

Ministry of Higher Education and Scientific research



Department of Chemistry.

College of Education

University of Salahaddin

Subject: Option (Pharmaceutical Chemistry)

Course Book – 4th Stage

Lecturer's name Dr.Diler Dilshad Kurda

Academic Year: 2022/2023

Course Book

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| 1. Course name | Industrial Chemistry |
| 2. Lecturer in charge | Diler Dilshad Kurda |
| 3. Department/ College | College of Education-chemistry department |
| 4. Contact | e-mail: dler.kurda@su.edu.krd Tel: (optional) 009647504485707 |
| 5. Time (in hours) per week | 2 |
| 6. Office hours | 4 |
| 7. Course code | --- |
| 8. Teacher's academic profile | B.Sc in chemistry college of science-chemistry department 1996-1997. M.Sc in industrial organic chemistry 2003 –college of education. PhD in industrial-polymer chemistry 2013 college of education. |
| 9. Keywords | |
| <p>10. Course overview:</p> <p>The search for new drugs to combat serious ailments such as cancer, heart disease and and bacterial and viral infections remains an exciting challenge at the forefront of medical research.</p> <p>The pharmaceutical industry has a need for highly skilled graduates with a strong background in organic chemistry, coupled with a broad understanding of pharmacology and related biochemical areas.</p> <p>This course offers you the opportunity to study chemistry as a major subject along with subjects allied to the medical and pharmaceutical industries.</p> <p>provides you with a sound basis of core principles.</p> <p>includes principles of biological chemistry with an emphasis on topics relevant to the medical and pharmaceutical industry. The biological modules do not depend on having a background in biology.</p> <p>you can take advantage of the industrial placement scheme.</p> <p>and 4 further specialism is possible and you will undertake a research project (MChem course) on a topic in biological or organic chemistry.</p> <p>The course also provides students with the professional training required to practice as pharmacists at the community and hospital levels, and to work as pharmaceutical sales representatives.</p> | |

In particular, the programme aims to train professional figures who, on the strength of their multidisciplinary competences, meet the requirements of the pharmaceutical industry, the cosmetic, medical device and dietary supplement sectors, public and private research and regulative authorities in the health field.

The training provided is therefore of a multidisciplinary nature and provides the following:

- training in the basic scientific disciplines (mathematics, physics, chemistry, biology, medicine), equipping students with solid theoretic and practical competences alongside the main subject areas
- the in-depth chemical, pharmaceutical, biochemical and pharmacological training required for the design and development of new biologically active molecules
- the scientific and technological knowledge needed for the design, development and testing of forms of dosage for medications and health products
- familiarity with the national and supranational regulations concerning medications and health products
- the planning and operational capacities required to carry out research in the key sectors covered by the degree programme; training is provided as part of the thesis, which must be experimental in nature
- the professional knowledge required to practice pharmacy under the national health service
- training through completion of a professional internship, as per directive 85/432/ECC.

12. Student's obligation

Students attend a lecture in a very important and lecture in his absence causes him not being able to link information .So interest in student attendance is very good for lectures

13. Forms of teaching

Interest in using more than one way to understand the students, such as the use of Power Point and blackboard and other means such as video as well as Before the lecture the student to take the lectures of Professor

14. Assessment scheme

Your final grade in this course will be based on following assessment. Dates are tentative only:

1. Problem Sets (1) 5 % of the grades of the absences
 2. Mid-Term Exam 20 % Oct. 18 (tentative: details to follow)
 3. Group Project 15 % Report (10%) and presentation (15%) - see handout
 4. Final Exam 50 % Comprehensive; Date to be announced
- Total 100 % Last day of class, Dec. 2: (Review)

15. Student learning outcome:

On successful completion of the course students will be able to:

