

ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

**The National Commission for Academic Accreditation &
Assessment**

**Course Specifications
(CS)**

Course Specifications

Institution: University of Dammam

Date: 15/02/2014

A. Course Identification and General Information

1. Course title and code: Chemistry of Heterocyclic Compounds/ CHEM 252N		
2. Credit hours: 2(Lecture)		
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs): Bachelor of Science - Chemistry department/ College of Science		
4. Name of faculty member responsible for the course:		
5. Level/year at which this course is offered: Level 4 / Year: Second		
6. Pre-requisites for this course (if any): CHEM 251N		
7. Co-requisites for this course (if any): NA		
8. Location if not on main campus: Chemistry department/ College of Science.		
9. Mode of Instruction (mark all that apply)		
a. traditional classroom	<input type="checkbox"/>	What percentage? <input type="text"/>
	✓	60- 50
% b. blended (traditional and online)	<input type="checkbox"/>	What percentage? 20-
30 % c. e-learning	✓	X What percentage?
0%		<input type="text"/>
d. correspondence	<input type="checkbox"/>	What percentage? <input type="text"/>
0%	X	
f. other	<input type="checkbox"/>	What percentage? <input type="text"/>
20%	✓	
	<input type="checkbox"/>	<input type="text"/>

B Objectives

1. What is the main purpose for this course?

- To be able to understand the classic and modern methodologies of heterocyclic chemistry organic synthesis.
- To know the classification of the heterocyclic compounds.
- To explain the physical and chemical properties of heterocyclic compounds with one and two heteroatoms five- and six-member rings.
- To recognize the importance of medical, biological activity, and applied to some of these compounds.

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

- Lectures and power point presentation.
- Self learning.
- Open discussions.
- Group work.
- Used Black Board and e-learning.
- Small project.

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

	1. Topics to be Covered		
	List of Topics	No. of Weeks	Contact
1a	Introduction of heterocyclic compounds Nomenclature of heterocyclic compounds <ul style="list-style-type: none">• Nomenclature of one ring heterocyclic compounds with one heteroatoms (N,O,S).	1	2
2a	Nomenclature of heterocyclic compounds: <ul style="list-style-type: none">• Nomenclature of one ring heterocyclic compounds with two or more heteroatoms (N,O,S).• Nomenclature of fused ring heterocyclic compounds with one or more heteroatoms (N,O,S).• examples .	2	2

3a	<p>Five-Membered rings with one heteroatom</p> <ul style="list-style-type: none"> • Pyrrole (Azole): <ul style="list-style-type: none"> ○ Methods of preparation. ○ Physical properties and structure ○ Chemical properties. ○ Reactions : (basicity; acidity properties). 	3	2
4a	<p>Pyrrole Reactions:</p> <ul style="list-style-type: none"> • Addition reaction: <ul style="list-style-type: none"> ○ Reduction reactions. ○ Reactions of pyrrole salt. • Electrophilic substitution reactions: <ul style="list-style-type: none"> ○ Sulphonation. ○ Nitration. ○ Halogenation. ○ Friedel – Crafts acylation. ○ Reimer-Tiemann reaction. 	4	2
5a	<p>Derivatives of Pyrroles:</p> <ul style="list-style-type: none"> • Pyrrole -2-aldehyde • Pyrrole -2- carboxylic acid • Indoles: <ul style="list-style-type: none"> ○ Methods of preparation :(Madelung synthesis; Fisher synthesis) • Physical properties of Indoles. • Chemical properties of Indoles: <ul style="list-style-type: none"> ○ Electrophilic substitution reactions. 	5	2
6a	<p>Natural Products of heterocyclic compounds content nitrogen atoms:</p> <ul style="list-style-type: none"> • Porphyrenes • Simple pyrroles. <p>Biological activity of heterocyclic compounds content nitrogen atoms.</p> <p>Furans:</p> <ul style="list-style-type: none"> • Methods of preparation. • Physical properties and structure. • Chemical properties. <ul style="list-style-type: none"> ○ Basicity properties; acidity properties. 	6	2

7a	<p>Furans</p> <ul style="list-style-type: none"> • Reactions: <ul style="list-style-type: none"> ○ Reactions of Furan as ethers ○ Addition reactions: (Diels- Alder reaction, oxidation - reduction) ○ Electrophilic substitution reactions: (nitration, sulphonation, alkylation, acylation, halogenation). • Derivatives of Furans: <ul style="list-style-type: none"> ○ Effect of withdrawing groups (Furfural, Furoic acid) 	7	2
8a	<p>Thiophenes:</p> <ul style="list-style-type: none"> • Methods of preparation . • Physical properties and structure. • Chemical properties: <ul style="list-style-type: none"> ○ Addition reactions:(reaction with acids, oxidation - reduction, polymerization). ○ Electrophilic substitution reactions: (nitration, sulphonation, alkylation, arylation, halogenation). 	8	2
9a	<p>Six- Member ring with one Heteroatome</p> <ul style="list-style-type: none"> • Introduction of pyridine. • Methods of preparation . • Physical properties and aromatic properties • Chemical properties: <ul style="list-style-type: none"> ○ Addition reactions. ○ Electrophilic substitution reactions: (nitration, sulphonation, alkylation, Friedel – Crafts acylation. 	9	2
10a	<p>Chemical properties of Pyridine:</p> <ul style="list-style-type: none"> • Nucleophilic substitution reactions. • Derivatives of pyridine: <ul style="list-style-type: none"> ○ Pyridine oxide, alkyl pyridine, halopyridine. ○ Quinoline:(preparations , properties). 	10	2
11a	<p>Five and Six- member ring with two heteroatoms:</p> <ul style="list-style-type: none"> • Introduction • Five member ring with two heteroatoms: <ul style="list-style-type: none"> ○ Imidazole and pyrazole: (preparations, properties). ○ Isoxazole, Oxazole: (preparations, properties). ○ Thiazole, Isothiazole: (preparations, properties). ○ Biological activity . 	11	2

