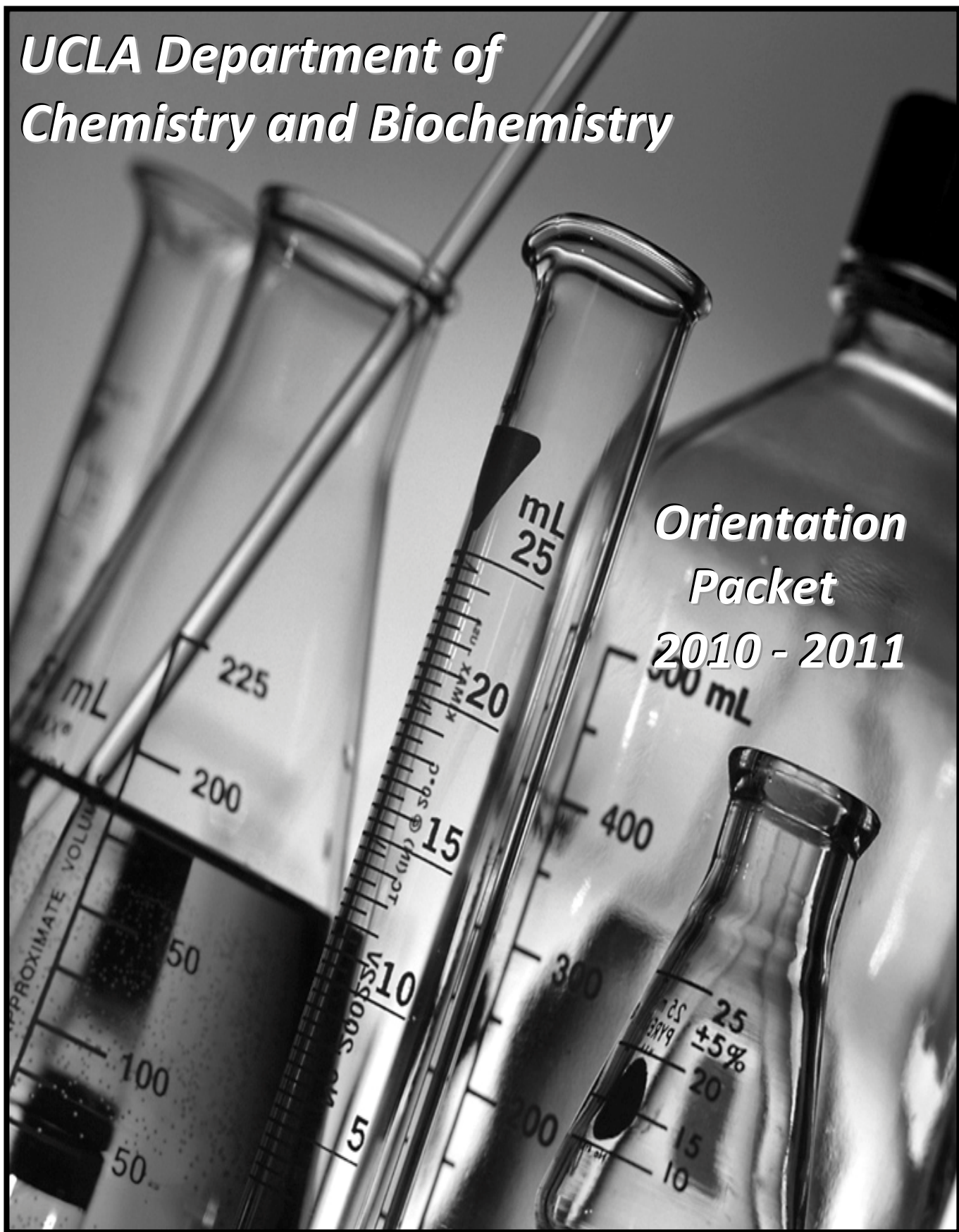


***UCLA Department of  
Chemistry and Biochemistry***

***Orientation  
Packet  
2010 - 2011***



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## Introduction

### Welcome to the Department of Chemistry & Biochemistry Orientation!

*Enclosed in this packet is some important information about the department, your major, and the College of Letters & Science.*

All this information and more can be found in the Undergraduate Handbook that is available on our website at: <http://www.chemistry.ucla.edu/pages/programs>.

Please take some time this summer and review the handbook online.

Chemistry is concerned with the composition, structure, and properties of substances. It analyzes the transformations of these substances into others by reactions, and studies the kinds of energy changes that accompany these reactions.

The UCLA Chemistry and Biochemistry Department is organized into four inter-related and overlapping sub-disciplines, including:

- Inorganic Chemistry - the chemistry of inorganic substances
- Organic Chemistry - the chemistry of carbon-containing compounds
- Biochemistry - the chemistry of living systems
- Physical Chemistry - the physical behavior of substances in relation to their structures and chemical properties

Chemistry and biochemistry are complex subjects that require a strong background in math, physics, and biology. As a chemistry or biochemistry major, you will be required to take a series of rigorous preparation courses to aid you in your understanding of the various chemical fields. The organization of the curriculum allows you to begin taking chemistry courses, along with other preparation courses, during your first quarters at UCLA.

Since many upper division major courses have preparation courses as prerequisites, you should begin your background preparation early. In fact, we recommend that you take at least one chemistry course each quarter. Additionally, we recommend that you utilize your GE requirements to take courses in writing. The mastery of English is extremely important, and well-developed verbal and writing skills are essential for success in any technical career.

Upon completion of the major, you will be equipped to pursue a variety of career options based on your exposure to a wide assortment of fields of study during your undergraduate career.

There are many people on campus that can assist you in finding courses, planning for the future, and exploring other resources on campus. Check out the "Academic Resources" section to make sure you know where to go for help.

This packet should serve as a great resource for questions you may have about the department or the major. For further questions, contact the

#### **Chemistry and Biochemistry Undergraduate Office**

**Office: 4009 Young Hall**

**Phone: (310) 825-1859**

**E-mail: [ugrad@chem.ucla.edu](mailto:ugrad@chem.ucla.edu)**

# Professors and Advisors

## Faculty

### *Department Chairman*

Albert Courey

### *Biochemistry Faculty*

James Bowie

Guillaume Chanfreau

Catherine Clarke

Steven Clarke

Robert Clubb

Albert Courey

David Eisenberg

Juli Feigon

James Gober

Jay Gralla

Wayne Hubbell

Carla Kohler

Christopher Lee

Joseph Loo

Harold Martinson

Sabeeha Merchant

Margot Quinlan

Emil Reisler

Jorge Torres

Joan Valentine

Richard Weiss

Todd Yeates

### *Inorganic Chemistry Faculty*

Paula Diaconescu

Xiangfeng Duan

Richard Kaner

John Wasson

Omar Yaghi

Jeffrey Zink

### *Organic Chemistry Faculty*

Timothy Deming

Miguel Garcia-Garibay

Neil Garg

Robin Garrell

Patrick Harran

Kendall Houk

Michael Jung

Ohyun Kwon

Heather Maynard

Craig Merlic

Yves Rubin

### *Physical Chemistry Faculty*

Anastassia Alexandrova

Delroy Baugh

David Bensimon

Louis-Serge Bouchard

Peter Felker

William Gelbart

Jim Gimzewski

Alexander Levine

Raphael Levine

Yung-Ya Lin

Thomas Mason

Daniel Neuhauser

C. Kumar N. Patel

Benjamin Schwartz

Sarah Tolbert

Paul Weiss

Jeffrey Zink

## Faculty Advisors

Faculty Advisors provide assistance with academic course planning and meet with students who want to know more details about the content of their chemistry courses. They can also provide important information about different careers in chemistry.

### **Biochemistry Faculty Advisor**

Dr. Richard Weiss

[weiss@chem.ucla.edu](mailto:weiss@chem.ucla.edu)

5072A Young Hall

### **Chemistry Faculty Advisor**

Dr. Paula Diaconescu

[pld@chem.ucla.edu](mailto:pld@chem.ucla.edu)

1515 Molecular Science Bldg.

### **Physical Chemistry Advisor**

Dr. Tom Mason

[mason@chem.ucla.edu](mailto:mason@chem.ucla.edu)

3040 Young Hall

### **Chemistry Materials Science Advisor**

Dr. Sarah Tolbert

[tolbert@chem.ucla.edu](mailto:tolbert@chem.ucla.edu)

