Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy	QF02/0408-2.1E

Department	Pharmacy

Course Name	Pharmaceutical Analytical Chemistry	**Course No.**	**201213**
Prerequisite	General chemistry	Credit Hours	3
Number & date of course plan approval	2016/2017	Brief Description	See form QF02/0409

Course Objectives	This course aim to cover different titremetric procedures that are employed in quantitative pharmaceutical analysis
Intended Learning Outcomes	1- The student is expected to have acquired basic knowledge regarding the importance of analysis in pharmaceutical industry. 2- The student is expected to have acquired basics of analytical calculations and -statistical handling of data. 3- Introducing the principles of chemical equilibrium and its relation to pharmaceutical analysis. 4- Introducing the concept of volumetric and gravimetric analytical methods and how to employ them in real life problems 5- Focusing on the principles and applications of the different titremetric procedures that are employed in quantitative pharmaceutical analysis
Course Topics	1- Introduction and Concentration units 2- Statistical Handling of Data 3- Volumetric analysis 4- Neutralization titrations 5- Precipitation titrations 6- Complexometric titrations 7- Oxidation Reduction titrations 8- Gravimetric Analysis
Text Books	1- Fundamentals of Analytical Chemistry (Brooks/Cole – Thomson Learning), 9th edition. Author: Donald West, F. James Holler, Douglas A. Skoog & Stanley R. Crouch, 2014.
References	1- Quantitative Chemical Analysis,7th edition (2007), (W. H. Freeman and Company). Author: Daniel C. Harris 2- Analytical Chemistry: An Introduction, 7th edition (2000), (Saunders Golden Sunburst series). Author: Douglas A. Skoog, Donald M. West, F. James Holler and Stanely R. Crouch. 3 -Modern Analytical Chemistry, first edition. David Harvey, 2000. McGraw –Hill Higher Education. 4- A textbook of Pharmaceutical Analysis, third edition. Connors, K.A.1982. John Wiley & Sons, New York.
Grade Determination	1st Exam = 25% 2nd Exam = 25% Final Exam = 50%

Course Outline				
Week	**Hours**	**Subjects**	**Chapters in Textbook**	**Notes**
1	3	- Introduction - Importance of chemical analysis in pharmacy - Classification of analysis (Quantitative &Qualitative) and the typical quantitative method. -Calculations used in analytical chemistry (Dealing with units, prefixes, moles, density, volume and molarity.	Ch 1 and Ch 4	
2	3	-Concentration units (normality, molality, w/w %, w/v%, v/v%) - Concentration units(ppm ,ppb) and conversion between units - Stoichiometric calculations	Ch 4	
3	3	-Statistical Handling of Data (mean, median, range, accuracy, precision) - Statistical Handling of Data (Relative and absolute error, standard deviation, coefficient of variation, examples)	Ch 5 and Ch 6	
4	3	Volumetric analysis (Requirements, Terms and Definitions) - Volumetric analysis (Titration, primary standard, standard solution, standardization). - Volumetric analysis (Titration curves, equivalence point, end point, titration error, type of reactions, indicators and methodologies.)	Ch 13	
5	3	-Neutralization titrations ; Acids and Bases definitions and types. - pH Calculation, Ka, Kb, Kw relationship. - Neutralization titrations: Titration curves for strong acids and strong bases.	Ch 9 and Ch 14	
6	3	- Titration curves for strong acids and strong bases, problems. - Titration curves for strong acids and strong bases, problems, indicators and applications - Buffer solution: definition, buffer capacity, Henderson – Hasselbalch equation. Strong-Weak Neutralization Titration curves - Problems, indicators and applications	Ch 9 and Ch 14	
7	3	**First Exam** - Problems, indicators and applicationsNon-aqueous acid – base titration: requirements, properties of solvents. Types of solvents, titrants, indicators and Applications.	Ch 9 and Ch 14	
8	3	- Precipitation Reaction, Solubility and Ksp. - Precipitation titrations; requirements and argentimetric titration curves. - Problems	Ch 13	
9	3	- Volhard's method, Fajan's method and Mohr's method.	Ch 13	

		- Volhard's method, Fajan's method and Mohr's method, problems.		
10	3	-Complexometric titrations:The concept of complexation reaction and stability constant. Ligands definition and characterization, examples. - EDTA as a ligand. - Titration curves; problems.	Ch 17	
11	3	-Titration curves; problems and indicators. - Titration methodologies, Masking agents and selectivity of EDTA	Ch 17	
12	3	**Second Exam** - Oxidation Reduction titrations (Oxidation- reduction half cell reactions, calculating oxidation number, balancing redox reactions) -Electrochemical cells: Galvanic, electrolytic, reversible and irreversible cells, schematic representation of cells..	Ch 18	
13	3	-Standard Electrode potential and cell potential - Nernst equation. - Applications: pH-determination, concentration cells and determination of equilibrium constant	Ch 18and 20	
14	3	-Some common reducing agents. - Some common oxidizing agents. - Oxidation reduction titration problems	Ch 18 and Ch 20	
15	3	- Gravimetric Analysis (Properties of precipitates and precipitating agents).Gravimetric Analysis (Application of gravimetric methods). - Workshop. **- Final Exam**	Ch 12	

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

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