

2018-2019

# Undergraduate Student Manual



UC SANTA BARBARA

Chemistry and Biochemistry



# 2018 Chemistry Orientation Agenda

- I. Introduction of Undergraduate Staff Advisor and Student Affairs Team
- II. Introduction of Department Chair and Welcome Remarks, Professor Steve Buratto
- III. Faculty Advisors Introduce and Advice to Freshman
  - ❖ Professor Paula Bruice, Honors
  - ❖ Professor Leroy Laverman, Chemistry Sophomores and Juniors
  - ❖ Professor Petra Van Koppen, Chemistry Freshman and Seniors
  - ❖ Professor Kalju Kahn, Biochemistry
- IV. Chemistry Club and SciTrek Presentations
- V. Review of Undergraduate Manual Contents
  - ❖ Explanation of Pre-Major and Major Sheets
- VI. Q&A

## Student Affairs Advising Staff

The staff undergraduate advisor is the primary contact for change of major and all other petitions, progress checks, enrollment and waiting list information. The undergraduate advisor can answer most of your questions, or refer you to one of the faculty advisors.

### Undergraduate Advisor:

Chika Anyiwo  
Office 1001 – Building 232  
Phone: (805)-893-5675

### Student Affairs Manager & Graduate Program Advisor

India Madden  
Office 1004 – Building 232  
Phone: (805)-893-5675

### Student Affairs Student Assistants:

Andrew Larson  
Christian Greer  
Joe Yuke  
Office 1001 & Office 1004 – Building 232

To schedule an appointment with the Chemistry & Biochemistry Undergraduate Advisor, please visit: <http://ucsbchemistry.youcanbook.me/>.  
You may also call (805) 893-5675 or come visit us in Building 232.



## Faculty Undergraduate Advisors

Take advantage of your faculty advisor for course content related questions, tips and advice for success in chemistry/science courses, undergraduate preparation for medical school, independent research with faculty, or if referred by staff undergraduate advisor.

### For Freshmen and Juniors (1<sup>st</sup> and 4<sup>th</sup> years): Petra Van Koppen

Office: PSBN 3670B  
Phone: (805) 893-5512  
Email: [petra@chem.ucsb.edu](mailto:petra@chem.ucsb.edu)

### For Sophomores and Seniors (2<sup>nd</sup> and 3<sup>rd</sup> years): Leroy Laverman

Office: PSBN 1643C  
Phone: (805) 893-5265  
Email: [laverman@chem.ucsb.edu](mailto:laverman@chem.ucsb.edu)

### For Biochemistry Majors: Kalju Kahn

Office: PSBN 2623  
Phone: (805) 893-6157  
Email: [kalju@chem.ucsb.edu](mailto:kalju@chem.ucsb.edu)

### For Honors Students: Paula Bruice

Office: PSBN 1668  
Phone: (805) 893-2279  
Email: [pybruice@chem.ucsb.edu](mailto:pybruice@chem.ucsb.edu)

# Chemistry and Biochemistry

## The Department of Chemistry and Biochemistry

<http://www.chem.ucsb.edu/>  
email: [ugrads@chem.ucsb.edu](mailto:ugrads@chem.ucsb.edu)

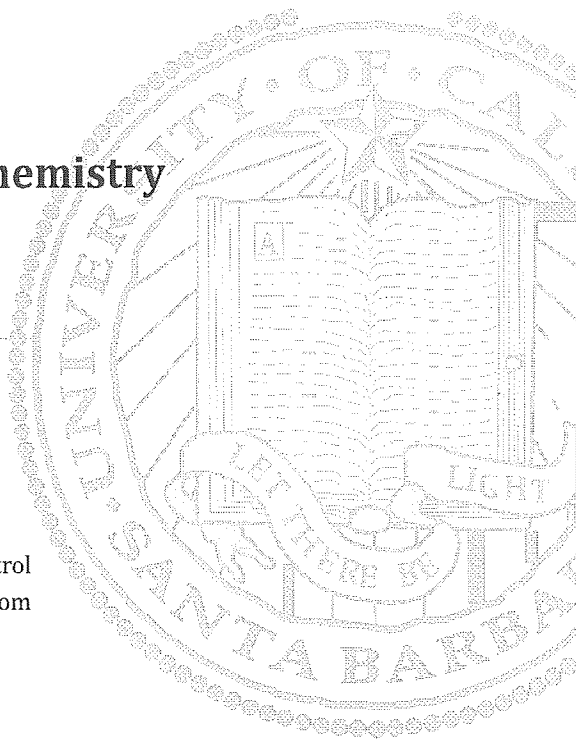
### MAJORS OFFERED:

- Bachelor of Arts (BA) and the Bachelor of Science (BS) degrees in Chemistry
- Bachelor of Science (BS) degree in Biochemistry.

Chemistry is the study of molecules, their formation from atoms, and their transformation into new molecules. Chemistry seeks to understand and control the reactions that cause these transformations. Chemistry's breadth results from the diversity of molecules, which range from the simple two- to three-atom molecules of the earth's atmosphere to the incredibly complex molecules and molecular structures of living things.

The Department of Chemistry and Biochemistry has divisions of organic, inorganic, analytical, physical and biological chemistry, and materials. Many of the department's 45 faculty members have won national as well as international awards.

The department's excellent facilities, personal contact between highly motivated students and faculty, undergraduate research opportunities, and a relaxed yet demanding learning environment, combine to make UCSB an attractive choice for the serious students of chemistry and biochemistry.



### WHAT CAN I DO WITH CHEMISTRY AND BIOCHEMISTRY?

The chemical/pharmaceutical industry is the largest science-based industry in the U.S., including pharmaceuticals and medical supplies, bioengineering, materials, paper and textile production, the petroleum industry, the chemical production industry, and the food and beverage processing industry. UCSB's Chemistry and Biochemistry majors prepare students for careers in industrial and environmental law, and other environmental fields such as resource management, soil conservation and water purification. The majors also prepare students for careers in medicine.

### WHY ARE CHEMISTRY AND BIOCHEMISTRY AT UCSB GREAT CHOICES?

- All Chemistry and Biochemistry majors are assigned an advisor to consult about courses and other decisions in their academic careers.
- The faculty includes two Nobel Chemistry prize winners (Walter Kohn, 1998, and Alan Heeger, 2000) and a half dozen members of the National Academy or Royal Society.
- In the period 1997-2007, UCSB ranked 8<sup>th</sup> in the world in its citation impact in chemistry, and the department ranked 22<sup>nd</sup> in the National Research Council rankings.
- Overall UCSB ranked 4<sup>th</sup> in the U.S. in number of citations in the US from 2005-09, and was ranked 7<sup>th</sup> in the world in 2011 by the Centre for Science and Technologies Studies at Leiden University in the Netherlands.