3045A Young Hall

### **General Chemistry Advisor**

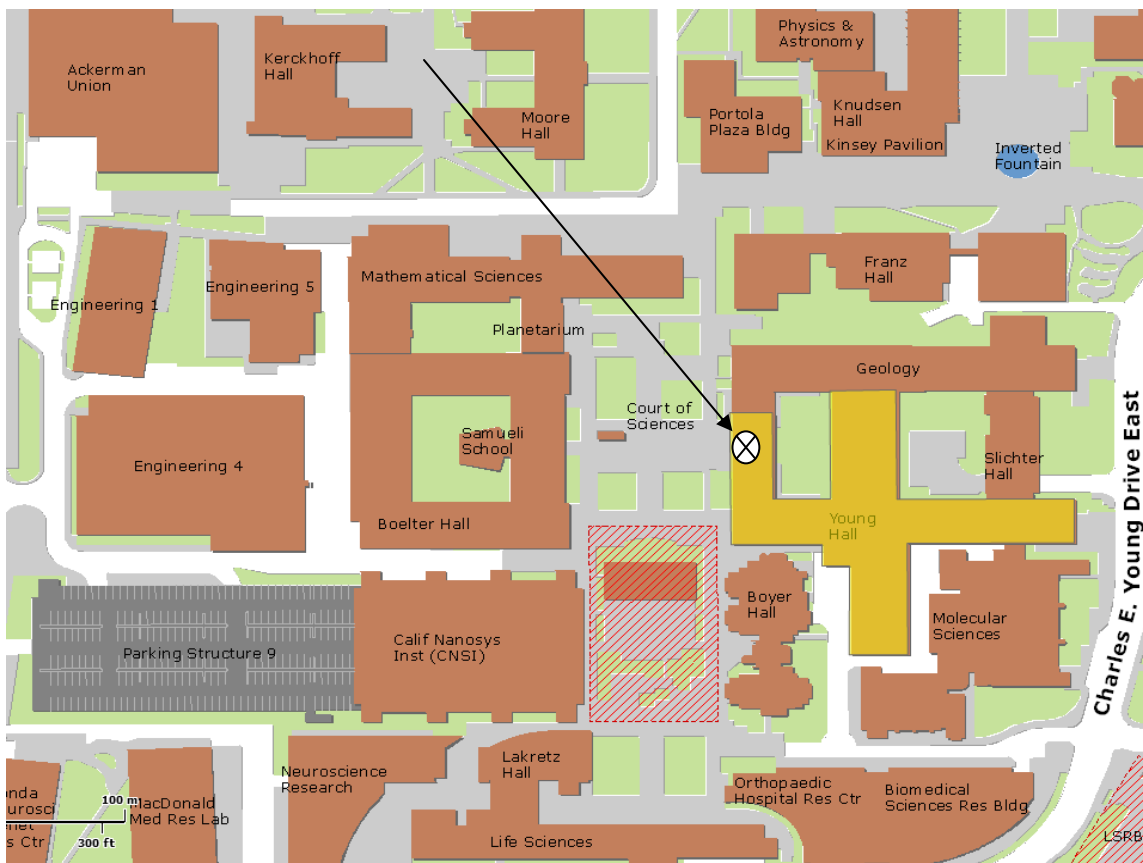
Dr. Steve Hardinger

[harding@chem.ucla.edu](mailto:harding@chem.ucla.edu)

3077C Young Hall

## Chemistry & Biochemistry Undergraduate Office

*Undergraduate Office is located in 4009 Young Hall.*



***Walk-In Hours Only***

***Monday –Friday***

***8:30 A.M.-5:00 P.M.***

### **Undergraduate Advisor**

Angela Carpenter

[angela.carpenter@chem.ucla.edu](mailto:angela.carpenter@chem.ucla.edu)

310-825-1859

### **Scheduling and Enrollment Coordinator**

Denise Mantonya

[denise@chem.ucla.edu](mailto:denise@chem.ucla.edu)

310-825-4660

If you need assistance in planning your schedule or have questions regarding petitions, then stop by. We also answer questions regarding Departmental and/or University regulations, career planning and problems of academic status, information about research projects (Chemistry/Biochemistry 196, 199), faculty room and phone numbers, summer internships, tutoring, scholarships, fellowships and job openings, questions concerning enrollment for all chemistry courses and schedule changes.

<http://www.chem.ucla.edu/pages/programs>

### **College Counselors**

For questions regarding University or College of Letters & Science requirements (e.g. General Education, Foreign Language, Writing I/II,ECP, etc.) and petitions, meet with your College Counseling Unit.

- Honors Students - Honors Counseling Office in A-311 Murphy Hall
- Academic Advancement Program (AAP) Students – AAP Office in 1209 Campbell Hall
- Athletes – The George Kneller Academic Center (J.D. Morgan Center Suites 121, 127)
- All Other Students - College Counselors in A-316 Murphy Hall

[www.ugeducation.ucla.edu](http://www.ugeducation.ucla.edu) and <http://www.uclabruins.com/academics/ucla-academics.html>

## Department Information

### Major Options in the Chemistry and Biochemistry Department

The UCLA Chemistry and Biochemistry Department offers four undergraduate majors, two concentrations, and one specialization.

- **Biochemistry Major**

This major is designed primarily for students who are interested in attending graduate school in Biochemistry or related areas. It also satisfies many of the requirements for applying to medical school and other professional schools.

- **Chemistry Major**

Designed primarily for students who are interested in attending graduate school in Chemistry or related areas. It also satisfies some of the requirements for applying to medical school and other professional schools.

- ❖ **Physical Chemistry Concentration**

Designed primarily for Chemistry majors who are interested in attending graduate school in Physical Chemistry, Physics, or related areas.

- **Chemistry-Materials Science Major**

Designed primarily for students who are interested in chemistry with an emphasis on material properties. The major provides appropriate preparation for graduate studies in fields emphasizing interdisciplinary research involving chemistry, engineering, and applied science.

- ❖ **Chemistry-Materials Science Organic Concentration**

Designed primarily for students who are interested in chemistry with an emphasis on the material properties of organic matter. The major provides appropriate preparation for graduate studies in fields emphasizing interdisciplinary research involving chemistry, engineering, and applied science.

- **General Chemistry Major**

Intended for students who wish to acquire considerable background in chemistry in preparation for careers outside chemistry. It may be appropriate for students who plan careers in environmental science, patent law, public health, or teaching with an emphasis on science, or other career paths.

**Computing Specialization** - can be added to any of the four majors above. Designed for students who are interested in adding computer programming and computational chemistry to their Chemistry, Biochemistry, General Chemistry, or Chemistry Materials Science degree.

## BIOCHEMISTRY MAJOR 2010-2011

**BIOCHEMISTRY MAJOR (B.S.):** This major is designed primarily for students who are interested in attending graduate school in Biochemistry or related areas. It also satisfies many of the requirements of pre-medical and other pre-professional schools. Refer to the UCLA General Catalog ([www.registrar.ucla.edu/catalog](http://www.registrar.ucla.edu/catalog)) for course descriptions and requisites.

For more details about this major and others offered in the Department of Chemistry and Biochemistry, consult the Undergraduate Office in 4009 Young Hall.

Preparation for the Major	
General Chemistry (Chem)	20A(H), 20B(H), 20L, 30AL
Organic Chemistry (Chem)	30A(H), 30B, 30BL, 30C, 30CL
Math	31A, 31B, 32A (33B recommended)
Physics	6A(H), 6B(H), 6C(H) <u>OR</u> 1A(H), 1B(H), 1C(H), 4BL
Life Science	Lifesci 2, Lifesci 3, Lifesci 4

(H) indicates that an HONORS section may be available

Upper Division (UD) Major Requirements	
Chemistry (Chem)	110A, 171
Biochemistry (Chem)	153A(H), 153B(H), 153C(H), 153L, 154, 156
One Chemistry or Biochemistry Elective (4 Units)	One upper division or graduate-level Chemistry (Chem) course
Four Electives (16 Units)	Four upper division or graduate level courses from the approved list (see separate list).

### Important Notes

- You may not take or repeat a chemistry or biochemistry course for credit if it is a prerequisite for a more advanced course for which you already have credit.
- Seminars, individual study courses, and research courses (e.g. 196, 199) may not be used to satisfy the requirements for the biochemistry major.
- You must maintain at least an overall 2.0 GPA in the upper division coursework taken to fulfill the major requirements.
- All Prep for Major and UD Major courses must be taken for a letter grade.**

### Class Scheduling - Preparation for the Major

The following schedule for the first six quarters is recommended for students planning to major in Biochemistry. A normal course load is 16 units per quarter; students should also integrate their lower division general education requirements.

Course	QUARTER					
	1 (units)	2 (units)	3 (units)	4 (units)	5 (units)	6 (units)
<b>Chemistry</b>	20A (4)	20B (4) & 20L (3)	30A (4) & 30AL (4)	30B (4) & 30BL (3)	30C (4) & 30CL (4)	171 (4) & 153A (4)
<b>Mathematics</b>	31A (4)	31B (4)	32A (4)			
<b>Physics</b>				6A (5)	6B (5)	6C (5)
<b>Other</b>	English 3 (5)		Life Sci. 2 (5)	Life Sci. 3 (5)	Life Sci. 4 (5)	

## Class Scheduling - Upper Division Courses

This table outlines the recommended course combinations and timing for the advanced Chemistry courses:

Quarter	7	8	9	10	11	12
<b>Chemistry</b>	153L, [153B(H) or 153C(H)]	110A, [153B(H) or 153C(H)]	154	156		

## Upper Division (UD) Chemistry Courses

The program of upper division courses for the Biochemistry major should be planned with care. Particular attention should be paid to prerequisites for advanced courses and to the quarter(s) in which courses are offered.

Course	Course Title	Prerequisite(s)
110A	Physical Chemistry: Chemical Thermodynamics	Chem 20B; Math 32A; [Physics 1A, 1B, 1C*, <u>OR</u> Physics 6A, 6B, 6C*]
153A(H)	Biochemistry: Intro to Structure, Enzymes, and Metabolism	Chem 30B with grade of C- or better; (Life Science 2, 3)
153B(H)	Biochemistry: DNA, RNA, and Protein Synthesis	Chem 153A(H); Life Science 2, 3
153C(H)	Biochemistry: Biosynthetic and Energy Metabolism and Its Regulation	Chem 153A(H)
153L	Biochemical Methods I	Chem 30B, 30BL, 153A(H)* with grades of C- or better
154	Biochemical Methods II	Chem 153A(H), 153B(H), 153L with grades of C- or better; (156)
156	Physical Biochemistry	Chem 110A, 153A(H)
171	Intermediate Inorganic Chemistry	Chem 30B with grade of C- or better

\* indicates may be taken concurrently with the course

( ) recommended courses

## College Requirements for the B.S. Degree

Requirements for the B.S. degree established by the College of Letters and Science are listed in the UCLA General Catalog. A minimum of 180 quarter units are required for the degree; 60 of these 180 units must be upper division (course numbers 100-199). Check your DPR to determine your allotted maximum number of quarter units. Note: the Biochemistry UD Requirements satisfy at least 53 UD units.

