CIP Code: 40.0502

METROPOLITAN STATE COLLEGE OF DENVER
Office of Academic Affairs

REGULAR COURSE SYLLABUS

SCHOOL: Letters, Arts & Sciences

DEPARTMENT: Chemistry

SEMESTER(S) OFFERED: Spring

PREFIX & COURSE NUMBER: CHE 4100

COURSE TITLE: Instrumental Analysis

CREDIT HOURS: 3 (3 + 0)

CONTACT HOURS: Lecture 45 Lab 0 Internship 0 Practicum 0

RESTRICTIONS (VARIABLE TOPICS COURSES): None

PREREQUISITE(S): CHE 3000, CHE3010, CHE3100, CHE3190 or CHE 3260

COREQUISITE(S): None

CATALOG COURSE DESCRIPTION:

This course presents the theory and practice of instrumental methods of analysis. Topics include: electronics, atomic and emission spectroscopy, UV-VIS spectroscopy, fluorescence and phosphorescence spectrophotometry, emission and absorption spectroscopy, infrared spectroscopy, Raman spectroscopy, NMR electroanalytical methods, HPLC, GC, SPE, CE and other chromatography methods.

REQUIRED READING MATERIALS (Title, Author, Publisher, Copyright Date):

Principles of Instrumental Analysis; Skoog and Leary, 4th Ed; Harcourt College Publishers, 1992.

APPROVED:		**DATE:**
Department Chair	Richard Linn	2/9/2000
Dean	James M. Conklin	2/10/00
V.P., Academic Affairs	Freida Kostu Holley	2/27/00

DISTRIBUTION: Original to Vice President for Academic Affairs
Copies retained by Dean and Department Chair

Revised 9/94: Academic Affairs-Curriculum-Regular Course Syllabus
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SPECIFIC (MEASURABLE) STUDENT BEHAVIORAL LEARNING OBJECTIVES:

Upon completion of this course the student should be able to:

1. Recognize and apply the limitations of spectrophotometric analysis.
2. Explain the theory of single-beam, double-beam and diode array UV-VIS spectrophotometers.
3. Explain in detail the theories of operation of grating and prism spectrophotometers.
4. Describe the construction and theory of specific ion-selective electrodes.
5. Explain the theory of ion-specific electrodes.
6. Explain the theory and operation of a polarograph.
7. Explain the construction and theory of operation of the NMR.
8. Interpret mass spectra.
9. Explain the theory of NMR at the molecular level.
10. Explain the construction of a mass spectrometer.
11. Operate a gas chromatograph.
12. Choose optimum conditions for a gas chromatographic separation.
13. Choose an optimum column for a gas chromatographic separation.
14 Understand HPLC, GG and SPE procedures
15. Operate an IR spectrometer.
16. Explain the principles of operation and the construction of an IR spectrometer.
17. Use the Sadtler Indices to identify a compound from its IR spectra.
18. Understand the operation of detectors for HPLC, CE and GC

OUTLINE OF COURSE CONTENT (Major Topics and Subtopics):

I. Electronics
   a. amplifiers
   b. digital electronics
   c. signals and noise
II. Instruments for Optical Spectroscopy
   a. ultraviolet/visible
   b. infrared
   c. fluorescence/phosphorescence
   d. atomic spectroscopy
   e. emission spectroscopy
III. Nuclear Magnetic Resonance Spectroscopy
IV. Mass Spectrometry
V. Electroanalytical Methods
   a. potentiometric
   b. coulometric
   c. voltammetry

VI. Chromatography
   a. gas
   b. high performance
   c. SPE
   D. CE

EVALUATION OF STUDENT PERFORMANCE:

Students will be given periodic fifty minute examinations. These examinations will be supplemented by short quizzes. A final exam one hundred minutes long will terminate the course. The final grade determination will be based on the students performance on the examinations, quizzes, final exam, and the instructors evaluation.