### LINKS FOR EXPLORATION

About the Department  
<http://www.chem.ucsb.edu/about>  
Undergraduate Education  
<http://www.chem.ucsb.edu/undergrad>  
Meet the Faculty and Staff  
<http://www.chem.ucsb.edu/people>  
UCSB Materials Research Laboratory  
<http://www.mrl.ucsb.edu/>

### USEFUL CAMPUS SERVICES

Advice on Choosing a Major  
<http://www.lsueducation.ucsb.edu/advising/major>  
UCSB Catalog  
<http://my.sa.ucsb.edu/catalog>

# Chemistry and Biochemistry Departmental Honors Program

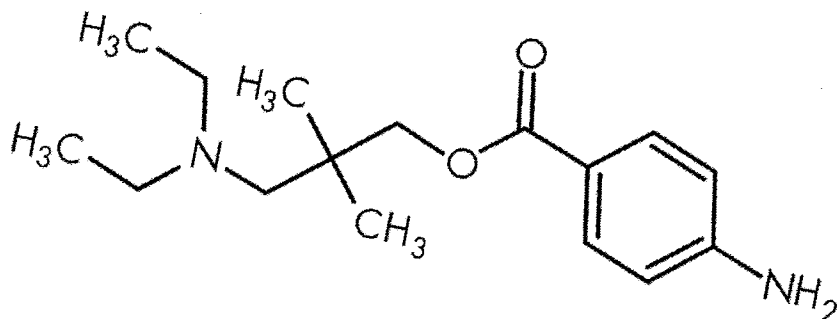
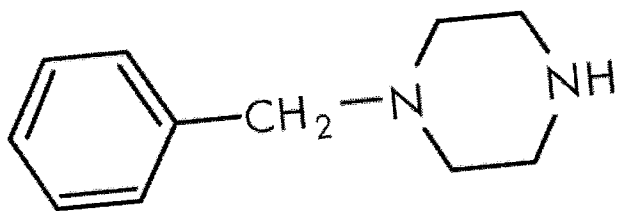


Students shall be designated as having achieved a Distinction in the Major if the following requirements are met:

- ❖ Achieve a grade-point average of 3.5 or above in their chemistry courses
- ❖ Carry out research for a minimum of one year
- ❖ Submit a research thesis paper

Students contemplating this option should adhere to the following:

- 1) Review “**Undergraduate Research: Getting Started**” pamphlet, available on the Chemistry Department website (<http://www.chem.ucsb.edu/undergrad/research>)
- 2) Begin Research with chosen faculty member by enrolling in CHEM 99 (lower-division standing) or CHEM 199 (upper-division standing)
- 3) End of Junior year (no later than the first quarter of your senior year) - notify the Undergraduate Staff Advisor of your intention to pursue Distinction in the Major **and** identify two research advisors
- 4) Senior year - enroll in CHEM 199 for two quarters and CHEM 192 for one quarter
- 5) Submit written research thesis paper by the end of the quarter in which you will graduate



# Are You in the Right Major?

## You're in the RIGHT major when:

- You can't wait to go to classes in your major.
- The material you study is fun and interesting.
- You have trouble picking which major classes to take because you want to take everything that is being offered.
- You can't stop thinking about the ideas brought up in lecture.
- You talk about topics in your major in regular conversation with friends.
- You pursue opportunities outside of class (research, field trips, additional assignments) in your major field of study.
- You do well in your major classes.

## You're in the WRONG major when:

- You dislike your major, but you think it's too late to change.
- Your major makes your family happy, but your true interests lie elsewhere.
- You have lost sight of why you chose your major in the first place.
- You think your current major is the only path to the job you want.
- Your health suffers when you return to school. You feel sick thinking about your classes and assignments in your major.
- The books required for your major do not appeal to you.
- The thought of going to your major classes is scary.
- Your other grades are fine, but your major GPA is lower than it should be.
- You would rather go to the dentist than study for your major.

## Want to Talk About it?

- Make an appointment with an academic advisor in the College of Letters and Science (1117 Cheadle Hall).
- Visit Career Services (Building 599) to research career opportunities.

## Campus-Wide Resources

### **CAPS- Counseling and Psychological Services**

- Licensed psychologists and stress peer advisors provide students with one-to-one personal and confidential support at Counseling Services.

### **Career Services**

- Provides students with many job search preparation services, including interviewing skills, networking, and resume and cover letter assistance.

### **CLAS – Campus Learning Assistance Services**

- Offers group tutorials, drop-in help sessions, learning skills workshops, writing labs, and tutoring services to help students succeed in their classes.

### **DSP – Disabled Students Program**

- Staff members assist permanently and temporarily disabled students in their success at UC Santa Barbara.

### **EOP – Educational Opportunity Program**

- Encourages student involvement on campus and a sense of community and empowerment among students.

### **MCC – Multicultural Center**

- Strives to promote a sense of belonging among students of color, international students, and gay, lesbian, and bisexual students.

### **OSL – Office of Student Life**

- Provides a variety of valuable services to students, including campus room scheduling, organizational advising, and leadership development.

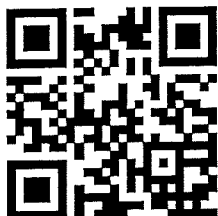
### **OISS – Office of International Students**

- Provides services and programs to meet the cross-cultural and immigration needs of international students and scholars.

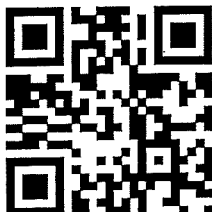
### **RCSGD – Resource Center for Sexual and Gender Diversity**

- Serves the lesbian, gay, bisexual, transgender, intersex, queer, questioning and ally community with the goal of enhancing safety, acceptance, and life quality at UCSB

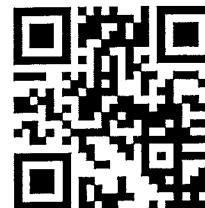
**CAPS - Counseling and  
Psychological Services**



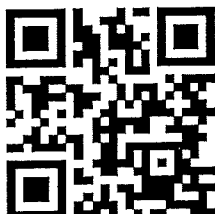
**DSP - Disabled Students  
Program**



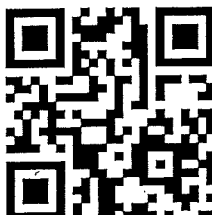
**OSL - Office of Student  
Life**



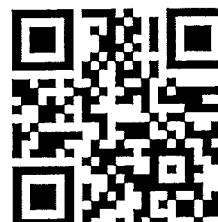
**Career Services**



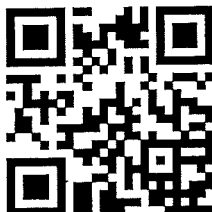
**EOP - Educational  
Opportunity Program**



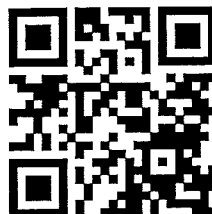
**OISS - Office of  
International Students and  
Scholars**



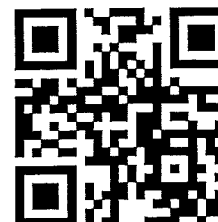
**CLAS - Campus Learning  
Assistance Services**



**MCC - MultiCultural  
Center**



**RCSGD - Resource Center  
for Sexual and Gender  
Diversity**





DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

Trailer 232—PHONE: 893-5675

<http://www.chem.ucsb.edu>

College of Letters and Science

University of California, Santa Barbara

NAME \_\_\_\_\_

Date \_\_\_\_\_ Perm # \_\_\_\_\_

PRE-CHEMISTRY MAJOR, 2018-2019

Students are not admitted directly to the following majors: Biochemistry, B.S., Chemistry, B.S., Chemistry, B.A. Instead, they are first admitted to the Pre-Chemistry major, and they may advance to full major standing in one of these majors only after fulfilling the pre-major courses and grade requirements listed below.

