**TEMPLATE FOR COURSE SPECIFICATION**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

Course Instructor: Ass. Prof. Dr. Hussain Majeed Flayeh

****COURSE SPECIFICATION

This course deals with major problems of Air pollution of the atmosphere. It covers processes responsible for the occurrence and release of pollutants in the environment, dispersion and mechanisms of air pollutant, the hazards associated with different types of pollutant, global climate change, energy balance, greenhouse gases, acid rain, Stratospheric Ozone Depletion, principal of air pollution control equipment operation , and design. The course includes lectures, tutorials, and writing a report.

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| 1. Teaching Institution | University of Baghdad/ College of Engineering |
| 2. University Department/Centre | Environmental Engineering Department |
| 3. Course title/code | Air Pollution |
| 4. Modes of Attendance offered | 2 days per week |
| 5. Semester/Year | Year |
| 6. Number of hours tuition (total) | 90 h |
| 7. Date of production/revision of this  specification | 2021-2022 |
| 8. Aims of the Course | |
| By the end of the course, students will have a broad, integrated understanding of the major problems associated with Air pollution of the atmosphere. Students will be expected to be familiar with and have an understanding of:  - The causes of global warming, ozone depletion, emissions and urban air pollution; - How air pollution is caused by burning of fuels, and processing of spent fuel and emission of flue gases; - Problems of air pollution on health, plants, materials effects, and environment; - modeling of air pollution dispersion , point, line, area , and indoor sources; - Procedures and prospects for reducing unwanted emissions to the environment and remediation of already polluted systems  - principals of air pollution controls, equipment operation and controls | |

9· Learning Outcomes, Teaching ,Learning and Assessment Methode

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| 1. Cognitive goals  |  | | --- | | A1. Develop an understanding of the core ideas and concepts of air pollution | | A2. Attract and welcome undergraduate students to our Bachelor of Science program in Environmental Engineering, and to graduate B.S. students who are innovative problem solvers, who become leaders in their organizations, and who possess the knowledge and skills required for a wide range of careers and career changes. | |
| B. The skills goals special to the course.   |  | | --- | | B1. Be able to recognize the power of abstraction and generalization, and to carry out investigative mathematical work with independent judgment. | | B2. Concentrating on scientific research and its leading role in helping to serve the society and solving its problems through conducting application researches  and resource recovery/recycling, transport. | |
| Teaching and Learning Methods |
| More description of case studies and applications |
| Assessment methods |
| Homework related to problem solving, tutorials, and writing a report |
| C. Affective and value goals   |  | | --- | | C1. Be able to apply rigorous, analytic, highly numerate approach to analyze and solve problems in air pollution. | | C2 Prepare students for successful careers in environmental engineering | |
| Teaching and Learning Methods |
| Intensive homework and applications |
| Assessment methods |
| Team work and problem solving |

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

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| D1. Be able to communicate problem solutions using correct mathematical terminology and good English. |
| D4.An ability to identify, formulate, and solve engineering problems |

