Who Should Attend?

This workshop series is specially designed to provide insight into the discipline of optimisation for a wide range of individuals such as OR professionals & financial quantitative analysts, risk analysts, consultants, DSS application developers, and academics. Everyone can benefit from a clear presentation of optimisation and how it is applied to solve business problems.

OR Professionals: This workshop series will help you to get up-to-date on the latest methodologies and receive exposure to the wide range of technologies and software now available in the field of optimisation.

Quantitative Analysts / Risk Analysts: This workshop series gives you an overview of the wide range of the technologies available allowing you to define and conceptualise your business problem in terms of an optimisation problem.

Software Developers/IT: This workshop series provides instruction on how to embed optimisation models into software applications. It will also give you all the necessary information and techniques in order to understand optimisation modelling and data modelling integration.

Academics and Students: Take advantage of our application focused examples to view optimisation from a business perspective, as well as receive hands-on experience with leading optimisation software.

CARISMA - IIM Calcutta Workshop Optimisation Methods & Risk Analysis: Applications in Finance

Date: 06 – 09 April, 2011

Workshops:

Part I: Linear & Integer Programming: Modelling Systems and embedded DSS

06 April - 07 April 2011

Part II: Stochastic Optimisation Models and Solution Methods

08 April - 09 April 2011

Venue:

Financial Research and Trading Lab, IIM Calcutta

CFA Institute
CE Qualified Activity

CFA Institute has approved this program, offered by OptiRisk Systems Ltd, for 24 CE credit hours. If you are a CFA Institute member, CE credit for your participation in this program will be automatically recorded in your CE Diary.

www.carisma.brunel.ac.uk

CARISMA Speakers:
- Gautam Mitra
- Cormac Lucas
- Christian Valente

IIMC Speakers:
- Ashok Banerjee

CARISMA

Brunel UNIVERSITY WEST LONDON

OptiRisk INDIA

50 INDIAN INSTITUTE OF MANAGEMENT CALCUTTA

INDIAN INSTITUTE OF MANAGEMENT CALCUTTA

■ 06 April - 07 April 2011

Benefits

At the end of the workshop, the participants will be able to develop their own optimisation models, link them to data sources and solve the models using state-of-the-art commercial solvers.

Participants will also acquire a good knowledge on how to embed optimisation models into applications.

By attending this workshop you will be able to:

- Build your own optimisation applications.
- Identify the best use of optimisation techniques and how to deploy them for your purposes.
- Gain an insightful and realistic view on the use of optimisation for business applications.
- Prepare and consolidate data from disparate sources for optimisation applications.
- Identify solving and fine-tuning requirements in your optimisation applications.

Software Used

The workshop is designed to give the participants hands-on experience with industrial optimisation tools, including:

- AMPL COM Object by Optirisk Systems
- FortMP Solver from Optirisk Systems
- CPLEX Solver from ILOG
- Microsoft Excel and Access
- SPInE (Stochastic Programming Integrated Environment)

Background

Optimisation technologies have become key tools in making important business decisions that increase competitive advantage. Optimisation, through the use of advanced mathematics and computer science techniques, is used to assist organisations with solving their complex business problems in areas such as manufacturing, distribution, finance and scheduling. The success of optimisation projects depends on many different factors such as which modelling tools are used, integration with corporate data and the selection of the most efficient solution algorithms available for the problem. The purpose of this optimisation workshop is to provide participants with an insightful overview and give step-by-step instructions for successfully building optimisation applications.

In this workshop, our instructors, who all have years of experience in this field, will take you through all the steps of an optimisation project using powerful optimisation tools such as CPLEX, FortMP, FortSP and AMPL Studio. The purpose of the workshop is to show how optimisation models, relational data and optimisation algorithms can be brought together in one cohesive business application.

This workshop is an advanced course designed to benefit individuals with various levels of optimisation knowledge. Some previous exposure to optimisation is helpful.

Overview

We introduce optimisation modelling using an algebraic modelling system and help delegates develop an understanding of how to formulate real-world optimisation models.

