



Course Specifications

Course Title:	ORGANIC REACTIONS MECHANISM
Course Code:	CHEM 335- 3
Program:	Bachelor in Chemistry
Department:	Chemistry
College:	Faculty of Sciences
Institution:	Jazan University (JU)

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A. Course Identification

1. Credit hours: 3hrs Workload: 166 ECTS: 5.9			
2. Course type			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
3. Level/year at which this course is offered: Level 6 / Year 3			
4. Pre-requisites for this course (if any): <div style="text-align: center;">None</div>			
5. Co-requisites for this course (if any): <div style="text-align: center;">None</div>			

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	27	40%
2	Blended		
3	E-learning	3	10%
4	Distance learning		
5	Laboratory/Studio	30	50%
5	Total	60	100%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description

<i>Course Title</i>	<i>Course Number</i>	<i>Contact Hours (CH)</i>		<i>Credit unit (CU)</i>	<i>Year</i>	<i>Level</i>	<i>Pre-requisite</i>
		<i>Lec.</i>	<i>Prac.</i>				
<i>Organic Reactions Mechanism</i>	<i>CHEM 335-3</i>	<i>2</i>	<i>2</i>	<i>3</i>	<i>3</i>	<i>6</i>	<i>None</i>

Course objectives: They are to identify the following.

1. Types of organic reactions.
2. Identify the factors affecting the mechanism of organic reactions.
3. Identification of substitution, elimination and addition reactions.
4. Studying the reaction mechanisms of the reactions.
5. Recognition of the role of Stereochemistry during the mechanism of reactions.

Syllabus: A-Theoretical contents

A general introduction to the mechanics of organic reactions - include (atomic orbitals - the bonds in organic compounds - properties of organic reactions) Classification of organic reactions - Electrophilic substitution in aromatic systems, Nucleophilic substitution reaction (SN1, SN2) on saturated carbon atom; mechanistic pathways, nature of the transition state and relative reactivity, Elimination reaction (E1, E2); mechanistic pathways, nature of the transition state and relative reactivity, rearrangement reactions, Addition reactions on carbonyl group, Addition reactions at (C=C) double bond, Name reactions.

Syllabus*: B-Practical contents

Selected experiments related to the course topics.

*See attachment

2. Course Main Objective

This course aims to expertise students, types of reactions and their basic principles of organic reactions mechanisms (atomic orbitals-the bonds in organic compounds - properties of organic reactions) etc...

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	<i>Demonstrate abroad knowledge and understanding in, fundamental principles of organic chemistry that include chemical bonding, breaking</i>	K.1

CLOs		Aligned PLOs
	<i>of a covalent bond, stereochemistry, chemical reactions and mechanism. (P)</i>	
1.2	Describe the synthesis and analysis of organic reaction mechanisms and their products. (P)	K.2
2	Skills :	
2.1	<i>Demonstrate the knowledge and skills required to Predict the reactivity of an organic compound from its structure and explain the multi-step synthesis of organic compounds. (P)</i>	S.1
2.2	<i>Perform experiments as well as accurately record and analyze the results of such experiments. (P)</i>	S.2
2.3	<i>Knows the proper procedures and regulations for safe handling and use of chemicals and can follow the proper Procedures and regulations for safe handling when using chemicals. (P)</i>	S.3
2.4	<i>Make effective use of communication and online technology, modern library searching and writing the information about chemistry topics related to organic reactions mechanism. (I)</i>	S.4
3	Values:	
3.1	<i>Working as a group leader or a member of a team. (P)</i>	V.1

C. Course Content

No	List of Topics	Contact Hours
1	<i>A general introduction to the mechanics of organic reactions – include (atomic orbitals - the bonds in organic compounds - properties of organic reactions).</i>	4
2	<i>Electrophilic substitution in aromatic systems.</i>	6
3	<i>Nucleophilic substitution reaction (SN1, SN2) on saturated carbon atom; mechanistic pathways, nature of the transition state and relative reactivity.</i>	4
4	<i>Elimination reaction (E1, E2); mechanistic pathways, nature of the transition state and relative reactivity.</i>	4
5	<i>Addition reactions on carbonyl group.</i>	4
6	<i>Addition of double bond.</i>	3
7	<i>Introduction to rearrangement reactions.</i>	3
8	<i>Name reactions.</i>	2
9	<i>Experimental Part</i>	30
Total		60

