

Course Syllabus typical Format (CSTF)

First: Course Information

1	College: Pharmacy	2	Department: Pharmaceutical Chemistry
3	Academic Semester: First	4	Academic year: H1442 /H1443
5	Course Name: Pharmaceutical Analytical Chemistry	6	Course code and number: PPC0221
7	Number of credit hours: 4Units(3 theoretical/lecture, 2 practical/lab)		
8	Course requirement in program: <input checked="" type="checkbox"/> Required (obligatory) <input type="checkbox"/> Optional (Elective)		
9	Course type: <input type="checkbox"/> University Requirement <input checked="" type="checkbox"/> College Requirement <input type="checkbox"/> Departmental Requirement		
10	Pre-requisite(code and number) (if applicable): General chemistryCHEM101		

Second: Instructor Information

1	Instructor's name: Dr. Nader Abo dya (male section)- Dr. Hebatallah Atteia , Dr. Nehal Elsherbiny (female section)		
2	Sectionsof the course that I teach (All theoretical and practical parts)		
3	Office phone number:	4	Mobile number (optional):
5	Office location and number: First floor		
6	Office hours: Thursday 9-10 AM-Sunday 12-1 AM		
7	Website: https://www.ut.edu.sa/ar/Staff/Pages/default.aspx?EmpNum=20s9YRPIndOd753dCeTDlg%3d%3d https://www.ut.edu.sa/ar/Staff/Pages/default.aspx?EmpNum=drZOyn2tAXnD5fTnbesNrA%3d%3d https://www.ut.edu.sa/ar/staff/Pages/default.aspx?EmpNum=a%2Bygem5hIWrHk/njboq6cQ%3D%3D		
8	E-mail: nabodya@ut.edu.sa hatteia@ut.edu.sa nelsherbiny@ut.edu.sa		

Third: Lecture and lab timetables

Section	Days	Time	Place (Building/Room)
Male	Sunday	09:00-12:00 am	Faculty of pharmacy/ 1st floor/ Lecture room 01-03-0-06
	Sunday	01:00-3:00 am	Faculty of pharmacy/ 1st floor/ Lecture room 01-03-0-06
	Sunday	3:00-5:00 pm	Faculty of pharmacy/ 1st floor/ Chemistry lab. 01-03-0-07

Female	Sunday	09:00-12:00 am	Faculty of pharmacy/ 2nd floor/ Lecture room 01-25-2-032
	Sunday	1:00-3:00 pm	Faculty of pharmacy/ 1st floor/ Chemistry lab. 01-25-2-096
	Thursday	1:00-3:00 pm	Faculty of pharmacy/ 1st floor/ Chemistry lab. 01-25-2-097

Fourth: Course description

<p>Course description as found in the University Catalogue in both Arabic and English</p> <p>The course offers a wide range of analytical methods for analysis of pharmaceuticals and related materials. It deals with quantitative methods (acid-base titrations in aqueous and non-aqueous media, precipitation titrations, complexometric titrations, and redox titrations). In addition, it provides the basis of the following techniques: UV-visible spectroscopy, spectrofluorimetry, flame photometry, atomic absorption spectrophotometry, electrochemistry (conductometry and potentiometry), and chromatography (HPTLC, HPLC, and GC).</p>

Fifth: General Objectives and Teaching Strategies

<p>General course objectives (designate the sections and goals that are related to the course content)</p>	<p>Teaching strategies and instructional aids (Tradition lecture, Blended teaching, Brain storming, Demonstration, Role playing, Advanced organizer, Discussion, Problem solving, Kits or instructional packages, Maps, Models, PowerPoint)</p>
<p>Cognitive Domain:</p> <ul style="list-style-type: none"> ▪ Researchable ▪ Cognitive (Traditional and Revised Bloom's Taxonomy is recommended)(Knowledge, Comprehension, Application, Analysis, Evaluation, and Creation) 	<p><u>By the end of this course, the student should be able to demonstrate comprehensive, detailed knowledge and understanding of:</u></p> <ul style="list-style-type: none"> ▪ Quantitative sense in chemical analysis as well as a deep knowledge of acid -base (aqueous & non- aqueous) titrations, redox titrations, precipitemetry and complexometry. ▪ The use of absorption of (light, heat energy) or emission of energy by chemical substances for their Qualitative & Quantitative analysis ▪ Absorption spectrophotometry, fluorimetry, flame spectroscopy, flame emission and atomic absorption ▪ Theoretical basis of separation techniques (chromatography): TLC, GLC and HPLC. ▪ Application of the different electrochemical techniques (conductometry and potentiometry) in the analysis of pharmaceuticals. ▪ By the end of this course, the student should be able to: <ul style="list-style-type: none"> ○ Analyze pharmaceutical chemical substances. ○ Select the most suitable method of analysis. ○ Classify compounds according to their acidic/basic nature.

