

## T6. Course Specification (CS) توصيف المقرر

Institution : <b>University of Najran</b>	Date of Report <b>20.12.1438</b>
College/Department : <b>Pharmacy / Pharmaceutical chemistry</b>	

### A. Course Identification and General Information:

1. Course title and code: <b>Pharmaceutical Analytical Chemistry-2 (PHCH 314 )</b>			
2. Credit hours: <b>3 hours (2+1)</b>			
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) <b>Pharmaceutical Sciences</b>			
4. Name of faculty member responsible for the course <b>Prof./ Ashraf Mohamed Mohamed Mahmoud</b>			
5. Level/year at which this course is offered <b>5<sup>th</sup> Level / 1438/1439 1<sup>st</sup> semester</b>			
6. Pre-requisites for this course (if any) <b>Pharmaceutical Analytical Chemistry-1: course code: PHCH 213</b>			
7. Co-requisites for this course (if any)			
8. Location if not on main campus			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom	<input checked="" type="checkbox"/>	What percentage %	<input type="text" value="100%"/>
b. Blended (traditional and online)	<input type="checkbox"/>	What percentage :	<input type="text"/>
c. e-learning	<input type="checkbox"/>	What percentage	<input type="text"/>
d. Correspondence	<input type="checkbox"/>	What percentage	<input type="text"/>
f. Other طرق أخرى	<input type="checkbox"/>	What percentage	<input type="text"/>
Comments :			

عليه تعليق [T1]:  
ماذا عن الجزء العملي من المقرر ؟

## B. Objectives

1. What is the main purpose for this course?

Describing and explaining theoretical background and principles that are used for quantitative analysis of substances including fundamentals of redox, precipitometry, and complexometry titrations as well as fundamentals of HPLC, UV-VIS, and Raman spectroscopy.

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)

Students are referred to specialized websites to enhance their knowledge and making essay.

## C. Course Description (Note: General description in the form used in the Bulletin or handbook should be attached.

### Course Description

This course deals with describing and explaining theoretical background and principles that are used for quantitative analysis of substances including fundamentals of redox, precipitometry, and complexometry titrations as well as fundamentals of high pressure liquid chromatography (HPLC), UV-VIS, and Raman spectroscopy. The practical part deals with training students on different types of titrations, mathematical calculations and formulas needed for calculation of the final concentrations as well as identifying and operating the instruments.

### 1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
UV-VIS spectroscopy (Introduction)		

1. Absorption of UV-VIS radiations 2. Types of electronic transitions and their wavelengths 3. Factors affecting ultraviolet absorption. 4. Beer's Lambert Law for quantitative analysis 5. Deviations from Beer's Lambert law 6. Instrumentation of UV-VIS spectrophotometers 7. Application of the UV-VIS absorption in the pharmaceutical analysis of drug substances	3	6
<b>Raman spectroscopy,</b>		
1. Raman Spectroscopy 2. Difference between Raman and normal IR spectroscopy 3. Quantitation using Raman spectroscopy 4. Instrumentation of Raman spectroscopy	2	4
<b>High Performance Liquid Chromatography (HPLC)</b>		
1. Definitions of all parts of HPLC (Instrumentation) 2. Modes of separation analysis by using HPLC 3. Qualitative and quantitative analysis by using HPLC. 4. Chromatographic parameters of HPLC analysis	2	4
<b>Volumetric Titrations</b>		
1. Fundamentals of oxidation-reduction titrations	4	6
2. Oxidation-reduction indicators and titration curves		
3. Redox reagents and their applications		
4. Application of redox systems in biological systems		
5. Fundamentals of complexometric titrations	2	4
6. Metallochromic indicators and complexon reagents		
7. Application of complexometric EDTA titrations and how to increase EDTA selectivity		
8. Fundamentals of precipitometric titrations and methods for detection of the end point	3	6
9. Applications of precipitometric titrations		
<b>Total</b>	<b>15</b>	<b>30</b>

عليه تعليق [T2]: المجموع حسب الأرقام المكتوبة في الجدول 16

## 2. Practical sessions

### List of experiments in this course

- 1- Introduction to laboratory health and safety procedures and tools names (Tutorial class)
- 2- Lab 1. Beer's Lambert Law plot
- 3- Lab 2. Determination of pharm. compounds by UV
- 4- Lab 3. IR spectra (e.g. paracetamol, and aspirin).
- 5- Lab 4. HPLC components and functions
- 6- Lab 5. Quantitative HPLC analysis
- 7- Lab 6. Acid-base titrations
- 8- Lab 7. Redox titration of ferrous sulphate by  $\text{KMnO}_4$
- 9- Lab 8. Redox titration of  $\text{H}_2\text{O}_2$
- 10- Lab 9. Complexometric titration of  $\text{Ca}^{2+}$  by EDTA
- 11- Lab 10. Precipitometric titrations (Mohr's and Volhard's methods)
- 12- Statistics in laboratory (Tutorial class)
- 13- Data Analysis using excel software (Tutorial class)
- 14- Practical Exam week number 16

15

30

### Total

15

30

### 1. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory or studio	Practical	Other:	Total
Contact Hours	30	-	-	30		30
Credit	30	-	-	1		3

### 3-Additional private study/learning hours expected for students per week **2 hours per week**

### 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.

عليه تعليق [T3]:

حدد لكل تجربة على حدة عدد الأسابيع المخصصة لها

عليه تعليق [T4]:

