

Course Title: Optimization Methods

Target Group: Graduate students, Engineers, Researchers,
Financial Analysts

Modules: 4

Course Outline:

- **Module I: Training in SCILAB**
 - Introduction to SCILAB
 - Understanding SCILAB's built-in functions
 - Introduction to Matrices
 - Scripts and functions; Conditional statements and loops
 - Solving linear equations and numerical integration
 - Solving single and a system of non-linear equations
 - Solving single and a system of differential equations
 - Linear and non-linear regression
 - Linear programming
 - Non-Linear programming
- **Module II: Introduction to Optimization Methods**
 - Introduction to relevant linear algebra
 - Principles of optimization
 - First and second order conditions for optima
 - Conjugate gradient search
 - Programming/Hands-on session implementing techniques in SCILAB
- **Module III: Introduction to Constrained Optimization**
 - Penalty and barrier function methods
 - Parameter estimation with steady-state models
 - Active set methods for constrained optimization
 - Programming/Hands-on session implementing techniques in SCILAB
- **Module IV: Constrained Optimization**
 - Linear Programming formulation
 - * Simplex method
 - * Duality

- Quadratic Programming formulation
- Non-Linear constrained optimization
- Mixed-Integer Linear Programming
- Branch and bound algorithm
- Programming/Hands-on session implementing techniques in SCILAB