<i>12a</i>	Six- member ring with two heteroatoms: <ul style="list-style-type: none"> • Introduction . • Pyridazine, pyrimidine, pyrazine: (preparations, properties). • Biological activity. 	12	2
<i>13a</i>	Revision	13	2

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	26	NA	NA	NA	NA	26
Credit	26	NA	NA	NA	NA	26

3. Additional private study/learning hours expected for students per	5
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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code	NQF Learning Domains	Course Teaching	Course Assessment
1.0	Knowledge		
1.1	Know the rules of nomenclature and describe structural and spectroscopic properties of heterocycles compounds.	<ul style="list-style-type: none"> Lectures Self learning 	<ul style="list-style-type: none"> Quizzes Assignments
1.2	Summarize and characterize the difference methods of ring synthesis of aromatic and non aromatic heterocycles (preparing	<ul style="list-style-type: none"> Lectures Self learning 	<ul style="list-style-type: none"> Exams Quizzes
1.3	Discuss various types of reactions with electrophilic, nucleophilic, oxidizing and reducing reagents.	<ul style="list-style-type: none"> Lectures Self learning 	<ul style="list-style-type: none"> Exams Quizzes Assignments
1.4	Point out the role of heterocycles in , biochemistry and medicine.	<ul style="list-style-type: none"> Lectures 	<ul style="list-style-type: none"> Quizzes Assignments Exams
2.0	Cognitive Skills		
2.1	Apply the different ways of nomenclature heterocyclic compounds and recognize the correct methods	<ul style="list-style-type: none"> Lectures Self learning 	<ul style="list-style-type: none"> Assignments Online exam.
2.2	Design effective synthetic routes to the desired heterocyclic. compare between the different ways of preparation methods, between physical and chemical properties	<ul style="list-style-type: none"> Lectures Group work Problem solving 	<ul style="list-style-type: none"> Exams Assignments Small project
2.3	Estimate the reactivity of electron deficient and electron rich heterocycles.	<ul style="list-style-type: none"> Open discussions. Group work 	<ul style="list-style-type: none"> Assignments Small project .
2.4	Employ and modify heterocyclic chemistry literature procedures.	<ul style="list-style-type: none"> Lectures Small project 	<ul style="list-style-type: none"> Assignments Exams
3.0	Interpersonal Skills & Responsibility		
3.1	The student fluent in dealing with others and collaborative work.	<ul style="list-style-type: none"> Team work problem solving 	Not assignments
3.2	The student respects the opinions of others .	<ul style="list-style-type: none"> Interactive learning 	Assignments
3.3	The student accepts criticism.		
4.0	Communication, Information Technology, Numerical		
4.1	Research about some subject in heterocyclic	<ul style="list-style-type: none"> Research in 	<ul style="list-style-type: none"> Assignments

	chemistry and the application.	internet • Team	• Small project
4.2	Communicate with others to receive the comments and explanations are important.	• Team work • Online discussion	• Interview
5.0	Psychomotor		
5.1	NA	NA	NA
5.2			

5. Map course LOs with the program LOs. (Place course LO #s in the left column and program LO #s across the top) Not applicable

Course LOs #	Program Learning Outcomes (Use Program LO Code #s provided in the Program)							
	1.1	1.2		2.1		3.2		4.1
1.1	Not applicable							
2.1								

6. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination,	Week Due	Proportion of Total
1	Essay/Written exam	8,11	30%
2	Activity / Assignments / Group works	3,5,7,9	10%
3	Online exam	10,7	10%
4	Final exam	16	50%
5			100%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

- Faculty web-page with communication tolls in Black Board.
 - 4 Office hours/ week.
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E Learning Resources

1. List Required Textbooks: Heterocyclic compounds - Dr. Hamad Abdullah alluhaidan, Dr. Mohamed Ibrahim al-Hassan, Dr. Salm Selim Elziyab - King Saud University.
2. List Essential References Materials (Journals, Reports, etc.): Heterocyclic compounds. - Dr. Hassan Mohamed Hazmi, Dr. Nasser Mohammed Elandus and Dr. Siham Abdul Rahman AL-Essa - 1422
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc) Heterocyclic Chemistry I. A. Joule and G. F. Smith Van Nostrand Reinhold(UK)
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc. Web Sites: Science direct; Google; Google+; Blogger; wiki; Black Board ; YouTube.
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. computer-based programs :Chemdraw office

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) - Classrooms enough for No. of students, Black (white) board and also in lab.
2. Computing resources (AV, data show, Smart Board, software, etc.) Computer, data show, smart board., internet connection
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list): NA

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- 1- Students evaluation in each semester.
- 2- Meeting with students.

3- E-suggestions .

4- Open door policy.

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- 1- Self evaluation.
- 2- Peer review.
- 3- Annual outsider review.
- 4- Conducting research.

3 Processes for Improvement of Teaching

- 1- Studying reports
- 2- Training of faculty.
- 3- Exchanging faculty between different institutions (NA)

4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

Revision of the sample of assignments with teaching staff of another institution.

- 1 - Revision of the corrected sample worksheets and tests by independent professors to check the standards of achievement among students.
- 2 - Exams were reviewed by an evaluating team before finalizing and printing.

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- 1- Collecting all reports and evaluations at the end of the year for a reviewing purpose.
- 2- Conducting a workshop to presents finding of reports and evaluation to share knowledge.
- 3- Reviewing results of reports and evaluations with outside reviewers (NA)