A UC GPA of 2.00 or above in each of the six sequences of courses, considered separately, is required for advancement to full-major status. Acceptance into the pre-major does not guarantee admission to full major status. Upon satisfactory completion of the pre-major courses, students must complete a change of major petition, available in the Department of Chemistry and Biochemistry Student Affairs Office.

**Note:** Completion of the pre-major does not fully satisfy the *Preparation for the Major* requirements for the Biochemistry B.S., Chemistry B.S. or the Chemistry B.A. Students should review the full requirement sheet for the major they intend to declare and plan their schedules accordingly. At the time of the petition, they must also have a 2.0 or higher grade-point average in all courses attempted toward the major (preparation and upper-division).

PRE-MAJOR REQUIREMENTS

UNITS YET TO COMPLETE

Chemistry 1A or 2A, 1B or 2B, 1C or 2C.....	9
Chemistry 1AL, 1BL or 2BC, 1CL or 2CC.....	6
Chemistry 6AL <u>and</u> 6BL or 6BH.....	6
Chemistry 109A or 109AH, 109B or 109BH, 109C (or W 109C) or 109CH.....	12
Math 2A or 3A, 2B or 3B <u>and</u> 4A.....	12-14
Physics 1-2-3-4 or 6A-B-C.....	14 or 9

Note: Physics 1-2-3-4 is required for the Chemistry B.S. major

MAJOR REGULATIONS

- PREREQUISITES ..... Check the *General Catalog* for the prerequisites to all listed courses.
- P/NP GRADING OPTION ..... Not allowed for any major course (Prep or UD major), including courses applied to the major from other departments.
- SUBSTITUTIONS ..... In the major requirements permissible only by petition to the department chair and dean.
- RESIDENCE REQUIREMENTS ..... At least 20 UD units in major while in residence at UCSB.
- G.P.A REQUIREMENTS ..... At least 2.0 overall UC average in all upper-division major courses and all courses (Prep and UD) for the major, including courses in excess of minimum requirements.
- DOUBLE MAJORS ..... With the approval of each department chairperson, up to a total of 8 units may be applied simultaneously to both UD majors.

# GPA Check for Pre-Chemistry Major

## 2018-2019

A UC GPA of 2.00 or above in each of the following six sequences of courses, considered separately, is required for advancement to full-major status:

Chemistry 1A or 2A, 1B or 2B, 1C or 2C ..... GPA: \_\_\_\_\_

Chemistry 1AL or 2AC, 1BL or 2BC, 1CL or 2CC ..... GPA: \_\_\_\_\_

Chemistry 6AL and 6BL (or 6BH) ..... GPA: \_\_\_\_\_

Chemistry 109A or 109AH, 109B or 109BH, 109C or 109CH ..... GPA: \_\_\_\_\_

Math 2A-2B or 3A-3B, 4A ..... GPA: \_\_\_\_\_

Physics 1-2-3-4 or 6A-B-C ..... GPA: \_\_\_\_\_

✦ Completion of the pre-major does not fully satisfy the *Preparation for the Major* requirements for the Biochemistry B.S. or the Chemistry B.S. Review the full requirement sheet for the major you intend to declare and plan your schedule accordingly. In order to guarantee that you are on track for graduation, be sure to see the undergraduate advisor. Also please note that there are College and University Requirements not listed here or on the major sheets.

✦ At the time of the change of major petition, students must also have a 2.0 or higher grade-point average in all courses attempted toward the major (preparation and upper-division).

✦ Must be enrolled in a minimum of 12 units per quarter to be considered a full time student.

DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

Trailer 232—PHONE: 893-5675

http://www.chem.ucsb.edu

College of Letters and Science

University of California, Santa Barbara

NAME \_\_\_\_\_

Date \_\_\_\_\_ Perm # \_\_\_\_\_

CHEMISTRY MAJOR, B.A. – 2018-2019

A UC GPA of 2.00 or above in each of the six sequences of courses, listed in Area I, is required for admission to the full Chemistry major. Acceptance into the pre-major does not guarantee admission to full major status. Upon satisfactory completion of the pre-major courses, students must complete a change of major petition, available in the Department of Chemistry and Biochemistry Student Affairs Office.

I. PRE-MAJOR REQUIREMENTS

UNITS YET TO COMPLETE

Chemistry 1A or 2A, 1B or 2B, 1C or 2C.....	9 _____
Chemistry 1AL, 1BL or 2BC, 1CL or 2CC .....	6 _____
Chemistry 6AL <u>and</u> 6BL or 6BH.....	6 _____
Chemistry 109A or 109AH, 109B or 109BH, 109C (or W 109C) or 109CH.....	12 _____
Math 2A or 3A, 2B or 3B, <u>and</u> 4A.....	12-14 _____
Physics 1-2-3-4 or 6A-B-C .....	14 or 9 _____

II. PREPARATION FOR THE MAJOR

The following course are not required to be admitted into the Chemistry B.A. major, but are required to complete the major.

Math 6A .....	4 _____
Physics 3L-4L or 6AL-BL-CL.....	2 or 3 _____

UPPER-DIVISION MAJOR

39 UD Chemistry units are required, distributed as follows:

**Note:** Transfer students receiving subject credit for Chemistry 109A-B-C and/or Chemistry 150 *must* complete a minimum of 39 UD units in the Department of Chemistry and Biochemistry.