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| <ol style="list-style-type: none"> 1. Demonstrate the importance of chemistry in the development and application of therapeutic drugs. 2. Develop an understanding of the physico-chemical properties of drugs. 3. Obtain a working knowledge of chemical structures and nomenclature. 4. Gain an appreciation of the importance of ionisation of drugs with respect to the solubility and efficacy of drugs; 5. Understand how current drugs were developed and how new scientific techniques will provide future drugs. 6. Understand how changes in the chemical structure of drugs affect efficacy; 7. Have been introduced to a variety of drug classes and some pharmacological properties; 8. Develop an understanding of the principles of analytical techniques | |
| <p>16. Course Reading List and References:</p> <ol style="list-style-type: none"> 1. J H Block, F Roche, I O Soine and C O Wilson, Inorganic Medicinal and Pharmaceutical Chemistry, Lea and Febiger, Philadelphia, P A. 2. AH Beckett & Stenlake, Text book of Practical Pharmaceutical chemistry, Vol.I&II. 3. Kasture & Wadodkar, Text Book of Pharmaceutical analysis Vol.I & II. 4. A. Day Under Wood, Text Book of Quantative Analysis 5. Connors, A Textbook of Pharmaceutical Analysis. | |
| 17. The Topics: | Lecturer's name |
| Introduction to medicinal chemistry - Medicinal chemistry covers the following stages | Dr. Diler Kurda (2 hrs) 6/9/2022 |
| General Principles of Drug Action - Definition of Drugs - Classification of Drugs | Dr. Diler Kurda (2 hrs) 13/9/2023 |
| CHARACTERISTICS OF DIFFERENT ROUTES OF DRUG ADMINISTRATION | Dr. Diler Kurda (2 hrs) 20/9/2022 |

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| <p>Mode of Drug action</p> | <p>Dr. Diler Kurda (2 hrs) 27/9/2022</p> |
| <p>Drug-receptor Interaction Receptor is the site in the biological system where the drug exerts its characteristic effects . Receptors have an important regulatory function in the target organ or tissue. Most drugs act by combining with receptor in the biological system (<i>specific drugs</i>). 1-cholinergic drugs interacts with acetylcholine receptors. 2-synthetic corticosteroids bind to the same receptor as cortisone and hydrocortisone</p> | <p>Dr. Diler Kurda (2hrs) 4/10/2022</p> |
| <p>Agonists and antagonist Affinity, potency and efficacy</p> | <p>Dr. Diler Kurda (2 hrs) 11/10/2022</p> |
| <p>Physic-chemical properties of Drugs The ability of a chemical compound to a pharmacological/ therapeutic effect is related to the influence of various physical and chemical (<i>physicochemical</i>) properties of the chemical substance on the biomolecules</p> | <p>Dr. Diler Kurda (2 hrs) 22/11/2022</p> |
| <p>IONIZATION OF DRUGS The accumulation of an ionized drug in a compartment of the body is known as "ion trapping". The ionization of a drug is dependent on its pKa and the pH. The pKa is the negative Logarithm of Ka. The Ka is the acidity constant of a compound, its tendency to release a proton..</p> | <p>Dr. Diler Kurda (2 hrs) 29/11/2022</p> |
| <p>Application of chelation 1- Dimercaprol is a chelating agent, its an effective antidote for organic arsenical lewisite but can also be used for treatment of poisoning due to antimony gold and mercury. 2- Pencillamine is an effective antidote for the treatment of copper poisoning because it forms water-soluble chelate with copper and other metal ions. 3- Hydroxyquinoline and its analogues act as anti-bacterial and anti-fungal agents by complexing with iron or copper</p> | |
| <p>Bioisostere</p> | |

