

Subject Description Form

Subject Code	ABCT3741
Subject Title	Analytical Chemistry II
Credit Value	3
Level	3
Pre-requisite	Analytical Chemistry I
Objectives	This is an introductory course on instrumental methods of chemical analysis. Selected analytical techniques which are commonly used in the chemical laboratory will be introduced to students.
Intended Learning Outcomes	<p>Upon completion of this subject, students will be able to:</p> <ol style="list-style-type: none"> demonstrate a good understanding on the basic concepts, principles and instrumentations of general techniques for chemical analysis, including atomic absorption and emission spectroscopy, molecular luminescence spectroscopy, gas chromatography, high-performance liquid chromatography, and relevant sample preparation; recognize the advantages and limitations of each analytical technique; apply the knowledge gained to solve common and practical problems in chemical analysis.
Subject Synopsis/ Indicative Syllabus	<p><u>Overview of Chemical Analysis</u> Test methods and validation; performance characteristics; quantitative methods; quality management and laboratory accreditation.</p> <p><u>Atomic Absorption and Emission Spectroscopy</u> Basic concepts; comparison with molecular spectroscopy; components of atomic absorption/emission spectrometers; the flame and graphite furnace atomizers; the inductively-coupled plasma excitation source; interference effects; applications.</p> <p><u>Molecular Luminescence Spectroscopy</u> Fluorescence and phosphorescence: basic principles, instrumentations and applications.</p> <p><u>Chromatographic Techniques</u> Fundamentals of chromatography: the chromatographic process; general description of chromatography; column efficiency and resolution; the general chromatographic theory.</p> <p>Gas Chromatography: basic instrumentation; types of columns; choice of stationary phases; properties of thermal conductivity, flame ionization and electron capture detectors; temperature-programming, qualitative and</p>

	<p>quantitative analytical methodology.</p> <p>High-Performance Liquid Chromatography: development of liquid chromatography; instrumentation; adsorption chromatography; partition chromatography; ion exchange chromatography; size exclusion chromatography; other chromatographic techniques.</p> <p><u>Sample Preparation Techniques</u> Solid-liquid extraction, batch extraction, continuous extraction, selection of solvents; liquid-liquid extraction, acid-base extraction; gel permeation chromatographic cleanup, solid phase extraction cleanup.</p>																																												
Teaching/Learning Methodology	<p>Lecture: basic principles and instrumentations will be introduced and discussed. Examples will be used to illustrate the applications of various techniques.</p> <p>Tutorials: a set of tutorial problems will be given to allow students to apply the knowledge acquired from the lectures. Students are encouraged to solve the problems before seeking assistance. These will help students consolidate what they have learned and develop a deeper understanding of the subject.</p>																																												
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th></tr> <tr> <th>a</th><th>b</th><th>c</th><th></th><th></th><th></th></tr> </thead> <tbody> <tr> <td>1. Exam</td><td>40</td><td>√</td><td>√</td><td>√</td><td></td><td></td><td></td></tr> <tr> <td>2. Test</td><td>60</td><td>√</td><td>√</td><td>√</td><td></td><td></td><td></td></tr> <tr> <td>Total</td><td>100 %</td><td colspan="6"></td></tr> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Test and examination are used to evaluate how much students have learned in principles and applications of various techniques.</p>							Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b	c				1. Exam	40	√	√	√				2. Test	60	√	√	√				Total	100 %						
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1. Exam	40	√	√	√																																									
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Student Study Effort Required	Class contact:																																												
	▪ Lecture					26 Hrs.																																							
	▪ Tutorial					13 Hrs.																																							
	Other student study effort:																																												
	▪ Self study					72 Hrs.																																							

	Total student study effort	111 Hrs.
Reading List and References	<u>Essential:</u> Principles of Instrumental Analysis (7 th ed.) Skoog, D. A.; Holler, F. J. and Crouch, S. R Cengage Learning, 2017. <u>Supplementary:</u> Introduction to Instrumental Analysis Braun R. D. BSP Books, 2019.	