

Module Title:	Analytical Chromatographic Techniques for Brewing and Distilling
Language of Instruction:	English
Credits:	5
NFQ Level:	6
Module Delivered In	1 programme(s)
Teaching & Learning Strategies:	This module will be taught in two theory classes of one hour duration for 12 weeks plus one 3 hour practical per week for 12 weeks. Lectures will be linked to practical classes and the practical component will allow students to develop the required technical competencies, attitudes and behaviours and promote timely submission of reports written in the standard format
Module Aim:	The aim of this module is to develop knowledge of basic analytical principles together with practical applications in the brewing and distilling industry
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Explain and demonstrate a range of analytical techniques for HPLC High performance liquid chromatography Gas Chromatography and Ion Chromatography
LO2	Discuss and describe the theoretical background on which these chromatographic techniques are based
LO3	Operate analytical techniques relevant to the brewing and distilling industry
Pre-requisite learning	
Module Recommendations	
<i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
Incompatible Modules	
<i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements	
<i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
No requirements listed	

Module Content & Assessment

Indicative Content

Analytical Techniques and Procedures

General approach to analytical procedures. Steps in analytical analysis. Representative sampling, sample preparation, analysis and interpretation of results. Systematic error and random error. Precision and accuracy. Measurement uncertainty.

Spectroscopic Methods

Properties of light. Electromagnetic spectrum. Absorption of light. Beers Law. Absorption Spectra and colour. Spectrometer - good operating techniques. Applications of Beers' Law. Principles of atomic absorption and flame emission spectroscopy, sample treatment, use of standards. Interferences standard addition methods applications. Infra-red spectroscopy sample preparation care and maintenance of cells. Identification of compounds using correlation charts

Separation and Chromatographic Techniques

Separation and Chromatographic Techniques: Principles of absorption, partition, ion exchange, molecular and affinity chromatography. Chromatogram description. Theoretical plates. Resolution selectivity. Gas liquid chromatography. High performance liquid chromatography. Methods of separation. Mobile and stationary phases. Columns detectors solvents. Sample preparation. Qualitative and quantitative measurements. Internal standards. Ion chromatography. Solvent extraction

The Brewing and Distilling industry

Introduction to analytical techniques in brewing and distilling. Basic calculations.

Practical

Practicals will develop skills in the use of analytical equipment and techniques from , HPLC, GC, and UV-Vis and ion chromatography. The practicals covered will reinforce and amplify the material covered in the lecture course. The use of updated software, e.g. EMPOWER for HPLC and PROBE for UV-Vis will be used also.

Assessment Breakdown	%
Continuous Assessment	10.00%
Practical	40.00%
End of Module Formal Examination	50.00%

Special Regulation

Students must achieve a minimum grade (35%) in both the practical/CA and final examination.

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	Written assessment	1,2	5.00	n/a
Examination	Written assessment	2	5.00	n/a

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Practical log book	1,3	40.00	n/a

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Written examination	1,2,3	50.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	12 Weeks per Stage	2.00
Laboratory	12 Weeks per Stage	3.00
Independent Learning	15 Weeks per Stage	4.33
Total Hours		125.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_SABRE_B	Bachelor of Science (Honours) in Brewing and Distilling	4	Mandatory