## CHEMISTRY MAJOR 2010-2011

**CHEMISTRY MAJOR (B.S.):** This major is designed primarily for students who are interested in attending graduate school in Chemistry or related areas. It also satisfies some of the requirements of pre-medical and pre-professional schools. Refer to the UCLA General Catalog ([www.registrar.ucla.edu/catalog](http://www.registrar.ucla.edu/catalog)) for course descriptions and requisites.

For more details about this major and others offered in the Department of Chemistry and Biochemistry, consult the Undergraduate Office in 4009 Young Hall.

Preparation for the Major	
General Chemistry (Chem)	20A(H), 20B(H), 20L, 30AL
Organic Chemistry (Chem)	30A(H), 30B, 30BL, 30C, 30CL
Math	31A, 31B, 32A, 32B, 33B
Physics	1A(H), 1B(H), 1C(H), 4BL

(H) indicates that an HONORS section may be available

Upper Division Major Requirements	
Chemistry (Chem)	110A, 113A, [110B <u>OR</u> C113B], 114(H), [136 <sup>+</sup> <u>OR</u> 144 <sup>+</sup> ], 171, C172
Biochemistry (Chem)	153A(H), 153L
One Chemistry Elective (4 units)	One upper division or graduate-level Chemistry (Chem) course (see list on back)
Chemistry Laboratory (Choose one)	118, 136 <sup>+</sup> , 144 <sup>+</sup> , 154, C174, 184, C185

\*Course may only be applied once to the major

[ ] Pick one course enclosed in brackets

### Important Notes

- You may not take or repeat a chemistry or biochemistry course for credit if it is a prerequisite for a more advanced course for which you already have credit.
- Seminars, individual study courses, and research courses (e.g. 196, 199) may not be used to satisfy the requirements for the Chemistry major.
- You must maintain at least an overall 2.0 GPA in the upper division coursework taken to fulfill the major requirements.
- All Prep for Major and UD Major courses must be taken for a letter grade.**

### Class Scheduling - Preparation for the Major

The following schedule for the first six quarters is recommended for students planning to major in Chemistry. A normal course load is 16 units per quarter; students should also integrate their lower division general education requirements.

Course	QUARTER					
	1 (units)	2 (units)	3 (units)	4 (units)	5 (units)	6 (units)
<b>Chemistry</b>	20A (4)	20B (4) & 20L (3)	30A (4) & 30AL (4)	30B (4) & 30BL (3)	30C (4) & 30CL (4)	171 (4) & [110A (4) <u>OR</u> 113A (4)]
<b>Mathematics</b>	31A (4)	31B (4)	32A (4)	32B (4)	33B (4)	
<b>Physics</b>		1A (5)	1B (5)	1C (5) & 4BL (2)		

## Upper Division (UD) Chemistry Elective Courses

The program of upper division courses for the Chemistry major should be planned with care. Particular attention should be paid to prerequisites for advanced courses and to the quarter(s) in which courses are offered. Please use the following list as a guide to plan your elective courses.

Course	Course Title	Prerequisite(s)
103	Environmental Chemistry	Chem 30B, 30BL, 110A, 153A(H), 153L
C115A	Quantum Chemistry	Chem 113A; Math 32B, 33A with grades of C- or better (see catalog)
C115B	Quantum Chemistry	Chem C115A with grade of C- or better
<b>118</b>	Colloidal Dynamics Laboratory	[Chem 110A, 110B with grades of B or better OR equivalent Statistical Mechanics courses from engineering, math, or physics]
C123A	Classical and Statistical Thermodynamics	Chem [110B or 156] (113A)
C123B	Classical and Statistical Thermodynamics	Chem [110B or 156] (113A)
125	Computers in Chemistry	Chem 110A, 110B, 113A; Prep: working knowledge of Fortran IV or PL/1
C126A	Computational Methods for Chemists	Chem 110A; Math 33B; Prep: programming experience in BASIC, Fortran, C, C++, Java, or Pascal
<b>136</b>	Organic Structural Methods	Chem 30C, 30CL with grades of C- or better
C140	Bionanotechnology	Chem 30C, 110A
C143A	Structure and Mechanism in Organic Chemistry	Chem 30C, 30CL*, 110B, 113A with grades of C- or better
C143B	Mechanism and Structure in Organic Chemistry	Chem C143A with grade of C- or better
<b>144</b>	Practical and Theoretical Introductory Organic Synthesis	Chem 30C, 30CL with grades of C- or better
C145	Theoretical and Computational Organic Chemistry	Chem 30C, 113A
153B(H)	Biochemistry: DNA, RNA, and Protein Synthesis	Chem 153A(H); Life Sciences 2, 3
153C(H)	Biochemistry: Biosynthetic and Energy Metabolism and Its Regulation	Chem 153A(H)
CM153G	Advanced Principles of Molecular and Cellular Biosciences I	Chem 110A, 153A, 153B, 153C, 156
<b>154</b>	Biochemical Methods II	Chem 153A(H), 153B(H), 153L with grades of C- or better (156)
156	Physical Biochemistry	Chem 110A, 153A
CM160A	Intro to Bioinformatics	[Biostats 100A <u>OR</u> 110A <u>OR</u> Math 170A <u>OR</u> Stats 100A <u>OR</u> 110A]; [Comp Sci 180 <u>OR</u> PIC 60] with grades of C- or better.
C160B	Algorithms in Bioinformatics and Systems Biology	Chem CM160A with grade of C- or better (PIC 60; Stats 100A, 110A)
C161A	Plant Biochemistry	Chem 153C
C164	Free Radicals in Biology and Medicine	Chem 153A and [153B <u>OR</u> 153C] with grades of C- or better
<b>C174</b>	Inorganic and Metalorganic Lab Methods	Chem 30CL, C172 with grades of C- or better
C175	Inorganic Reaction Mechanisms	Chem 110A, 110B, 113A, C172
C176	Group Theory and Applications to Inorganic Chemistry	Chem 113A, C172
C179	Biological Inorganic Chemistry	Chem 153A(H), 171
C180	Solid-State Chemistry	Chem C172
C181	Polymer Chemistry	Chem 30B, 110A
<b>184</b>	Chemical Instrumentation	Chem 30CL, 110A with grades of C- or better
<b>C185</b>	Materials Chemistry Lab	Chem 30AL, 110A, 113A, 171

\* indicates may be taken concurrently with the course

( ) recommended courses

[ ] pick one course enclosed in brackets

**bold** indicates courses that satisfy the lab requirement

## College Requirements for the B.S. Degree

Requirements for the B.S. degree established by the College of Letters and Science are listed in the UCLA General Catalog. A total of at least 180 quarter units are required for the degree; 60 of these 180 units must be upper division (course numbers 100-199). Check your DPR to determine your allotted maximum number of quarter units. Note: the Chemistry UD Requirements satisfy at least 46 UD units.

## PHYSICAL CHEMISTRY CONCENTRATION 2010-2011

**CHEMISTRY MAJOR (B.S.), PHYSICAL CHEMISTRY CONCENTRATION:** This concentration is designed primarily for Chemistry majors who are interested in attending graduate school in Physical Chemistry/Physics or related areas. It may also satisfy some of the needs of pre-medical and other pre-professional schools. Refer to the UCLA General Catalog ([www.registrar.ucla.edu/catalog](http://www.registrar.ucla.edu/catalog)) for course descriptions and requisites.

For more details about this major and others offered in the Department of Chemistry and Biochemistry, consult the Undergraduate Office in 4009 Young Hall.

Preparation for the Major	
General Chemistry (Chem)	20A(H), 20B(H), 20L, 30AL
Organic Chemistry (Chem)	30A(H), 30B, 30BL
Math	31A, 31B, 32A, 32B, 33A, 33B
Physics	1A(H), 1B(H), 1C(H), 4BL

(H) indicates that an HONORS section may be available

Concentration Course Requirements	
Chemistry (Chem)	110A, 110B, 113A, C113B, [114(H) <u>OR</u> 118 <sup>+</sup> ], 153A(H), 171, C172
One Laboratory Elective (4 units)	Chem 118 <sup>+</sup> , M120, 184, C185; Physics 117, 180B, 180C; Electrical Engineering 122L, 172L
Three Lecture Electives (12 units)	Three approved elective lectures chosen from upper division or graduate courses in physics, mathematics, electrical engineering, physical chemistry, physical inorganic chemistry, biophysical chemistry, or physical organic chemistry (see approved elective list on back).

\* course may only be applied once to the major

### Important Notes

- You may not take or repeat a chemistry or biochemistry course for credit if it is a prerequisite for a more advanced course for which you already have credit.
- Seminars, individual study courses, and research courses (e.g. 196, 199) may not be used to satisfy the requirements for the Physical Chemistry major.
- You must maintain at least a 2.0 GPA in the upper division coursework taken to fulfill the major requirements.
- All Prep for Major and UD Major courses must be taken for a letter grade.**
- By their junior year, students are strongly encouraged to join a research group within the physical chemistry division to obtain research experience.
- You must have at least a combined 3.0 GPA in the following Prep for Major courses: General Chemistry, Math, and Physics.

