

School of pharmacy

Department Medicinal Chemistry

Course title: Analytical Chemistry

Credit (Theory): 2

Prerequisite: General Chemistry

Course lecturers: Dr. Asadi, Dr. Mahboubi, Dr. Ahmadi

Responsible lecturer: Dr. Azizian

- 1- Seminars and projects: *20% of whole mark*
- 2- Mid-term Exam: *40% of whole mark*
- 3- Comprehensive Written Examination: *40% 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	<i>Dr. Mahboubi</i>	Attendance class or online	Tus. 14 Feb. (25 Bahman)	8-10
2	Basic Tools and Operations of Analytical Chemistry	<i>Dr. Mahboubi</i>	Attendance class or online	Tus. 21 Feb. (2 Esf)	8-10
3	Statistics and Data Handling in Analytical Chemistry	<i>Dr. Mahboubi</i>	Attendance class or online	Tus. 28 Feb. (9 Esf)	8-10
4	Good Laboratory Practice: Quality Assurance and Method Validation	<i>Dr. Mahboubi</i>	Attendance class or online	Tus. 07 Mar. (16 Esf)	8-10
5	Stoichiometric Calculations: The Workhorse of the Analyst	<i>Dr. Mahboubi</i>	Attendance class or online	Tus. 14 Mar. (23 Esf)	8-10
6	Electrochemical Cells and Electrode Potentials	<i>Dr. Ahmadi</i>	Attendance class or online	Tus. 04 Apr. (15 Far)	8-10
7	Electrochemistry in Pharmaceutical Analysis	<i>Dr. Amadi</i>	Attendance class or online	Tus. 11 Apr. (22 Far)	8-10
8	Mid-term Exam		Attendance class or online	Tus. 18 Apr. (29 Far)	8-10
9	General Concepts of Chemical Equilibrium	<i>Dr. Asadi</i>	Attendance class or online	Tus. 25 Apr. (05 Ord)	8-10
10	Acid-base Equilibria	<i>Dr. Asadi</i>	Attendance class or online	Tus. 02 May. (12 Ord)	8-10
11	Acid-base titrations (2)	<i>Dr. Asadi</i>	Attendance class or online	Tus. 09 May. (19 Ord)	8-10
12	Acid-base titrations (2)	<i>Dr. Asadi</i>	Attendance class or online	Tur. 11 May. (21 Ord)	8-10
13	Complexometric Reactions and Titrations (1)	<i>Dr. Asadi</i>	Attendance class or online	Tus. 11 May. (21 Ord)	8-10
14	Complexometric Reactions and Titrations (2)	<i>Dr. Asadi</i>	Attendance class or online	Tus. 23 May. (2 khor)	8-10
15	Gravimetric Analysis and Precipitation Equilibria	<i>Dr. Asadi</i>	Attendance class or online	Tus. 30 May. (9 Khor)	8-10
16	Precipitation Reactions and Titrations	<i>Dr. Asadi</i>	Attendance class or online	Tus. 06 June. (16 Khor)	8-10
17	Application in classical analytical methods in pharmaceuticals and synthesis	<i>Dr. Asadi</i>	Attendance class or online	Tus. 13 June. (23 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	2	-	8	10
Dr Ahmadi	0.6	2		2.6
Dr Mahboubi	1.4	6	-	7.4

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