

**Academic Course description: Physical Pharmacy I/ Theoretical / Second Stage / First Course**

**Performance review of higher education institution (assessment of the academic program)**

This course description summarizes the key characteristics and anticipated learning objectives for students, assessing their utilization of available learning resources, and must be aligned with the program description

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| <b>1. Educational Institution</b>                                                                                                                                                                                        | Ministry of Higher Education and Scientific Research / Al-Zahrawi University |
| <b>2. University Department / Center</b>                                                                                                                                                                                 | College of Pharmacy / Pharmaceuticals Branch                                 |
| <b>3. Course Name / Code</b>                                                                                                                                                                                             | Physical Pharmacy I / PPCT 23                                                |
| <b>4. Programs in which it is included</b>                                                                                                                                                                               | Bachelor of Pharmacy                                                         |
| <b>5. Available Forms of Attendance</b>                                                                                                                                                                                  | Daily attendance                                                             |
| <b>6. Semester / Year</b>                                                                                                                                                                                                | First course / 2025- 2026                                                    |
| <b>7. Total Number of Study Hours</b>                                                                                                                                                                                    | 3 hours weekly                                                               |
| <b>8. Date of preparing this description</b>                                                                                                                                                                             | 2025 - 2026                                                                  |
| <b>9. Course Objectives:</b>                                                                                                                                                                                             |                                                                              |
| The student studies the basic information about matter and its types, as well as the principles of solubility, types of solutions, ionic equilibrium, buffered and isotonic systems, and their applications in pharmacy. |                                                                              |

## 1. Learning Outcomes, Teaching and Learning Methods, and Evaluation

### A. Knowledge and Understanding

1. Enable students to recognize states of matter.
2. Enable students to acquire and understand the solubility and types of solutions
3. Enable students to acquire and understand electrolytic and non-electrolytic solutions.
4. Enable students to acquire and understand ionic equilibrium and buffer and isotonic solutions.

### B. Subject-Specific Skills

- ١ . Enabling students to acquire skills in solving mathematical problems related to the course.
- ٢ . Enabling students to possess skills in dealing with different forms of the material.
3. Acquiring the skill of extracting the required information from its approved sources.

### Teaching and Learning Methods

- 1 .Using the smart board.
- 2 .Teaching and giving theoretical lectures
- 3 .Educational seminars and posters

### C. Evaluation Methods

- ١ . Midterm and final exams
- ٢ . Oral and written exams
3. Classroom activities and posters

### D. Thinking Skills

- 1 .Thinking skills through translating, analyzing, evaluating and extracting ideas.
2. Extracting the correct methods for dealing with the physical and chemical properties of materials .

### e. General and Transferable Skills

1. Acquire skill in using the computer
2. Give confidence to the student through presenting scientific research
3. Give confidence to the student through discussing reports
4. Acquire skill in dealing
5. Acquire skill in leadership

| 10. Course Structure                          |                       |                                       |                                                                                                       |       |       |
|-----------------------------------------------|-----------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------|-------|-------|
| Evaluation Method                             | Learning Methods      | Unit Name / Course or Topic           | Required Learning Outcomes                                                                            | hours | Weeks |
| Monthly and daily examinations and discussion | Using the smart board | States of matter                      | Binding forces between molecules,<br>States of matter,<br>The gaseous state                           | ۳     | ۱     |
| Monthly and daily examinations and discussion | Using the smart board | States of matter                      | Solids and crystalline state,<br>The liquid crystalline state,<br>The supercritical fluid state       | ۳     | ۲     |
| Monthly and daily examinations and discussion | Using the smart board | States of matter                      | Phase equilibria and phase rule; thermal analysis, Solid .dispersions                                 | ۳     | ۳     |
| Monthly and daily examinations and discussion | Using the smart board | Solutions of non-electrolytes         | Physical properties of substances,<br>Types of solutions,<br>Concentration expressions                | 4     | 4     |
| Monthly and daily examinations and discussion | Using the smart board | Solutions of non-electrolytes         | Ideal and real solutions,<br>Colligative properties,<br>Molecular weight determination.               | ۳     | 5     |
| Monthly and daily examinations and discussion | Using the smart board | Solutions of electrolytes             | Properties of solutions of electrolytes,<br>Theory of dissociation,<br>Theory of strong electrolytes. | ۳     | 6     |
| Monthly and daily examinations and discussion | Using the smart board | Solutions of electrolytes             | Ionic strength,<br>The Debye- Hückel theory,<br>Coefficients for expressing colligative properties    | ۳     | 7     |
| Monthly and daily examinations and discussion | Using the smart board | Solubility and distribution phenomena | Solvent-solute interactions,<br>Solubility of liquids in liquids                                      | ۳     | 8     |
| Monthly and daily examinations and discussion | Using the smart board | Solubility and distribution phenomena | Solubility of solids in liquids                                                                       | ۳     | 9     |
| Monthly and daily examinations and discussion | Using the smart board | Solubility and distribution phenomena | Determining thermodynamic and kinetic solubility,<br>Poor aqueous solubility                          | ۳     | 10    |

|                                               |                       |                                       |                                                                                                         |   |    |
|-----------------------------------------------|-----------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------|---|----|
| Monthly and daily examinations and discussion | Using the smart board | Solubility and distribution phenomena | Measuring solubility, Distribution of solutes between immiscible solvents                               | ۳ | 11 |
| Monthly and daily examinations and discussion | Using the smart board | Ionic equilibria                      | Brønsted–Lowry theory, Ionization and dissociation, Classification of solvents, Lewis electronic theory | ۳ | ۱2 |
| Monthly and daily examinations and discussion | Using the smart board | Ionic equilibria                      | Acid-base equilibria, Calculation of pH and acidity constants                                           | ۳ | ۱3 |
| Monthly and daily examinations and discussion | Using the smart board | Buffered and isotonic solutions       | The buffer equation, Buffer capacity                                                                    | 3 | ۱4 |
| Monthly and daily examinations and discussion | Using the smart board | Buffered and isotonic solutions       | Buffers in pharmaceutical and biological systems                                                        | 3 | 15 |

## 11. Learning and teaching resources

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| <b>References:</b> | <ul style="list-style-type: none"> <li>• <b>Reference text:</b> Martin's Physical Pharmacy and Pharmaceutical Sciences Seventh Edition</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Websites</b>    | <ul style="list-style-type: none"> <li>• <a href="https://www.chem.purdue.edu/gchelp/howtosolveit/Equilibrium/Calculating_pH_and_pOH.htm#pKb">https://www.chem.purdue.edu/gchelp/howtosolveit/Equilibrium/Calculating_pH_and_pOH.htm#pKb</a></li> <li>• <a href="https://pharmatech-rx.com/category/physical-pharmacy/">https://pharmatech-rx.com/category/physical-pharmacy/</a></li> <li>• <a href="https://pharmdecks.com/modules/drug-delivery-and-biopharmaceutics/lesson/solubility-dissolution/">https://pharmdecks.com/modules/drug-delivery-and-biopharmaceutics/lesson/solubility-dissolution/</a></li> </ul> |

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