**COURSE SPECIFICATION**

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| This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification. |

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| College of Engineering  University of Baghdad | 1. Teaching Institution |
| Chemical Engineering Department (CHED) | 2. University Department/Centre |
| Pollution and Industrial safety/CHE441 | 3. Course title/code |
| Chemical Engineering Department (CHED) | 4. Programme(s) to which it contributes |
| Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. | 5. Modes of Attendance offered |
| 1st& 2nd Semesters/Academic Year 2017 -2018 | 6. Semester/Year |
| 60 hrs. / 2 hrs. per week | 7. Number of hours tuition (total) |
| 1.october.2017 | 8. Date of production/revision of this specification |
| 9. Aims of the Course | |
| The aims of the course are:   1. To develop an understanding of the air pollution processes to prevent the earth. 2. To present the basic transport equation sand in design of unit operations and separation process. 3. To develop knowledge in modern separation processes and sustainable energy used to prevent pollution. 4. To understand the health effect due to pollution | |

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| 10· Learning Outcomes, Teaching ,Learning and Assessment Methode |
| 1. Knowledge and Understanding   A1. Know the importance of unit operation in the design of most of the chemical engineering units used to prevent pollution.  A2. Be familiar with the pollution, and industrial safety.  A3. Recognize the analogy between health hazard and sustainability.  A4. Understand the limit of health hazard.  A5. Understand fluid-particle and its effect on health.  A6 . Understand fluid flow through packed and fluidized beds  A7. Know various chemical engineering separation processes used to prevent pollution.  A8. Select appropriate separation technique for intended problem.  A9. Understand the mechanism of the separation by membrane processes and the properties of membrane units in Reverse osmosis.  A10. Identify separations equipment of various types and their components |
| B. Subject-specific skills  B1. Use the techniques, skills, and modern engineering tools necessary for engineering practice in unit operation applications  B2. Communicate effectively.  B3. Understand professional, social and ethical responsibilities.  B4. Identify, formulate and solve unit operation problems  B5. Work in groups and function on multi-disciplinary teams.  B6. Be able to apply modern knowledge and to apply mathematics, science, engineering and technology to unit operation problems and applications.  B7. Evaluate competing separation technologies on factors such as simplicity, reliability, and cost. |
| Teaching and Learning Methods |
| 1. Lectures 2. Tutorials 3. Homework and assignments 4. Tests and Exams 5. In-Class questions and discussions 6. Connection between theory and application 7. Seminars 8. In- and Out-Class oral conservations 9. Reports, presentations, and posters |
| Assessment methods |
| 1. Examinations, Tests, and Quizzes. 2. Extracurricular activities and homework. 3. Student engagement during lectures. |
| C. Thinking Skills  C1.methods to connect theoretical science with application of pollution  C2.try and error examination  C3.new idea to prevent the air and water pollution  C4. To find different way and different idea to prevent pollution |
| Teaching and Learning Methods |
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| D. General and Transferable Skills (other skills relevant to employability and personal development)  D1. Community affectivity.  D2. Work individually and team members in international and multidisciplinary teams.  D3. Understanding impact of engineering solutions in an environmental and social context. |

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| 11. Course Structure | | | | | |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
|  |  | **Introduction** |  | 2 |  |
|  |  | **Definitions** |  | 2 |  |
|  |  | **Sources of air pollution** |  | 2 |  |
|  |  | **Types o air pollution** |  | 2 |  |
|  |  | **Troposphere and winds** |  | 2 |  |
|  |  | **Air quality measurement** |  | 2 |  |
|  |  | **Air pollution control** |  | 2 |  |
|  |  | **Purification of air from dust** |  | 2 |  |
|  |  | **Purification of air from gases** |  | 2 |  |
|  |  | **Epidemiological studies** |  | 2 |  |
|  |  | **Water pollution** |  | 2 |  |
|  |  | **Specific measurement of water** |  | 2 |  |
|  |  | **BOD و COD** |  | 2 |  |
|  |  | **Supply and treatment of water** |  | 2 |  |
|  |  | **Purification of water** |  | 2 |  |
|  |  | **Salt removal** |  | 2 |  |
|  |  | **Treatment of heavy water of city** |  | 2 |  |
|  |  | **Treatment of industrial water** |  | 2 |  |
|  |  | **Air pollution** |  | 2 |  |
|  |  | **Specific air measurements** |  | 2 |  |
|  |  | **Suspended particles** |  | 2 |  |
|  |  | **Gases, effect on human health** |  | 2 |  |
|  |  | **Industrial safety** |  | 2 |  |
|  |  | **Safety terms in equipments** |  | 2 |  |
|  |  | **dangers** |  | 2 |  |
|  |  | **Effect of radioactive materials** |  | 2 |  |
|  |  | **Chemical effects** |  | 2 |  |
|  |  | **Biological effects** |  | 2 |  |
|  |  | **Storage of chemicals** |  | 2 |  |
|  |  | **Fires and their causes** |  | 2 |  |

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| 12. Infrastructure | |
|  | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER |
|  | Special requirements (include for example workshops, periodicals, IT software, websites) |
| Field and scientific visits | Community-based facilities  (include for example, guest  Lectures , internship , field studies) |

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| 13. Admissions | |
|  | Pre-requisites |
| 32 | Minimum number of students |
| 75 | Maximum number of students |