



- 1. Course number and name: (0965201 ) Computer Applications in Chemical Engineering**
- 2. Class schedule:** 1 credit hours
  - Time and place: Sun (Sec 1), Yue (Sec 2): 2:00 - 5:00 at Computer Labs
- 3. Instructor:** Dr. Linda Al-Hmoud
  - a. Office: CHE 305
  - b. Email address: l.alhmoud@ju.edu.jo, linda.ju14@gmail.com
  - c. Office hours: as per announced at office door.
- 4. Text book:** Palm III, W. J, *Introduction to MATLAB 7 for Engineers*, 4th ed., McGraw-Hill, 2008.
- 5. References:**
  - a. Chapra, S. C., *Applied Numerical Methods with MATLAB for Engineers and Scientists*, McGraw-Hill, 2005.
  - b. Davis, T. A., and Sigmon, K., *MATLAB Primer*, 7<sup>th</sup> edition, Chapman & Hall/CRC, 2005
  - c. Hanselman, D., and Littlefield, B., *Mastering MATLAB 7*, Prentice Hall, 2005.
  - d. Higham, D. J., and Higham, N. J., *MATLAB Guide*, First and 2<sup>nd</sup> editions, SIAM, 2000 and 2005.
  - e. Hunt, B. R., Lipsman, R. L., Rosenberg, J. M., Coombes, K. R., Osborn, J. E., and tuck, G. J., *A Guide to MATLAB for Beginners and Experienced Users*, C.U.P, 2001.
  - f. Kuncicky, D. C., *MATLAB Programming*, Pearson Prentice Hall, 2004.
  - g. Magrab, E. B., Azarm, S., Balachandran, B., Duncan, J., Herold, K., and alsh,G., *Engineer's Guide to MATLAB*, First and 2<sup>nd</sup> editions, Prentice-Hall, 2000 and 2005.
- 6. Website:** <http://eacademic.ju.edu.jo/l.alhmoud>  
Your e-learning account (<https://elearning.ju.edu.jo/>)
- 7. Course information:**  
**Compulsory, 1 Credit hour (3 hr lecture per week including problem solving session)**  
An applied course focusing on use of computer packages: Getting started with some available packages used in typical modern chemical engineering textbooks, e.g., EZ-Solve, Polymath, and Matlab. Students will undertake a number of assignments involving solving problems utilizing the numerical, symbolic and graphical capabilities of the computer packages.
- 8. Course objective:**
  1. To explore the importance of solving problems using computer's software.
  2. Students will be expected to develop the skills to start HYSYS and/or CHEMCAD (software), solve a simplified problem, find needed physical properties for any chemical component, and to design a simplified chemical plant using HYSYS and/or CHEMCAD.
  3. Students will be expected to develop the skills of using MATLAB; use MATLAB in solving mathematical problems, do fitting, plotting, integration and differentiation.
- 9. Course outcomes:** By the end of the course, a student should be able to:
  - Objective 1**
    1. use software in order to solve engineering problems (O1)
  - Objective 2**
    2. calculate physical properties and liquid vapor phase equilibria using HYSYS/CHEMCAD (O1)
    3. select and add components and fluid package in HYSYS/CHEMCAD. Add heaters, coolers, streams, compressors, separators, reactors, etc., and solve them using special specification in HYSYS/CHEMCAD. (O1)
    4. work in teams to design simplified chemical plant using HYSYS CHEMCAD. (O5)

**Objective 3**

5. do simple mathematics & fundamental expressions of MATLAB using M-files. (O1)
6. solve polynomials, plot graphs using MATLAB (O1)
7. solve single and system of linear and non-linear equations using MATLAB (O1)
8. use logical operators; the if statement, loops, and the else statement using MATLAB (O1)
9. solve ordinary differential equations using MATLAB operators (O1)
10. work in group to solve chemical engineering related problems using MATLAB. (O1, O5)

**10. Topics covered:**

Week	Topics
1-2	Principles & Basic Features of MATLAB
3-4	Mathematical functions; Arrays and Vectors; Text strings; Input & Display
5	Polynomials and Solving Systems of Linear Equations
6	Plotting: 2D and 3D; Basic fittings
7-8	M-file in MATLAB
9	Midterm Exam
10	Logical Operators; Decision Making and Loops
11	Solving Systems of Non-Linear Equations, and Numerical Integration
12	Solving Ordinary Differential Equations
13-14	Introduction to CHEMCAD

**11. Instructional methods:**

Labs, group and individual assignments, class discussion and problem solving, and projects.

**12. Assessment & Grading:**

Quizzes	:	15%
Lab work and Home works	:	15%
Midterm Exam	:	30%
Final exam	:	40%
<b>Total</b>	:	<b>100%</b>

**13. Relationship to Program Outcomes**

O1	O2	O3	O4	O5	O6	O7
✓				✓		

**14. Relationship to Chemical Engineering Program Objectives**

PEO1	PEO2	PEO3	PEO 4
✓	✓	✓	✓

**15. Notes:**

- a. All cases of academic dishonesty will be handled in accordance with university policies and regulations.
- b. There will be 4-5 announced quizzes during the semester. Students are expected to be ready to take a quiz any time they have a lab. There will be no make-up quizzes.
- c. Students are expected to attend EVERY LAB SESSION and they are responsible for all material, announcements, schedule changes, etc., discussed in class. The university policy regarding the attendance will be strictly adhered.
- d. Any students with disabilities who need accommodations in this course are encouraged to speak with the instructor as soon as possible to make appropriate arrangements for these accommodations.