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	<i>Demonstrate abroad knowledge and understanding in, fundamental principles of organic chemistry that</i>	<i>Lecture</i>	<i>MCQ Short answer Q Oral exam</i>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	<i>include chemical bonding, breaking of a covalent bond, stereochemistry, chemical reactions and mechanism. (P)</i>	<i>Open discussion in class</i>	
1.2	Describe the synthesis and analysis of organic reaction mechanisms and their products. (P)	<i>Lecture</i> <i>Open discussion in class</i>	<i>MCQ</i> <i>Short answer Q</i> <i>Fill-in the Blank</i> <i>Final Exam</i>
2.0	Skills		
2.1	<i>Demonstrate the knowledge and skills required to Predict the reactivity of an organic compound from its structure and explain the multi-step synthesis of organic compounds. (P)</i>	<i>Lecture</i> <i>Open discussion in class</i> <i>Examination and assignments</i>	<i>MCQ</i> <i>Short answer Q</i> <i>Fill-in the Blank</i> <i>Final Exam</i>
2.2	<i>Perform experiments as well as accurately record and analyze the results obtained for the experiments. (P)</i>	<i>Lab work</i> <i>Group work</i>	<i>MCQ</i> <i>Short answer Q</i> <i>Practical Exam</i>
2.3	<i>Knows the proper procedures and regulations for safe handling and use of chemicals and can follow the proper Procedures and regulations for safe handling when using chemicals. (P)</i>	<i>Lab work</i> <i>Group work</i>	<i>Quiz in Safety</i>
2.4	<i>Make effective use of communication and online technology, modern library searching and writing the information about chemistry topics related to organic reactions mechanism. (I)</i>	<i>Presentations</i> <i>Group discussion</i>	<i>Research project</i> <i>Reports, poster and seminar presentation,</i>
3.0	Values		
3.1	<i>Working as a group leader or a member of a team. (P)</i>	<i>Open discussion</i>	<i>Oral presentation</i>

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework assignment	2	2
	Lecture Quizzes.	4	0
2	Mid-term exam	8	15
4	Homework assignment	9	3
5	Lecture Quizzes	10	0
6	Presentation	11	0
7	LAB SAFETY QUIZ	12	0
	LAB SHEET	14	10
	FINAL PRACTICAL EXAM	15	20
8	Final Exam	16	50
Total			100

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Instructor will be available for academic counseling on daily basis for at 4h/day during office hours.
- The office hours are listed in the instructor time table and delivered to students in the first lecturer in each semester.
- E-mail and Telephone number are delivered to student for any help during semester.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1- Peter sykes/ A guide book to the mechanism in organic chemistry. 2- Jerry March / Advanced organic chemistry- Reactions, Mechanisms, Structures. 3- Organic Reactions, Larry E. Overman, John Wiley & Sons, 2002. 4- Organic Reaction Mechanisms, Gallego, Techmedia, 2004 5- Advanced Organic Chemistry: Part A: Structure And Mechanisms, Carey, Springer Verlag Gmgh , 2007.
Essential References Materials	1- A Guidebook to Mechanism in Organic Chemistry, Peter Sykes Third Edition, longman U.K., (1996). 2- Understanding Organic Reaction Mechanisms, Adam Jacobs, Cambridge University Press, 1997.
Electronic Materials	https://doi.org/10.1036/1097-8542.475400 https://app.knovel.com/web/toc.v/cid:kpAOCRM002/viewerType:toc/
Other Learning Materials	<ul style="list-style-type: none"> • Computer-based programs/ ChemDraw • http://en.wikipedia.org/ • http://www.chemhelper.com/mechanisms.html • https://chem.libretexts.org/Special:Search?qid=&fpid=230&fpth=&query=organic+reaction+mechanism&type=wiki

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms capacity (30) students. Lab capacity (15) students.
Technology Resources (AV, data show, Smart Board, software, etc.)	Smart board, Data show, Black board, internet.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Chemical Models, scientific videos .

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and Assessment	<i>Student</i>	<i>Likert-type Survey (CES)</i> <i>Indirect</i>
Extent of achievement of course learning outcomes	<i>Instructor & Course coordinator</i>	Class room evaluation (direct and indirect)
Quality of learning resources	<i>Program committee</i>	Indirect
Exam quality assessment	Assessment committee	Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Chemistry Department Council
Reference No.	42 / 35 /102 112
Date	17 /09 /1442 Corresponding to 28 / 04 /2021

Attachment: Chem-335- LAB
EXP. Table

No.	List of Topics	APPARATUS	CHEMICALS	Week	Cont act Hrs
1	Introduction of course 1- Definition of safety in the laboratory 2- Identification of Carboxylic acid organic compounds 3- Identification of carbohydrate. 4-Identification of hydrocarbon. 5- Identification of phenols, 6- Identification of salts of acid (amm. And metallic) 7- Identification of Base	Flame distilled water - test tubes - Beaker- flask	Carboxylic acids, carbohydrates, phenols, Base, HCl, NaOH, Na ₂ CO ₃	1	2
2	Acid + Acid mixture	Filter paper Glass (Beakers- Separating funnel- Conical flask-Test Tube - Glass plate measuring cylinder.	Aliphatic acid (Oxalic acid- Tartaric acid- (Citric acid- Succinic acid-) -Aromatic acid (Benzoic acid-Phthalic acid- Salicylic acid-Phenyl acetic acid cinnamic acid) Regent (CaCl ₂ -FeCl ₃ - NH ₄ OH, NaOH KMnO ₄ , H ₂ SO ₄ , Con. HCl, NaHCO ₃ , Na ₂ CO ₃ Resorcinol- ethanol, methanol.	2	4
3	Acid + Phenols	Filter paper Glass (Beakers- Separating funnel- Conical flask-Test Tube - Glass plate measuring cylinder.	Aliphatic acid (Oxalic acid- Tartaric acid- Citric acid- Succinic acid-) -Aromatic acid(Benzoic acid-Phthalic acid- Salicylic acid-Phenyl acetic acid cinnamic acid) -Phenol soluble in water (catechol- Hydro quinone, resorcinol- pyrogallol -Phenols insoluble water(1-naphthol- 2- naphthol) -Regent (CaCl ₂ -FeCl ₃ - NH ₄ OH-NaOH, KMnO ₄ - H ₂ SO ₄ -Con. HCl-NaHCO ₃ - Na ₂ CO ₃ -Resorcinol-Phenol- filter paper ethanol- methanol	2	4