	<ul style="list-style-type: none"> ○ Differentiate between compounds forming precipitate(s) and those forming complexes. ○ Develop and improve analytical methods to prevent interferences. ○ Discriminate between the different chromatographic and spectroscopic methods. ○ Examine the diagrams got from the electro analytical methods: conductometry and potentiometry ○ Assess and interpret the possible interactions or interferences of some compounds with the selected method of analysis of certain compounds depending on the studied principles.
<p>PsychomotorDomain:</p> <ul style="list-style-type: none"> ▪ Dealing with Technology ▪ Communication skills ▪ Analytical skills ▪ Integration skills ▪ Motivation and follow-up skills ▪ Assessment and critique skills 	<p><u>By the end of the course, the student should be able to:</u></p> <ul style="list-style-type: none"> ▪ Work with minimum guidance in laboratories dealing with quality control in pharmaceutical industries. ▪ Handle properly the chemical compounds in the laboratory and be aware of the rules of good laboratory and storage practice to minimize the errors of an applied analytical method. ▪ Handle (choice, preparation, standardization and application) standards. ▪ Apply the suitable analytical method based on the knowledge and skills acquired. ▪ Do pharmaceutical searches for suitable analytical methodologies. ▪ Demonstrate critical thinking, problem solving and decision making abilities in a variety of theoretical and practical situations.
<p>Affective Domain:</p> <ul style="list-style-type: none"> ▪ Social ▪ Economical ▪ Psychological 	<p><u>Student should be able to work independently in different quality control labs:</u></p> <ul style="list-style-type: none"> ▪ Apply the information technology skills, such as word processing, internet communication and online searches. ▪ Work effectively with the others as a team work in performing the report on the results of an analytical method. ▪ Manage the time in an analytical work effectively.

Sixth: Course or Curriculum units, subjects, specific objectives, and time schedule in the academic semester (first, second, or third semester (summer))
(Example)

Week number	Units		Instructional Objectives (Actions that prove the students adoption of specified behavior and achievement, learning outcomes, content)	Readings		Keywords
	Unit Number	Unit/Chapter/Subject title		Reference Number	Pages	
First	Introduction	<p>First meeting:</p> <ul style="list-style-type: none"> - Introducing the curriculum (course content) - Review of the previous prerequisite (basics) - Highlighting the knowledge and skills the curriculum is based on 	<ol style="list-style-type: none"> 1) Presenting an overview of the curriculum's content and extent 2) Clarifying curriculum requirements 3) Specifying methods of communication between students and their instructors 4) Clarifying the assessment techniques/methods of the learning objectives 5) Clarifying policies concerning instruction, classroom participation and assessment 6) Advising students on note taking and time management techniques 7) Introductory test (pretest) 8) Introduction to qualitative and quantitative analysis. 	[1-3]		Exam purpose, Time management, Note taking strategies
Second	First Unit	Application of bases of acid-base titrations in pharmaceutical analysis of drug substances.	<ol style="list-style-type: none"> 1) Defines acids and bases 2) Clarifies the pH laws of different types of acids and bases 3) Recognizes titration curves. 4) Understands the way of action of acid base indicators. 	[1-3]		pH, acids, bases, titration curve, indicators, applications

Third	First Unit	Application of bases of acid-base titrations in pharmaceutical analysis of drug substances.	5) Comprehends the principles behind analysis of different acids and bases 7) Recognize a group of applications of acid base titrations in pharmaceuticals.	[1-3]		
Fourth	First Unit	Application of bases of acid-base titrations in pharmaceutical analysis of drug substances.	8) Retrieve information from other resources on acid-base titration applications	[1-3]		
Fifth	Second Unit	Application of bases of precipitometric titrations in pharmaceutical analysis of drug substances.	1) Recognize precipitation reactions. 2) Realize factors affecting precipitate formation 3) Understand titration curves for precipitate formation. 4) Choose the proper indicator for precipitation titrations. 5) Understand different examples of applications in pharmaceuticals.	[1-3]		Precipitate, complex, indicators, applications
Sixth	Third Unit	Application of bases of complexometric titrations in pharmaceutical analysis of drug substances.	1) Recognize complex formation reactions. 2) Realize factors affecting complex formation 3) Understand titration curves for complex formation. 4) Choose the proper indicator for complexation titrations. 5) Understand different examples of applications in pharmaceuticals.	[1-3]		
Seventh	Fourth Unit	Application of Redox titrations in pharmaceutical analysis of drug substances.	1) Recognize redox reactions. 2) Realize factors affecting redox reactions 3) Understand titration curves for redox reactions. 4) Choose the proper indicator for redox titrations. 5) Understand different examples of applications in pharmaceuticals.	[1-3]		Reduction, oxidation, indicators, applications.
Eighth						