A. Chemistry 109A or 109AH, 109B or 109BH, 109C (or W 109C) or 109CH, 113A-B-C, 150, 173A.....	15-30 _____
B. Chemistry 116AL and 116BL.....	6 _____
C. UD Chemistry electives .....	3-18 _____

The following courses **will not** apply toward the major: Chemistry 101, 102, 183, 184, 192, 193, 196, 198, and 199

Courses taken: \_\_\_\_\_

MAJOR REGULATIONS

- PREREQUISITES**..... Check the *General Catalog* for the prerequisites to all listed courses.
- P/NP GRADING OPTION**..... Not allowed for any major course (Prep or UD major), including courses applied to the major from other departments.
- SUBSTITUTIONS**..... In the major requirements permissible only by petition to the department chair and dean.
- RESIDENCE REQUIREMENTS**..... At least 20 UD units in major while in residence at UCSB.
- G.P.A REQUIREMENTS**..... At least 2.0 overall UC average in **all** upper-division major courses and **all** courses (Prep and UD) for the major, including courses in excess of minimum requirements.
- DOUBLE MAJORS**..... With the approval of each department chairperson, up to a total of 8 units may be applied simultaneously to both UD majors.

# Sample Curriculum for B.A. Chemistry

## 2018-2019

Fall		Winter		Spring	
Course	(Units)	Course	(Units)	Course	(Units)
<b>Year 1</b>					
Chem 1A/2A	(3)	Chem 1B/2B	(3)	Chem 1C/2C	(3)
Chem 1AL/2AC	(2)	Chem 1BL/2BC	(2)	Chem 1CL/2CC	(2)
Math 2A/3A	(4)	Math 2B/3B	(4)	Math 4A	(4)
GEs	(4+)	Phys 1	(4)	Phys 2	(4)
GEs	(4+)	<i>or</i> 6A/6AL GEs	(4+)	<i>or</i> 6B/BL GEs	(4+)
<b>Year 2</b>					
Chem 109A/109AH	(4)	Chem 109B/109BH	(4)	Chem 109C/109CH	(4)
Phys 3	(3)	Chem 6AL	(3)	Chem 6BL	(3)
Phys 3L	(1)	Phys 4	(3)	GEs/UD Electives	(4+)
<i>or</i> 6C/CL		Phys 4L	(1)	GEs/UD Electives	(4+)
GEs	(4+)	GEs	(4+)		
Math 6A	(4)				
<b>Year 3</b>					
★Chem 113A	(4)	★Chem 113B	(4)	★Chem 113C	(4)
★Chem 150	(3)	★Chem 116AL	(3)	★Chem 116BL	(3)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
<b>Year 4</b>					
★Chem 173A	(3)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)

★ Only offered in the quarter listed. 150 and 173A are also generally offered in the summer.

✦ All Math and Physics courses from the preparation for the major need to be completed before 113A.

✦ 150 is a prerequisite to 116AL.

✦ 113B is a prerequisite to 116AL, but may be taken concurrently.

✦ 113ABC are prerequisites to 173A.

✦ Must be enrolled in a minimum of 12 units per quarter to be considered a full time student.

✦ This is a sample curriculum. In order to guarantee that you are on track for graduation, be sure to see the undergraduate advisor. Also please note that there are College and University Requirements not listed here.

GE: General Education Requirement

UD: Upper Division

DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

Trailer 232—PHONE: 893-5675

<http://www.chem.ucsb.edu>

College of Letters and Science

University of California, Santa Barbara

NAME \_\_\_\_\_

Date \_\_\_\_\_ Perm # \_\_\_\_\_

CHEMISTRY MAJOR, B.S. – 2018-2019

A UC GPA of 2.00 or above in each of the six sequences of courses, listed in Area I, is required for admission to the full Chemistry major. Acceptance into the pre-major does not guarantee admission to full major status. Upon satisfactory completion of the pre-major courses, students must complete a change of major petition, available in the Department of Chemistry and Biochemistry Student Affairs Office.

I. PRE-MAJOR REQUIREMENTS

UNITS YET TO COMPLETE

Chemistry 1A or 2A, 1B or 2B, 1C or 2C.....	9
Chemistry 1AL, 1BL or 2BC, 1CL or 2CC.....	6
Chemistry 6AL <u>and</u> 6BL or 6BH.....	6
Chemistry 109A or 109AH, 109B or 109BH, 109C (or W 109C) or 109CH.....	12
Math 2A or 3A, Math 2B or 3B, <u>and</u> 4A.....	12-14
Physics 1-2-3-4.....	14

II. PREPARATION FOR THE MAJOR

*The following courses are not required to be admitted into the Chemistry B.S. major, but are required to complete the major.*

Chemistry 6CL or 6CH.....	3
Math 4B and 6A.....	8
Physics 3L-4L.....	2

UPPER-DIVISION MAJOR

45 UD Chemistry units are required, distributed as follows:

Note: Transfer students receiving subject credit for Chemistry 150 *must* complete a minimum of 45 UD units in the Department of Chemistry and Biochemistry.

A. Chemistry 113A-B-C, 142A (or W 142A), 150, and 173A-B.....	21-24
B. Chemistry 116AL-BL-CL.....	9
C. UD Chemistry electives, with no more than one course from Chemistry 110, 123 and 149.....	12-15

The following courses will not apply toward the major: Chemistry 101, 102, 183, 184, 192, 193, 196, 198 and 199

Courses taken: \_\_\_\_\_

Note: By petition, some of the Area C elective units may be taken in other related departments.

MAJOR REGULATIONS

PREREQUISITES.....	Check the <i>General Catalog</i> for the prerequisites to all listed courses.
P/NP GRADING OPTION.....	Not allowed for any major course (Prep or UD major), including courses applied to the major from other departments.
SUBSTITUTIONS.....	In the major requirements permissible only by petition to the department chair and dean.
RESIDENCE REQUIREMENTS.....	At least 20 UD units in major while in residence at UCSB.
G.P.A REQUIREMENTS.....	At least 2.0 overall UC average in all upper-division major courses <u>and</u> all courses (Prep and UD) for the major, including courses in excess of minimum requirements.
DOUBLE MAJORS.....	With the approval of each department chairperson, up to a total of 8 units may be applied simultaneously to both UD majors.

# Sample Curriculum for B.S. Chemistry

## 2018-2019

Fall		Winter		Spring	
Course	(Units)	Course	(Units)	Course	(Units)
<b>Year 1</b>					
Chem 1A/2A	(3)	Chem 1B/2B	(3)	Chem 1C/2C	(3)
Chem 1AL/2AC	(2)	Chem 1BL/2BC	(2)	Chem 1CL/2CC	(2)
Math 2A/3A	(4)	Math 2B/3B	(4)	Math 4A	(4)
GEs	(4+)	Phys 1	(4)	Phys 2	(4)
GEs	(4+)	GEs	(4+)	GEs	(4+)
<b>Year 2</b>					
Chem 109A/109AH	(4)	Chem 109B/109BH	(4)	Chem 109C/109CH	(4)
Phys 3	(3)	Chem 6AL	(3)	Chem 6BL	(3)
Phys 3L	(1)	Phys 4	(3)	GEs/UD Electives	(4+)
Math 4B	(4)	Phys 4L	(1)	GEs/UD Electives	(4+)
		Math 6A	(4)		
<b>Year 3</b>					
★Chem 113A	(4)	★Chem 113B	(4)	★Chem 113C	(4)
★Chem 142A	(3)	★Chem 116AL	(3)	★Chem 116BL	(3)
★Chem 150	(3)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
Chem 6CL	(3)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
GEs/UD Electives					
<b>Year 4</b>					
★Chem 173A	(3)	★Chem 173B	(3)	GEs/UD Electives	(4+)
★Chem 116CL	(3)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)

★ Only offered in the quarter listed. 150 and 173A are also generally offered in the summer.