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| <p>Structure–activity relationship (SAR) A study of the structure–activity relationships of a lead compound and its analogues may be used to determine the parts of the structure of the lead compound that are responsible for both its beneficial biological activity, and also its unwanted side effects. This information may be used to develop a new drug that has increased activity by selecting the structure with the optimum activity, a different activity from an existing drug and fewer unwanted side effects.</p> | |
| <p>3-Introduction or removal of a ring system The introduction of a ring system changes the shape and increases the overall size of the analogue. The effect of these changes on the potency and activity of the analogue is not generally predictable. However, the increase in size can be useful in filling a hydrophobic pocket in a target site, which might strengthen the binding of the drug to the target.</p> | |
| <p>Prodrug is a pharmacological substance administered in an inactive form. Once administered, the prodrug is metabolized in vivo into an active drug within the body through metabolic process, such as hydrolysis of an ester form of the drug.</p> | |
| <p>Development of prodrugs One of the reasons for poor patient compliance, particularly in case of children, is the bitterness of the drug. Two approaches can be utilized to overcome the bad taste of drug.</p> | |
| <p>Soft drug The soft drugs are defined as therapeutically beneficial agents characterised by a predictable and controllable in vivo metabolism to non-toxic drug after they achieve their therapeutic role. The application of soft drugs is necessary to overcome and to improve (a) pharmacokinetic insufficiencies (b) transportability and (c) site specificity.</p> | |

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| <p>Metabolic reactions</p> | |
| <p>● Sulfate Conjugation Sulfate conjugation involves transfer of a sulphate molecule from the cofactor (3¹-phosphoadenosine-5¹ phosphosulfate) to the substrate (metabolite or drug moiety) by the enzymes (sulfotransferases). Sulphate conjugation is the common conjugation reactions of substrate molecules possessing of alcoholic hydroxyl, phenolic hydroxyl and aromatic amine groups</p> | |
| <p>CHRACTERISTIC AND SYNTHESIS OF DRUG</p> | |
| <p>Characteristic features of ideal general anesthetic An ideal general anesthetic should possess the following characteristic features:</p> <ul style="list-style-type: none"> ● It should be inert ● It should be potent and non-inflammable ● It should be non-irritating to mucous membrane ● It should produce rapid and smooth anesthesia | |
| <p>THIOPENTONE Chemistry. Thiopentone is an intravenous anesthetic. It is a barbituric acid derivative and is synthesized by condensing thiourea with ethyl (ethyl 1-methyl butyl) malonate</p> | |
| <p>2-Sedative-Hypnotic Drugs At higher doses, most of these sedative drugs will also produce drowsiness and eventually produce sleep. Drugs that have such a sleep-inducing effect are called hypnotic drugs or hypnotics. There is, no sharp distinction between sedative and hypnotic and the same Drug may have both actions depending on the method of use and the dose employed.</p> | |
| <p>NON-BARBITURATES Numerous heterocyclic derivatives with low toxicity for hypnotic and sedative properties were synthesized. The following are some most important non-barbiturate sedative-hypnotics among piperidines, quinazolinones, aldehydes, benzodiazepines etc</p> | |

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| <p>Classification of psychoactive drugs The psychoactive drugs are classified as ; 1. Antipsychotic drugs 2. Anti depressant drugs 3. Anti anxiety drugs</p> | |
| <p>18. Practical Topics (If there is any)</p> | |
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| <p>19. Examinations:</p> <p>1. Compositional: 1. Define, Recreational drugs. Are drugs that are not used for medicinal purposes, but are instead used for pleasure. Common recreational drugs include alcohol, nicotine and caffeine, as well as other substances such as opiates anesthesia.</p> <p>Some drugs can cause addiction and all drugs can cause side effects</p> <p>2. True or false type of exams:</p> <p>In this type of exam a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence. Examples should be provided:</p> <p><i>Example: Most drugs can be administered by a variety of routes the most mast type is:</i></p> <p>Oral/swallowed , Oral/sublingual , Rectal , <u>Inhalation</u></p> | |
| <p>20. Extra notes:</p> <p>The subject of medicinal chemistry explains the design and production of compounds that can be used for the prevention, treatment or cure of human and animal diseases. Medicinal chemistry includes the study of already existing drugs, of their biological properties and their structure-activity relationships.</p> <p>Medicinal chemistry was defined by IUPAC specified commission as “it concerns the discovery, the development, the identification and the interpretation of the mode of action of biologically active compounds at the molecular level</p> | |
| <p>21. Peer review</p> <p>The contents of the Advanced Course Includes topics before good to be part of the curriculum.</p> <p>Dr. Essa Ismail</p> | |

