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| Department | Pharmacy |
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| Course Name | Pharmaceutical Organic Chemistry (2) | Course No. | 201211 |
| Prerequisite | Pharmaceutical Organic Chemistry (1) | Credit Hours | 2 |
| Number & date of course plan approval | | Brief Description | See form QF02/0409 |

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| Intended Learning Outcomes | <ol style="list-style-type: none"> 1) To recognize most modern synthetic reagents and illustrate their common use with sample reactions of their devising. 2) To understand and illustrate the mechanistic for all reactions to which they are exposed. 3) To locate accurate literature precedent for any transformation they wish to suggest, and to cite it the correct format. 4) To design an original synthesis for any molecule presented to them, Complete with accurate, appropriate literature references for all non-trivial steps. 5) To communicate mechanistic logic with electron pushing arrows. | | |
| Course Topics | <p>Pharmaceutical organic chemistry is primarily a lecture and problem-solving course, which builds upon the first course of organic chemistry to prepare the student for other courses in pharmacy; biochemistry medicinal chemistry and phytochemistry. The curriculum is divided between advance topics in the three areas of organic chemistry; (1) structures , properties, and nomenclatures of organic compounds , (2) mechanistic theory ,and (3) synthesis and reactions. The course is composed of series of lectures, guided problem sets , and exams.</p> | | |
| Text Books | Organic Chemistry, T.W.G. Solomons & C.B.Fryhle, John Wiley & Sons, 10 th edition. | | |
| References | <ol style="list-style-type: none"> 1. Organic Chemistry By Morrison & Boyd, 6th Edition. 2. Organic Chemistry By Mc Morry, 7th Edition. | | |
| Grade Determination | <input type="checkbox"/> 1 st Exam = 25% <input type="checkbox"/> 2 nd Exam = 25% <input type="checkbox"/> Final Exam = 50% | <input type="checkbox"/> Practical Course <input type="checkbox"/> Grade <input type="checkbox"/> Determination | <input type="checkbox"/> Course Work = 50% <input type="checkbox"/> (Reports, Term Papers, Quizes) <input type="checkbox"/> Final Exam = 50% |



| Course Outline | | | | |
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| Week | Hours | Subjects | Chapters in Textbook | Notes |
| 1 | 1 | Aromatic Compounds, Aromaticity and Reactions of Aromatic Compounds Introduction , Nomenclature of Benzene Derivatives Reactions of Benzene | 14 | Ref.1 &2 |
| | 1 | Kekule Structure of Benzene Stability of Benzene, Molecular Orbital Explanation | | |
| 2 | 1 | Aromaticity and Huckel's Rule, Heterocyclic and Other Polycyclic Aromatic Compounds. | | |
| 2 | 1 | Reactions of Aromatic Compounds Electrophilic Aromatic Substitution Reactions. Mechanism, Limitations and some applications | 15 | Ref.1 &2 |
| 3 | 1 | Effect of Substitutions on Reactivity and Orientation of Substitution. Theory of Orientation. Alkenylbenzenes | | |
| | 1 | Synthetic Applications Allylic and Benzylic Halides in Nucleophilic Substitutions. | | |
| 4 | 1 | Aryl Halides and Nucleophilic Aromatic Substitution Reactions . The Addition-Elimination: $S_N Ar$ Mechanism. Elimination- Addition Mechanism: Benzyne formation. | | Ref.1 &2 |
| 4 | 1 | Phenols Structure and Nomenclature. Physical properties . Synthesis of phenols. | 21 | Ref.1 &2 |
| 5 | 1 | Reactions of phenols as Acids. Other Reactions of the O-H Group. Cleavage of Alkyl Aryl Ethers. Reactions of the Benzene Ring of Phenols. Claisen Rearrangement | | |



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| Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy | QF02/0408–1.0 |
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| 5 6 | | Aldehydes and Ketones I Nomenclature and Physical properties. Synthesis of Aldehydes and Ketones. | 16 | Ref.1 &2 |
| 6 | 1 | Reactions of Aldehydes and Ketones Nucleophilic addition to C=O, The Addition of Alcohols : Hemiacetals and Acetals. | | |
| 7 | 1 | The Addition of H ₂ O, HCN, and Ammonia derivatives. | | |
| | 1 | Reformatsky Reaction. Oxidation of aldehydes and ketones. Chemical Analysis for Aldehydes and Ketones | | |
| 8 | 1 | Aldehydes and Ketones II The acidity of the α -H of carbonyl compounds: Keto and enol Tautomers. Reactions via Enols and Enolate Anions. | 17 | Ref.1 &2 |
| 9 | 1 | Aldol Reactions. Crossed aldol condensation | | |
| | 1 | Iodoform reaction. Cyclizations via Aldol | | |
| 10 | 1 | Carboxylic Acids and Their Derivatives, Nucleophilic Addition-Elimination at the Acyl Carbon Acidity , Nomenclature , Physical Properties Preparation of Carboxylic Acids. | 18 | Ref 1&2 |
| | 1 | Nucleophilic Addition – Elimination at the acyl Carbon | | |
| 11 | 1 | Decarboxylations of Carboxylic Acids. Synthesis of Carboxylic Acid Derivatives: | | |
| | 1 | Acyl Chlorides, Anhydrides, Esters , & Amides. | | |
| 12 | 1 | Mechanism of Fischer Esterification and other reactions. | | |
| | 1 | Hell-Volhard-Zelinski Reaction . Decarboxylation of Carboxylic Acids | | |



| Course Outline | | | | |
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| Week | Hours | Subjects | Chapters in Textbook | Notes |
| 13 | 1 1 | Amines: Aliphatic and Aromatic Amines Nomenclature, Physical Properties Basicity of Amines . Synthesis of Amines | 20 | Ref 1&2 |
| 14 | 1 1 | Reactions of Amines. Reactions with Nitrous acid. Replacement Reactions of Arenediazonium salts. Coupling Reactions of Arenediazonium salts, | | |
| 15 | 1 1 | Reaction of Amines with Sulfonyl Chloride. Sulfa Drugs. Analysis of Amines. Hinsberg test. Hoffmann and Cope eliminations. | | |
| 16 | 1 | Polynuclear Aromatic Compounds Naphthalene: Synthesis and Reactions Anthracene and Phenanthrene Syntheses and Reactions. | | |
| 16 | 1 | Heterocyclic compounds Three-membered ring system, four membered ring systems, Five-membered ring systems and Six-membered ring systems: Nomenclature, Structure and Reactivity | | |
| | 1 | Orientation and Electrophilic Substitution Reactions. Fused rings: Quinoline and Isoquinoline Nomenclature, Structure, Syntheses and Reactions | | |
| | | Final Examination | | |

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| Approved by Dept. Chair | Date of Approval |
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Extra Information: (Updated every semester and filled by course instructor)



Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy

QF02/0408–1.0

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| Course Instructor | |
| Office No. | |
| Extension | |
| Email | |
| Office hours | |