### Class Scheduling - Preparation for the Major

The following schedule for the first six quarters is recommended for students planning to major in the Physical Chemistry Concentration. A normal course load is 16 units per quarter; students should also integrate their lower division general education requirements.

Course	QUARTER					
	1 (units)	2 (units)	3 (units)	4 (units)	5 (units)	6 (units)
<b>Chemistry</b>	20A (4)	20B (4) & 20L (3)	30A (4) & 30AL (4)	30B (4) & 30BL (3)	171 (4) & 110A (4)	153A (4)
<b>Mathematics</b>	31A (4)	31B (4)	32A (4)	32B (4)	33A (4)	33B (4)
<b>Physics</b>		1A (5)	1B (5)	1C (5) & 4BL (2)		

### Approved Upper Division (UD) Lecture Electives (pick 3 - 12 units)

Attention should be paid to prerequisites for advanced courses and the quarter(s) in which courses are offered.

Course	Course Title	Prerequisite(s)
<b>Chemistry</b>		
C115A	Quantum Chemistry	Chem 113A; Math 32B, 33A with grades of C- or better (See catalog)
C115B	Quantum Chemistry	[Chem 115A <u>OR</u> Physics 115B] with grade of C- or better
C123A	Classical & Statistical Thermodynamics	Chem [110B <u>OR</u> 156] (113A)
C123B	Classical & Statistical Thermodynamics	Chem [110B <u>OR</u> 156] (113A)
125	Computers in Chemistry	Chem 110A, 110B, 113A; Prep: See catalog
C143A	Structure & Mechanism in Organic Chem	Chem 30C, 30CL*, 110B, 113A with grades of C- or better
C145	Theoretical & Computational OChem	Chem 30C, 113A
156	Physical Biochemistry	Chem 110A, 153A
C176	Group Theory & Apps to Inorganic Chem	Chem 113A, C172
C180	Solid-State Chemistry	Chem C172
C215C	Advanced Quantum Chem: Applications	Chem C215B
215D	Molecular Spectra, Diffraction, & Structure	Chem C215B; Physics 131
M223C	Nonequilibrium Statistical Mechanics & Molecular Biophysics	[(Chem C215B and C223B) <u>OR</u> Physics 215A]
225	Chemical Kinetics	Chem C215B, C223B
<b>Physics</b>		
105A	Analytic Mechanics	Physics 1A(H), 1B(H), 1C(H); Math 32B, 33A, 33B*
105B	Analytic Mechanics	Physics 1A(H), 1B(H), 1C(H), 105A
110A	Electricity and Magnetism	Physics 1A(H), 1B(H), 1C(H), 131; Math 32B, 33A, 33B
110B	Electricity and Magnetism	Physics 1A(H), 1B(H), 1C(H), 110A; Math 32B, 33A, 33B
131	Mathematical Methods of Physics	Physics 1A(H), 1B(H), 1C(H); Math 32B, 33A, 33B
132	Mathematical Methods of Physics	Physics 1A(H), 1B(H), 1C(H), 131; Math 32B, 33A, 33B
140A	Intro to Solid-State Physics	Physics 112
160	Numerical Analysis Techniques & Particle Simulations	Physics 1A(H), 1B(H), 1C(H), 105A, 105B, 110A, 110B; Prep: See catalog
<b>Mathematics</b>		
115A	Linear Algebra	Math 33A
115B	Linear Algebra	Math 115A
132	Complex Analysis for Applications	Math 32B, 33B
134	Linear & Nonlinear Systems of Diff. Eq.	Math 33B, 115A
135	Ordinary Differential Equations	Math 33A, 33B
136	Partial Differential Equations	Math 33A, 33B
142	Mathematical Modeling	Math 32B, 33B
146	Methods of Applied Mathematics	Math 32B, 33B
151A	Applied Numerical Methods	Math 32B, 33B, 115A; PIC 10A
151B	Applied Numerical Methods	Math 151A
153	Numerical Methods for Partial Diff. Eq.	Math 151A, 151B
<b>Electrical Engineering</b>		
100	Electrical & Electronic Circuits	[ElecEng 1 <u>OR</u> Physics 1C]; Math 33A, 33B
101	Engineering Electromagnetics	[ElecEng 1 <u>OR</u> Physics 1C]; [(Math 32A & 32B) <u>OR</u> (33A & 33B)]
102	Systems and Signals	[ElecEng 1 <u>OR</u> Physics 1C]; Math 33A, 33B
121B	Principles of Semiconductor Device Design	ElecEng 2
136	Intro to Eng. Optimization Techniques	ElecEng 103; Math 32A, 33A
172	Intro to Lasers & Quantum Electronics	ElecEng 101
173	Photonic Devices	ElecEng 101

\* indicates may be taken concurrently with the course    [ ] pick one course enclosed in brackets    ( ) recommended courses

### College Requirements for the B.S. Degree

Requirements for the B.S. degree established by the College of Letters and Science are listed in the UCLA General Catalog. A total of 180 quarter units are required for the degree; 60 of these 180 units must be upper division (course numbers 100-199). Check your DPR to determine your allotted maximum number of quarter units. Note: the Physical Chemistry Concentration UD Requirements satisfy at least 49 UD units.

## CHEMISTRY-MATERIALS SCIENCE MAJOR 2010-2011

**CHEMISTRY-MATERIALS SCIENCE MAJOR (B.S.):** This major is designed primarily for students who are interested in chemistry with an emphasis on material properties. The major provides appropriate preparation for graduate studies in fields emphasizing interdisciplinary research involving chemistry, engineering, and applied science. Refer to the UCLA General Catalog ([www.registrar.ucla.edu/catalog](http://www.registrar.ucla.edu/catalog)) for course descriptions and requisites.

For more details about this major and others offered in the Department of Chemistry and Biochemistry, consult the Undergraduate Office in 4009 Young Hall.

Preparation for the Major	
General Chemistry (Chem)	20A(H), 20B(H), 20L, 30AL
Organic Chemistry (Chem)	30A(H)
Math	31A, 31B, 32A, 32B, 33B
Physics	1A(H), 1B(H), 1C(H), 4BL

(H) indicates that an HONORS section is available

Upper Division Major Requirements	
Chemistry (Chem)	110A, 113A, 171, C185, [C172 <sup>+</sup> or C180 <sup>+</sup> or C181 <sup>+</sup> ]
One Chemistry Elective (4 units)	110B, 113B, C172 <sup>+</sup> , C174, C175, C176, C180 <sup>+</sup> , C181 <sup>+</sup>
Materials Science & Engineering	104, 110, 110L, 120, 131, [121 <sup>+</sup> or 150 <sup>+</sup> or 160 <sup>+</sup> ]
Two Materials Science & Engineering Electives (8 units)	111, 121 <sup>+</sup> , 122, 132, 150 <sup>+</sup> , 160 <sup>+</sup> , 162, CM180
Laboratory Electives (7 units)	Chem 114, 118, 184; Materials Science & Engineering 121L, 131L, 161L

\*Course may only be applied once to the major

[ ] Pick one course enclosed in brackets

### Important Notes

- You may not take or repeat a chemistry or biochemistry course for credit if it is a prerequisite for a more advanced course for which you already have credit.
- Seminars, individual study courses, and research courses (e.g. 196, 199) may not be used to satisfy the requirements for the Chemistry Materials Science major.
- You must maintain at least an overall 2.0 GPA in the upper division coursework taken to fulfill the major requirements.
- All Prep for Major and UD Major courses must be taken for a letter grade.**

### Class Scheduling - Preparation for the Major

The following schedule for the first six quarters is recommended for students planning to major in Chemistry-Materials Science. A normal course load is 16 units per quarter; students should also integrate their lower division general education requirements.

Course	QUARTER					
	1 (units)	2 (units)	3 (units)	4 (units)	5 (units)	6 (units)
<b>Chemistry</b>	20A (4)	20B (4) & 20L (3)	30A (4) & 30AL (4)		171 (4)	[110A (4) <u>OR</u> C172 (4)]
<b>MatSci &amp; Eng</b>				104 (4)		110 (4) & 110L (2)
<b>Mathematics</b>	31A (4)	31B (4)	32A (4)	32B (4)	33B (4)	
<b>Physics</b>		1A (5)	1B (5)	1C (5)	4BL (2)	

## Upper Division (UD) Courses

The program of upper division courses for the Chemistry-Materials Science major should be planned with care. Particular attention should be paid to prerequisites for advanced courses and the quarter(s) in which courses are offered.

