THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

Department of Chemistry

CHE 202 – Analytical Chemistry I

COURSE PARTICULARS

Course Code: CHE 202
Course Title: Analytical Chemistry I
No. of Units: 2
Course Duration: Two hours of theory and three hours of practical per week for 15 weeks.
Status: Compulsory
Course Email Address: che202@gmail.com
Course Webpage: http://www.fwt.futa.edu.ng/courseschedule.php?coursecode=CHE%20202
Prerequisite: CHE 101 & 102

COURSE INSTRUCTORS

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COURSE DESCRIPTION

This course is an introductory; it is designed primarily for Chemistry and other students from Biochemistry, Microbiology, Food Science and Technology, Marine Science and Technology, Applied Geology and Mining Engineering students. It designed to teach basically classical techniques in analytical Chemistry. It actual deals with acid-base, precipitation, redox and complexometric titration techniques as well as gravimetric method of analysis. In the course theory of errors shall be introduced to students and statistical evaluation of data shall be treated. Theoretical background of the course shall be taught and the students will conduct practicals on the sub topics as it is been taught.

COURSE OBJECTIVES

The objectives of this course are to:

- Understand Guarding principles of the classical techniques in analytical Chemistry
- Understand appropriate techniques amenable to any type of analysis
- Perform some classical methods of analysis
- Use appropriate statistical method for data obtained during analysis.

COURSE LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this course, the student will be able to:
(Knowledge based)

- Students should understand basic principles of classical methods of analysis
- Know appropriate method to analysis materials of interest

(Skills)

- Understand appropriate precaution in laboratory
- Handling simple glassware and chemicals in laboratory
- Be able to perform experiment to high level of accuracy

GRADING SYSTEM FOR THE COURSE

This course will be graded as follows:

Class Attendance	5%
Assignments	5%
Practical (s)	30%
Final Examination	60%
TOTAL	**100%**

GENERAL INSTRUCTIONS

Attendance: It is expected that every student will be in class for lectures, participate in all practical and assessment exercises. Attendance records will be kept and used to determine each person's qualification to sit for the final examination. In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with any of the instructors, indicating the reason for the absence.

Academic Integrity: Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited. You are not allowed to make copies of another person's work and submit it as your own. All cases of academic dishonesty will be reported to the University Management for appropriate sanctions in accordance with the guidelines for handling students' misconduct as spelt out in the Students' Handbook.

Assignments and Practicals: Students are expected to submit assignments and practicals as scheduled. Failure to submit such as at when due will earn you zero. Only under justifying circumstances, for which a student has notified any of the instructors in advance, will late submission of assignments be permitted.

Code of Conduct in Lecture Rooms and Laboratories: Students should turn off their cell phones during lectures put on apron during the practical period. Students are prohibited from engaging in other activities (such as texting, watching videos, *etc*.) during lectures/practical. Food and drinks are not permitted in the laboratories.

READING LIST

[1,2]Daniel C. Harris (2007). Quantitative Chemical Analysis, W.H. Freeman and Company, New York. 808p.

[1] Pradyot Patnaik. *Dean's Analytical Chemistry Handbook* McGraw-Hill Handbook Company, 1800p.

[1] R.A. Meyers (2007). (Editors) (2003) *Encyclopaedia Analytical Chemistry: Application, Theory and Instrumentation*. John Wiley & Son. 14484p.

[1] David Harvey (2000). *Modern Analytical Chemistry*. McGraw-Hill Higher Education. 816p.

[2] Laitinen, H. A.(1980) "Analytical Chemistry in a Changing World," *Anal. Chem.***,** *52,* 605A–609A.

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Legend

1- Available as Personal Collection

2- Available in the University Library

COURSE OUTLINE

Week	Topic	Remarks
1	Introduction to the Course • Introduction of simple apparatus and glass wares • Reagents for dissolution of samples. • Preparation of solutions	During this first class, the course content will be introduced. Students should be to identify various glass wares. Students should be able to prepare solutions / reagents
2 & 3	Acid-base titration • Basic acid-base reactions • Acid/base titration curves • Theory of acid/ base indicator • Selection of appropriate indicator for a reaction • Perform a typical acid/base titration such as determination of HCO_3^-, CO_3^{2-}, OH^-, hardness and total alkalinity in water sample	Students will have a basic understanding of acid-base titration. Student will be able to know appropriate indicator for any type of acid-base reaction. Student will be able to perform practical and obtain useful data
4&5	Complexometric titration • Identify role of ligands in analytical Chemistry • Structure of EDTA • Selectivity in EDTA • Metallochromic indicators • Calculation during EDTA titration • EDTA determination of metals such Mg^{2+}, Ca^{2+}, Pb^{2+}, and metal ions generally	Student will have good understanding of complexometric titration reaction as regard selectivity. Student will know appropriate indicator. Student will be able to perform and obtain useful EDTA titration
6&7	Redox titration • The role oxidation-reduction in titration • Different type of redox titration • Type indicator for redox titration • Conditions for the successful conduct of titration • Redox titration by iodometric and iodimetric method	Student will have good understanding of redox titration reaction. Student will know appropriate indicator. Student will be able to perform and obtain useful data by redox titration method
8&9	Precipitation titration • Solubility and solubility products • Criteria for using a precipitation reaction for successful/useful titration • Conditions for successful titration • Indicator for precipitation titration • Argentometric and argentimetric titration	Student will have good understanding of precipitation titration reaction. Student will know appropriate indicator. Student will be able to perform and obtain useful data by precipitation titration method

10&11	Gravimetry • Meaning of gravimetry • Procedure for gravimetric analysis • Type of gravimetry • Solubility and solubility products • Precipitation gravimetry • Conditions for successful gravimetic analysis • Source of errors and their minimisation in gravimetry • Gravimetric factor	Student will know different type of gravimetry. Student will know sources of error and be able to conduct experiment for gravimetric determination of compounds
13&14	Statistical evaluation of data • Experimental error • Propagation of error • Gaussian distribution • Confidence intervals • Comparison of means with Student's t • Comparison of Standard Deviations with the F test • Q test for bad data • Calibration curve • Quality assurance	Student will quite aware source of errors and their propagation in analytical procedure. Student will obtain data without bias
15	Revision	