Course specification
2017- 2018
Faculty of Pharmacy
Mansoura University

Third Level | **Spectroscopic Identification**

University: Mansoura University (MU)
Faculty: Pharmacy
Department: Pharmaceutical Organic Chemistry
Course title: Spectroscopic Identification
Course code: PO 315

Program on which the course is given	B. Pharm
Academic Level	Third Level, First semester, 2016-2017
Date of course specification approval	11/4/2018

1. Basic Information: Course data:

Course title:	**Spectroscopic Identification**	**Code: PO 315**
Specialization:	**Basic Sciences**	
Prerequisite:	**Registration**	
Teaching Hours:	**Lecture: 1**	**Practical: 1**
Number of units: (credit hours)	**2**	

2. Course Aims:

2.1. Enable students to understand the basic principles of spectroscopy.
2.2. Teach the students how to identify the structural skeleton of a chemical compounds.
2.3. Recognize and elucidate the functional groups in the organic and natural molecules.
2.4. Teach the students how to apply the different methods of spectroscopic devices inn determination the entity of chemical compounds and drugs.

3. Intended learning outcomes (ILO_S):

a- Knowledge and understanding

a1	Define the spectroscopic properties of various substances used in preparation of medicines.
a2	List the different spectroscopic techniques, using good laboratory practice (GLP) guidelines.
a3	Enumerate the theories of spectroscopic identification of chemicals and pharmaceutical compounds.

b- Intellectual skills

b1	Design appropriate methods for spectroscopic identification of various chemicals and pharmaceutical compounds.
b2	Interpret experimental data and published literatures, based on relevant spectroscopic principles.
b3	Predict the physical and chemical properties of organic compounds based on molecular structure elucidation using spectroscopic techniques.

c- Professional and practical skills

c1	Apply appropriate spectroscopic methods for identification active substances from different origins.
c2	Conduct experimental and research studies and present, analyze and interpret the results.
c3	Employ different spectroscopic methods for assay of raw materials and pharmaceutical preparations.

d- General and transferable skills

d1	Interact effectively in team working.
d2	Exploit calculations and statistical methods as well as information technology (IT) tools.
d3	Present information clearly in written and oral forms.
d4	Promote critical thinking, problem-solving, decision-making, and time managing capabilities.

4. Contents:

Week No	Topics	No. of hours	Lecture credit hours	Practical credit hours
Theoretical Topics				
1.	Ultraviolet-visible spectroscopy Introduction	2	1 hours	
2.	Infrared spectroscopy			
3.	Infrared spectroscopy(cont.)	2	1 hours	
4.	Nuclear Magnetic Resonance spectroscopy - 1H-NMR	2	1 hours	

5.	Nuclear Magnetic Resonance spectroscopy - 1H-NMR (cont.)	2	1 hours	
6.	**Midterm Exam**			
7.	Nuclear Magnetic Resonance spectroscopy - 1H-NMR(cont.)	2	1 hours	
8.	Nuclear Magnetic Resonance spectroscopy - 13C-NMR	2	1 hours	
9.	Mass Spectroscopy and types of fragmentation	2	1 hours	
10.	Mass Spectroscopy and types of fragmentation (cont.)	2	1 hours	
11.	Deduction of chemical structure using spectroscopic data	2	1 hours	
12.	Problems for structure determination: Molecular formula, Molecular weight, Index of Hydrogen deficiency, UV: λmax calculation, IR: interpretation of spectra	2	1 hours	
13.	Problems for structure determination: 1H-NMR: interpretation of spectra, 13C-NMR: interpretation of spectra, Mass: interpretation of spectra	2	1 hours	
14.	**Week 15 Final written & oral**			

Practical topics

Week No	Topics	**No. of hours**	**Lecture credit hours**	**Practical credit hours**
1.	Index of Hydrogen deficiency and Molecular formula calculations	2		1 hour
2.	UV spectroscopy	2		1 hour
3.	IR spectroscopy	2		1 hour
4.	IR spectroscopy (cont.)	2		1 hour
5.	1H NMR	2		1 hour
6.	**Midterm exam**			
7.	1H NMR continue	2		1 hour

8.	13C NMR	2		1 hour
9.	Mass Spectrometry	2		1 hour
10.	Mass Spectrometry (cont.)	2		1 hour
11.	Revision (problems)	2		1 hour
12.	**Final Exam**			

5. Teaching and learning Methods:

5.1	**Lectures using whiteboard**
5.2	**Lectures using Data show, PowerPoint presentations**
5.3	**Models, Animation files**
5.4	**Case study**
5.5	**Discussion session**

6. Student Assessment:

a- Assessment methods

1. Written exam	**To assess understanding, intellectual and professionalskills**
2. Practical exam	**To assess professional and practical skills**
3. Oral exam	**To assess knowledge, understanding, intellectual skills, general skills and confidence**

b- Assessment schedule

Assessment 1	**Practical**	**12th week**
Assessment 2	**Mid-term**	**6thweek**
Assessment 3	**Oral**	**15thweek**
Assessment 4	**Written**	**15thweek**

c- Weighting of assessments

1.	**Mid-term examination**	**10%**
2.	**Final-term examination**	**50%**
3.	**Oral examination**	**15%**
4.	**Practical examination**	**25%**
Total		**100%**

7. List of References

No	Reference	Type
1.	Practical course notes prepared by the department staff members	Course notes
2.	Introduction to Spectroscopy, 5th Edition, Donald L. Pavia, 2015.	Book
3.	Spectrometric Identification of Organic Compounds 7th Edition by Robert M. Silverstein	Book
4.	SDBS Spectral Database for Organic Compounds	Website

8. Matrix of knowledge and skills of the course

No	Course contents	Study Week	ILOS			
			Knowledge & understanding	Intellectual skills	Professional and practical skills	General & transferable skills
1.	Ultraviolet-visible spectroscopy Introduction	1st	a1	b1	---	d1
2.	Infrared spectroscopy	2nd and 3rd	a1	b1	---	d1
3.	Nuclear Magnetic Resonance spectroscopy - 1H-NMR	4th, 5th and 7th	a1	b1	c1	d1
4.	Nuclear Magnetic Resonance spectroscopy - 13C-NMR	8th	a1	b1	c1	d1, d2
5.	Mass Spectroscopy and types of fragmentation.	9th and 10th	a1	b1	c2	d1, d2
6.	Deduction of chemical structure using spectroscopic data.	11th	a2, a3	b2, b3	c2, c3	d1, d2, d3, d4
7.	Problems for structure determination	12th and 13th	a2, a3	b2, b3	c1, c2, c3	d1, d2, d3, d4

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