Course	Course Title	Prerequisite(s)
<b>Chemistry</b>		
110A	Physical Chemistry: Chemical Thermodynamics	Chem 20B; Math 32A; Physics 1A, 1B, 1C*
110B	Physical Chemistry: Intro to Statistical Mechanics and Kinetics	Chem 110A, 113A; Math 32B
113A	Physical Chemistry: Intro to Quantum Mechanics	Chem 20B; Math 32A, 32B, 33B; Physics 1A, 1B, 1C with grades of C- or better
C113B	Physical Chemistry: Intro to Molecular Spectroscopy	Chem 113A
<b>114 (H)</b>	Physical Chemistry Lab	Chem 30AL, 110A, 113A with grades of C- or better; [110B* <u>OR</u> C113B*]
118	Colloidal Dynamics Lab	[Chem 110A, 110B with grades of B or better <u>OR</u> equivalent Statistical Mechanics courses from engineering, math, or physics]
171	Intermediate Inorganic Chemistry	Chem 30B with grade of C- or better
C172	Advanced Inorganic Chemistry	Chem 171 with grade of C- or better
C174	Inorganic and Metalorganic Lab Methods	Chem 30CL, C172 with grades of C- or better
C175	Inorganic Reaction Mechanisms	Chem 110A, 110B, 113A, C172
C176	Group Theory and Applications to Inorganic Chemistry	Chem 113A, C172
C180	Solid-State Chemistry	Chem C172
C181	Polymer Chemistry	Chem 30B, 110A
<b>184</b>	Chemical Instrumentation	Chem 30CL, 110A with grades of C- or better
C185	Materials Chemistry Lab	Chem 30AL, 110A, 113A, 171
<b>Material Science &amp; Engineering</b>		
104	Science of Engineering Materials	Chem 20A, 20B, 20L; Physics 1A, 1B
110	Intro to Materials Characterization A (Crystal Structure, Nanostructures, and X-Ray Scattering)	MatSci&Eng 104
110L	Intro to Materials Characterization A Lab	MatSci&Eng 104
111	Intro to Materials Characterization B (Electron Microscopy)	MatSci&Eng 104, 110
120	Physics of Materials	[{MatSci&Eng 104 and 110} <u>OR</u> Chem 113A]
121	Materials Science of Semiconductors	MatSci&Eng 120
<b>121L</b>	Materials Science of Semiconductors Lab	MatSci&Eng 121*
122	Principles of Electronic Materials Processing	MatSci&Eng 104
131	Diffusion and Diffusion-Controlled Reactions	MatSci&Eng 130
<b>131L</b>	Diffusion and Diffusion-Controlled Reactions Lab	MatSci&Eng 131*
132	Structure and Properties of Metallic Alloys	MatSci&Eng 131
150	Intro to Polymers	None
160	Intro to Ceramics and Glasses	MatSci&Eng 104, 130
<b>161L</b>	Lab in Ceramics	MatSci&Eng 160 (161*)
162	Electronic Ceramics	MatSci&Eng 104; [Electrical Eng 1 <u>OR</u> Physics 1]
CM180	Intro to Biomaterials	[MatSci&Eng 104 <u>OR</u> (Chem 20A, 20B and 20L)]

\* indicates may be taken concurrently with the course

[ ] pick one course enclosed in brackets

( ) recommended courses

**bold** indicates courses that satisfy the lab requirement

## College Requirements for the B.S. Degree

Requirements for the B.S. degree established by the College of Letters and Science are listed in the UCLA General Catalog. A total of 180 quarter units are required for the degree; 60 of these 180 units must be upper division (course numbers 100-199). Check your DPR to determine your allotted maximum number of quarter units. Note: the Chemistry-Materials Science UD Requirements satisfy at least 58 UD units.

## CHEMISTRY-MATERIALS SCIENCE ORGANIC CONCENTRATION 2010-2011

**CHEMISTRY-MATERIALS SCIENCE MAJOR (B.S.), ORGANIC CONCENTRATION:** This concentration is designed primarily for students who are interested in chemistry with an emphasis on the material properties of organic matter. The major provides appropriate preparation for graduate studies in fields emphasizing interdisciplinary research involving chemistry, engineering, and applied science. Refer to the UCLA General Catalog ([www.registrar.ucla.edu/catalog](http://www.registrar.ucla.edu/catalog)) for course descriptions and requisites.

For more details about this major and others offered in the Department of Chemistry and Biochemistry, consult the Undergraduate Office in 4009 Young Hall.

Preparation for the Major	
General Chemistry (Chem)	20A(H), 20B(H), 20L, 30AL
Organic Chemistry (Chem)	30A(H), 30B, 30BL, 30C, 30CL
Math	31A, 31B, 32A, 32B, 33B
Physics	1A(H), 1B(H), 1C(H), 4BL

(H) indicates that an HONORS section is available

Upper Division Major Requirements	
Chemistry (Chem)	110A, 113A, 136, 171, C185
One Chemistry Elective (4 units)	110B, C113B, C143A, C143B, 144, C172, C174, C175, C176, C180, C181
Materials Science & Engineering	104, 110, 110L, 120, 150
One Materials Science & Engineering Elective (4 units)	111, 121, 122, 131, 132, 160, 162, CM180
Laboratory Electives (7 units)	Chem 114, 118, 184; Materials Science & Engineering 121L, 131L, 161L

### Important Notes

- You may not take or repeat a chemistry or biochemistry course for credit if it is a prerequisite for a more advanced course for which you already have credit.
- Seminars, individual study courses, and research courses (e.g. 196, 199) may not be used to satisfy the requirements for the Chemistry Materials Science Organic Concentration major.
- You must maintain at least an overall 2.0 GPA in the upper division coursework taken to fulfill the major requirements.
- All Prep for Major and UD Major courses must be taken for a letter grade.**

### Class Scheduling - Preparation for the Major

The following schedule for the first six quarters is strongly recommended for students planning to major in Chemistry-Materials Science with the Organic Concentration. A normal course load is 16 units per quarter; students should also integrate their lower division general education requirements.

COURSES	QUARTER					
	1 (units)	2 (units)	3 (units)	4 (units)	5 (units)	6 (units)
Chemistry	20A (4)	20B (4) & 20L (3)	30A (4) & 30AL (4)	30B (4) & 30BL (3)	30C (4) & 30CL (4)	171 (4) & 110A (4)
MatSci&Eng						104 (4)
Mathematics	31A (4)	31B (4)	32A (4)	32B (4)	33B (4)	
Physics		1A (5)	1B (5)	1C (5)	4BL (2)	

## Upper Division (UD) Courses

Course	Course Title	Prerequisite(s)
<b>Chemistry</b>		
110A	Physical Chemistry: Chemical Thermo	Chem 20B; Math 32A or 3C; Physics 1A, 1B, 1C*
110B	Physical Chemistry: Intro to Statistical Mechanics and Kinetics	Chem 110A, 113A; Math 32B
113A	Physical Chemistry: Intro to Quantum Mechanics	Chem 20B; Math 32A, 32B, 33B; Physics 1A, 1B, 1C with grades of C- or better
C113B	Physical Chemistry: Intro to Molecular Spectroscopy	Chem 113A
<b>114 (H)</b>	Physical Chemistry Lab	Chem 30AL, 110A, 113A with grades of C- or better; [110B* <u>OR</u> C113B*]
118	Colloidal Dynamics Lab	[Chem 110A, 110B with grades of B or better <u>OR</u> equivalent Statistical Mechanics course from engineering, math, or physics]
136	Organic Structural Methods	Chem 30C, 30CL with grades of C- or better
C143A	Structure and Mechanism in Organic Chemistry	Chem 30C, 30CL*, 110B, 113A with grades of C- or better
C143B	Mechanism and Structure in Organic Chemistry	Chem C143A with grade of C- or better
144	Practical and Theoretical Introductory Organic Synthesis	Chem 30C, 30CL with grades of C- or better
171	Intermediate Inorganic Chemistry	Chem 30B with grade of C- or better
C172	Advanced Inorganic Chemistry	Chem 171 with grade of C- or better
C174	Inorganic and Metalorganic Lab Methods	Chem 30CL, C172 with grades of C- or better
C175	Inorganic Reaction Mechanisms	Chem 110A, 110B, 113A, C172
C176	Group Theory and Applications to Inorganic Chemistry	Chem 113A, C172
C180	Solid-State Chemistry	Chem C172
C181	Polymer Chemistry	Chem 30B, 110A
<b>184</b>	Chemical Instrumentation	Chem 30CL, 110A with grades of C- or better
C185	Materials Chemistry Laboratory	Chem 30AL, 110A, 113A, 171
<b>Materials Science &amp; Engineering</b>		
104	Science of Engineering Materials	Chem 20A, 20B, 20L; Physics 1A, 1B
110	Intro to Materials Characterization A (Crystal Structure, Nanostructures, and X-Ray Scattering)	MatSci&Eng 104
110L	Intro to Materials Characterization A Lab	MatSci&Eng 104
111	Intro to Materials Characterization B (Electron Microscopy)	MatSci&Eng 104, 110
120	Physics of Materials	[{MatSci&Eng 104 and 110} <u>OR</u> Chem 113A]
121	Materials Science of Semiconductors	MatSci&Eng 120
<b>121L</b>	Materials Science of Semiconductors Lab	MatSci&Eng 121*
122	Principles of Electronic Materials Processing	MatSci&Eng 104
131	Diffusion and Diffusion-Controlled Reactions	MatSci&Eng 130
<b>131L</b>	Diffusion and Diffusion-Controlled Reactions Lab	MatSci&Eng 131*
132	Structure and Properties of Metallic Alloys	MatSci&Eng 131
150	Intro to Polymers	None
160	Intro to Ceramics and Glasses	MatSci&Eng 104, 130
<b>161L</b>	Laboratory in Ceramics	MatSci&Eng 160 (161*)
162	Electronic Ceramics	MatSci&Eng 104; [Electrical Eng 1 <u>OR</u> Physics 1]
CM180	Introduction to Biomaterials	[MatSci&Eng 104 <u>OR</u> Chem {20A, 20B and 20L}]

\* indicates may be taken concurrently with the course  
 ( ) recommended courses

[ ] pick one course enclosed in brackets  
**bold** indicates courses that satisfy the lab requirement

## College Requirements for the B.S. Degree

Requirements for the B.S. degree established by the College of Letters and Science are listed in the UCLA General Catalog. A total of 180 quarter units are required for the degree; 60 of these 180 units must be upper division (course numbers 100-199). Check your DPR to determine your allotted maximum number of quarter units. Note: the Chemistry-Materials Science Organic Concentration UD Requirements satisfy at least 51 UD units.