Furthermore, we cover advanced modelling concepts such as highly sparse large-scale models and how to formulate models with integer variables and logical constraints. We also guide participants to learn the tools and methods used for embedding optimisation into business applications including Excel and Access from Microsoft Office.

Introduction to Optimisation Modelling and Solving
- Fundamental modelling techniques and model development
- Formulating models with a Modelling System
- Solving models with MATLAB, CPLEX, FortMP
- Discrete Optimization Models and Methodologies
- Fine tuning of optimisation applications for performance
- Model validations and sensitivity analysis
- Common modelling mistakes and how to avoid them.

Advanced Optimisation Modelling
- Special model formulations
- Integer/binary variables
- Logical constraints
- Advanced indexing techniques for sparse data
- Data instantiation techniques
- Scalability for large optimisation models
- Developing solution heuristics using a script language
- Hints and tips for managing your data
- Common data problems and how to avoid them

Part II: Stochastic Optimisation Models & Solution Methods.

■ **08 April - 09 April 2011**

Background

Stochastic programming models are designed to capture both these aspects in a unique way, thus optimally allocating resources, while taking into consideration the alternative scenarios of how the future unfolds. The result is an optimal, or near optimal, plan of action that is hedged against the vagaries of the future. Stochastic programming is at the forefront of making decisions for the uncertain world of tomorrow. After three decades of research into the theory and application of stochastic programming, today, it is the first choice for analysts in portfolio selection, asset allocation, supply chain planning, energy systems planning, and agricultural planning, among others. We also introduce robust optimisation and illustrate how risk can be modelled and constraints used to control (Conditional Value At Risk - CVaR). This workshop is designed for those who wish to deploy stochastic programming successfully, but have little or no experience in the development of stochastic programming applications. Our course is most comprehensive and covers the latest developments in the field, with plenty of hands-on examples which help you develop stochastic programming applications for your sector, be it financial, supply chain, agriculture or energy systems planning. If you want to make optimal plans for an uncertain future, this is definitely the course for you. The course also introduces the delegates to a state of the art software SPInE, for developing and investigating stochastic programming applications. The course will also introduce the

Topics Covered

- **Introduction to stochastic programming**
- **Scenario generation**
- **Use of simulation as model validation**
- **Application of stochastic programming in Asset Liability Management**
- **Robust Optimization**
- **Portfolio optimisation with conditional VaR**
- **Volatility Modelling**

Overview

The aims of this workshop are to explain to the attendees:

   The implications of time and uncertainty in optimum decision making.
   The alternative models which have become established as paradigms for capturing uncertainty and optimum resource allocation.
   The role of scenarios as a pragmatic way of representing future uncertainties.
   The requirements for modelling and solving stochastic programming (SP) problems.
   The use of simulation as model validation.
   How to make risk decisions.

On successful completion of the workshop attendees will:
   Understand the basic concepts underlying:
      Scenario analysis (SCENAL)
      Two stage stochastic programming (TWOSP)
      Multistage stochastic programming (MULTISP)
      Chance constrained programming (CHNSP)
      Integrated chance constrained programming (ICCP)
      Robust Optimisation (RO)

   Be able to investigate SCENAL, TWOSP, MULTISP problems in specific application domains such as finance or supply chain planning.
   Understand the interplay between algebraic formulation of optimisation models and the imposed (decision) trees of SP representation.
   Gain insight into available software tools, their scope as well as shortcomings, in respect of capturing and solving these classes of SP problems.
   Be able to incorporate risk measure in SP in order to make optimal risk decisions.
   Understand models of randomness, scenario generation and the SP decisions by out of sample simulations.