† All Math and Physics courses from the preparation for the major need to be completed before 113A.

† 150 is a prerequisite to 116AL.

† 113B is a prerequisite to 116AL, but may be taken concurrently.

† 113ABC are prerequisites to 173A.

† Must be enrolled in a minimum of 12 units per quarter to be considered a full time student.

† This is a sample curriculum. In order to guarantee that you are on track for graduation, be sure to see the undergraduate advisor. Also please note that there are College and University Requirements not listed here.

GE: General Education Requirement

UD: Upper Division

DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

Trailer 232—PHONE: 893-5675

<http://www.chem.ucsb.edu>

College of Letters and Science

University of California, Santa Barbara

NAME \_\_\_\_\_

Date \_\_\_\_\_ Perm # \_\_\_\_\_

### BIOCHEMISTRY MAJOR, B.S. – 2018-2019

A UC GPA of 2.00 or above in each of the six sequences of courses listed in Area I, is required for admission to the full Biochemistry major. Acceptance into the pre-major does not guarantee admission to full major status. Upon satisfactory completion of the pre-major courses, students must complete a change of major petition, available in the Department of Chemistry and Biochemistry Student Affairs Office.

#### I. PRE-MAJOR REQUIREMENTS

#### UNITS YET TO COMPLETE

Chemistry 1A or 2A, 1B or 2B, 1C or 2C.....	9
Chemistry 1AL, 1BL or 2BC, 1CL or 2CC.....	6
Chemistry 6AL and 6BL or 6BH.....	6
Chemistry 109A or 109AH, 109B or 109BH, 109C (or W 109C) or 109CH.....	12
Mathematics 2A or 3A, 2B or 3B, and 4A.....	12-14
Physics 1-2-3-4 or 6A-B-C.....	14 or 9

#### II. PREPARATION FOR THE MAJOR

*The following courses are not required to be admitted into the Biochemistry B.S. major, but are required to complete the major.*

Mathematics 6A.....	4
Physics 3L-4L or 6AL-BL-CL.....	2 or 3
MCDB 1A-1B, EEMB 2, and either (MCDB 1AL and MCDB 1BL or EEMB 2L) or MCDB 1LL.....	11.5-12

#### UPPER-DIVISION MAJOR

46 UD units required, distributed as follows:

A. Chemistry 112A, 112B, 112C, 142A (or W 142A), 142B, 142C, and 173A.....	24
B. Chemistry 110L, 112L, and 125L.....	11
C. Six units from the following core electives: Chemistry 141, 143, 145, 146, 147, 151, 154A, 154B, 161, 162A, 162B, 171, 181.....	6
D. Five additional units from C above, or the following, with no more than one course from Chemistry 110, 123 and 149: Chemistry 110, 111, 113AL, 115A, 115B, 115C, 117A, 118, 120, 123, 124, 126 (provided 145 has not been taken), 127, 128, 129, 132, 133, 134, 149, 150, 153, 163, 173B, 175, 176, 186; MCDB 101B, 103, 126B, 126C, 134, 135.....	5

#### MAJOR REGULATIONS

<b>PREREQUISITES</b> .....	Check the <i>General Catalog</i> for the prerequisites to all listed courses.
<b>P/NP GRADING OPTION</b> .....	Not allowed for major courses (prep or UD), including courses applied to the major from other departments.
<b>SUBSTITUTIONS</b> .....	In the major requirements permissible only by petition to the department chair and dean.
<b>RESIDENCE REQUIREMENTS</b> .....	At least 20 UD units in major while in residence at UCSB.
<b>G.P.A REQUIREMENTS</b> .....	At least 2.0 overall UC average in <b>all</b> upper-division major courses <b>and</b> <b>all</b> courses (Prep and UD) for the major, including courses in excess of minimum requirements.
<b>DOUBLE MAJORS</b> .....	With the approval of each department chairperson, up to a total of 8 units may be applied simultaneously to both UD majors.

# Sample Curriculum for B.S. Biochemistry

## 2018-2019

Fall		Winter		Spring	
Course	(Units)	Course	(Units)	Course	(Units)
<b>Year 1</b>					
Chem 1A/2A	(3)	Chem 1B/2B	(3)	Chem 1C/2C	(3)
Chem 1AL/2AC	(2)	Chem 1BL/2BC	(2)	Chem 1CL/2CC	(2)
Math 2A/3A	(4)	Math 2B/3B	(4)	Math 4A	(4)
Phys 6A/6AL	(4)	Phys 6B/6BL	(4)	Phys 6C/6CL	(4)
GEs	(4+)	GEs	(4+)	GEs	(4+)
<b>Year 2</b>					
Chem 109A/109AH	(4)	Chem 109B/109BH	(4)	Chem 109C/109CH	(4)
★MCDB 1A/1AL	(5)	Chem 6AL	(3)	Chem 6BL	(3)
GEs	(4+)	★MCDB 1B	(3)	Math 6A	(4)
GEs	(4+)	★EEMB 2	(3)	GEs/UD Electives	(4+)
		★(MCDB BL/EEMB 2L) or MCDB 1LL	(1-1.5)		
<b>Year 3</b>					
★Chem 112A	(4)	★Chem 112B	(4)	★Chem 112C	(4)
★Chem 142A	(3)	★Chem 142B	(3)	★Chem 142C	(3)
★Chem 110L	(4)	★Chem 125L	(4)	★Chem 112L	(3)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
<b>Year 4</b>					
★Chem 173A	(3)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)
GEs/UD Electives	(4+)	GEs/UD Electives	(4+)	GEs/UD Electives	(4+)

★ Only offered in the quarter listed. 173A is also generally offered in the summer.

† All Math and Physics courses from the preparation for the major need to be completed before 112A.

† If you plan to take Physics 1-2-3-3L-4-4L, please see the undergraduate advisor for scheduling.

† 142A is a prerequisite to 110L, but may be taken concurrently.

† 110L and 142AB are prerequisites to 125L. 142B may be taken concurrently with 125L.

† 112A, 110L, and 142ABC are prerequisites to 112L. 142C may be taken concurrently with 112L.

† 112ABC are prerequisites to 173A.

† Must be enrolled in a minimum of 12 units per quarter to be considered a full time student.