# GENERAL CHEMISTRY MAJOR 2010-2011

Advisor: Dr. Steve Hardinger, 3077C Young Hall, harding@chem.ucla.edu

**GENERAL CHEMISTRY MAJOR (B.S.):** The General Chemistry major is intended for students who wish to acquire considerable background in chemistry in preparation for careers outside chemistry. It may be appropriate for students who plan careers in environmental science, patent law, public health, or teaching with an emphasis on science, or other career paths.

Please note the following:

- This General Chemistry major is not a shortcut to early graduation or a way to avoid the intellectual challenge presented by upper division chemistry courses.
- The General Chemistry major is usually not suitable for students interested in medical or related professional schools.
- This major cannot be used as part of a double major.
- Students **MUST** declare the General Chemistry major before reaching senior status (135 units, not including AP credit)

Preparation for the Major	
General Chemistry (Chem)	20A(H), 20B(H), 20L, 30AL
Organic Chemistry (Chem)	30A(H), 30B, 30BL, 30C, 30CL
Math	31A, 31B, 32A, 33B
Physics	1A(H), 1B(H), 1C(H), 4BL

(H) indicates that an HONORS section may be available

Upper Division Major Requirements	
Chemistry & Biochemistry (Chem)	110A, 153A(H), 153L, 171
Two Chemistry Electives (8 units)	Two (2) upper division Chem electives (see list on back)
Chemistry Laboratory (Choose one)	118, 136, 144, 154, C174, 184, C185
Additional Electives (24 units)	Six (6) additional upper division courses in any department

## Written Proposal Guidelines

Any student who is considering the General Chemistry major should prepare a written proposal for submission. It should be written in essay format and should include items 1-3 below.

1. Your specific career interests
2. A detailed statement of your rationale for choosing each of the nine elective courses and how each of them contribute to a coherent major, relative to your overall career goals
3. A proposed schedule of the courses you still need to take (including the nine proposed electives) showing when you will complete all of your requirements. You will need to contact the departments outside the Chemistry & Biochemistry Department to determine:
  - a. the quarters in which the courses are offered
  - b. availability - i.e. if the courses are limited to majors; if they fill up quickly
4. Fill out a change of major petition in the Undergraduate Chemistry & Biochemistry Office, 4009 Young Hall
5. Email your proposal to [harding@chem.ucla.edu](mailto:harding@chem.ucla.edu) and [angela.carpenter@chem.ucla.edu](mailto:angela.carpenter@chem.ucla.edu)
6. Please allow one week for your proposal to be evaluated.

\*To view a sample proposal, visit the General Chemistry advisor's website at <http://web.chem.ucla.edu/~harding/>

## Important Notes

- You may not take or repeat a chemistry or biochemistry course for credit if it is a prerequisite for a more advanced course for which you already have credit.
- Individual study courses and research courses (e.g. 196, 199) may not be used to satisfy the requirements for the General Chemistry major. Seminars and workshop courses are usually not acceptable.
- You must maintain at least a 2.0 GPA in all upper division coursework taken to fulfill the major requirements.
- All Prep for Major and UD Major courses must be taken for a letter grade.**
- Until the proposal has been approved, there is **NO** guarantee that the proposed courses can be used for the major, even if they have already been taken.

## Upper Division (UD) Chemistry Elective Courses

The program of upper division courses for the General Chemistry major should be planned with care. Particular attention should be paid to prerequisites for advanced courses and to the quarter(s) in which courses are offered. Please use the following list as a guide to plan your Chemistry electives.

Course	Course Title	Prerequisite(s)
103	Environmental Chemistry	Chem 30B, 30BL, 110A, 153A(H), 153L
C115A	Quantum Chemistry	Chem 113A; Math 32B, 33A with grades of C- or better (see catalog)
C115B	Quantum Chemistry	Chem C115A with grade of C- or better
<b>118</b>	Colloidal Dynamics Laboratory	[Chem 110A, 110B with grades of B or better OR equivalent Statistical Mechanics courses from engineering, math, or physics]
C123A	Classical and Statistical Thermodynamics	Chem [110B or 156] (113A)
C123B	Classical and Statistical Thermodynamics	Chem [110B or 156] (113A)
125	Computers in Chemistry	Chem 110A, 110B, 113A; Prep: working knowledge of Fortran IV or PL/1
C126A	Computational Methods for Chemists	Chem 110A; Math 33B; Prep: programming experience in BASIC, Fortran, C, C++, Java, or Pascal
<b>136</b>	Organic Structural Methods	Chem 30C, 30CL with grades of C- or better
C140	Bionanotechnology	Chem 30C, 110A
C143A	Structure and Mechanism in Organic Chemistry	Chem 30C, 30CL*, 110B, 113A with grades of C- or better
C143B	Mechanism and Structure in Organic Chemistry	Chem C143A with grade of C- or better
<b>144</b>	Practical and Theoretical Introductory Organic Synthesis	Chem 30C, 30CL with grades of C- or better
C145	Theoretical and Computational Organic Chemistry	Chem 30C, 113A
153B(H)	Biochemistry: DNA, RNA, and Protein Synthesis	Chem 153A(H); Life Sciences 2, 3
153C(H)	Biochemistry: Biosynthetic and Energy Metabolism and Its Regulation	Chem 153A(H)
CM153G	Advanced Principles of Molecular and Cellular Biosciences I	Chem 110A, 153A, 153B, 153C, 156
<b>154</b>	Biochemical Methods II	Chem 153A(H), 153B(H), 153L with grades of C- or better (156)
156	Physical Biochemistry	Chem 110A, 153A
CM160A	Intro to Bioinformatics	[Biostats 100A OR 110A OR Math 170A OR Stats 100A OR 110A]; [Comp Sci 180 OR PIC 60] with grades of C- or better.
C160B	Algorithms in Bioinformatics and Systems Biology	Chem CM160A with grade of C- or better (PIC 60; Stats 100A, 110A)
C161A	Plant Biochemistry	Chem 153C
C164	Free Radicals in Biology and Medicine	Chem 153A and [153B OR 153C] with grades of C- or better
<b>C174</b>	Inorganic and Metalorganic Lab Methods	Chem 30CL, C172 with grades of C- or better
C175	Inorganic Reaction Mechanisms	Chem 110A, 110B, 113A, C172
C176	Group Theory and Applications to Inorganic Chemistry	Chem 113A, C172
C179	Biological Inorganic Chemistry	Chem 153A(H), 171
C180	Solid-State Chemistry	Chem C172
C181	Polymer Chemistry	Chem 30B, 110A
<b>184</b>	Chemical Instrumentation	Chem 30CL, 110A with grades of C- or better
<b>C185</b>	Materials Chemistry Lab	Chem 30AL, 110A, 113A, 171

\* indicates may be taken concurrently with the course  
( ) recommended courses

[ ] pick one course enclosed in brackets  
**bold** indicates courses that satisfy the lab requirement

## College Requirements for the B.S. Degree

Requirements for the B.S. degree established by the College of Letters and Science are listed in the UCLA General Catalog. A total of at least 180 quarter units are required for the degree; 60 of these 180 units must be upper division (course numbers 100-199). Check your DPR to determine your allotted maximum number of quarter units. Note: the General Chemistry UD Requirements satisfy at least 52 UD units.

## BIOCHEMISTRY ELECTIVES

Biochemistry majors must take:

- One UD **Chem** Elective (4 units)– Listed in the first column     **AND**
- Four UD Electives (16 units) – Choose from any course listed below

