לשכת המהנדסים, האדריכלים והאקדמאים
במקצועות הטכנולוגיים בישראל (ע"ר)
אגודת מהנדסי הכימיה והכימאים
ASSOCIATION OF ENGINEERS AND ARCHITECTS IN ISRAEL
Israel Society of Chemical Engineers and Chemists

האגודה הישראלית להנדסה כימית
Israel Institute of Chemical Engineers
Corresponding Member - European Federation of Chemical Engineers
www.IIChE.org.il

One Day Workshop

Modern Problem Solving Techniques in Engineering with POLYMATH, Excel and MATLAB.

The workshop will be held at the Tel-Aviv University, from 9:00 a.m. till 5:00 p.m. on September 23, 2008. The workshop includes presentations and hands-on sessions of problem solving using POLYMATH, Excel and MATLAB in a computer lab.

Audience: This workshop will be of interest to faculty and graduate students of chemical engineering, environmental engineering and biotechnology, and practicing engineers from the same disciplines who desire to enhance their problem solving efficiency and capabilities in design, analysis and research activities and /or utilize modern numerical problem solving in their teaching.

Presenters: Prof. Neima Brauner, Tel-Aviv University
Prof. Mordechai Shacham, Ben-Gurion University of the Negev

Registration Fee: 500 NIS
The registration fee includes all the workshop activities (except lunch), a copy of the education version of POLYMATH 6.1**,** copies of all the workshop presentation and examples on a CD ROM**.**

Recommended Textbook: Cutlip, M. B. and Shacham, M., *Problem Solving In Chemical and Biochemical Engineering with Polymath, Excel and MATLAB*. Prentice-Hall, Upper Saddle River, New-Jersey, 2008.

Workshop Program:

9:00 – 11:00

	Subject	Duration
Introduction	Historical Perspective on Numerical Problem Solving	20 min
	Introduction to Polymath	20 min
Topic 1	Sequential Calculations with POLYMATH and Excel, Parametric Studies with Excel	
Example 1	Molar Volume and Compressibility Factor from Redlich-Kwong Equation	25 min
Topic 2	Solution of a Single Nonlinear (Implicit) Algebraic Equation with POLYMATH and MATLAB, Parametric Studies with MATLAB	
Example 2	Calculation of the Flow Rate in A Pipeline	25 min
Topic 3	Multiple Linear Regression with Statistical Analysis	
Example 3	Correlation of Heat of Hardening of Portland Cement versus Composition	30 min

11:00-11:15 Coffee Break

11:15 – 13:00

	Subject	Duration
Topic 4	Polynomial and Nonlinear Regression with Statistical Analysis	
Example 4	Correlating Temperature Dependent Physical Properties	30 min
Topic 5	Solution of a System of ODEs with POLYMATH and Excel, Parametric Studies with Excel	
Example 5	Adiabatic Operation of a Tubular Reactor for Cracking of Acetone	30 min
Topic 6	Solution of a System of Nonlinear Algebraic Equations (NLE) with POLYMATH and MATLAB, Parametric Studies with MATLAB	
Example 6	Complex Chemical Equilibrium	20
Topic 7	Solution of Multiple-Model, Multiple-Algorithm Problems	
Example 7	Semi-continuous Fed-Batch and Cyclic- Fed Batch Operation of a Bioreactor	25

13:00 -14:00 Lunch

14:00 – 17:00

	Subject	Duration
Topic 8	Estimating Model Parameters for Dynamic Models	
Example 8	Modeling Reproduction Rate of a Microorganism in a Fermenter	30 min
Topic 9	Constrained Minimization with POLYMATH and Excel	
Example 9	Complex Chemical Equilibrium by Gibbs Energy Minimization	30 min
Topic 10	Solution of a System of ODEs with POLYMATH and MATLAB, Boundary Value Iterations with MATLAB	
Example 10	Simultaneous Multicomponent Diffusion of Gases	30 min
Topic 11	Method of Lines for Partial Differential Equations	
Example 11	Diffusion and Reaction in a Falling Laminar Liquid Film	30 min
Topic 12	Applications in Environmental Engineering	
Example 12	Numerical Simulations with the Oxygen-sag model	25 min
Topic 13	Applications in Process Safety	
Example 13	HAZOP Analysis of a Process for Oxidation of 2-octanol in a semi-batch reactor	25 min
Conclusions	Conclusions and Discussion	10 min