

**OHLONE COLLEGE**  
**Ohlone Community College District**  
**OFFICIAL COURSE OUTLINE**

**I. Description of Course:**

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| <p><b>1. Department/Course:</b> <u>CHEM - 190</u></p> <p><b>2. Title:</b> <u>Scientific Research Methodology</u></p> <p><b>3. Cross Reference:</b></p> <p><b>4. Units:</b> <u>1.00</u><br/><b>Lec Hrs:</b> <u>.50</u><br/><b>Lab Hrs:</b> <u>1.50</u></p> <p><b>5. Repeatability:</b> <u>No</u></p> <p><b>6. Grade Options:</b><br/>Grade Only (GR)</p> | <p><b>7. Degree/ Applicability:</b><br/>Credit, Degree Applicable, Not Transferable (D)</p> <p><b>8. General Education:</b></p> <p><b>9. CAN Numbers:</b></p> <p><b>10. Field Trips:</b> <u>Optional</u></p> <p><b>11. Requisites:</b><br/><b>Advisory</b><br/>Major in a STEM Program MATH 188<br/><b>Prerequisite</b><br/>Consent of instructor</p> |
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**12. Catalog Description:**

This course introduces students to scientific research methods. It includes hypothesis writing, variable identification, experiment design, literature reviews, data interpretation and analysis, research proposal preparation and presentation of scientific papers.

**13. Class Schedule Description:**

Introduction to research methods -- hypothesis, experimental design, data analysis, literature review.

**14. Counselor Information:**

This course is offered to prepare students for scientific research and internships who are majoring in science, technology, engineering and mathematics (STEM) disciplines.

**II. Student Learning Outcomes**

The student will:

1. Write hypothesis
2. Identify variables (dependent and independent)
3. Design experiment with suitable controls and replicates
4. Identify a research problem
5. Conduct a literature review
6. Prepare graphs manually and with Excel
7. Statistically and graphically analyze data from experiments
8. Write a research proposal
9. Make an oral presentation and defense of a research proposal
10. Prepare a scientific abstract for presentation in a peer reviewed journal and/or conference
11. Generate documents using MS Word, PowerPoint, and Excel software

### **III. Course Outline:**

- A. Hypothesis development
  - 1. Identifying independent, dependent and extraneous variables
- B. Literature searches
  - 1. Primary, secondary, and tertiary literature
  - 2. Use of university libraries
- C. Experimental design using one independent and one dependent variable
  - 1. Identification of variables
  - 2. Protocols and procedures
- D. Data collection and analysis
  - 1. Statistical methods
  - 2. Data tables
  - 3. Graphs -- prepared manually and with Excel software
- E. Literature Citation
  - 1. Literature cited
  - 2. Bibliography
- F. The written research proposal
  - 1. Organization and format
  - 2. Using Word to write the proposal
- G. Presenting research proposals, reports and abstracts
  - 1. Oral presentations using PowerPoint
  - 2. Poster Presentations
- H. Final presentations

### **IV. Course Assignments:**

#### Reading Assignments

Textbooks and journal articles

#### Writing Assignments

short written assignments - including

hypothesis statements

literature reviews and abstracts

experimental methods

written research paper

using scientific research proposal guidelines

#### Projects, Activities, and other Assignments

Oral presentation of research proposal using PowerPoint and other methods.

### **V. Methods of Evaluation:**

- A. Term paper
- B. Research paper
- C. Defense of the Research proposal

#### **Methods of Instruction:**

Lecture

Laboratory

### **VI. Textbooks:**

Required

1. Paul D. Leedy, Timothy J. Newby, Peggy A. Ertmer *Practical Research "Planning and Design"* 6th Edition, Prentice Hall, 1996 ISBN: 0132414074 Required

1. Paul D. Leedy and Jeanne Ellis Ormrod *Planning and Designing* 8th Edition, Prentice Hall, 2004 ISBN: 0131108956

Optional

Optional

**VII. Supplies:**

1. none