<b>Chem 103</b>	BioEng 100	EE Biol M139	Math 149	MS&Eng CM180	Physics 108
<b>Chem M104</b>	Biol Ch M140	EE Biol M145	Math 151A	Neurbio M169	Physics 110A
<b>Chem C108</b>	Biomath 106	EE Biol 146	Math 151B	Neurosc M101A	Physics 110B
<b>Chem 110B</b>	Biomath 108	EE Biol 151A	Math 153	Neurosc M101B	Physics 112
<b>Chem 113A</b>	Biomath C108C	EE Biol 154	Math 157	Neurosc M101C	Physics 114
<b>Chem C113B</b>	Biomath 110	EE Biol M158	Math 164	Neurosc 101L	Physics 115A
<b>Chem 114</b>	Biomath 160	EE Biol 162	Math 167	Neurosc 102	Physics 115B
<b>Chem C115A</b>	Biomath 170A	EE Biol 168	Math 170A	Neurosc M119L	Physics 115C
<b>Chem C115B</b>	BioMed Eng C101	EE Biol 170	Math 170B	Neurosc M119N	Physics 116
<b>Chem M117</b>	BioMed Eng CM180	EE Biol 175	Math 171	Neurosc M130	Physics 117
<b>Chem 118</b>	BioMed Eng C185	EE Biol 181	Math 172A	Neurosc M145	Physics M122
<b>Chem M120</b>	Biostat 100A	Elec Eng M185	Math 172B	Neurosc M148	Physics 123
<b>Chem 121</b>	Biostat 100B	Environ 121	MCD Bio 100	Neurosc C172	Physics 124
<b>Chem C123A</b>	Biostat 110A	Env Hlt 100	MCD Bio 138	Philos M134	Physics 126
<b>Chem C123B</b>	Biostat 110B	Env Hlt C140	MCD Bio M140	PhySci 100	Physics 131
<b>Chem 125</b>	Biostat 115	Epidem 100	MCD Bio C141	PhySci 107	Physics 132
<b>Chem C126A</b>	ChemEng 100	E&S Sci C107	MCD Bio 143	PhySci 111A	Physics 140A
<b>Chem CM127</b>	ChemEng 101A	E&S Sci C109	MCD Bio C150	PhySci 111B	Physics 140B
<b>Chem 136</b>	ChemEng 109	E&S Sci M118	MCD Bio 155	PhySci 111L	Physics 150
<b>Chem C140</b>	ChemEng 110	Grntlgy M119X	MCD Bio CM156	PhySci 124	Physics 160
<b>Chem C143A</b>	ChemEng CM145	Hum Gen C144	MCD Bio 162	PhySci C126	Physics 180A
<b>Chem C143B</b>	C&EE 108	Hum Gen CM156	MCD Bio 165A	PhySci 133	Physics 180B
<b>Chem 144</b>	EE Biol 100	M Pharm 110A	MCD Bio 165B	PhySci 135	Physics 180C
<b>Chem C145</b>	EE Biol 101	M Pharm 110B	MCD Bio 168	PhySci 136	Physics 180D
<b>Chem C159A</b>	EE Biol 103	Math 110A(H)	MCD Bio M170	PhySci C137	Physics 180E
<b>Chem C159B</b>	EE Biol 105	Math 110B(H)	MCD Bio 172	PhySci 138	Physics C185
<b>Chem CM160A</b>	EE Biol 109	Math 110C	MCD Bio C174A	PhySci C144	Psych 115
<b>Chem C160B</b>	EE Biol 110	Math 111	MCD Bio C174B	PhySci M145	Psych 116
<b>Chem C161A</b>	EE Biol 111	Math 115A	MCD Bio C174D	PhySci 147	Psych M117A
<b>Chem C164</b>	EE Biol 112	Math 115B	MCD Bio M175A	PhySci M148	Psych M117B
<b>Chem C165</b>	EE Biol 113A	Math 117	MCD Bio M175B	PhySci 149	Psych M117C
<b>Chem CM170</b>	EE Biol 114A	Math 120A	MCD Bio M175C	PhySci C150	Psych M117J
<b>Chem 172</b>	EE Biol 115	Math 120B	Med Hist M169	PhySci C152	Psych M119L
<b>Chem C174</b>	EE Biol 116	Math 121	MIMG 100L	PhySci 153	Psych M119N
<b>Chem C175</b>	EE Biol 117	Math 123	MIMG 101	PhySci 155	Psych 119R
<b>Chem C176</b>	EE Biol C119	Math 131A	MIMG 102	PhySci M158	Psych M119X
<b>Chem C179</b>	EE Biol 120	Math 131AX	MIMG 103L	PhySci 165	Pub Hlt 150
<b>Chem C180</b>	EE Biol 121	Math 131B	MIMG 106	PhySci 166	Stats 100A
<b>Chem C181</b>	EE Biol 122	Math 131C	MIMG 120	PhySci 167	Stats 100B
<b>Chem 184</b>	EE Biol 128	Math 132	MIMG 132	PhySci 173	Stats 100C
<b>Chem C185</b>	EE Biol 129	Math 134	MIMG CM133	PhySci M180A	
Anthro 153	EE Biol 130	Math 135	MIMG CM156	PhySci M180B	
A&O Sci 104	EE Biol 134A	Math 136	MIMG 168	PhySci M180C	
A&O Sci M105	EE Biol 135	Math 142	MIMG C174	PhySci M181	
A&O Sci M140	EE Biol 136	Math 143	MIMG 185A	Physics 105A	
A&O Sci 145	EE Biol 137	Math 146	Mol Tox M110A	Physics 105B	

## COMPUTING SPECIALIZATION 2010-2011

**COMPUTING SPECIALIZATION:** This computing specialization is designed for students who are interested in adding computer programming and computational chemistry to their Chemistry, Biochemistry, General Chemistry, or Chemistry-Materials Science degree. Refer to the UCLA General Catalog ([www.registrar.ucla.edu/catalog](http://www.registrar.ucla.edu/catalog)) for course descriptions and requisites.

For more details about this specialization offered in the Department of Chemistry and Biochemistry, consult the Undergraduate Office in 4009 Young Hall.

Specialization Requirements	
Major Requirements	Satisfy all the requirements for a bachelor's degree in the specified major within the Chemistry and Biochemistry department.
Program in Computing (PIC)	10A, 10B
Program in Computing (PIC) Elective (Choose one)	10C, 15, 20A, 30, 40A, 60
Chemistry (Chem) (8 units)	C126A, C145, CM160A, C160B

### Important Notes

- Courses must be completed with a combined GPA of at least 2.0.
- Students must petition for admission to this program AFTER they complete Programming in Computing 10A and 10B.
- Petitions should be filed in the Undergraduate Office in 4009 Young Hall.
- Students graduate with a bachelor's degree in their major and a specialization in computing.
- Program In Computing courses are offered through the Mathematics Department

### Course Information

Course	Course Title	Prerequisite(s)
<b>Program In Computing</b>		
10A	Intro to Programming	None (PIC 1 if no prior computing experience)
10B	Intermediate Programming	PIC 10A
10C	Advanced Programming	PIC 10B
15	Intro to Lisp and Symbolic Computation	PIC 10A
20A	Principles of Java Language with Applications	PIC 10A
30	Machine Organization and Assembly Language Programming	PIC 10B
40A	Intro to Programming for the Internet	PIC 10A (10B)
60	Data Structures and Algorithms	PIC 10B; Math 31A, 31B, 61
<b>Chemistry</b>		
C126A	Computational Methods for Chemists	Chem 110A; Math 33B (see catalog for preparation)
C145	Theoretical and Computational Organic Chemistry	Chem 30C, 113A
CM160A	Intro to Bioinformatics	[Biostats 100A <u>OR</u> 110A <u>OR</u> Math 170A <u>OR</u> Stats 100A <u>OR</u> 110A]; [CompSci 180 <u>OR</u> PIC 60] with grades of C- or better
C160B	Algorithms in Bioinformatics and Systems Biology	Chem C160A with grade of C- or better (PIC 60; Stats 100A, 110A)

( ) recommended courses

[ ] pick one course enclosed in brackets

## Frequently Asked Questions

### **I have the prerequisites for a class, but I get an error message when I try to enroll. What can I do?**

If you have taken the prerequisites for a UCLA chemistry class as a different school, URSA will not recognize the transfer credit, even if it shows correctly on your DPR. If this happens, or you cannot enroll for another reason, stop by the Undergraduate Office in 4009 Young Hall to fill out an enrollment form or email Denise Mantonya, the enrollment coordinator, at [denise@chem.ucla.edu](mailto:denise@chem.ucla.edu) with the following information:

- Your Name
- Student ID number
- The term
- The Course
- The Course ID number

You will be enrolled within 24 hours (on business days) of submitting an enrollment request if there are not other restrictions and space is available. Enrollment requests are processed in order of receipt.

### **Can I enroll in a class that I have not met the prerequisites for?**

You are not able to enroll in a chemistry class unless you meet the prerequisites. This rule is only waived if you bring in written permission from the instructor stating that he/she knows the prerequisites have not been completed and is still allowing you to enroll in the class. These permission notes should be brought to Denise Mantonya in 4009 Young Hall.

Professors will not waive prerequisites simply because you need the class to graduate.

And be careful, as it is difficult to do well in courses where you are not fully prepared. Also, Chemistry courses are sequential and once an advanced course is completed, you cannot go back and take an earlier course in the sequence for unit credit (won't count towards unit max) or grade credit (won't count in your GPA).

### **What is my chance of getting into a Chemistry class if I am waitlisted? What if I can't even get on the waiting list?**

Chemistry waitlists are realistic. If you are waitlisted, you have a good chance of getting into the class, but there is no guarantee. Enrollment decisions will be made no earlier than the first day of the class. Be sure to attend class on the first day, even if you are not on the waiting list. The professor will communicate the most updated enrollment information on the first day of class.

### **Why are there some Chemistry classes where you can only enroll on the waitlist?**

These are upper division lab classes - 114, 136, 144, 154, C174, 184, C185 - where enrollment priority is given to graduating seniors.

You should sign up on the waiting list and show up to class on the first day. The professor will give enrollment spots to graduating seniors first. Even if your name is on the waitlist, you must show up on the first day of class or your spot will be given to someone else.

## How can I drop a class?

You must not complete your class in any way (i.e., take the final, turn in a term paper) if you wish to drop the course from your study list.

### Non-impacted Courses

	How to Drop	Fee	Transcript Notation?
Weeks 1-2	URSA	None	No
Weeks 3-4	URSA	\$5	No
Weeks 5-7	URSA	\$20	Yes
Weeks 8-10*	Red Drop Petition	\$35	Yes
After Week 10 <sup>+</sup>	Red Drop Petition	\$50	Yes

\*Students are restricted to three drops during this period throughout their academic careers

<sup>+</sup>These petitions are generally only approved for extenuating and documented circumstances.

### Impacted Courses

Impacted courses may not be dropped after the second week of a term for other than exceptionally extenuating circumstances. Exceptionally extenuating circumstances do not include circumstances of short duration where other alternatives exist, including but not limited to a late drop of other (non-impacted) courses or taking an Incomplete in the impacted course.

	How to Drop	Fee	Transcript Notation?
Weeks 1-2	URSA	None	No
Weeks 3 -10 <sup>+</sup>	Red Drop Petition	\$20	Yes
After Week 10 <sup>+</sup>	Red Drop Petition	\$50	Yes

<sup>+</sup>These petitions are generally only approved for extenuating and documented circumstances.

All fees are charged to your BAR account. A list of Impacted Courses can be found at [www.registrar.ucla.edu/soc/impact.htm](http://www.registrar.ucla.edu/soc/impact.htm).

