# TEMPLATE FOR COURSE SPECIFICATION

Physical chemistry/ CHEM 241

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW |

**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. |

**Lec .Abeer k.Shams**

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| 1. Teaching Institution | Al-NAHRAIN UNIVERSITY/COLLEGE of SCIENCE |
| 2. University Department/Centre | Department of chemistry |
| 3. Course title/code | Physical chemistry/ CHEM 241 |
| 4. Programme(s) to which it contributes | Bachelor of Science in Chemistry |
| 5. Modes of Attendance offered | Full Time |
| 6. Semester/Year | first Semester/ 2022-2023 |
| 7. Number of hours tuition (total) | 30 theory + 30 practical lab |
| 8. Date of production/revision of this specification | 1/10/2022 |
| 9. Aims of the Course | |
| Develops understanding of mass, energy, heat, work, efficiency, ideal and real thermodynamic cycles and processes. Covers first and second laws of thermodynamics, perfect gas law, properties of real gases, and the general energy equation for closed and open systems. | |

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| 10· Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Cognitive goals .   A1-Enable students to obtain knowledge and understanding of the principles of gas laws  A2- Enabling students to obtain knowledge and understanding of the laws of thermodynamics  A3- Enabling students to obtain knowledge and understanding of the relationship between laws  A4- Enabling students to acquire knowledge of the methods of deriving the basic equations of thermodynamics, Ideal and real gases  A5- Enable students to identify the most important applications of thermodynamics |
| B. The skills goals special to the course.  B1 - Practical laboratory skills  B2 - Using mathematical means to achieve derivations  B3 - Mental dynamics in the use of units and their conversions |
| Teaching and Learning Methods |
| Providing students with the basics related to the thermodynamics of ideal and real gases Forming   * discussion groups during the lectures to discuss various topics within the principles and applications of thermodynamics * Direct questions to the students to test their understanding of the topic * Assigning students homework as well as sudden exams |
| Assessment methods |
| Sudden daily exams,quia  Programmed mid-term exams  homework  Direct oral questions |
| C. Affective and value goals  C1- Enabling students to solve problems related to the applications of thermodynamic equations for gases  C2- Enabling students to solve problems related to the derivations of laws and their equations  C3 - Enabling students to solve mathematical problems using the simplest means  C4- Expanding the perceptions of students in dynamic dealing with units and their conversions |

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| D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)   1. -The ability to self-research to solve problems 2. -Using laboratory techniques to measure the physical properties of materials and to determine the inaccuracy of quantitative measurements 3. -Use Excel to manage experimental measurements and present them in graphs 4. - Be able to work productively as a team member by solving problems with other student |

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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or Topic Title | Teaching Method | Assessment Method |
| 1 | 2lec +2lab |  | Gas laws | Explanation and examples |  |
| 2 | 2lec +2lab |  | Dalton’s law | Explanation and examples |  |
| 3 | 2lec +2lab |  | First law of thermodynamics | Explanation and examples |  |
| 4 | 2lec +2lab |  | First law of thermodynamics | Explanation and examples |  |
| 5 | 2lec +2lab |  | Work- Internal energy | Explanation and examples |  |
| 6 | 2lec +2lab |  | Work- Internal energy | Explanation and examples |  |
| 7 | 2lec +2lab |  |  |  | MIDTERM #1 IN-CLASS Duration: 60 min; |
| 8 | 2lec +2lab |  | Enthalpy - Heat capacity | Explanation and examples |  |
| 9 | 2lec +2lab |  | ***Calorimetry*** | Explanation and examples |  |
| 10 | 2lec +2lab |  | ***Heat capacity*** | Explanation and examples |  |
| 11 | 2lec +2lab |  | Thermochemistry | Explanation and examples |  |
| 12 | 2lec +2lab |  | Thermochemistry | Explanation and examples |  |
| 13 | 2lec +2lab |  |  |  | MIDTERM #2 IN-CLASS Duration: 60 min; |
| 14 | 2lec +2lab |  | Hess law- Standard enthalpies | Explanation and examples |  |
| 15 | 2lec +2lab |  | ***Kirchhoff`s law*** | Explanation and examples |  |

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| 11. Infrastructure | |
| 1. Books Required reading: | ./ Physical chemistry/ 4th edition/ Houghton Mifflin Co. / N.Y. / 2003 |
| 2. Main references (sources) | 2-Physical Chemistry/ P.W.Atkins/ 9thedition / Oxford university press/ 2009 |
| A- Recommended books and references (scientific journals, reports…). | Physical Chemistry/Third Edition/Robert G. Mortimer/ Elsevier |
| B-Electronic references, Internet sites… | <https://chem.libretexts.org/Special:FirstLoginWelcome?return>= |

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| 12. The development of the curriculum plan |
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