

# *Department of Chemistry – Yale University*

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

### **CHEM 490 Student Responsibilities:**

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: \_\_\_\_\_ SID: \_\_\_\_\_ College/Class: \_\_\_\_\_

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

E-Mail Address: \_\_\_\_\_ Major/Degree: \_\_\_\_\_

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

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

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

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

### **CHEM 490 Research Mentor Responsibilities:**

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: \_\_\_\_\_

E-Mail Address: \_\_\_\_\_ Department: \_\_\_\_\_

Please list any rooms for which student needs key or card access (Chemistry only): \_\_\_\_\_

### **CHEM 490 Safety Certification:**

Cognizant staff from Yale's Office of Environmental Health and Safety (EHS) or the DUS of Chemistry (upon consultation with EHS personnel) must affirm that the student has fulfilled basic safety requirements *prior to them engaging in any research activities*. This includes completion of online courses on laboratory chemical handling and hazardous waste disposal, as well as any other specialized training deemed necessary.

EHS Staff/DUS Name: \_\_\_\_\_

EHS Staff/DUS Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### **Chem 490 Final Approval:**

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

DUS 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:**

After consulting with the Director of Undergraduate Studies (DUS) in Chemistry *no later than the last week of the preceding academic term*, Senior Chemistry Majors in B.S.-level degree programs engage individual experimental and/or theoretical problems in the laboratories of a selected faculty member. 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. Additionally, mandatory class meetings (one hour per week) address issues relating to essential laboratory safety and ethics in science, online literary research, oral presentation skills, and effective scientific writing. At the completion of the final semester of CHEM 490 students 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 must have demonstrated proficiency in the aspects of chemistry required for planned activities, as ascertained and certified by the supervising faculty member. For each term of enrollment, students must complete a CHEM 490 registration form, have it signed by their faculty research mentor, and submit it to Chemistry DUS for final approval *no later than the last week of classes in the immediately preceding academic term*. CHEM 490 is restricted to Senior Chemistry Majors pursuing B.S. or B.S.-Intensive degrees, however, in special cases and with DUS approval, juniors may take this course (*e.g.*, individuals engaged in the B.S./M.S. Chemistry program). Only two semesters of CHEM 490 may be taken with assigned 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 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 the semester and are assigned letter grades, subject to restrictions imposed by Yale College. CHEM 490 may be taken 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. For each term of enrollment, students must complete a CHEM 490 registration form, have it signed by their faculty research mentor, and submit it to Chemistry DUS for final approval *no later than the last week of classes in the immediately preceding academic term*.

#### **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 as coordinated by the instructor of CHEM 490.