4	Acid + Phenols	Filter paper Glass (Beakers- Separating funnel- Conical flask-Test Tube - Glass plate measuring cylinder.	-Aliphatic acid (Oxalic acid- Tartaric acid- Citric acid- Succinic acid) -Aromatic acid(Benzoic acid-Phthalic acid- Salicylic acid-Phenyl acetic acid cinnamic acid.) -Phenol soluble in water (catechol-quinolresorcinol- Pyrogallol-Phenols insoluble water(1-naphthol- 2- naphthol) -Reagent(CaCl ₂ - FeCl ₃ -H ₄ OH- NaOHKMnO ₄ -H ₂ SO ₄ - Con.HCl-NaHCO ₃ -Na ₂ CO ₃ - Resoncenol- Phenol.	2	4
5	Base + Phenol mixture	Filter paper Glass (Beakers- Separating funnel- Conical flask-Test Tube - Glass plate, measuring cylinder.	Phenol soluble in water (catecholquinol- resorcinol- pyrogallol -Phenols insoluble water (1-naphthol- 2- naphthol) – Base(p- Toulidine-1- naphthylamine-2- naphthylamine) - Reagent (CaCl ₂ -FeCl ₃ -NH ₄ OH, NaOH- KMnO ₄ -H ₂ SO ₄ - Con.HCl-NaHCO ₃ -Na ₂ CO ₃ - Resorcinol-Phenol.	2	4
6	Acid + Neutral mixture	Filter paper Glass (Beakers- Separating funnel- Conical flask-Test Tube - Glass plate, measuring cylinder.	Aliphatic acid (Oxalic acid- Tartaric acid- Citric acid- Succinic acid-) -Aromatic acid (Benzoic acid-Phthalic acid- Salicylic acid-Phenyl acetic acid cinnamic acid)- Carbohydrate (Glucose- Galatose- Fructose-Lactose- Maltose-Starch- Sucrose)- Hydrocarbons (naphthane- Ancerthane) -Salts of metallic and Salts of ammonium) -Reagent (CaCl ₂ -FeCl ₃ - NH ₄ OH-NaOHKMnO ₄ - H ₂ SO ₄ -Con. HCl-NaHCO ₃ - Na ₂ CO ₃ - Resorcinol- Phenol-1-naphthol-Feling regents-Berforded Regent- picric acid- acetone- ethanol.	1	2
7	Base + Neutral mixture	Filter paper Glass (Beakers- Separating funnel- Conical flask-Test Tube -	Carbohydrate (Glucose- Galatose-Fructose- Lactose-Maltose-Starch- Sucrose) -	1	2

		Glass plate, measuring cylinder.	Hydrocarbons(naphthane-Anthracene) -Salts of metallic and Salts of ammonium)-Base (p-Toulidine-1-naphthylamine-2-naphthylamine) - Regent (CaCl ₂ -FeCl ₃ -NH ₄ OHNaOH- KMnO ₄ -H ₂ SO ₄ -Con. HCl- NaHCO ₃ -Na ₂ CO ₃ - Resorcinol-Phenol, ethanol-methanol.		
8	Phenol + Neutral mixture	Filter paper Glass (Beakers- Separating funnel- Conical flask-Test Tube - Glass plate, measuring cylinder.	Phenol soluble in water (catechol-quinolresorcinol-Pyrogallol- -Phenols insoluble water(1-naphthol-2-naphthol) - Carbohydrate (Glucose-Galatose-Fructose-Lactose-Maltose-Starch- Sucrose) - Hydrocarbons(naphthane-Ancerthane) -Salts of metallic and Salts of ammonium)- - Regent (CaCl ₂ -FeCl ₃ -NH ₄ OHNaOH- KMnO ₄ -H ₂ SO ₄ -Con. HCl- NaHCO ₃ -Na ₂ CO ₃ - Resorcinol-Phenol -ethanol-methanol.	2	4
9	Neutral + Neural mixture	Filter paper Glass (Beakers- Separating funnel- Conical flask-Test Tube - Glass plate measuring cylinder.	Carbohydrate (Glucose-Galatose-Fructose- Lactose-Maltose-Starch-Sucrose) -Hydrocarbons (naphthalene- Anthracene) - Salts of metal lic and Salts of ammonium) -Regent (CaCl ₂ -FeCl ₃ -NH ₄ OH-NaOHKMnO ₄ -H ₂ SO ₄ -Con. HCl-NaHCO ₃ -Na ₂ CO ₃ - Resorcinol-Phenol- ethanol- methanol.	2	4
10	Final exam			15	30

