

## COURSE DESCRIPTION FORM

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|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <b>Course Code and Title</b>                                                         | KM476COMPUTER APPLICATIONS IN CHEMICAL ENGINEERING                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                              |
| <b>Course Semester</b>                                                               | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                              |
| <b>Catalog Description (Content) of the Course</b>                                   | Use of computers in chemical engineering applications and design. Use of various programming techniques in estimation of transport properties, calculations of phase equilibria and design of unit operations in chemical processes.                                                                                                                                                                                                                                                                           |                                                                              |
| <b>Main Textbook</b>                                                                 | 1. Yeong Koo Y., Chemical Engineering Computation with MATLAB, CRC Press, 2016.                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                              |
| <b>Supporting Textbooks</b>                                                          | 1. Problem Solving In Chemical Engineering With Numerical Methods, Michael B. Cutlip, Mordechai Shacham, Prentice Hall PTR Intn Series, Upper Saddle River, NJ, 1999.<br>2. Dukkupati Rao V., Matlab Introduction wirh Applications, New Age, International Publishers, Hyderabad, 2010.<br>3. Mariano Martin M., Introduction to Software for Chemical Engineers, CRC Press, London, 2015.<br>4. Brian Hahn and Dan Valentine, Essential MATLAB for Engineers and Scientists, Academic Press, Elsevier, 2010. |                                                                              |
| <b>Course Credit (ECTS)</b>                                                          | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                              |
| <b>Prerequisites of the Course (Compulsory attendance should be indicated here.)</b> | There is no prerequisite for this course,Compulsory attendance (70 %)                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                              |
| <b>Type of the Course</b>                                                            | Elective                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                              |
| <b>Instruction Language of the Course</b>                                            | Turkish                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                              |
| <b>Object and Target of the Course</b>                                               | To show by numerous examples how to utilize computer in various applications of Chemical Engineering. To show how to make data analysis, parameter estimation of the models developed theoretically, simultaneous solution of algebraic equations required to define a system. To use simple and esaily accessible programs in doing all these and to choose the examples which have direct application potentials.                                                                                            |                                                                              |
| <b>Learning Outcomes of the Course</b>                                               | To gain experience in using engineering programs like <b>MATLAB</b> . To learn basic and mathematical techniques in Chemical Engineering applications.                                                                                                                                                                                                                                                                                                                                                         |                                                                              |
| <b>Mode of Delivery</b>                                                              | There is no prerequisite or co-requisite for this course                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                              |
| <b>Weekly Schedule of the Course</b>                                                 | <b>Weeks</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Topics</b>                                                                |
|                                                                                      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Parameter estimation, regression analysis; modeling of transport properties  |
|                                                                                      | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Parameter estimation, regression analysis; modeling of transport properties  |
|                                                                                      | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Solution of differential equations; Example from Heat Transfer               |
|                                                                                      | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Solution of differential equations; Example from Mass Transfer               |
|                                                                                      | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Solution of differential equations; Example from Heat and Mass Transfers     |
|                                                                                      | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Solution of simultaneous algebraic equations; Design of a pipe line net work |
|                                                                                      | 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Solution of simultaneous algebraic equations; Design of a pipe line net work |
|                                                                                      | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Simulation of Heat Exchangers                                                |
|                                                                                      | 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Simulation of Heat Exchangers                                                |
|                                                                                      | 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Simulation of Absorption Columns                                             |
|                                                                                      | 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Simulation of Absorption Columns                                             |
|                                                                                      | 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Simulation of Distillation Columns                                           |
|                                                                                      | 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Simulation of Distillation Columns                                           |
|                                                                                      | 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Simulation of Distillation Columns                                           |

