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**Department of Pharmacy**

**Noble Private Institute**

**Subject: Pharmaceutical Chemistry**

**Course Book – 2nd Year Students**

**Lecturer's name:**

**Assistant Professor Dr. Mazin A. Othman**

**Academic Year: 2022 – 2023**

**Course Book**

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| **1. Course name** | **Pharmaceutical Chemistry** | | |
| **2. Lecturer in charge** | **Dr. Mazin A. Othman** | | |
| **3. Department/ Institute** | **Pharmacy – Noble Private Institute** | | |
| **4. Contact** | **e-mail:** [**m**azin**.o**thman**@su.edu.krd**](mailto:mazin.othman@su.edu.krd) | | |
| **5. Time (in hours) per week** | **Theory: 2**  **Practical: 2** | | |
| **6. Office hours** | **Saturday: 10:00-10:30, 12:00-12:30, 14:00-14:30**  **Sunday: 10:00-10:30, 12:00-12:30, 14:00-14:30** | | |
| **7. Course code** |  | | |
| **8. Teacher's academic profile**  **Academic achievements and Qualifications: (starting from the most recent degree)**   |  |  |  |  | | --- | --- | --- | --- | | From- To | Degree | College-University | Country | | 2011 to date | PhD Physical Chemistry, Department of Chemistry | College of Science- University of Salahaddin | Iraq | | 2001 – 2004 | M. Sc. in Physical Chemistry, Department of Chemistry | College of Science- University of Salahaddin | Iraq | | 1994 – 1998 | B.Sc. Chemistry, Department of Chemistry, | College of Science- University of Salahaddin | Iraq |   **Experiences: (starting from the most recent position), please mention Year, Position and Place**   1. ***Assignments and Posts:***  |  |  |  |  | | --- | --- | --- | --- | | From- To | Post | Department -College | University | | 2020 to date | Assistant Professor | Chemistry Department-College of Science | Salahaddin University | | 2011 – 2020 | Lecture | Chemistry Department-College of Science | Salahaddin University | | 2004 – 2011 | Assistant Lecture | Chemistry Department-College of Science | Salahaddin University | | 2004 – 2006 | Reporter in Chemistry  Department | Chemistry Department-College of Science | Salahaddin University | | 2004 – 2007 | Member of Examination Committee | Chemistry Department-College of Science | Salahaddin University |  1. ***Teaching Activities***  |  |  |  |  | | --- | --- | --- | --- | | From- To | Subject | Stage-College | University | | 2004-2007 | Introduction to Physical Chemistry – thrmodynamic | 2nd- year students / Environmental Department-College of Science | Salahaddin University | | 2011 to date | Quantum chemistry and spectroscopy | 4th- year students / Chemistry Department-College of Science | Salahaddin University | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  | | | | | | | |
| **9. Keywords** | Pharmaceutical chemistry, drugs, chemical structure, synthesis | | |
| **10. Course overview:**  This course is intended to provide fundamentals of pharmaceutical chemistry. The first part of the course covers an introduction into pharmaceutical chemistry and a short introduction into methods of chemical analysis.  The second part provides an introduction to the basic principles of pharmaceutical. Towards the end of the course; the importance of analytical and pharmaceutical chemistry in pharmacy will be covered. | | | |
| **11. Course objective:**  The goal of this course is to introduce you to the principles of pharmaceutical chemistry with emphasis on the fundamental methods used for chemical analysis. The focus is on three important aspects: how to design experiments, how to analyze data, and how the tools of measurement work. The objectives of the course are  1. Learn the principles of pharmaceutical chemistry.  2. Understand the principles and use of the instruments of chemical analysis; from basic glassware to modern instruments. | | | |
| **12. Student's obligation**  Students are obligated to be prepared for each lecture by reading the relevant reading assignment before class (see the lecture schedule). Students should study the materials and work problems after each lecture as they are meant to reinforce your understanding of the lecture material. Work extra problems for each topic in addition to the assignments. The more problems you practice, the better you will understand the material. | | | |
