



Philadelphia University
Faculty of Pharmacy
Department of Pharmaceutical Sciences
Second Semester, 2017/2018

Course Syllabus	
Course Title: Analytical Chemistry	Course code: 0510113
Course Level: 2nd year	Course prerequisite: 0221101
Lecture Time Location	Credit hours: 2 credits
1. Monday/Wednesday 8:15-9:15 9310	Contact hours: 2 hours
3. Sunday/Tuesday 11:00-12:00 9422	
4. Monday/Wednesday 12:45-1:45 9310	

Academic Staff Specifics				
Name	Rank	Office Number and Location	Office Hours	E-mail Address
Dr. Ahmad Najjar	Assistant Professor	203 Faculty of Nursing building	S,T 10-11 & 12-1 M,W 9-11	a.najjar@philadelphia.edu.jo

Course description

This course is devoted to the exploration of principles of qualitative and quantitative analysis, methods expressing of the concentrations, principles of volumetric analysis, acid-base equilibria in aqueous solutions, acid-base titration and their applications in both solutions. The precipitation equilibria, Reduction–oxidation equilibria, and applications, also gravimetric methods.

Course objectives

- Demonstrate the importance of substance determination and explain the difference between qualitative and quantitative analysis;
- Provide students with a strong theoretical and practical grounding in the principles and practices of analytical chemistry, including different types of titrations and their applications and the fundamentals of gravimetric analysis.
- Illustrate the appropriate steps of the analytical process from sampling to results presentation for different kinds of matrices

Course components

- **Books (title , author (s), publisher, year of publication)**
 1. Analytical Chemistry by Gary D. Christian, 7th edition (2014), John Wiley and Sons.
ISBN : 9781118805169
 2. Fundamentals of Analytical Chemistry by Skoog, West, Holler, and Crouch, 9th edition (2013), Brooks/Cole, ISBN; 9780495558286
- **Support material (s) (vcs, acs, etc). N.A.**
- **Study guide (s) (if applicable) N.A.**
- **Homework and laboratory guide (s) if (applicable).**
Handouts containing problems to solve related to each topic will be provided to the students.

Teaching methods:

Lectures, discussions and problem solving.

Learning outcomes:

- Knowledge and understanding

At the end of this module, student will be able to:

- Have a background in those chemical principles that are of particular importance to analytical chemistry.
 - Be subjected to traditional techniques of analytical chemistry including different types of titration processes and precipitation process
 - Acquire confidence in his/her ability to obtain high quality analytical data and to understand difference between accuracy and precision
- Cognitive skills (thinking and analysis).
 - Distinguish between various traditional analytical methods and suitability of applying
 - Learn the basis of different errors sources and how to overcome them by a successful titration process
 - Recognize the properties of primary standard substances and standard solutions preparation and dilutions
 - Understand how indicators are working in different titration processes in addition to different reactions conditions for each type of titration
 - Understand all steps which must be done during gravimetric analysis and how to overcome all contamination types in different matrices.
 - Communication skills (personal and academic).
 - Develop the ability to think and work in a team and also in individual manner.
 - Ability to perform the mathematical calculations and statistical data presentation
 - Develop skills related to use computers, spreadsheet applications and internet for calculations, report and homework writing and for literature research.
 - Practical and subject specific skills (transferable skills).
N.A.

Assessment instruments

- Quizzes.
- Major and final exams
- Home works

Allocation of Marks	
Assessment Instruments	Mark
First examination	20
Second examination	20
Final examination	40
Quizzes	20
Total	100

Documentation and academic honesty

- Documentation style (with illustrative examples)
- Protection by copyright
- Avoiding plagiarism.

Course/module academic calendar

No. of Lectures	Chapter No. : main topics	Basic and support material to be covered
1	Chapter 1 Analytical chemistry	Course introduction; Analytical science, qualitative and quantitative analysis. The analytical process.
5	Chapter 5 Stoichiometric calculations	Review the fundamental concepts of mass, moles, and equivalents. Methods of expressing the concentrations: molarity, normality, percent ppt. ppm, ppb. Principle of volumetric analysis and volumetric calculations.
3	Chapter 6 General concept of general equilibrium	Review the equilibrium concept and the equilibrium constants and describe general approaches for calculations using equilibrium constants. And discuss the activity of ionic species along with calculation of activity coefficients
First examination		
5	Chapter 7 Acid – base equilibria	Acid-base Equilibria in aqueous solution and pX concept (X; H ⁺ , OH ⁻). pH calculations, buffer solutions and physiological buffer
4	Chapter 8 Acid –base titrations	Neutralization reactions; Titration of strong acids and strong bases, titration curves for weak acids, titration curves for weak bases, mixtures of strong and weak acids or bases, factors affecting and theory of indicators
Second examination		
4	Chapter 10 Gravimetric analysis and precipitation equilibria	Steps required in gravimetric analysis. Gravimetric factor and gravimetric calculations. Examples of gravimetric analysis, Precipitation equilibria, factors affecting the solubility of the precipitate. Applications involving calculations of sparingly soluble salts.
2	Chapter 11 Precipitation reactions and titrations	Precipitation Titrations, titration curves, detection of the end point, indicators.
3	Chapter 14 Redox and potentiometric titrations	Balance the reduction–oxidation reaction. Calculating redox titration. Visual detection of the end point. Titrations with reducing and oxidizing agents. Titrations involving iodine: Iodimetry and Iodometry.
Final examination		

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Module references**Books**

- Analytical Chemistry, an Introduction. Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R. (1990). Saunders Golden Sunburst Series.
- Quantitative analysis. Day, R. A., & Underwood, A. L. (1991). Prentice Hall.
- Quantitative analytical chemistry. Fritz, J. S., & Schenk, G. H. (1987).
- Analytical chemistry: principles. Kennedy, J. H. (1990). Saunders College Pub.

Journals

NA

Websites

<http://www.philadelphia.edu.jo/pharmacy/resources.html>