Part I: Linear and Integer Programming & Embedded DSS

LINEAR PROGRAMMING MODELLING
Wednesday 6 April 2011

TIME	TOPIC	Presenter
9.00	**REGISTRATION AND COFFEE**	
9.15	**Ice breaking session**	
9.30	**Introduction and Overview**	
9.40	**Introduction to LP Terminology, model representation and mathematical models**	*Gautam Mitra*
10.30	**COFFEE BREAK**	
11.00	**An Introduction to Modelling via AMPL Studio** Participants will learn how to use various functionalities of AMPL Studio	*Cormac Lucas*
11.30	**An Introduction to AMPL Syntax** A formal presentation of basic AMPL modelling constructs	*Christian Valente*
12.00	**Efficient/Structured Modelling** A process to create an efficient model starting from the problem is presented	*Cormac Lucas*
12.30	**Goal programming/Elastic Constraints** Presentation of an introductory financial model that includes goal programming	*Gautam Mitra*
13.15	**LUNCH**	
14.15	**Using EXCEL as data source for AMPL** How to connect an AMPL model to Excel	*Christian Valente*
14.45	**Workshop (I) Financial Model** Participants investigate, formulate and solve an introductory financial model using AMPL	*Cormac Lucas, Christian Valente*
15.15	**TEA BREAK**	
15.30	**Hands-on models partial description: bond stripping, portfolio, ALM, supply chain** The models for the hands-on sessions will be described and hints for their implementation will be given	*Cormac Lucas, Christian Valente*
16.00	**Hands-On Session** The attendees should form groups and implement one of the models presented in the previous session	*Cormac Lucas, Christian Valente*
17.00	**Discussion and Feedback**	

Part I: Linear and Integer Programming & Embedded DSS

ADVANCED MP MODELLING
Thursday 7 April 2011

TIME	TOPIC	Presenter
9.00	COFFEE	
9.30	**Mixed Integer Programming Problems** Integer problems involving binary variables, semi-continuous variables and special ordered set variables are introduced. A few discrete programming problems are explained	*Gautam Mitra*
10.30	COFFEE BREAK	
11.00	**Case study: IP with buying threshold** An IP model with semi-continuous variables is introduced	*Cormac Lucas*
11.45	**An Introduction to AMPL scripting functionalities** Introduction to AMPL's powerful scripting functionalities	*Christian Valente*
12.15	**Continuation of Hands-On Session** The groups should continue the implementation of the chosen models and prepare brief presentations of their results	*Cormac Lucas,* *Christian Valente*
13.15	LUNCH	
14.15	**Introducing AMPL-COM** How to embed optimisation models in applications	*Christian Valente*
15.00	TEA BREAK	
15.30	**Part I: Heuristic for solving Integer Programs using AMPL Script** Different kind of heuristics to speed up solution of problems are here proposed and prototyped using AMPL scripting functionalities	*Cormac Lucas*
16.00	**Part II: AMPL-COM implementation of AMPL script procedures** Examples of integration of models and scripts into applications	*Christian Valente*
16.30	**Attendees' Presentations and feedback** The groups have ten minutes each to present the model they implemented and their results	
17.00	**Discussion and Feedback**	

Part II: Stochastic Optimisation Models and Solution Methods

INTRODUCTION TO SP

Friday 8 April 2011

TIME	TOPIC	Presenter
9.00	**COFFEE**	
9.30	**Stochastic Programming: optimum decision making under uncertainty: an overview** A theoretical background to decision making under uncertainty will be given, with a particular focus on Stochastic Programming	*Gautam Mitra*
10.30	**Stochastic Programming and Risk Measures**	*Gautam Mitra*
11.00	**COFFEE BREAK**	
11.30	**Two Stage SP: Expected value, scenario analysis and deterministic equivalent approaches** Different approaches to SP using modelling languages	*Cormac Lucas, Christian Valente*
12.30	**LUNCH**	
13.30	**News Analytics**	*Ashok Banerjee*
14.30	**Event Study**	*Ashok Banerjee*
15.30	**TEA BREAK**	
15.45	**Hands-on: Expected Value, Wait and See and Deterministic Equivalent: an ALM model** Various models will be described and attendees will be helped with their implementation in AMPL	*Cormac Lucas, Christian Valente,*
16.45	**Stochastic Extensions to AMPL: SAMPL and SPInE** AMPL Language extensions to represent SP, Chance Constrained, Integrated Chance Constrained and Robust Optimisation problems are presented	*Christian Valente*
17.30	**SAMPL Example: an ALM model** An ALM model will be refined by the introduction of uncertainty and expressed using SAMPL syntax	*Christian Valente*
18.00	**Solution Methods for Stochastic Programming**	*Gautam Mitra*
18.30	**Robust Optimization**	*Gautam Mitra*
19.00	**Discussion and Feedback**	