† This is a sample curriculum. In order to guarantee that you are on track for graduation, be sure to see the undergraduate advisor. Also please note that there are College and University Requirements not listed here.

GE: General Education Requirement

UD: Upper Division



## UNDERGRADUATE PETITION TO CHANGE MAJOR, EMPHASIS, OR COLLEGE

Please read all instructions on reverse side completing this form. Please print neatly.

Name \_\_\_\_\_ Perm# \_\_\_\_\_  
Last First Middle

U-mail Address \_\_\_\_\_@umail.ucsb.edu Phone ( ) \_\_\_\_\_

Unit Standing:  FR (0-44.9)  SO (45-89.9)  JR (90-134.9)  SR (135+)

Expected date of graduation: \_\_\_\_\_, \_\_\_\_\_ Current quarter candidacy?  Y  N  
QTR YR

**Please note the change in major, college or emphasis you wish to pursue, and the catalog year for the major**

FROM:  Pre \_\_\_\_\_ and  Pre \_\_\_\_\_  
CURRENT MAJOR CURRENT DOUBLE MAJOR

EMPHASIS  
 Creative Studies  Engineering  Letters & Science

EMPHASIS  
 Creative Studies  Engineering  Letters & Science

TO:  Pre \_\_\_\_\_, \_\_\_\_\_ and  Pre \_\_\_\_\_, \_\_\_\_\_  
PROPOSED MAJOR catalog year PROPOSED DOUBLE MAJOR catalog year

EMPHASIS  
 Creative Studies  Engineering  Letters & Science

EMPHASIS  
 Creative Studies  Engineering  Letters & Science

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

### Approval of chair(s) of department(s) that sponsor proposed major(s)

\_\_\_\_\_  
Signature of chair Department Date

\_\_\_\_\_  
Signature of chair Department Date

**Approval of the dean of the college is required for students who have completed more than 134.9 units, those who are changing to undeclared, those pursuing a double major, and those who are changing college (including adding a major in a new college).**

\_\_\_\_\_  
Signature of dean of present college Date catalog year

\_\_\_\_\_  
Signature of dean of proposed college Date catalog year

Registrar's use only: MVS/PRC handled \_\_\_\_\_ Data entry \_\_\_\_\_



## INSTRUCTIONS for completing your Undergraduate Petition to Change Major, Emphasis, or College

1. Print your full name, perm number, u-mail address, and current local telephone number clearly where indicated.
2. Indicate your current unit standing by checking the appropriate box.
3. Print the title and emphasis of your current major(s) and the title, emphasis, *and catalog year* of your proposed major(s). (Your change of major cannot be processed without the catalog year. The catalog year is normally the academic year in which you first declare your major or pre-major.)
4. Sign and date the petition.
5. To drop one major from a double major, you need only your own signature. Submit your completed petition to the Office of the Registrar.
6. Secure signatures as follows:
  - chair of the department(s) that sponsor your proposed new major(s)
  - dean of your college(s) *if you are changing from one college to another, pursuing a double major or dual college double major, have completed more than 134.9 units, or if you are changing to undeclared.*

---

**NOTE:**

In most cases, you will leave the petition in the department that sponsors your proposed major, and the department will forward the approved petition to the Office of the Registrar. This is true if you meet both of the following criteria:

- You are changing from one major to another within the College of Letters and Science.
- You have not yet completed 135 units.

In the following circumstances, you must collect the approved petition from the sponsoring department and submit it to Dean of Undergraduate Education in the College of Letters and Science, 1117 Cheadle Hall, for review:

- You have completed 135 or more units.
- You are proposing a double major. In this case, you must also submit a memo of understanding, indicating your expected date of graduation and the number of units you expect to have completed by that time and submit to the College of Letters and Science.
- You are changing to the College of Letters and Science from the College of Engineering or the College of Creative Studies. If you are proposing a dual college double major, you must submit a memo of understanding indicating your agreement to meet the regulations of the College of Letters and Science, your expected date of graduation, and the number of units you expect to complete by that time.
- You are changing your major to undeclared.

## Enrollment & Waiting List Policies

*To be fair to all students, enrollment is handled exclusively through GOLD, on a first come, first serve basis. We are unable to assist students in getting back into courses they accidentally dropped, or were dropped from due to billing/collection issues. Do not contact the instructor, teaching assistant or undergraduate advisor for an approval code. Refer to our department website for more information regarding waitlist and crashing policies. (<http://www.chem.ucsb.edu/undergrad/advising>)*

### GENERAL CHEMISTRY ENROLLMENT POLICIES:

1. Pass 1 priority:
    - Chemistry and Biochemistry (all majors)
    - College of Engineering (following majors): Chemical Engineering, Electrical Engineering, Computer Engineering, Mechanical Engineering
    - College of Creative Studies: Chemistry and Biochemistry
    - Earth Science (all majors)
    - Ecology, Evolution, Marine Biology (all majors)
    - Environmental Studies (all majors)
    - Geography (following majors): Physical Geography
    - Molecular, Cell, Developmental Biology (all majors)
    - Physics (all majors)
    - Psychology (following majors): Psychological and Brain Sciences BS, Biopsychology
  2. Students in Earth Science and Physical Geography BS majors must email **ugrads@chem.ucsb.edu** from their UMAIL address\* with the following information for an approval code for Chem 1A/1B/1C (lectures, not labs) **during Pass 1 only**:
    - Full Name
    - Perm Number
    - The course in which you are hoping to enroll (please include first and second preferences for lecture courses)
- \*Sending multiple emails will slow down the process and move you to a lower priority.
3. Majors not listed above, including undeclared, must wait until Pass 2 to enroll.
  4. You must add the lecture (Chem 1A/1B/1C) before adding the lab (1AL/1BL/1CL). If you drop the lecture, you will be automatically dropped from the lab. If you drop the lab, you will not be automatically dropped from the lecture. You can find more information about course prerequisites in the general catalog:  
<https://www.sa.ucsb.edu/parents/Academics/UCSBGeneralCatalog.aspx>

### ORGANIC CHEMISTRY ENROLLMENT POLICIES:

1. Enrollment during Pass 1 is limited to the following:
  - 6AL/BL:
    - Chemistry and Biochemistry (all majors)
    - College of Engineering (following majors):
      - Chemical Engineering
    - College of Creative Studies (following majors):
      - Chemistry and Biochemistry
2. Undeclared students, or students in majors not listed above, must wait until Pass 2 to enroll.