| **13. Forms of teaching**  PowerPoint presentation using Data show and white board | | | |
| **14. Assessment scheme**  Two exams during the course period: 20%  Quiz tests and homework: 10%  Practical Course 20%  Final Exam: 50% (20% for theoretical and 30% for practical). | | | |
| **15. Student learning outcome:**  On successful completion of the course, students will be able:  1. To develop expertise relevant to the professional practice of chemistry  2. To develop an understanding of the range and uses of analytical methods in chemistry and pharmacy  3. To establish an appreciation of the role of chemistry in pharmaceutical analysis  4. To provide an understanding of chemical methods employed for elemental and compound analysis  5. To provide experience in some scientific methods employed in analytical and biochemistry  6. To develop skills in the scientific method of planning, developing, conducting, reviewing and reporting experiment. | | | |
| **16. Course Reading List and References‌:**  The student can find additional information and examples in the following references   1. Essentials of Pharmaceutical Chemistry-Donald Cairns-3rd Edition. 2. Fundamentals of Medicinal Chemistry-Gareth Thomas-2003. 3. Textbook of Organic Medicinal and Pharmaceutical Chemistry-Wilson and Gisvold's-12th Edition. 4. Handbook of Modern Pharmaceutical Analysis-Satinder Ahuja-2001 5. Medicinal Chemistry and Drug Design-Deniz Ekinci-2012. 6. The Practice of Medicinal Chemistry, Thi - Camille Georges Wermuth. 7. Pharmaceutical Chemistry I-Laboratory Experiments and Commentary-Attila-2014. 8. Pharmaceutical Analysis A Textbook for Pharmacy Students and Pharmaceutical Chemists, David G Watson, 1999. | | | |
| **17. Theory Topics:** | | | **Lecturer's name** |
| Course Program  **(Pharmaceutical Chemistry-Theory)**  **(2 hrs / Week)** | | **Week** | **Asst. Prof.**  **Dr. Mazin A. Othman** |
| Introduction and Importance of Pharmaceutical Chemistry | | 1 |
| Classification of drug | | 2 |
| Characteristic of different routes of drug administration | | 3 |
| Physical Properties of Organic Drug Molecules | | 4 |
| Physico-chemical properties of drugs | | 5 |
| Structure–activity relationship (SAR) of drug | | 6 |
| Prodrug | | 7 |
| Metabolism of drug | | 8 |
| Drug Synthesis | | 9 |
| **The First Exam** | | 10 |
| Introduction to pharmaceutical analysis | | 11 |
| Importance of pharmaceutical analysis | | 12 |
| Sources of chemical impurities in medicine | | 13 |
| Classic methods of medicine analysis | | 14 |
| Instrumental methods | | 15 |
| Uv-Visible methods | | 16 |
| Electro methods | | 17 |
| Separation methods | | 18 |
| Simultaneous methods | | 19 |
| **The Second Exam** | | 20 |
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| **18. Practical Topics** | | |  |
| Course Program  **(Pharmaceutical Chemistry-Practical)**  **(2 hrs / Week)** | | **Week** | **Assis. Prof.**  **Dr. Mazin A. Othman** |
| The students should be introducing to the main chemistry tools through demonstration | | 1 |
| Aspirin Determination using acid base titration | | 2 |
| Gravimetric analysis: Determination of hydrate water in pharmaceuticals | | 3 |
| Separation methods: Extraction of caffeine from tea | | 4 |
| Determination Drug boiling point and melting point | | 5 |
| Synthesis of acetyl salicylic acid (aspirin) | | 6 |
| Synthesis of acetaminophen (paracetamol) | | 7 |
| Synthesis of benzocaine | | 8 |
| Recrystallization of drug | | 9 |
| **The First Exam** | | 10 |
| Introduction to Pharmaceutical analysis | | 11 |
| Qualitative analysis of drugs | | 12 |
| Determination of chloride in drugs | | 13 |
| Determination of iron in drugs | | 14 |
| Oxidation of Alcohols: Preparation of Benzoic Acid | | 15 |
| Identification of Alcohols and Phenols | | 16 |
| Determination of Paracetamol Concentration Using Spectrophotometer | | 17 |
| Related Substances Analysis | | 18 |
| **Seminar** | | 19 |
| **The Second Exam** | | 20 |
| **19. Examinations:**  Will be covered in the lectures | | | |
| **20. Extra notes:** | | | |
| **21. Peer review** | | | |