Part II: Stochastic Optimisation Models and Solution Methods

SCENARIO GENERATION AND APPLICATIONS

Saturday 9 April 2011

TIME	TOPIC	Presenter
9.00	**COFFEE**	
9.30	**Stochastic Programming and Scenario Generation: A modelling perspective** The role of scenario generation in SP will be illustrated	*Gautam Mitra*
10.00	**Scenario Generation: overview and desirable properties**	*Gautam Mitra*
10.30	**COFFEE BREAK**	
11.00	**Combining moment matching and bootstrapping** A scenario generator for 2-stage stochastic programs with multiple time periods	*Cormac Lucas*
11.30	**Hands-on: formulation of SP models in SAMPL** Various SP models will be described and attendees will be helped in their implementation in SAMPL	*Cormac Lucas, Christian Valente*
12.30	**LUNCH**	
13.30	**Real world application** Supply chain network design under uncertainty	*Cormac Lucas*
14.15	**Hands-on: formulation of SP models in SAMPL** Chance Constraint and Integrated Chance Constraint formulation of some models in SAMPL	*Cormac Lucas, Christian Valente*
15.15	**TEA BREAK**	
15.30	**Scenario Generation library in SPInE** The functionalities of the scenario generation library in SPInE will be presented	*Christian Valente*
16.00	**Hands-on: formulation of SP models in SAMPL** Various SP models will be described and attendees will be helped in their implementation in SAMPL	*Christian Valente, Cormac Lucas*
17.00	**Discussion and Feedback**	

CARISMA - IIM Calcutta Workshop
Optimisation Methods and its Financial Applications.

06 —09 April 2011

VENUE: Financial Research and Trading Lab, IIM Calcutta
You can use this form to book your seat
The last date of registration is 30 March 2011

Please book me on the event(s) ticked opposite
☐ Please send further information on the related event ticked in the list Opposite

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Status:
☐ PhD Student
☐ Academic or Researcher
☐ Industry

Fee

Place and date………………………………………….

Signature……………………………………………….

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Events - Please tick as appropriate

☐ Part I: Linear and Integer Programming & Embedded DSS   **06 — 07 April 2011**

☐ Part II: Stochastic Optimisation Models and Solution Methods, **08 — 09 April 2011**

Four easy ways to book

1. Fax this page: 033-24677851

2. Post to: Asst. Manager-Financial Research and Trading Lab, Indian Institute of Management. D.H. Road. Joka. Kolkata 700104. INDIA

3. Email: asstmgr_finlab@iimcal.ac.in
4. Telephone: +91-98305 16165

Registration Fees (in INR)

Students	4000
Academic & Researchers	7000
Industry	10000

For sponsorship and group booking contact:

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Registration Details

The registration fee for the event covers the following: Attendance, copy of the documentation, lunches and light refreshments Accommodation is not included. Detailed delegate information will be sent to you approximately two weeks before the event. Payment is required in advance of the event or at the latest, paid at the event. Payment may be made by par cheque or demand draft drawn in favour of Indian Institute of Management Calcutta" payable at Kolkata .

WHAT HAPPENS IF I HAVE TO CANCEL?
Confirm your CANCELLATION in writing up to 15 working days before the event and receive a refund less a 10% service charge. Regrettably, no refunds can be made for cancellations received less than 15 working days prior to the event.

SUBSTITUTIONS are welcome at any time.

The organisers reserve the right to amend the programme if necessary.
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