### **WAITING LIST POLICIES:**

1. Waiting lists will be made available once a course is full. Students must be registered in 12 units to view the waiting list.
2. To increase your chances of securing a seat, all sections that fit into your schedule should be selected. Do not select a section if you are not able to attend at the specified day/time.
3. Students will be auto-added from the waiting lists as spaces become available.
4. Waiting lists will close:
  - At the end of the 5<sup>th</sup> Day of Instruction for:
    - Chem 1A-B-C
    - Chem 109A-B-C
    - Chem 6AL (no labs during the first week)
  - Prior to the first day of instruction for:
    - Chem 1AL-BL-CL
    - Chem 6BL

### **CRASHING POLICIES - LABS:**

1. If you are not auto-added to the course prior to the waiting list closing, you **MUST** crash the course in order to remain eligible to enroll.
2. Attendance on the first day of lab is required; if you do not attend, you will be dropped.
3. You do not need to be on the Waiting List to crash courses, though students on the Waiting List will receive priority.
4. You may continue to crash labs until the add deadline (typically the 3<sup>rd</sup> week of class).
5. Chem 6AL: Do not crash during the first week.
6. Chem 1AL/1BL/1CL/6AL/6BL: All crashers must meet in front of the Undergraduate Stockrooms (General Chemistry: 2<sup>nd</sup> floor stockroom, Organic Chemistry: in PSB-N Breezeway) to sign a crash list.
7. Approval codes (via UMAIL account ONLY) will be distributed as spaces become available; you must enroll within 24 hours or your space will be offered to another student.
8. Do not contact the course instructor, teaching assistant or undergraduate advisor for approval codes.

### **SWITCHING SECTIONS POLICY:**

1. If you are enrolled in a section, **DO NOT** crash another section to obtain an approval code.
2. If the course is open on GOLD, and there is a space in the section you would like to switch into, you can change sections by selecting the "SWITCH" button. Do not drop your current section you will lose your space in the course.
3. If you are able to find another student to switch sections with, you both will need to fill out a Lab Switch Form in Building 232.
4. Students are prohibited from switching ORGANIC labs once the first experiment has been completed.

# UNDERGRADUATE RESEARCH

<http://www.chem.ucsb.edu/undergrad/research>

## GETTING STARTED

1. **Make a list** of the subjects that really interest you and that you'd like to explore.
2. **Decide what you could gain** from working on a project—such as simply learning more about a field of study, being better prepared for a future career, and working closely with faculty and graduate students who can offer professional guidance and mentoring.
3. **Check out UCSB web pages** to identify researchers working on projects that interest you. You might want to sit in on an upper-division class to get a sense of a subject's scope.
4. **Tell your professors of your interest** after class or during office hours. Make a specific appointment to discuss.

Before your appointment, read about the general research area and, perhaps, read one or two published papers before your meeting. Published papers are listed on faculty web pages.

Develop a description of up to a page explaining why you want to do research and why a faculty mentor should want to work with you. Include information on your major, if you have identified it; background courses you have taken; and time availability and commitment (number of quarters you will be available; hours per week; times available). Be sure the faculty member knows how to get in touch with you.

5. **Talk with the academic adviser in your major.** (And don't limit your thinking to just one discipline. Most UCSB professors work in at least two fields, and 20 percent of all faculty have appointments in more than one department.)

**Pre-Requisites:** You must earn a 3.0 grade point average or higher for three consecutive quarters before you start research. This shows that you have the potential to understand the concepts you need to succeed in your research. You will need to be able to manage your time and balance your class work and research to maintain a 3.0 GPA.

**Graduate schools** require a 3.0 grade point average to be accepted into their programs. You will also need to take GRE exams and have letters of recommendation from faculty members. You need research experience to show that you understand the commitment required to becoming a successful graduate student.

## Research Opportunities

For more information, visit the College of Letters and Science webpage: <http://www.duels.ucsb.edu/> and the Career Services webpage: <http://career.sa.ucsb.edu/students/career-counseling>.

- Undergraduate Research and Creative Activities (URCA)
- Faculty Research Assistance Program (FRAP)
- General Undergraduate Research at UCSB
- STEM Undergraduate Research Programs
- Resources for Healthcare Professions
- Internships for MCDB, Chemistry, and Biochemistry Majors

# Academic Integrity at UCSB – A Student’s Guide

As a UCSB student, and future graduate and holder of a degree from UCSB, it is important to protect the value of the degree you are working towards. We all play a part in this. Honesty and integrity in your own academic work, and holding peers to the same standards, are ways to do your part in maintaining the esteemed reputation of the campus and desirability of a UCSB degree. Students are expected to refrain from cheating and plagiarism, refuse to aid or abet any form of academic dishonesty, and notify professors of any knowledge one has about cheating, plagiarism, or collusion.

Papers, examinations, laboratory reports, and homework must always be your own work. Cheating, plagiarism, and collusion are all forms of academic dishonesty and are violations of the Student Conduct Code. Students found responsible for these violations face possible suspension or dismissal from the University.

## TYPES OF ACADEMIC DISHONESTY

**Cheating** - unauthorized use of information in any academic exercise, including, but

not limited to:

- Copying from others during an examination
- Sharing answers for homework, lab reports, or a take-home examination
- Using unauthorized notes during an examination
- Taking an examination for another student
- Asking or allowing another student to take an examination for you
- Tampering with an examination after it has been corrected, then returning it for more credit than deserved
- Submitting substantial portions of the same academic work for credit in more than one course without consulting with the second instructor (and the first instructor if the courses are concurrent at UCSB)
- Preparing answers or writing notes in a blue book before an examination
- Allowing others to do the research and writing of an assigned paper (for example, using the services of a commercial term paper company), or doing the research or writing for another student’s assigned paper
- Sending electronic messages to another student during an examination
- Stealing or using another student’s paper or examination and claiming it as your own

**Plagiarism/Internet Plagiarism** - the use of another’s idea or words without proper attribution or credit. An author’s work is his/her property and should be respected by documentation. Students should always ask their instructors how sources are to be cited if this information is not provided. Internet sources must always be cited, even if the author is unknown. Citations must be given for every direct quotation, when a work is paraphrased or summarized in whole or in part in your own words, and for information which is not common knowledge.

