CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

NEW COURSE PROPOSAL

PROGRAM: MULTIPLE PROGRAMS/ CHEMISTRY

1. **Catalog Description of the Course.** *[Include the course prefix, number, full title, and units. Provide a course narrative including prerequisites and corequisites. If any of the following apply, include in the description: Repeatability (May be repeated to a maximum of ___ units); time distribution (Lecture ___ hours, laboratory ___ hours); non-traditional grading system (Graded CR/NC, ABC/NC). Follow accepted catalog format.]*

   CHEM 450. INSTRUMENTAL ANALYSIS AND LABORATORY (4)
   Three hours lecture and three hours laboratory per week.
   Prerequisite: CHEM 250, CHEM 251, CHEM 305 (or concurrent enrollment or consent of instructor), and CHEM 315 with a grade of C or better
   This course is designed to introduce chemical analysis using instrumental methods. Areas covered will include atomic and molecular spectroscopy, chromatography, and mass spectroscopy. Lectures will focus on theory and application of these techniques to organic, inorganic, and biochemical analysis. Experimental design, materials used in scientific apparatus, vacuum science and electronic circuits will also be examined. Lab fee required.

2. **Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment
Lecture	3	1	36
Seminar			
Laboratory	1	3	18
Activity			

3. **Justification and Learning Objectives for the Course.** (Indicate whether required or elective, and whether it meets University Writing, and/or Language requirements) *[Use as much space as necessary]*

   This course is typically taken by Chemistry majors, as well as other science majors, who are interested in using instrumentation for chemical analysis in their profession or graduate studies. This course will be an upper-division elective for chemistry majors.

   Students who successfully complete this course will be able to:
   - Outline the development of the field of instrumental chemical analysis from a historical perspective including different techniques and how these techniques have contributed to the science.
   - Describe the theories governing spectroscopy, chromatography, and mass spectroscopy.
   - Demonstrate the ability to use state-of-the-art scientific instrumentation in the analysis of organic, inorganic and biochemical samples.
   - Describe how molecular shape, electronic structure, thermodynamics, kinetics, and intermolecular interactions are involved in instrumental analysis.
   - Compare advantages and disadvantages of commonly used techniques in chemical analysis.
   - Describe simple electronic circuits, vacuum technology, optics, and materials used in construction of scientific apparatus.
   - Plan their own chemistry experiments using scientific instrumentation.
   - Evaluate methodologies utilizing scientific instrumentation for reasonable limits to what data can be obtained from these techniques.
   - Interpret, discuss, and evaluate a primary literature article

4. **Is this a General Education Course** **YES** **(NO)**
   If Yes, indicate GE category:

5. Course Content in Outline Form. *[Be as brief as possible, but use as much space as necessary]*

Fundamentals of Instrumentation
Experimental Design
Materials
Vacuum Technology
Optics
Charged Particle Optics
Electrical Components and Circuits
Signals and Noise
Optical Spectroscopy
Components of an Optical Instrument
Atomic Absorption, Fluorescence, and Emission
X-Ray spectroscopy
UV/Visible Spectroscopy and fluoresce
Infrared Spectroscopy, Raman, and Fourier Transforms
Nuclear Magnetic Resonance Spectroscopy
Separation Methods
Gas Chromatography
Liquid Chromatography
Supercritical Fluid Chromatography and Extraction
Capillary and Gel Electrophoresis
Mass Spectroscopy
Sector and Electrostatic Analyzers
Quadropole Mass Spectroscopy
Other charged particle separation techniques
Surface Techniques
Electroanalytical Techniques
Potentiometry, Coulometry, and Voltametry

6. References. *[Provide 3 - 5 references on which this course is based and/or support it.]*

Moore, J.H.; Davis, C.C.; Coplan, M.A.; Greer, S. *Building Scientific Apparatus*, Addison-Wesley, 3rd Ed., 2002
Skoog, D.A.; Holler, F.J.; and Nieman, T.A. *Principles of Instrumental Analysis*, Brooks-Cole, 5th Ed., 1998
Strobel, H.A.; and Heineman, W.R. *Chemical Instrumentation*, Wiley, 3rd Ed., 1989

7. List Faculty Qualified to Teach This Course.

Dr. Simone Aloisio

8. Frequency.
a. Projected semesters to be offered: Fall __X___ Spring _____ Summer _____
Alternating with other upper-level chemistry electives on a two-year cycle.

9. New Resources Required.
None.

10. Consultation.
Attach consultation sheet from all program areas, Library, and others (if necessary)

11. If this new course will alter any degree, credential, certificate, or minor in your program, attach a program modification.

__Simone Aloisio_____12-16-03_____
Proposer of Course Date