



497 Chem

**Instrumental Chemical Analysis  
Training**



# Course Description

Chemical instrumentation is increasingly important in providing so much of the data necessary for industry, health science, environment protection, food production and basic research to mention just a few areas. Instrumentation fills only part of the need, as the challenges presented often require highly developed skills and judgement of chemists using these in order for the best results to be obtained. This course develops knowledge, experience and skills related to a variety of mainstream instrumental techniques in areas of spectroscopy, separation science and electrochemistry, and builds on the foundations provided in CHEM 250, CHEM 351 & CHEM 352.



# References

- Ibrahim Al-Zamil, "Analytical Chemistry, Instrumental Analysis" 5th Ed., Al- Khrigi Publisher, 2015.
- G.D. Christian, P.K. Dasgupta, K.A. Schug, "Analytical Chemistry", 7th Ed., John Wiley & Sons, 2013.
- D.A. Skoog, F.J. Holler, S.R. Crouch, "Principles of Instrumental Analysis", 6thEd., Brooks Cole, 2006.
- Adel Mujawwah, Turki Alkhulaiwi "Experiments in Analytical Chemistry" 1stEd., KSU Publisher 2010.
- Sawyer, Heineman, Beebe, "Chemistry Experiments for Instrumental Methods" 1st Ed., John Wiley & Sons, LTD. 1984.
- Francis Rouessac & Annick Rouessac, "Chemical Analysis, Modern Instrumental Methods and Techniques". 3rd Ed., John Wiley & Sons, LTD. 1998.

# Course Content


No	List of Topics	Contact Hours
1.	Glass Electrode (pH Meter as an example)	4
2.	Potentiometry	4
3.	Ultra Violet Spectroscopy (UV)	4
4.	Visible Spectroscopy	4
5.	Flame Atomic Absorption/Emission Spectroscopy (FAAS & FAES)	4
6.	Inductively Coupled Plasma – Optical Emission Spectroscopy (ICP-OES)	4
7.	Inductively Coupled Plasma - Mass Spectroscopy (ICP-MS)	4
8.	Reactive Ion Etching (RIE) -Theoretically and Virtually Only-	4
9.	Fourier Transform Infra-Red (FTIR & IR)	4
10	Gas Chromatography (GC/GLC)	4
11	High Performance Liquid Chromatography (HPLC)	4
12	Ion Exchange Chromatography (IC)	4
13	Nuclear Magnetic Resonance (NMR)	4
14	Water Deionizer & Hydraulic Pellet Press (As supporting instruments)	4
<b>Total</b>		<b>56</b>



# Course Learning Outcomes



- Recognize principles and concepts for specific various chemical analysis techniques and instruments and their relevant applications.
- Define all units of concentrations of analytes in various sample matrices.
- Explain the meaning of, and how, to estimate the bias, precision, accuracy and detection limits of an analytical method.
- Suggest and implement suitable methods of sampling and analysis.
- Ability to set, prepare, calibrate these instruments and techniques.
- Capability to read the results and analyze them beside the explain them and conclude them meanings.



No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	Weekly	5%
2.	Handling in laboratory and written reports	Continuous	35%
3.	Attendance	Weekly	10%
4.	Attitude and Cooperation	Continuous	10%
5.	Midterm Theoretical Exam	7 <sup>th</sup> week	10%
6.	Midterm Practical Exam	7 <sup>th</sup> week	10%
7.	Final Theoretical Exam	15 <sup>th</sup> week	10%