ZPHA C2101: Analytical Techniques Pharmaceutical Science

Module Title:	Analytical Techniques Pharmaceutical Science
Language of Instruction:	English

Credits:	10

NFQ Level:	6

Module Delivered In	3 programme(s)

Teaching & Learning Strategies:	This module will be taught in four theory classes of 1 hour duration per week plus 16 x 3 hour labs delivered on a rota. 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 good record keeping and timely submission of reports.

Module Aim:	The aim of this module is to impart knowledge of basic analytical principles together with practical applications in pharmaceutical and related industries

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Explain and demonstrate a range of analytical techniques and discussthe theoretical background on which they are based.
LO2	Operate analytical techniques used in the analysis of pharmaceuticals.
LO3	Comprehend and apply quality control measures in pharmaceutical analysis.
LO4	Carry out pharmaceutical assays and chromatographic separations of drugs.
LO5	Identify certain categories of drugs.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
Successful completion of year 1 or equivalent

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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.
Titrimetric Methods: Review of concentration calculations, ppm, w/w,w/v dilutions of solutions. Principles of titrations
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. Identification of compounds using correlation charts
Separation and Chromatographic Techniques Separation and Chromatographic Techniques: Principles of adsorption, 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 places. Columns detectors solvents. Sample preparation. Qualitative and quantitative measurements. Use in the analysis of drugs. Internal standards. Ion chromatography. Solvent extraction
The Pharmaceutical industry Introduction to pharmaceutical industry. Primary and secondary manufacture. Basic calculations in pharmaceutical analysis. Licensing of drugs and the pharmacopoeia. European Pharmacoipoeia, BP and USP monographs of pure drugs and formulations including assays, storage and identification.
Pharmaceutical Chemistry Selected categories of pharmaceuticals: vitamins, analgesics, general and local anaesthetics, sulphonamides antibiotics, antacids and acid-inhibitors, barbiturates.
Analytical Techniques Analytical methods used in drug analysis – UV/Vis, AAS, AES, Titrimetric, IR, GC and HPLC methods. E(1%,1cm). Dissolution testing.
Chemistry of acids and bases Ionisation of drugs. pKa values of drugs. Partition coefficients relating to drug absorption.
Extraction Methods in Pharmaceutical analysis Excipients in formulations. Solvent and solid phase extraction methods
Control of the quality of analytical methods Control of errors in analysis. Repeatability and reproducibility. Validation of drug analysis to include assay, precision specificity, LOD, LOQ, linearity, ruggedness and robustness.
Practical Practicals will develop skills in the use of analytical equipment and techniques from AAS, AES, FTIR, 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 will be implemented.

Assessment Breakdown	%
Continuous Assessment	60.00%
Practical	40.00%

Special Regulation
Students must achieve a minimum grade (35%) in both the practical and CA

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Examination	written assessment examination	1,5	20.00	n/a
Examination	written assessment examination.	1,5	20.00	n/a
Examination	written assessment examination	1,5	20.00	n/a

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Laboratory worksheets and reports Practical Log Book	2,3,4	40.00	n/a

No End of Module Formal Examination

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

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	12 Weeks per Stage	4.00
Laboratory	12 Weeks per Stage	4.00
Estimated Learner Hours	15 Weeks per Stage	10.27
	Total Hours	250.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_SABTP_B	Bachelor of Science (Honours) in Biosciences with Biopharmaceuticals	4	Mandatory
CW_SABFQ_D	Bachelor of Science in Biosciences	4	Mandatory
CW_SASCI_C	Higher Certificate in Science in Applied Biology or Applied Chemistry	4	Group Elective 1