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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or  Topic Title | Teaching  Methods | Assessment  Method |
| 1 | 3 | Introduction &Definition of air pollution | **Introduction**  **Component of an air pollution problem, Source, Effect, Criteria Air Pollutant** |  | Questions during the lectures ,quiz, exam, present in the class |
| 2 | 3 | Properties of air pollutants | **Air pollution effects on human health, Vegetation and animals, Materials and structure, and Atmospheric effects** |  | Questions during the lectures ,quiz, exam, present in the class |
| 3 | 3 | Meteorology | **Meteorology and air pollution** |  | Questions during the lectures ,quiz, exam, present in the class |
| 4 | 3 | Dispersion modeling | **Air pollution dispersion model**  **-Gaussion (point source)** |  | Questions during the lectures ,quiz, exam, present in the class |
| 5 | 3 | Dispersion modeling | **Air pollution dispersion model**  **-Gaussion (point source)** |  | Questions during the lectures ,quiz, exam, present in the class |
| 6 | 3 | Dispersion modeling | **Air pollution dispersion model**  **-Gaussion (point source)** |  | Questions during the lectures ,quiz, exam, present in the class |
| 7 | 3 | Dispersion modeling | Applications |  | Questions during the lectures ,quiz, exam, present in the class |
| 8 | 3 | Dispersion modeling | **Air pollution dispersion model**  **-line source** |  | Questions during the lectures ,quiz, exam, present in the class |
| 9 | 3 | Dispersion modeling | **Air pollution dispersion model**  **-Area source** |  | Questions during the lectures ,quiz, exam, present in the class |
| 10 | 3 | Dispersion modeling | Applications |  | Questions during the lectures ,quiz, exam, present in the class |
| 11 | 3 | Dispersion modeling | **Air pollution dispersion model**  **-indoor source** |  | Questions during the lectures ,quiz, exam, present in the class |
| 12 | 3 | Mid. Exam | Applications |  | Questions during the lectures ,quiz, exam, present in the class |
| 13 | 3 | Dispersion modeling | **global climate change, energy balance, greenhouse gases,** |  | Questions during the lectures ,quiz, exam, present in the class |
| 14 | 3 | Dispersion modeling | **global climate change, acid rain, Stratospheric Ozone Depletion** |  | Questions during the lectures ,quiz, exam, present in the class |
| 15 | 3 | Half-year Break |  |  | Questions during the lectures ,quiz, exam, present in the class |
| 16 | 3 | Half-year Break |  |  | Questions during the lectures ,quiz, exam, present in the class |
| 17 | 3 | Air pollution control | **Air Pollution control**  **Principals** |  | Questions during the lectures ,quiz, exam, present in the class |
| 18 | 3 | Control equipment’s for particulate mater | **Air Pollution control**  **For particulate**  **Settling chambers** |  | Questions during the lectures ,quiz, exam, present in the class |
| 19 | 3 | Control equipment’s for particulate mater | **Air Pollution control**  **For particulate**  **cyclone** |  | Questions during the lectures ,quiz, exam, present in the class |
| 20 | 3 | Control equipment’s for particulate mater | **Air Pollution control**  **For particulate**  **Bag filters** |  | Questions during the lectures ,quiz, exam, present in the class |
| 21 | 3 | Control equipment’s for particulate mater | **Air Pollution control**  **For particulate**  **-Electrostatic precipitators** |  | Questions during the lectures ,quiz, exam, present in the class |
| 22 | 3 |  | Applications |  | Questions during the lectures ,quiz, exam, present in the class |
| 23 | 3 | Control equipment’s for Gases | **Air Pollution control**  **For gases** |  | Questions during the lectures ,quiz, exam, present in the class |
| 24 | 3 | Control equipment’s for Gases | **Air Pollution control**  **For gases**  **-Absorption** |  | Questions during the lectures ,quiz, exam, present in the class |
| 25 | 3 | Control equipment’s for Gases | **Air Pollution control**  **For gases**  **-Adsorption** |  | Questions during the lectures ,quiz, exam, present in the class |
| 26 | 3 | Control equipment’s for Gases | Applications |  | Questions during the lectures ,quiz, exam, present in the class |
| 27 | 3 | Control equipment’s for Gases | **Air Pollution control**  **For gases**  **-condensation** |  | Questions during the lectures ,quiz, exam, present in the class |
| 28 | 3 | Control equipment’s for Gases | Applications |  | Questions during the lectures ,quiz, exam, present in the class |
| 29 | 3 | Control equipment’s for Gases | **Air Pollution control**  **For gases**  **-Incinerations** |  | Questions during the lectures ,quiz, exam, present in the class |
| 30 | 3 | Control equipment’s for Gases | Applications |  | Questions during the lectures ,quiz, exam, present in the class |

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| 11. Infrastructure | |
| 1. Books Required reading: | **1- Mackenzie L. Davis, and Susan J. Masten, 2014, Principles of Environmental Engineering and Science Third Edition, McGraw Hill.**  **2- M. N. Rao and H. V. N. Rao, “Air Pollution,” McGraw Hill, USA, 2000**  **3 Daniel Vallero, 2014, Fundamentals of Air Pollution, 5th Edition** |
| 2. Main references (sources) | [**J.R. Mudakavi**](https://www.ikbooks.com/author-details/jrmudakavi/239)**, 2014, Principles and Practices of Air Pollution Control and Analysis,** |
| A- Recommended books and references (scientific journals, reports…). | **by**[**Lawrence K. Wang**](https://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Lawrence+K.+Wang&search-alias=stripbooks)**(Editor),**[**Norman C. Pereira**](https://www.amazon.in/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=Norman+C.+Pereira&search-alias=stripbooks)**(Editor),**[**Yung-Tse Hung**](https://www.amazon.in/s/ref=dp_byline_sr_book_3?ie=UTF8&field-author=Yung-Tse+Hung&search-alias=stripbooks)**(Editor), Air Pollution Control Engineering: (Handbook of Environmental Engineering)  July 2004** |
| B-Electronic references, Internet  sites… | **https://www.researchgate.net/profile/Muhammadreza\_Tabatabaei/post/Electronic\_copy\_of\_book/attachment/5d7c8e6b3843b0b982641cc4/AS%3A802926524133376%401568444009676/download/Principles+of+Environmental+Engineering.pdf** |

12. The development of the curriculum plan

The development includes more computer applications using air pollution dispersion models, and air pollution equipment design software