|                                                                                                                                             |                                                    |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
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| <b>Educative Activities</b><br><i>(Credit will be determined based on the time given for these activities. Should be filled carefully.)</i> | Theoretical Study Hours of Course Per Week         |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Reading                                            |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Searching in Internet and Library                  |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Preparing Reports                                  |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Preparing Presentation                             |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Presentation                                       |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Mid-Term and Studying for Mid-Term                 |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
| Final and Studying for Final                                                                                                                |                                                    |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
| <b>Assessment Criteria</b>                                                                                                                  |                                                    |                                                                                                                                                                                                                       |                     | <b>Sayı</b>            | <b>Toplam Katkı (%)</b>      |          |          |          |          |
|                                                                                                                                             | Midterm                                            |                                                                                                                                                                                                                       |                     | 2                      | 25                           |          |          |          |          |
|                                                                                                                                             | Homework                                           |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Assignment                                         |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Projects                                           |                                                                                                                                                                                                                       |                     | 1                      | 10                           |          |          |          |          |
|                                                                                                                                             | Practice                                           |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Quiz                                               |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Contribution of In-term Studies to Overall Grade   |                                                                                                                                                                                                                       |                     | 60                     |                              |          |          |          |          |
|                                                                                                                                             | Contribution of Final Examination to Overall Grade |                                                                                                                                                                                                                       |                     | 40                     |                              |          |          |          |          |
|                                                                                                                                             | Attendance                                         |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
| <b>Workload of the Course</b>                                                                                                               | <b>Ekinlik</b>                                     |                                                                                                                                                                                                                       | <b>Hafta sayısı</b> | <b>Süre Saat/Hafta</b> | <b>D.Sonu toplam iş yükü</b> |          |          |          |          |
|                                                                                                                                             | Theoretical Study Hours of Course Per Week         |                                                                                                                                                                                                                       | 14                  | 3                      | 42                           |          |          |          |          |
|                                                                                                                                             | Practising Hours of Course Per Week                |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Reading                                            |                                                                                                                                                                                                                       | 7                   | 2                      | 14                           |          |          |          |          |
|                                                                                                                                             | Searching in Internet and Library                  |                                                                                                                                                                                                                       | 7                   | 2                      | 14                           |          |          |          |          |
|                                                                                                                                             | Designing and Applying Materials                   |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Preparing Reports                                  |                                                                                                                                                                                                                       | 1                   | 6                      | 6                            |          |          |          |          |
|                                                                                                                                             | Preparing Presentation                             |                                                                                                                                                                                                                       | 1                   | 6                      | 6                            |          |          |          |          |
|                                                                                                                                             | Presentation                                       |                                                                                                                                                                                                                       | 1                   | 1                      | 1                            |          |          |          |          |
|                                                                                                                                             | Mid-Term and Studying for Mid-Term                 |                                                                                                                                                                                                                       | 2                   | 6                      | 12                           |          |          |          |          |
|                                                                                                                                             | Final and Studying for Final                       |                                                                                                                                                                                                                       | 1                   | 5                      | 5                            |          |          |          |          |
|                                                                                                                                             | Other                                              |                                                                                                                                                                                                                       |                     |                        |                              |          |          |          |          |
|                                                                                                                                             | Total Workload                                     |                                                                                                                                                                                                                       |                     |                        | 100                          |          |          |          |          |
|                                                                                                                                             | Workload / 25                                      |                                                                                                                                                                                                                       |                     |                        | 4                            |          |          |          |          |
|                                                                                                                                             | ECTS Credit                                        |                                                                                                                                                                                                                       |                     |                        | 4                            |          |          |          |          |
| <b>Course's Contribution To Program</b>                                                                                                     | <b>Num.</b>                                        | <b>Program Ourcomes</b>                                                                                                                                                                                               |                     |                        | <b>1</b>                     | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> |
|                                                                                                                                             | <b>1</b>                                           | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems. |                     |                        |                              |          |          | ×        |          |
|                                                                                                                                             | <b>2</b>                                           | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.                                                            |                     |                        |                              |          |          | ×        |          |
|                                                                                                                                             | <b>3</b>                                           | Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.      |                     |                        |                              |          | ×        |          |          |
|                                                                                                                                             | <b>4</b>                                           | Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.                                                               |                     |                        |                              |          |          | ×        |          |
|                                                                                                                                             | <b>5</b>                                           | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.                                                                                         |                     |                        |                              |          | ×        |          |          |
|                                                                                                                                             | <b>6</b>                                           | Ability to work efficiently in intra-disciplinary teams.                                                                                                                                                              |                     |                        |                              | ×        |          |          |          |

|                                             |    |                                                                                                                                                                                     |   |   |   |   |  |
|---------------------------------------------|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|--|
|                                             | 7  | Ability to work efficiently in multi-disciplinary teams;                                                                                                                            |   | × |   |   |  |
|                                             | 8  | Ability to work individually.                                                                                                                                                       |   | × |   |   |  |
|                                             | 9  | Ability to communicate effectively in Turkish/English, both orally and in writing; Ability to write effective reports and comprehend written reports, make effective presentations, |   | × |   |   |  |
|                                             | 10 | prepare design and production reports, give and receive clear and intelligible instructions.                                                                                        |   |   | × |   |  |
|                                             | 11 | Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.             |   |   |   | × |  |
|                                             | 12 | Awareness of professional and ethical responsibility.                                                                                                                               |   | × |   |   |  |
|                                             | 13 | Information about business life practices such as project management, risk management, and change management.                                                                       | × |   |   |   |  |
|                                             | 14 | Information about awareness of entrepreneurship, innovation, and sustainable development.                                                                                           | × |   |   |   |  |
|                                             | 15 | Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety.                                                | × |   |   |   |  |
|                                             | 16 | Knowledge about awareness of the legal consequences of engineering solutions.                                                                                                       | × |   |   |   |  |
|                                             | 17 | Knowledge on standards used in engineering practice.                                                                                                                                | x |   |   |   |  |
| Name of Lecturer(s) and Contact Information |    | 1. Prof. Dr. Muzaffer BALBAŞI , mbalbasi@gazi.edu.tr<br>2.<br>3.                                                                                                                    |   |   |   |   |  |