

**School of pharmacy**

**Department Medicinal Chemistry**

**Course title: Analytical Chemistry**

**Credit (Theory): 2**

**Prerequisite: General Chemistry**

**Course lecturers: Dr. Asadi**

**Responsible lecturer: Dr. Asadi**

- 1- Seminars and projects: **20% of whole mark**
- 2- Comprehensive Written Examination: **80% of whole mark**

## Course Description:

### Course objectives:

Explain the fundamentals of analytical chemistry and steps of a characteristic analysis. expresses the role of analytical chemistry in science. compare qualitative and quantitative analyses. expresses the quantitative analysis methods.

### Student Learning Objectives:

- 1- explain the fundamentals of analytical chemistry and steps of a characteristic analysis.
- 2- expresses the role of analytical chemistry in science.
- 3- compare qualitative and quantitative analyses.
- 4- expresses the quantitative analysis methods.
- 5- expresses the qualitative analysis methods.
- 6- evaluate the analytical data in terms of statistics.
- 7- estimates kinds of errors in chemical analysis.
- 8- evaluates the effects of systematic errors on analytical results.
- 9- compare of the experimental mean with a true value and two experimental means.
- 10- determine the detection limits.
- 11- interpret the statistical tests.
- 12- interpreted the sources of random errors and effects of random errors on analytical results.
- 13- explain the sources of random errors.
- 14- specifies the standard deviation of calculated results.
- 15- expresses the significant figures and rounding of data.
- 16- define the general properties of volumetry
- 17- employ the volumetric calculations.
- 18- identify quality of experimental measurements.
- 19- explain the confidence level and confidence limit.
- 20- identifies the detection limit.
- 21- interprets statistical tests.
- 22- describe the salts and the buffer solutions
- 23- define the different gravimetric methods.
- 24- defines the properties of precipitate and precipitating reagent.
- 25- uses the gravimetric calculations.
- 26- interpret the complexometric titrations.
- 27- interpret the redox titrations.
- 28- express the titrimetric analysis methods.
- 29- expresses the terms such as standard solution, titration, back titration, equivalence point, end point, primary and secondary standard.
- 30- solves volumetric calculations.
- 31- defines the gravimetric titrimetry.
- 32- interpret aqueous solution chemistry.
- 33- expresses the terms such as electrolyte, acid, base, conjugate acid/base and autopyrolysis.
- 34- explains the chemical equilibrium and equilibrium constant types.
- 35- describes the activity coefficient and properties of activity coefficient.
- 36- apply the equilibrium calculations to complex systems.
- 37- determines systematic method for solving the multiple-equilibrium problems.
- 38- identifies the solubility by the systematic method.

39- solves the problems related to ion separation by control of the concentration of the precipitating reagents.

	Subject	Lecturer	Presentation Method	Date	Time
1	Analytical Objectives, or: What Analytical Chemists Do	Dr. Asadi	Attendance class or online	Tus. 05Feb. (17 Bahman)	8-10
2	Basic Tools and Operations of Analytical Chemistry	Dr. Asadi	Attendance class or online	Tus. 12Feb. (24 Bahman)	8-10
3	Statistics and Data Handling in Analytical Chemistry	Dr. Asadi	Attendance class or online	Tus. 20 Feb. (1 ESF)	8-10
4	Good Laboratory Practice: Quality Assurance and Method Validation	Dr. Asadi	Attendance class or online	Tus. 27 Feb. (8 Esf)	8-10
5	Stoichiometric Calculations: The Workhorse of the Analyst	Dr. Asadi	Attendance class or online	Tus. 05 Mar. (15 Esf)	8-10
6	Stoichiometric Calculations: The Workhorse of the Analyst	Dr. Asadi	Attendance class or online	Tus. 12 Mar. (22 Esf)	8-10
7	Stoichiometric Calculations: The Workhorse of the Analyst	Dr. Asadi	Attendance class or online	Tus. 02 Apr. (14 Far)	8-10
8	General Concepts of Chemical Equilibrium	Dr. Asadi	Attendance class or online	Tus. 09 Apr. (21 Far)	8-10
9	Acid-base Equilibria	Dr. Asadi	Attendance class or online	Tus. 16 Apr. (28 Far)	8-10
10	Acid-base titrations (2)	Dr. Asadi	Attendance class or online	Tus. 23 Apr. (4 Ord)	8-10
11	Acid-base titrations (2)	Dr. Asadi	Attendance class or online	Tus. 30 Apr. (11 Ord)	8-10
12	Complexometric Reactions and Titrations (1)	Dr. Asadi	Attendance class or online	Tus. 07 May. (18 Ord)	8-10
13	Complexometric Reactions and Titrations (2)	Dr. Asadi	Attendance class or online	Tur. 14 May. (25 Ord)	8-10
14	Gravimetric Analysis and Precipitation Equilibria	Dr. Asadi	Attendance class or online	Tus. 21 May. (01 khor)	8-10
15	Precipitation Reactions and Titrations	Dr. Asadi	Attendance class or online	Tus. 28 May. (08 khor)	8-10
16	Application in classical analytical methods in pharmaceuticals and synthesis	Dr. Asadi	Attendance class or online	Tus. 11 June. (22 Khor)	8-10

### The contribution of the grade of the professors of the course

Professors	Exercise	Mid-term Exam	Theoretical Final Exam	Sum
Dr Asadi	4	-	16	20

**References:**

**1- Basics of Analytical Chemistry – Skoog, 9th edition,**

**2- Basics of Analytical Chemistry, 7th Edition, Gary D. Christian,**

**3- Laboratory Techniques in Electroanalytical Chemistry, 2nd Edition,  
Marvin.D**