Ninth			Mid Term Exam		
Tenth	Fifth Unit	Uv-vis spectrophotometry (Basics and applications)	1) Recognize spectra of EMR and its different qualitative and quantitative applications. 2) Identifies principles of colorimetry. 3) Understands how uvspectrophotometers work and its composition. 4) Understand different examples of applications in pharmaceuticals.	[1-3]	Uv, visible radiation, spectrophotometer, cuvette, applications.
Eleventh	Sixth Unit	Spectrofluorimetry (Basics and applications)	1) Recognize emission and excitation spectra and its different qualitative and quantitative applications. 2) Understands how spectrofluorimeter works and its composition. 4) Understand different examples of applications in pharmaceuticals.	[1-3]	Fluorescence, phosphorescence, cuvette, spectrofluorimeter, applications.
Twelfth	Seventh Unit	Flame emission and atomic absorption (Basics and applications)	1) Recognize spectra of flame and absorption and its different qualitative and quantitative applications. 2) Identifies principles of atomic absorption spectrometry. 3) Understands how UV absorption spectrometer works and its composition. 4) Understand different examples of applications in elemental analysis.	[1-3]	Atoms, molecules, water analysis
Thirteenth	Eights Unit	Chromatographic analysis	1) Recognize principles of chromatographic separations and its qualitative and quantitative applications.	[1-3]	Liquid chromatography, mobile phase, stationary phase, chromatograph.

			<p>2) Identifies principles of high performance liquid chromatography.</p> <p>3) Understands how chromatographs and its detectors work and its composition.</p>			
Fourteenth	Ninth Unit	Chromatographic analysis	1) Recognize principles of Gas chromatography and thin layer chromatography	[1-3]		Adsorption Partition Retention time
Fifteenth	Activities/Revision	Electrochemical analysis (conductometry, potentiometry)	<p>1) Recognize principles of conductometry and potentiometry and its qualitative and quantitative applications.</p> <p>2) Understand different examples of applications in pharmaceutical analysis.</p>	[1-3]		Conductometry, potentiometry, electrode, applications.
Sixteenth	Revision					
Seventeenth	Final exam					
Eighteenth						

Seventh: Assessment and evaluation plan

Assessment tools	Date and duration (day/date/ time)	Subject matter covered in the exam	Type of questions	Grades out of 100	Guidelines and instructions
First Exam (midterm)	21/2-25/2/1441	Units 1-3	MCQ, essay	30	-----
Final	11/4/1441 to 5/5/1441	All units	MCQ, essay	40	-----
Practical exam				20	-----
Non-exam assessment/quiz	- Student activity/quiz	One topic attended during the semester	Research activity	10	-----

Eighth: Readings and further References

1	1- Christian G. D., "Analytical Chemistry ", John-Wiley and Sons, Inc New York (Sixth edition).
Extra reading references and citations (books, internet cities, research papers)	
2	2- Vogels Textbook of Quantitative Inorganic Analysis, 6th Edition Longman Scientific and Technical, USA (2000).
3	3- D. A. Skoog and d. M. west, "Fundamentals of Analytical Chemistry", 8th ed CBS Publishing Asia Ltd (2004).

Ninth: The instructor's policy of dealing with students within the framework of the university laws, regulations, and guidelines (examples and prototypes).

1	Late attendance: maximum 10 minutes
2	Cheating and plagiarism: not permissible in any form
3	Absences: maximum 25%
4	Late work policy: affects your grades (2 marks per day delay)
5	Exiting during the lecture period: Allowed after permission.
6	Seating and student placement in the classrooms: as you like
7	Absence from an exam: needs a serious excuse to consider
8	Mobile phone use in the classroom: not allowed
9	Eating and drinking: not allowed.

Tenth: (for the instructor) Final and formative evaluation for the course instruction

1) Comments and reflections on students' answers of open ended question in the Course Evaluation Form.

- 2) Comments and reflections on students' statistical or numerical ratings of the items in the Course Evaluation Form(s).
- 3) Instructor's reflections and comments on students' performance and marks/grades statistical distribution in the course
- 4) Obstacles faced by the instructor in implementing the course plan
- 5) Points of strength found in the implementation of the course plan
- 6) Expected changes that need to be adopted into the course plan
- 7) Adopted assumptions by the instructor proven to be false
- 8) Mark/grade optimization in light of possible measurement or assessment (by tests or rubrics) sources of errors