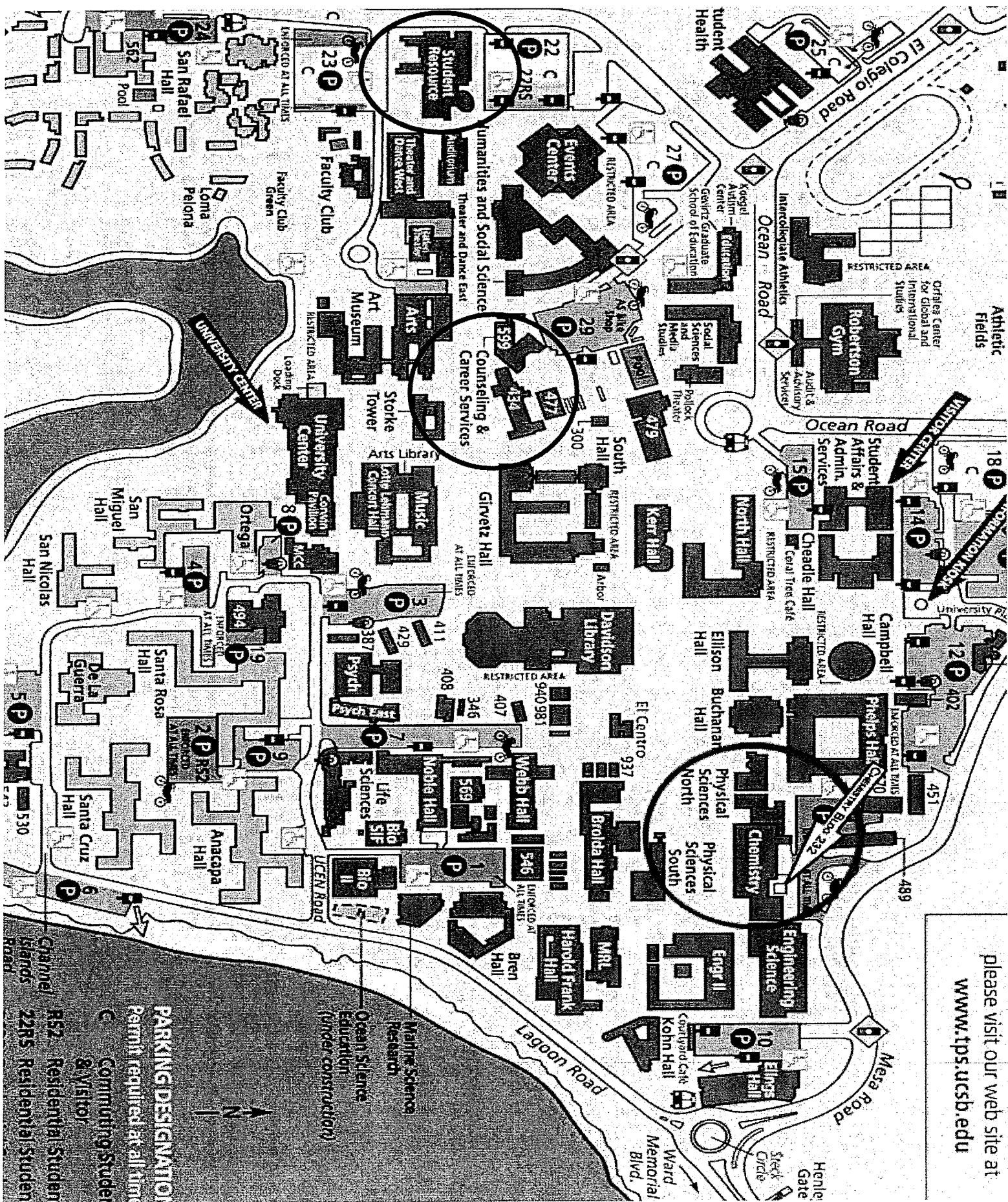
**Collusion** – assisting someone else in cheating or plagiarizing. Any student who helps another student to perform any of the above acts, knowingly or unknowingly, is subject to campus discipline for academic dishonesty. There is no distinction between those who cheat and plagiarize and those who knowingly allow it to occur.

All students are expected to protect their academic work from easy theft. This includes, not showing a paper or examination to another student without first receiving permission from the instructor of the course, and protecting academic work that may be accessed by other students electronically or otherwise. For example, posting course notes or materials (either your own or those owned by the instructor or teaching assistants) to any commercial online study resource, or failing to protect your own work from being copied (leaving your exam within view of others, loaning your computer to another student without securing your academic work, etc.).

For more information, please visit: <http://judicialaffairs.sa.ucsb.edu>.

# PERIODIC TABLE OF THE ELEMENTS

1 H Hydrogen 1.008	2 He Helium 4.002602	Atomic Number →																Atomic Mass																																															
3 Li Lithium 6.94	4 Be Beryllium 9.0121831	Symbol →																←																																															
11 Na Sodium 22.98976928	12 Mg Magnesium 24.305	1																Hydrogen ←																																															
19 K Potassium 39.0983	20 Ca Calcium 40.078	Sc																Ti																																															
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	Y																Zr																																															
55 Cs Cesium 132.90545196	56 Ba Barium 137.327	57 / 71																Hf																																															
87 Fr Francium 223	88 Ra Radium 226	89 / 103																Rf																																															
Lanthanide Series																		57 La Lanthanum 138.90547	58 Ce Cerium 140.118	59 Pr Praseodymium 140.90768	60 Nd Neodymium 144.242	61 Pm Promethium 145	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.92535	66 Dy Dysprosium 162.500	67 Ho Holmium 164.93033	68 Er Erbium 167.259	69 Tm Thulium 168.93422	70 Yb Ytterbium 173.054	71 Lu Lutetium 174.9668	Actinide Series																																
Lanthanide Series																		89 Ac Actinium 227	90 Th Thorium 232.0377	91 Pa Protactinium 231.03688	92 U Uranium 238.02891	93 Np Neptunium 237	94 Pu Plutonium 244	95 Am Americium 243	96 Cm Curium 247	97 Bk Berkelium 247	98 Cf Californium 251	99 Es Einsteinium 252	100 Fm Fermium 257	101 Md Mendelevium 288	102 No Nobelium 289	103 Lr Lawrencium 266	Actinide Series																																
23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938044	26 Fe Iron 55.845	27 Co Cobalt 58.933194	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Al Aluminum 76.9815385	32 Ge Germanium 72.630	33 As Arsenic 74.921595	34 Se Selenium 78.971	35 Br Bromine 79.904	36 Kr Krypton 83.798	37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90584	40 Zr Zirconium 91.224	41 Nb Niobium 92.90637	42 Mo Molybdenum 95.96	43 Tc Technetium 98	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.90550	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	52 Te Tellurium 127.60	53 I Iodine 126.90447	54 Xe Xenon 131.29	55 Cs Cesium 132.90545196	56 Ba Barium 137.327	57-71 Lanthanides	72 Hf Hafnium 178.49	73 Ta Tantalum 180.94788	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.222	78 Pt Platinum 195.084	79 Au Gold 196.966569	80 Hg Mercury 200.592	81 Tl Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.98040	84 Po Polonium 209	85 At Astatine 210	86 Rn Radon 222	87-103 Actinides	104 Rf Rutherfordium 307	105 Db Dubnium 306	106 Sg Seaborgium 309	107 Bh Bohrium 307	108 Hs Hassium 309	109 Mt Meitnerium 309	110 Ds Darmstadtium 309	111 Rg Roentgenium 309	112 Cn Copernicium 309	113 Uut Ununtrium 309	114 Fl Flerovium 309	115 Uup Ununpentium 309	116 Lv Livermorium 309	117 Uus Ununseptium 309	118 Uuo Ununoctium 309



please visit our web site at  
[www.tps.ucsb.edu](http://www.tps.ucsb.edu)