

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	Upon completion of this subject, students will be able to: a. demonstrate a good understanding on the working principles and applications of atomic emission and absorption spectrophotometry, gas chromatography and high-performance liquid chromatography; b. recognize the advantages and limitations of each analytical technique; c. demonstrate practical proficiency in a chemical testing laboratory; d. apply the knowledge gained to solve common and practical problems in chemical analysis.
Subject Synopsis/ Indicative Syllabus	<p><u>Molecular Emission and Absorption Spectroscopy</u> Fluorescence spectrophotometry: instrumentation and applications</p> <p><u>Atomic Emission and Absorption Spectroscopy</u> Atomic Emission and Absorption Spectrophotometry: review of Beer's Law of light absorption; components of an atomic absorption/emission spectrophotometer; the flame and graphite furnace atomizer; the inductively-coupled plasma excitation source; interference effects; applications.</p> <p><u>Chromatographic Techniques</u> Fundamentals of chromatography: the chromatographic process; capacity factor and retention times, column efficiency and resolution, and 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 quantitative analytical methodology.</p> <p>High-Performance Liquid Chromatography: basic instrumentation; silica gel, bonded phase normal and reverse-phase packings; UV, fluorescence and MS detectors. Ion-exchange and ion chromatography, and its</p>

	<p>applications.</p> <p><u>Testing and Certification</u> Test methods and validation; quality management and laboratory accreditation; measurement uncertainty and interpretation of test results; statistical testing comparability and traceability of test results and chemical metrology; principles of product certification.</p> <p><u>Sample Preparation and Cleanup Techniques</u> Sampling and test portion; principles of extraction and cleanup, recovery consideration; liquid-liquid extraction, solid phase extraction and cleanup, gel permeation chromatographic cleanup, dispersive solid phase extraction.</p>																																												
Teaching/Learning Methodology	<p>Lecture: basic principles 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 lecture. 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" data-bbox="477 1010 1414 1419"> <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>d</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	d			1. Exam	40	√	√	√	√			2. Test	60	√	√	√	√			Total	100 %						
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Student Study Effort Required	Class contact:																																												
	▪ Lecture				26 Hrs.																																								
	▪ Tutorial				13 Hrs.																																								
	Other student study effort:																																												

	<ul style="list-style-type: none"> ▪ Self study 	72 Hrs.
	Total student study effort	111 Hrs.
Reading List and References	<p><u>Essential:</u></p> <p>Principles of Instrumental Analysis (6th ed.) Skoog, D. A.; Holler, F. J. and Nieman, T. A. Brooks/Cole, 2007.</p> <p><u>Supplementary:</u></p> <p>Introduction to Instrumental Analysis Braun R. D. Pharma Book Syndicate, 2006.</p> <p>Contemporary Instrumental Analysis Rubinson K. A. and Rubinson J. F. Prentic Hall 2000</p>	