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| <b>University of Petra</b>          | <br>جامعة البترا<br>Petra University | <br>جامعة البترا - عتقون علمها<br>Petra University Anniversary |
| <b>Faculty of Art &amp; Science</b> |   | كلية الآداب والعلوم   |
| <b>Department of Chemistry</b>      |   | قسم الكيمياء  |

## Course Syllabus

**Year: 2019 / 2020**

**Semester: Second**

| Course No. | Course Title                        | Prerequisite | Co-requisite | Credit Hours Lab./<br>European Credit<br>Transfer System<br>(ECTS) |
|------------|-------------------------------------|--------------|--------------|--|
| 101107     | General Chemistry<br>Laboratory (2) | 101101       | 101102       | 1/ 3   |

| Instructor Name | e-mail                | Office No. | Office ext. | Office Hours   |
|-----------------|-----------------------|------------|-------------|--|
| Amal almaareef  | aalmaareef@uop.edu.jo | 7117       | 7117        | Sun, Tue: 10:00 –<br>11:00 & 12:00 –<br>13:00, Thu, 10:00 –<br>11:00 |

|   |  |
|---|--|
| <b>Coordinator's Name:</b><br>(if applicable) |  |
|---|--|

|                                     |   |
|-------------------------------------|---|
| <b>Short Course<br/>Description</b> | This course involves experiments for determination of: molecular weight of a volatile liquid, molar volume of oxygen, molar solubility and $K_{sp}$ , equilibrium constant by spectrophotometry, rate law. Experiments involving analysis of $H_2O_2$ , colligative properties, pH, hydrolysis and buffers, potentiometric titrations, electrolytic cell and Faraday's laws. This course is designed to augment General chemistry 101102. |
|-------------------------------------|---|

### Course Objectives

- To instill in students a sense of enthusiasm for general chemistry, an appreciation of its application in different contexts and to involve them in an intellectually stimulating and satisfying experience of learning and studying.
- To develop in students the ability to apply their chemical knowledge and skills to the solution of theoretical and practical problems in general chemistry.
- To provide students with a knowledge and skills base from which they can proceed to further studies in specialized areas of chemistry or multi-disciplinary areas involving chemistry.
- To generate in students an appreciation of the importance of chemistry in an industrial, economic, environmental and social context.
- To provide students with a broad and balanced foundation of chemical knowledge and practical skills.

**Course Intended Learning Outcomes (ILOs) and their Alignment with Program ILOs, Teaching and Learning Methods, and Assessment Methods:**

Upon successful completion of this course, students are expected to achieve the following learning outcomes:

| Course ILOs  | Program ILOs | Teaching and Learning Method | Assessment Method                       |
|--|--------------|------------------------------|---|
| <b>Knowledge (K)</b>   |              |                              |   |
| Demonstrate knowledge and understanding of essential facts and perform experiments that related to all experiments mentioned in the laboratory manual. | K1           | Lectures & make experimental | Reports, discusion, exams, and homework |
| <b>Intellectual Skills (I)</b>   |              |                              |   |
| This skill is already covered by ILOs in practical skills.   |              | Lectures & make experimental | Reports, discusion, exams, and homework |
| <b>Practical skills (P)</b>  |              |                              |   |
| Estimate chemical data by performing calculations related to all experiments mentioned in the laboratory manual.                                       | P2           | Lectures & make experimental | Reports, discusion, exams, and homework |
| Describe the nature and behavior of chemical compounds, their classification, chemical structure and reactivity.                                       | P3           | Lectures & make experimental | Reports, discusion, exams, and homework |
| Use of laboratory equipment and standard procedures & safely.  | P1 & T1      | Lectures & make experimental | Reports, discusion, exams, and homework |
| <b>Transferable Skills (T)</b>   |              |                              |   |
| Communication skills, covering both written and oral communication.  | T1 & P4      | Lectures & make experimental | Reports, discusion, exams, and homework |

