springer)

and teaches logistics, supply chain management and advanced planning at universities.

Josef Kallrath obtained his PhD in astrophysics from Bonn University (Germany) in 1989. He is a professor at the University of Florida (Gainesville, FL, www.astro.ufl.edu/~kallrath), and solves real-world problems in industry using a broad spectrum of methods in scientific computing, from modeling physical systems to supporting decisions processes by mathematical optimization. He has written review articles on the subject, about 70 research papers in astronomy and applied mathematics, and several books on mixed integer optimization, as well as one on eclipsing binary stars. Among the books relevant to this course are

Business Optimization Using Mathematical Programming (J. Kallrath & J. M. Wilson, 1997, Macmillan – now Palgrave)

Gemischt-Ganzzahlige Optimierung in der Praxis (J. Kallrath, 2002, Vieweg)

Modeling Languages in Mathematical Optimization (J. Kallrath, 2004, Kluwer)

Real Optimization with SAP APO (J. Kallrath and T. I. Maindl, 2006, Springer)

Optimization in the Energy Industry (J. Kallrath, Panos M. Pardalos, S. Rebennack, and M. Scheidt, Editors, 2008, Springer)

Josef Kallrath is an experienced consultant and course-instructor with in-depth knowledge related to modeling and optimization systems. Josef Kallrath has been providing consulting services to a wide range of industries, including energy, metals, paper, process, refineries, and telecommunication. He leads the *Real World Optimization Working Group* of the German Operations Research Society. His current research interests are polyhedral modeling approaches to solve large-scale or difficult optimization problems, for instance, by decomposition techniques such as column generation, or hybrid methods.

Thanks for your interest.
We are looking forward to an exciting course!

GAMS Course Registration

F121C: Modeling and Optimization with GAMS Fundamentals Weekend Compact Version May 19–20, 2012 in Vienna, Austria

Herewith, I register for the GAMS course checked below.

1. PERSONAL DATA

Name: _____
Company: _____
Street / P.O. box: _____
ZIP code, city: _____
Phone / fax : _____
E-mail: _____

2. WORKSHOP FEE

FEES ARE SUBJECT TO 20% AUSTRIAN VAT

	excl. VAT	incl. VAT
<input type="checkbox"/> F121C weekend compact	€ 2,500.00	€ 3,000.00

I would like to get a free copy of the following book (please check):

- Gemischt-Ganzzahlige Optimierung in der Praxis (Josef Kallrath, Vieweg 2002)
- Business Optimization Using Mathematical Programming (Josef Kallrath & John M. Wilson, Macmillan)

Terms and Conditions

1. As limited seats are available registrations will be considered in the order they are received.
2. After the registration is received Dr. Maindl Consulting will send participants an invoice with payment instructions. With the receipt of the payment the registration is confirmed.
3. Change and cancellation policy:
 - a. Change of name / participant: no fee
 - b. The organizer can cancel the course due to force majeure or unforeseen events preventing the course to take place for a full refund of the workshop fee.
 - c. There is a cancellation fee of 50% of the invoice amount.

With my signature below I agree to the Terms and Conditions.

Place, Date

Signature

Please send your registration data per email or fax to

- Email: info@gams.de or info@dr-maindl.com
- Fax: +49-221-949-9171 (GAMS GmbH, Eupener Str. 135-137, 50933 Cologne, Germany)