COURSE DESCRIPTION
Chemistry 498 (Introduction to Research) is a required course for all chemistry majors. This is a course for qualified students to investigate problems in chemistry. It also provides guidance in the methods of chemical research, laboratory technics, and chemical analysis. Prerequisite: permission of the research advisor. Please consult the most current version of the Chemistry Student Handbook on the Chemistry Department webpage (http://bit.ly/2uakz3y) for details concerning how many credits are necessary for your degree option and ACS certification of your degree.

COURSE LEARNING OBJECTIVES
Upon completion of this course you should be able to...
1. Highiy prioritize safety, laboratory hygiene (cleanliness), green chemistry, and efficiency in the laboratory
2. Assess the dangers associated with chemicals prior to working with them
3. Search the chemical literature to find information on chemical hazards, toxicity, safe handling procedures, proper storage, molecular structure, applications, novelty, synthesis, reactions, physical properties, etc
4. Plan a research project with a focus on setting reasonable short-term and long-term research goals
5. Plan organic reactions using the chemical literature as a guide
6. Maintain a detailed laboratory notebook in the format described in the required materials for this course.
7. Set up, monitor, quench, and work-up reactions;
8. Then, isolate, purify, and analyze chemical products of organic reactions.
9. Maintain a chemically hygienic work environment with appropriate waste disposal.
10. Communicate your research purpose, goals, plans, actions, and results via poster presentations, verbal presentations, and in written formats (experimental procedures, research reports, a thesis, or a scientific paper).

REQUIRED MATERIALS:
- Laboratory safety glasses or goggles.
- Grit (http://bit.ly/2tJWTk9)
- Growth mindset (http://bit.ly/2tOzeOj)
- This laboratory notebook (http://bit.ly/2uRU7cZ)

USEFUL WEBSITES (Please click on each link to see what online resources are recommended):
Research Resources (http://bit.ly/2ueVa90)
D2L (http://bit.ly/2teYfBS)
Kennedy Lab 322 Caputo Chemical Inventory (http://bit.ly/2u9IvUU)
Millersville Chemistry (http://bit.ly/2uakz3y)
MU Student Research & Funding (http://bit.ly/2sQPpKU)
MU SGRCA Funding (http://bit.ly/2ueFti0)
Neimeyer-Hodgson Student Research Grant & Noonan Funding (http://bit.ly/2uf0bOL)
COURSE EVALUATION CHECKLIST (grade book in D2L)

- Actively attend weekly research meetings 64 points
  - Bring notebook to each meeting
  - Report weekly progress, results, ideas, and plans
  - Set weekly short-term goals and due dates

- Weekly research schedule 32 points
  - Plan your weekly research schedule (4 hours per week per credit)
  - Weekly due dates met
  - Maintain your weekly research schedule (4 hours per week per credit)

- Pick a project & set long-term goals 32 points
- Write or update research summary for department 64 points
- Set-up & maintain a detailed & legible lab notebook 32 points
  - Explore novelty, applications, and feasibility of the project
  - Literature searching (SciFinder, Request-It, journal articles, etc.)
  - Order, find, or obtain chemicals & supplies
  - Plan all experiments in notebook

- Complete at least FIVE (5) experiments per semester 160 points
  - Reactions: Set-up, quench, work-up, isolation, and purification
  - Analysis: NMR and other (TLC, MP, IR, MS, etc.) analysis

- Apply for funding (pick two per semester) 64 points
  - Noonan
  - NH
  - SGRCA
  - Other

- Poster or Oral Presentation (one per semester) Advanced Draft 64 points
  - Email PPT to Dr. K two weeks prior to presentation
  - Update presentation based on feedback

- Present to department, SCTE MU, Regional, or National 96 points

- Formal End of Semester Report, Manuscript, Thesis or Publication 320 points
  - End of semester report
  - Senior honors thesis
  - ChemSpider SyntheticPage submission after Dr. K approval
  - Manuscript advanced draft and submission after Dr. K approval

- Actively help to maintain a safe and clean laboratory (322 and 327 Caputo) 320 points

- Finals week meeting to discuss evaluation 92 points

\[ \sum = 1,500 \text{ points} \]

Grade Distribution (in percentage points)

- A 90.0 – 100
- B 80.0 – 89
- C 70.0 – 79
- D 60 – 69

Course Policies

   - a. Complete all course work in an ethical manner without plagiarizing.
   - b. BE SURE to cite all of your sources!
3. This laboratory is a Cooperative Environment. Become part of a team, a community, and a valued tradition.

Title IX Statement:
Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. The only exceptions to the faculty member’s reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. For more information on Title IX: [http://www.millersville.edu/socialeq/title-ix-sexual-misconduct/index.php](http://www.millersville.edu/socialeq/title-ix-sexual-misconduct/index.php)