عليه تعليق [T5R4]: 2

**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 And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Describe the fundamentals of all types of volumetric titrations	1. Lectures,	1. Theoretical exams
1.2	Describe the fundamentals of Raman and UV spectrophotometry, and HPLC	2. Tutorials 3. Brain storming	2. Observation card
<b>2.0</b>	<b>Cognitive Skills</b>		
2.1	Explain the possible interactions or interferences of some compounds with analysis of other compounds.	1. Lectures, 2. Tutorials	1. Theoretical exams
2.2	Plan strategies for the solution of analytical problems	3. Brain storming 4. Solving of problems 5. Carrying laboratory experiment	2. Observation card 3. Practical exam
<b>3.0</b>	<b>Interpersonal Skills &amp; Responsibility</b>		
3.1	Use properly the chemical compounds in the laboratory according to the rules of good laboratory and storage practice	Practical labs: Demonstration of analytical experiments	1. Observation card
3.2			2. Practical exam
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b>		
4.1	Communicate clearly by verbal and written means	Practical lab: Demonstration of analytical experiments	1. Observation card
4.2	Demonstrate practical skills of preparation of standard solutions and end point determination		2. Practical exam
<b>5.0</b>	<b>Psychomotor</b>		

5.1	Perform the titration of sample in professional way	Practical labs (Demonstration of titration)	Practical exam
5.2			

#### 5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Quiz on theoretical part	4-5	5%
2	Seminar or individual assignments	11	10%
3	Observation card in lectures	2-12	5%
4	Midterm exam	9	20%
5	Observation card in lab	2-12	5%
6	Final practical Exam	15	15%
7	Final exam	16	40%
8	Total		100%

عليه تعليق [T6]:  
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#### 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)

6 hours/ week the teaching staff is available for individual student consultations and academic advice. The time is announced and hanged up on the office door of the teaching staff member.

#### E. Learning Resources

1. List Required Textbooks:

1. Analytical Chemistry by Christian, G.D. 7th Edition, John Wiley and Sons: New York, 2014.
2. Vogel's Quantitative Chemical Analysis, 6th Edition, 2000
3. Modern Analytical Chemistry by David Harvey 1st Edition, 2010; ISBN 0-07-237547-7; McGraw-Hill.
4. Practical pharmaceutical analysis by A.H. Beckett and J.B.Stenlake; 6th Ed, Part

(1), the press London, 1998.
2. List Essential References Materials (Journals, Reports, etc.)
3. List Electronic Materials Web Sites, Facebook, Twitter, etc. <a href="http://www.dlaf.nu.edu.sa">www.dlaf.nu.edu.sa</a>
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. <b>Excel software for calculations and drawing</b>

#### 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.) <ul style="list-style-type: none"> <li>1. Suitable lecture room equipped with data show and internet, and 25 seats.</li> <li>2. Suitable laboratories equipped with health and safety tools, internet and 25 seats.</li> </ul>
2. Computing resources (AV, data show, Smart Board, software, etc.) <b>Data show</b>
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) <ul style="list-style-type: none"> <li>1. pH meters</li> <li>2. Burets</li> <li>3. Pipets</li> <li>4. Conical flasks</li> <li>5. Volumetric flasks of different volumes</li> <li>6. UV-VIS spectrophotometer</li> <li>7. IR spectrophotometer</li> <li>8. HPLC instrument</li> </ul>

#### G. Course Evaluation and Improvement Processes:

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching <ul style="list-style-type: none"> <li>1. Questionnaires</li> <li>2. Direct questions (Provoke students' initiative by asking questions)</li> <li>3. Observation card in lectures</li> </ul>
2 Other Strategies for Evaluation of Teaching by the Instructor or by the department <b>Sudden visits from the program committee to the classrooms and laboratories during</b>

teaching
<b>Course report and course portfolio</b>
3 Processes for Improvement of Teaching <ol style="list-style-type: none"> <li>1. Exchange of experiences with similar institutes if possible.</li> <li>2. Availability of textbooks and references and youtube videos on some difficult facts and principles.</li> <li>3. Encouragement of student to participate in the research field.</li> <li>4. <b>Evaluation of the student for the course</b></li> </ol>
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) <p>The examination committee of the program verify the standards of student achievement by check marking of a random sample of student work, exams and assignments</p>
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. <p>Each semester we periodically review the course contents, effectiveness, course ILOs according to the progression in the field worldwide</p> <ol style="list-style-type: none"> <li>1. Assessment of course content and ILOs in relation to the progressing knowledge in the field.</li> <li>2. Assessment of course content and ILOs in relation to the changing demands worldwide.</li> <li>3. <b>Course report and course portfolio</b></li> <li>4. <b>Trend analysis</b></li> <li>5. <b>Use of the software for measuring of the ILOs of the course</b></li> </ol>

Name of instructor: **Prof. Dr. Ashraf M. M. Mahmoud**

Signature:  Date Report Completed: 20.12.1438 H

Name of field experience teaching staff: **Prof. Dr. Ashraf M. M. Mahmoud**

Program coordinator: **Prof. Dr. Ashraf M. M. Mahmoud**

Signature:  Date: 20.12.1438 H



**Internal Revision Committee**

	Name	Signature
1	Dr. Mohamed S. Al Qahtani	
2	Prof. Ashraf M. Mohamed	
3	Prof. Mohamed Abdel Motaleb	Mohamed Abd EL-Motaleb
4	Dr. Basel Abdel Naem	
5	Dr. Ali Al Shabby	