

Subject Description Form

Subject Code	ABCT3709
Subject Title	ANALYTICAL CHEMISTRY II LABORATORY
Credit Value	2
Level	3
Pre-requisite	Chemistry Laboratory I
Co-requisite	Analytical Chemistry II
Objectives	This subject provides students with practical and operational experience on common instrumental methods of chemical analysis. The principles and techniques taught in Analytical Chemistry II provide the theoretical basis of this laboratory module.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. explain the operation principles of atomic absorption spectrophotometers, gas chromatographs and high-performance liquid chromatographs; b. operate the instruments mentioned in (a) in laboratory practicals; c. gain the ability to optimize instrumental parameters for analysis of real-life samples; d. recognize the operational advantages and limitations of each type of instruments commonly used in the chemical laboratory.
Subject Synopsis/ Indicative Syllabus	Determination of nickel in brass by flame atomic absorption spectrophotometry. Graphite furnace atomic absorption – determination of trace amounts of aluminium in beverages packed in a two-layered aluminium can. Fluorometric determination of riboflavin (vitamin B2) in Vitasoy. Analysis of phosphate by ion-exchange and potentiometric titrations. Qualitative analysis by gas chromatography: determination of aromatic hydrocarbons using a thermal conductivity detector. Quantitative analysis by gas chromatography: trace aromatics in industrial grade aliphatic hydrocarbon solvents. High-performance liquid chromatography of plastic plasticizers using a silica-gel adsorption column. C8 reverse-phase ion-pair HPLC separation of food dyes.

Teaching/Learning Methodology	Laboratory manuals will be provided to students and the manual will contain descriptions on the basics and background of the experiment. Stepwise instructions will guide the student through the experiment. Teaching staff will demonstrate the operation of more complicated instruments. Students will be questioned on the meaning of certain procedural steps in carrying out the experiments. Students have to hand in written reports and give answers to specific questions raised in the laboratory manual. Report writing is intended to develop the students' ability in technical and scientific writing.																																																				
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1" data-bbox="517 495 1461 936"> <thead> <tr> <th data-bbox="517 495 823 696" rowspan="2">Specific assessment methods/tasks</th> <th data-bbox="823 495 979 696" rowspan="2">% weighting</th> <th colspan="6" data-bbox="979 495 1461 629">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th data-bbox="979 629 1062 696">a</th> <th data-bbox="1062 629 1145 696">b</th> <th data-bbox="1145 629 1228 696">c</th> <th data-bbox="1228 629 1311 696">d</th> <th data-bbox="1311 629 1394 696"></th> <th data-bbox="1394 629 1461 696"></th> </tr> </thead> <tbody> <tr> <td data-bbox="517 696 823 797">1. Lab performance and reports</td> <td data-bbox="823 696 979 797">70</td> <td data-bbox="979 696 1062 797">√</td> <td data-bbox="1062 696 1145 797">√</td> <td data-bbox="1145 696 1228 797">√</td> <td data-bbox="1228 696 1311 797">√</td> <td data-bbox="1311 696 1394 797"></td> <td data-bbox="1394 696 1461 797"></td> </tr> <tr> <td data-bbox="517 797 823 864">2. Test</td> <td data-bbox="823 797 979 864">30</td> <td data-bbox="979 797 1062 864">√</td> <td data-bbox="1062 797 1145 864">√</td> <td data-bbox="1145 797 1228 864">√</td> <td data-bbox="1228 797 1311 864">√</td> <td data-bbox="1311 797 1394 864"></td> <td data-bbox="1394 797 1461 864"></td> </tr> <tr> <td data-bbox="517 864 823 936">Total</td> <td data-bbox="823 864 979 936">100 %</td> <td colspan="6" data-bbox="979 864 1461 936"></td> </tr> </tbody> </table> <p data-bbox="517 981 1461 1227">Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Students will be assessed by their written report and performance during the practical sessions, which will be carefully monitored by teaching staff. Written test will also be given to assess the students' understanding of the operation principles of the instruments and the merits/limitations of the different analytical methodologies.</p>								Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b	c	d			1. Lab performance and reports	70	√	√	√	√			2. Test	30	√	√	√	√			Total	100 %													
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Reading List and References	<p data-bbox="517 1630 1461 1798">Essential: Skoog D A, Holler F J and Nieman T A Principles of Instrumental Analysis Saunders College Publishing, 7th edition, 2018</p> <p data-bbox="517 1832 1461 1933">Sawyer D T, Heineman W R and Beebe J M Chemistry Experiments for Instrumental Methods John Wiley & Sons, 1984</p> <p data-bbox="517 2000 1461 2060">Supplementary:</p>																																																				

	<p>Larry G Hargis Analytical Chemistry: Principles and Techniques Prentice-Hall 1988</p>
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	<p>Rubinson K A and Rubinson J F Contemporary Instrumental Analysis Prentice Hall 2000</p>
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