# Basic to Advanced GAMS Class

## On Line Version May - 2021

## Introduction

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# Basic to Advanced GAMS Class Introduction
## Objectives and Method

A. Learning objectives

1. GAMS and GAMS use
   a. Will start elementary but go fast
   b. Backup provided by examples and documents

2. Firm Impact Analysis risk neutral and risk averse

3. Investment Analysis

B. Time is short -- Back up Course Materials

1. Reference materials on pdf backing up course
2. Personalized PDF of Overheads
3. Zip file
   a. All class examples
   b. Reference Materials

C. Mix of listening and doing hopefully about 60/40

# Basic to Advanced GAMS Class Introduction

## Class materials – a guide to their structure

This class is supported by a number of reference documents and class examples.

The fundamental support documents are the **overheads** that are distributed in the notebook. The overall course outline also indicates the name of the overhead set that will be under use during each course segment.

The overheads refer to a number of other course support documents and class examples. These include **class examples**, and **reference text materials**.

**Class examples** Generally, the class examples appear in the subdirectory **example** and are then contained in the subdirectory consistent with the name of the overheads. Thus, when working with the introductory material the overheads are called **gamintro** and the class example files are in the **example/gamintro** subdirectory. Generally I try to place filenames in **green** within the overheads.

**Reference text materials**. Generally the reference text materials appear under the subdirectory **document**. In the class overheads references to these materials are colored in **purple**.

# Basic to Advanced GAMS Class Introduction

## Class materials – a guide to their structure

## A list of part of the Reference Documents and their Function

| Reference Item Name | Class Intro | Basic GAMS | Firm Analysis Modeling | Multiple Locations | GAMS for Applied Modeling | Improved Output / Spreadsheets | CGE Modeling | Firm Risk Modeling | Indivisible Investment modeling |
|---|---|---|---|---|---|---|---|---|---|
| Outline | X | | | | | | | | |
| Newbook.pdf | | X | | X | X | X | | X | X |
| cgecoursenotes.htm, cgeingams.pdf | | X | | | X | | X | | |
| erwinhomepage.htm | | X | | | X | X | | | X |
| Fixmodel.pdf | | X | X | | X | X | | | |
| Rutherford.htm | | | | | X | X | X | | |
| McCarl User Guide (through IDE) | | X | | | X | X | X | | X |
| Tips | | X | | | X | | | | |
| Usegck | | | | | X | | | | |
| Probab | | | | | | | | | X |

Other documents can be gotten from GAMS web site www.gams.com and www.gams.de

# Basic to Advanced GAMS Class Introduction
# Additional Reference Documents and their Function

| Reference Name[a] | Brief Title | GAMS Features | Improved GAMS usage | Model Debugging | GAMSCHK Usage | Large Scale Modeling |
|---|---|---|---|---|---|---|
| fixmodel.pdf | So Your GAMS Model is not Working Right by McCarl | X | X | X | X | X |
| gnupltxy.pdf | GNUPLTXY Users guide by Schneider | X | X | | | |
| Newbook.pdf | Applied Math Programming by McCarl and Spreen | | X | X | | X |
| Rutherford.htm | Web page acessing utilities by Rutherford | X | X | | | |
| Sensitivity Analysis.htm | GAMS document on sensitivity analysis | | | | X | |
| tips.pdf | Tips on GAMS usage by McCarl | X | X | | | |
| usegck.pdf | An article on using GAMSCHK | | | X | | X |
| erwinhomepage.htm | Erwin Kalvahagen's web site with a number of utilities | | X | X | | X |
| createlib.pdf, uselib.pdf | Material on building and using library in IDE | X | X | | | |
| gamsmodeling.pdf, lp.pdf, mip.pdf | Erwin Kalvahagen's book chapters on applied GAMS modeling | X | X | | | X |
| The Excel Interface Doc.htm | XLIMPORT, XLEXPORT, XLDUMP documentation | X | X | | | |
| cgecoursenotes.htm | CGE class notes | X | X | | | |

# Basic to Advanced GAMS Class Introduction

## Class materials – a guide to their structure

## Zipfile Contents

| | |
|---|---|
| Document subdirectory | All resource materials |
| Example subdirectory | All examples plus some other models. Generally accessed through IDE library |
| Yourwork subdirectory | Blank to start. Present to catch your work |
| Fixmodelsubdirectory | Examples from fixmodel book that is in document directory |
| zipfile subdirectory | Installation files as follows |
| mccarlclass.exe | contains all class files. Run this to install files without default write protection (which happens if you copy in the cd) |
| gamsadds.exe | contains all additions to GAMS system mainly documents for docs directory and inclib files like gnupltxy. |
| Root directory | contains setup.bat that installs self extracting archives, along with installation instructions and class license file |