**Course Schedule:**

| Week | Topic Details   | Course ILO number   | Reference         |
|------|---|---------------------|-------------------|
| 1    | <b>Analysis of H<sub>2</sub>O<sub>2</sub></b><br>Analyze an unknown solution of H <sub>2</sub> O <sub>2</sub> by titrating it with a standard KMnO <sub>4</sub> solution.   | K1& P2&P3<br>P1& T1 | Laboratory Manual |
| 2    | <b>molecular weight of a volatile liquid</b><br>Determination of the molar mass of a low boiling point liquid by "Dumas Method".  | K1& P2&P3<br>P1& T1 | Laboratory Manual |
| 3    | <b>The molar volume of O<sub>2</sub></b><br>O <sub>2</sub> is prepared quantitatively by decomposition of KClO <sub>3</sub> by heat and the volume collected is adjusted to STP condition.  | K1& P2&P3<br>P1& T1 | Laboratory Manual |
| 4    | <b>Colligative properties</b><br>The molar mass of a nonvolatile ionic solute is determined by measuring the difference in freezing point of its aqueous solution and that of pure water.   | K1& P2&P3<br>P1& T1 | Laboratory Manual |
| 5    | <b>pH, hydrolysis and buffers</b><br>Measure and compare the pH of solutions of: strong acids and bases, weak acids and bases, various salts, buffers, drawing conclusions on their behaviors.  | K1& P2&P3<br>P1& T1 | Laboratory Manual |
| 6    | <b>Potentiometric titration</b><br>Potentiometric titration of an unknown NaOH solution using a standard HNO <sub>3</sub> solution.   | K1& P2&P3<br>P1& T1 | Laboratory Manual |
| 7    | <b>Midterm Exam</b><br>Theoretical Exam involving the first 5 experiments.  |                     | Laboratory Manual |
| 8    | <b>Spectrophotometric determination of equilibrium constant</b><br>Measuring K <sub>c</sub> for the reaction between Fe <sup>3+</sup> solution and SCN <sup>-</sup> solution using a visible spectrophotometer.   | K1& P2&P3<br>P1& T1 | Laboratory Manual |
| 9    | <b>Molar solubility and K<sub>sp</sub></b><br>To determine K <sub>sp</sub> of Ca(OH) <sub>2</sub> by titrating its solution against HNO <sub>3</sub> solution, and to study the common ion effect.  | K1& P2&P3<br>P1& T1 | Laboratory Manual |
| 10   | <b>The electrolytic cell and Faraday's laws</b><br>1. Electrolysis of NaCl solution using Pt electrodes (qualitative analysis).<br>2. Electrolysis of CuSO <sub>4</sub> solution using Cu electrodes so as to evaluate Avogadro's number and Faraday value (quantitative analysis). | K1& P2&P3<br>P1& T1 | Laboratory Manual |
| 11   | <b>Determination of rate law</b><br>Study the kinetics of the reaction between H <sub>2</sub> O <sub>2</sub> and I <sup>-</sup> in acidic solution.   | K1& P2&P3<br>P1& T1 | Laboratory Manual |

### **Assessment Methods and Grading System:**

| <b>Assessment method</b> | <b>Grade</b> | <b>Comments</b> |
|--------------------------|--------------|-----------------|
| Midterm Exam             | 30           |                 |
| Reports                  | 20           |                 |
| Evaluation               | 10           |                 |
| Final Exam               | 40           |                 |
| <b>Total</b>             | <b>100</b>   |                 |

### **Learning References:**

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| <b>1- Textbook (s):</b>  |
| 1. General Chemistry Laboratory Manual , Prepared by: Richard E. Bleil, Ph.D. 2005                               |
| 2. General Chemistry 101101 Laboratory Manual, by Lina Hanania, Layla Qaddoura and Maysaa Saleh, 2007, Bookshop. |
| <b>2- References:</b>  |
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| <b>3- Other Resources:</b><br><<Labs, computer resources, lecture rooms needed for the course>>                  |

### **Course Policies<sup>1</sup>**

- Attendance Policy: University regulations apply to attendance.
- Academic Honesty: Academic dishonesty is an unacceptable mode of conduct, and will not be tolerated in any form at University of Petra. All persons involved in academic dishonesty and plagiarism in any form will be disciplined in accordance with University rules and regulations.

| <b>Approved by</b>        | <b>Name</b>           | <b>Date</b> | <b>Signature</b> |
|---------------------------|-----------------------|-------------|------------------|
| <b>Head of Department</b> | Dr. Abdelmnim Altwaiq | 14/10/2020  |                  |
| <b>Faculty Dean</b>       | Dr. Rami Abdel-Rahem  | 14/10/2020  |                  |

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<sup>1</sup> Additional information may be added in this section according to the nature of the course.