

# Department of Chemistry - Yale University

## CHEM 490 Registration Form (Standard Yale College Letter Grading)

### CHEM 490 Student Responsibilities (To be completed by the Student):

A student conducting independent research in CHEM 490 must agree to the following:

- To have a basic proficiency in aspects of chemistry required for my planned activities.
- To devote at least 10hrs per week to research efforts in the laboratory of my mentor.
- To attend mandatory class meetings relating to safety, ethics, and research skills.
- To fulfill basic safety requirements, including completion of all pertinent training.

By signing below, the student affirms they have read the extended description of CHEM 490 (attached document), and will abide by all stipulations and requirements listed therein:

Student Name: \_\_\_\_\_ College/Class: \_\_\_\_\_

Student Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Phone Number (optional): \_\_\_\_\_

Emergency Contact (name/phone): \_\_\_\_\_

Faculty Research Mentor: \_\_\_\_\_

Title of Proposed Research: \_\_\_\_\_

### CHEM 490 Faculty Mentor Responsibilities (To be completed by the Faculty member):

A mentor supervising independent research in CHEM 490 must agree to the following:

- To affirm by midterm that the student is devoting at least 10hrs per week to research.
- To ensure student meets basic safety requirements before starting laboratory work.
- To administer to student any specialized training required for planned research activities.

Faculty Mentor Name: \_\_\_\_\_

Faculty Mentor Signature: \_\_\_\_\_ Date: \_\_\_\_\_

List any rooms to which the student needs key or card access to (Chemistry only): \_\_\_\_\_

Do you want a graduate student or postdoc mentor to be copied on non-grading related correspondence associated with the student's progress:  Yes  No

If yes please provide the name and e-mail address of the graduate student or postdoc.

Name: \_\_\_\_\_ Email Address: \_\_\_\_\_

### CHEM 490 Safety Certification (To be completed by the DUS of Chemistry):

*Prior to engaging in research activities* the DUS of Chemistry (in consultation with Yale's Office of Environmental Health and Safety) must affirm that the student has completed safety training. This includes completion of online courses on laboratory chemical handling and hazardous waste disposal, as well as any other specialized training deemed necessary.

DUS Name: \_\_\_\_\_

DUS Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### Chem 490 Final Approval (To be completed by the Chem 490 Instructor):

Chem 490 Instructor Name: \_\_\_\_\_

Chem 490 Instructor Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## CHEM 490: Independent Research in Chemistry

The following information affords a more detailed description of CHEM 490, enumerating the basic criteria imposed for student enrollment and the formal requirements that must be met for participants to complete the course successfully.

### **Brief Description:**

Chemistry Majors engage individual experimental and/or theoretical problems in the laboratories of a selected faculty member typically in the Fall and Spring semesters of their Senior Year. At least 10hrs per week of research is required (including initial time spent on requisite safety training), with the faculty mentor affirming this level of student commitment by midterm of each semester. Additionally, mandatory class meetings (one hour per week) address issues relating to essential laboratory safety and ethics in science, online literature research, oral presentation skills, and effective scientific writing. Students completing their final semester of CHEM 490 are expected to submit a capstone report describing their research and to give a poster presentation of said research as coordinated by the instructor of CHEM 490.

Individuals wishing to enroll in CHEM 490 must have demonstrated proficiency in the aspects of chemistry required for planned activities, as ascertained and certified by the supervising faculty member. To take CHEM 490 students must complete the registration form, have it signed by their faculty research mentor, and submit it to the Chemistry DUS by the end of the last day of classes in *their junior year*. Only one form is required to register for both the Fall and the Spring semesters of CHEM 490.

CHEM 490 is generally only for Senior Chemistry Majors, however, in special cases and with DUS approval, juniors may take this course. Only two semesters of CHEM 490 may be taken for letter grades, subject to restrictions imposed by Yale College. Students are able to complete CHEM 490 by working with a faculty member who does not have a primary appointment in the Chemistry Department, but in this case the DUS must approve that the project involves chemical techniques and is related to chemistry.

### **Course Overview:**

The primary purpose of CHEM 490 is to provide undergraduate students with a hands-on exposure to research in the chemical sciences. The course entails one semester of experimental or theoretical work in chemistry with a *minimum* of 10hrs per week being spent in the laboratories of a faculty member, as well as a weekly 1hr class meeting where topics related to research will be discussed. Building on concepts and techniques honed during formal coursework, participants are expected to direct their efforts towards the generation of chemically relevant data designed to engage and address a specific research problem, as coordinated and supervised by their selected faculty mentor. Students are required to submit a capstone report describing their research at the conclusion of their final semester of CHEM 490 and to give a poster presentation describing their research.

### **Time Commitment:**

Each student enrolled in CHEM 490 must fulfill a *minimum* of 10hrs per week of research, with the faculty mentor required to certify this level of participation by midterm, and attend the mandatory 1hr weekly meeting. If for any reason an individual is unable to meet this commitment, they will be required to withdraw from the course immediately.

Students traveling to interview for summer/post-graduate positions or to engage in extracurricular activities must account for lost research time by undertaking additional laboratory work as agreed with and coordinated by their faculty mentor.

**Safety Requirements:**

Participants in CHEM 490 must fulfill basic safety requirements, including *at least* the online courses entitled “Laboratory Chemical Training” and “Hazardous Chemical Waste Training” as administered by the Yale Office of Environmental Health and Safety (EHS) at <http://ehs.yale.edu/training>. Enrolled individuals must complete these courses successfully and receive formal certification from EHS *prior to beginning any laboratory activities*. Depending on the nature of specific efforts undertaken by the student, additional safety courses or other training requirements might be imposed by the faculty mentor and/or EHS personnel. The time expended to comply with such safety/training prerequisites can offset the mandated 10hrs per week of research.

**Ethical Conduct:**

Plagiarism and other forms of academic/professional dishonesty are antithetical to science, which critically depends on the integrity and ethical conduct of its participants to ensure the successful advancement of scientific knowledge and understanding. Students wishing to enroll in CHEM 490 should review Yale College policies regarding undergraduate plagiarism and cheating carefully (<http://yalecollege.yale.edu/campus-life/undergraduate-regulations>), as well as science-specific regulations composed by Yale’s Office of Research Administration to govern the responsible conduct of research (<http://researchadministration.yale.edu/responsible-conduct-research>).

**Grading:**

Students enrolled in CHEM 490 earn one (1) graduation credit upon successful completion of each semester and are assigned letter grades, subject to restrictions imposed by Yale College. CHEM 490 may be taken only twice, subject to restrictions imposed by Yale College.

**Enrollment Procedures and Formal Requirements:**

It is expected that individuals wishing to perform independent research will have demonstrated proficiency in the basic aspects of chemistry required for their planned activities, as ascertained and certified by the supervising faculty member. Students must complete a CHEM 490 registration form, have it signed by their faculty research mentor, and submit it to the Chemistry DUS Assistant for final approval *no later than the last week of classes in their junior year*.

**Capstone Report:**

CHEM 490 is used to satisfy the senior requirement for the Chemistry Major in Yale College and students must produce a capstone report at the conclusion of their final semester of CHEM 490. The capstone report is expected to be fifteen to twenty-five pages in length (double-spaced, twelve-point font, exclusive of figures, tables, and bibliography). All students performing research also must present their work in the form of a poster presentation in the reading period of the Spring semester as coordinated by the instructor of CHEM 490.