# Basic to Advanced GAMS Class Introduction

## Course Schedule

### Day 1 (all times US Central -Chicago)

| | | |
|---|---|---|
| 8:00-8:30 | Introduction<br>A. Participant Introduction<br>B. Class Introduction | |
| 8:30-9:30 | Intro to GAMS part 1 | gamintro |
| 9:30-10:00 | Break and Hands on 1 | |
| 10:00-11:00 | Intro to GAMS part 2<br>Model Inspect/Document | gamint2<br>inspect |
| 11:00-11:30 | Break and Hands on 2 | |
| 11:30-12:15 | Power of GAMS | power |
| 12:15-1:15 | Firm Modeling | firmimp |
| 1:15 | Recess for day | |
| 1:15- 1:45 | Optional dialogue session | |
| Over night | Hands on 3 and possibly 4 | |

# Basic to Advanced GAMS Class Introduction
## Course Schedule

### Day 2

| | | |
|---|---|---|
| 7:30-8:00 | Question session | |
| 8:00-8:40 | Quick Conditionals and Report Writing | qcondrep |
| 8:40-9:15 | Finish Firm Modeling | firmimp |
| 9:15-9:45 | Enhancing Self Documentation | goodmodl |
| 9:45-10:15 | Hands on 5 | |
| 10:15-11:15 | Fixing Misbehaving Models | fixmod |
| 11:15-12:00 | Hands on 6 | |
| 12:00-12:30 | Multiple Locations - transportation | multiloc |
| 12:30-1:15 | Forming and Solving NLPs in GAMS | nlp |
| 1:15 | Recess for day | |
| 1:15- 1:45 | Optional dialogue session | |
| Overnight | Hands on catch up (any of your choice) | |

# Basic to Advanced GAMS Class Introduction
## Course Schedule

### Day 3

| | | |
|---|---|---|
| 7:30-8:00 | Question session | |
| | Advanced Class Joins | |
| 8:00-8:15 | Advanced Class Introduction | |
| 8:15-9:00 | Using GAMSTUDIO | useide |
| 9:00-9:15 | Documentation | |
| 9:15-9:45 | Hands on 8 | |
| 9:45-10:30 | Controlling Algebra - Conditionals and Sets | condition |
| 10:30-11:15 | Hands on 9 | |
| 11:15-12:00 | Doing a Comparative Analysis | compare |
| 12:00-12:45 | CGE modeling | CGE |
| 12:45 | Recess for day | |
| 12:45- 1:15 | Optional dialogue session | |
| Overnight | Comparative part of hands on 11 and if interested 13 | |

# Basic to Advanced GAMS Class Introduction
## Course Schedule

### Day 4

| | | |
|---|---|---|
| 7:30-8:00 | Question session | |
| 8:00-8:45 | Output Improvement and Management | output |
| 8:45-9:30 | Hands on 10 | |
| 9:30-10:15 | Spreadsheet Links | link |
| 10:15-10:45 | Hands on 11 spreadsheet par | |
| 10:45-11:45 | Using GAMS MIRO | |
| 11:45-12:30 | Small to Large Model Development | smllrg |
| 12:30-12:45 | Basic Wrapup | |
| 12:45-1:00 | Hands on Introduction | handson |
| 1:00 | Recess for Day | |
| 1:00- 1:45 | Optional dialogue session | |
| | Farewell to Basic Class People | |
| Overnight | Hands on 14 | |

# Basic to Advanced GAMS Class Introduction
## Course Schedule

## Day 5

Advanced and Basic to Advanced People only

| | | |
|---|---|---|
| 7:30-8:00 | Question session | |
| 8:00-9:00 | Pre-solution Checking | presol |
| 9:00-9:30 | Calculations | calculat |
| 9:30-10:15 | Hands on 15 | |
| 10:15-10:45 | Conditional Compilation | condcomp |
| 10:45-11:45 | Post Solution Debugging of Nonsensical Models | unreal |
| 11:45-12:30 | Hands on 16 and break | |
| 12:30-1:15 | Scaling in GAMS | scale |
| 1:15 | Recess for day | |
| 1:15- 1:45 | Optional dialogue session | |
| Overnight | Hands on 17 | |

# Basic to Advanced GAMS Class Introduction

## Course Schedule

### Day 6

Advanced and Basic to Advanced People only

| | | |
|---|---|---|
| 7:30-8:00 | Question session | |
| 8:00-8:30 | Fixing Execution Errors | execerr |
| 8:30-9:30 | Fixing Unbounded and Infeasible Models | unbinf |
| 9:30-10:00 | Break and Hands on 18 | |
| 10:00-10:45 | Execution Time Speed and Memory | speedup |
| 10:45-11:15 | Saves and Restarts | savrestar |
| 11:15-12:00 | Break and Hands on 19 | |
| 12:00-12:30 | Advanced Bases | advbasis |
| 12:30-12:50 | Solution, Solvers and Reformulations | solver |
| 12:50-1:00 | Wrap It Up | wrapup |
| 1:00 | Workshop adjourns | |
| 1:00- 1:30 | Optional dialogue session | |