## What do I do if I have an emergency and need to drop all of my classes for the quarter?

You can withdraw from the term provided that you have not completed the work in any course taken that term. A “UCLA Notice of Withdrawal from the Term” form must be filed with your College Counseling unit. If you have any questions about the process, talk to your College Counseling Unit.

Withdrawing from a quarter can affect financial aid, international student status, athletics, and on-campus housing status, so students should check with these departments before withdrawing.

## Minors

There is not a minor offered in the Chemistry and Biochemistry Department.

A list of available minors can be found in the General Catalog. To declare a minor, start by meeting with an advisor in the department that offers the minor.

<http://cis.ucla.edu/studyArea/> - mixes minors with majors, but provides links to more information

## Declaring/Changing Your Major

To declare a major in the Chemistry and Biochemistry Department, fill out a change of major petition (<http://www.registrar.ucla.edu/forms/programchange.pdf>) and bring it to the Undergraduate Office in 4009 Young Hall.

When petitioning, we will look at your overall progress, check to see if you have at least a 2.0 GPA, make sure you do not have any outstanding D's or F's in any courses for the major, verify that there are no holds on your record, and that you can complete the major within your unit maximum (216 + AP units).

If there are any problems with processing of the change of major request, you will be contacted. If the petition is approved, you will receive an email and the update will be made on URSA and MyUCLA. You will also receive a copy of your updated Degree Progress Report (DPR) in the mail.

*You must be in good academic standing with at least 12 units completed at UCLA before being allowed to declare or change majors.*

If you decide a major in the Chemistry and Biochemistry Department is not for you, visit the department you are interested in and find out their requirements.

## Listserv

Sign up and receive e-mails with the most current announcements on jobs, internships, scholarships, awards, and department updates.

1. Send an e-mail to [majordomo@chem.ucla.edu](mailto:majordomo@chem.ucla.edu)
2. Leave the subject link blank
3. In the body text write: subscribe ugradlist myname@ucla.edu

You should receive a message that will request a reply to complete your registration.

<http://www.chemistry.ucla.edu/pages/ugrad/listserv>

## Course Information

### Advanced Placement (AP) Credit

A 4 or 5 on the AP Chemistry test will give you the option of credit for Chem 20A.

Note: Medical Schools do not recognize AP credit! If there is any chance you will apply to medical school, you should take Chem 20A(H) at UCLA.

If you want to use your AP credit, contact the Undergraduate Office.

<http://www.admissions.ucla.edu/Prospect/APCreditLS.htm>

## Transfer Credit

You can take classes at another college to complete UCLA, requirements, but you must verify that the course will be equivalent to the course you need at UCLA.

Some things to keep in mind when you are considering taking classes at another school:

- Concurrent Enrollment – Students will not receive credit for coursework completed at another institution while simultaneously enrolled at UCLA as a regular session student (regular session includes Fall, Winter, Spring, but not Summer). This policy includes Extension classes.
- Summer School – Students may receive course credit for courses taken at other UC campuses, other four-year institutions and community college provided that the courses are deemed equivalent
- Units – Students who have completed 105 units or more will not receive credit for classes taken at a community college, but you will receive course credit if the courses have been deemed equivalent\*.
- Grade Point Average (GPA) – Only UC courses or UCLA Extension classes marked XLC will apply to a student's UCLA GPA
- Residency Requirements
  - Senior Residency – **35 of the last 45 units** towards a student's degree must be completed at UCLA
  - Major Residency – a minimum **24 upper division units** must be completed in the major while at UCLA

\*If you transfer coursework to UCLA that is not given equivalent credit to a UCLA course, you may need to petition to get course credit. To find out if there is an established equivalent course or if you need to petition, contact the appropriate department as outlined below.

- For GE courses and College requirements, talk to your College Counseling unit
- For Chemistry courses, ask the Chemistry & Biochemistry Undergraduate Office.
- For other courses, i.e., Math, Physics, Life Science, etc., contact the department directly.

Use <http://www.assist.org> to look up equivalent credit at other California schools

## Impacted Classes

Impacted courses may not be dropped after the second week of a term for other than exceptionally extenuating circumstances.

### The following Chemistry courses are Impacted:

14BL, 14CL, 20L, 30A, 30AL, 30B, 30BL, 30C, 30CL, 110A, 114(H), 144, 153A, 153B(H), 153C, 153L, 154, C174, 184

For more information and a complete list of impacted courses, go to <http://www.registrar.ucla.edu/soc/impact.htm>

## Academic Programs for Undergrads in Science

### Departmental Scholar Program (B.S/M.S. Program)

Exceptionally promising undergraduate students may petition to pursue their bachelor's (B.S.) and master's (M.S.) degrees simultaneously. Qualifications include the following:

- Junior or senior standing
- Completion of 24 courses (96 quarter units) at UCLA, or the equivalent at a similar institution
- Completion of the major preparation courses
- A UC cumulative GPA and major GPA of 3.5 or better
- Has at least one term of coursework remaining at UCLA
- Doing research with a faculty member in the department

To obtain both the Bachelor's and Master's degrees you must be provisionally admitted to the Graduate Division, fulfill requirements for each program, and maintain a minimum B average. You may not use one course to satisfy multiple requirements.

If you are interested in becoming a Departmental Scholar, consult the Chemistry & Biochemistry Graduate Office in advance of application dates for graduate admission. The Graduate Office is located in 4006 Young Hall, or you can call (310) 825-3150.

<http://www.chemistry.ucla.edu/pages/programs>

### Student Organizations

Get Involved! From pre-med to Shakespeare there's a student group out there for you.

<http://www.studentgroups.ucla.edu>

### Alpha Chi Sigma (AXE)

Alpha Chi Sigma is a student fraternity for men and women who have taken at least one chemistry course at UCLA. The members of this group participate in social events together and support each other academically by striving for the advancement of chemistry, both as a science and as a profession. These students work in the Alpha Chi Sigma office (1275 Young Hall) to offer free tutoring services and sell lab equipment to current UCLA students.

[www.chem.ucla.edu/~AXE/](http://www.chem.ucla.edu/~AXE/)

### The ACS Student Affiliates Program (SAACS)

Any student working towards an undergraduate degree in the chemical sciences may become a Student Affiliate of the American Chemical Society (ACS). Affiliation with ACS helps you network with future colleagues and established professionals. Some benefits include discounts on ACS publications, career information and access to the ACS Office of Employment Services. Student Affiliates also have access to national, regional and local meetings of ACS as well as opportunities to present their research through the annual ACS Undergraduate Research Poster Session.

[www.chemistry.org](http://www.chemistry.org)

### **Program for Excellence in Education and Research in the Sciences (PEERS)**

The Program for Excellence in Education and Research in the Sciences starts students out on the right foot, offering first-year students an opportunity to create a network of assistance during their academic career at UCLA. PEERS students receive personal academic advising, tutoring, and assistance with research opportunities. They also attend collaborative learning workshops in math and science courses, career planning workshops, and seminars with UCLA faculty experts. PEERS targets students who have overcome significant hurdles prior to being accepted at UCLA.

[www.ugeducation.ucla.edu/urc-care/progpeers.htm](http://www.ugeducation.ucla.edu/urc-care/progpeers.htm)

### **The Center for Academic and Research Excellence (CARE)**

CARE facilitates student placement in paid laboratory research positions with UCLA faculty members in the College of Letters & Science and three of the professional schools (Engineering, Medicine, and Public Health). CARE also offers research opportunities at other UC campuses, California research universities, and national laboratories. Research stipends, funded by federal and private agencies, are available during the summer and academic year on a competitive basis. CARE emphasizes the need to increase the number of historically underrepresented individuals who will attain bachelor's and graduate science degrees as well as promotes a more ethnically diverse science community. Students from educationally or socio-economically disadvantaged backgrounds are encouraged to apply.

[www.ugeducation.ucla.edu/urc-care](http://www.ugeducation.ucla.edu/urc-care)

### **Science Teacher Education Program (STEP)**

The College of Letters and Science and the Graduate School of Education and Informational Studies offers a joint B.S./M.Ed./credential program for students planning science teaching careers. Students can begin preparing for a career in science teaching as early as their sophomore year. The Junior and Senior programs are highly structured, and include the completion of major classes for the B.S., graduate-level courses for the M.Ed., and part-time student teaching. Students earn increasing levels of financial support for their teaching.

For further information, contact:

Dr. Fred Freking, Advisor

[ffreking@ucla.edu](mailto:ffreking@ucla.edu)

(310) 794-2191

[www.nslc.ucla.edu/STEP](http://www.nslc.ucla.edu/STEP)

### **California Teach (CalTeach)**

California Teach is a collaborative academic program between the College of Letters and Science and Graduate School of Education and Information Studies. The goal of California Teach is to increase the number and retention of new, highly qualified math and science teachers in California.

The program offers undergraduates paid field experience in elementary, middle and high school classrooms, guided exploration of teaching as a career, advising for students exploring and preparing for teaching careers, and support for subject matter preparation. As early as your 1<sup>st</sup> year, you can get involved in California Teach.

For more information, contact Matt Fox at [CaTeach@ucla.edu](mailto:CaTeach@ucla.edu), to set up an individual advising session.

[www.nslc.ucla.edu/cateach](http://www.nslc.ucla.edu/cateach)

## Academic Resources

### UCLA General Catalog

This is where you can find policies and procedures, course descriptions, prerequisites, unit credit, and more helpful stuff. It is your responsibility for the information contained in the Catalog for the academic year in which they were admitted to UCLA.

<http://www.registrar.ucla.edu/catalog>

### UCLA Schedule of Classes

This is where you can find a list of all the courses offered each quarter. It includes discussion and laboratory sections, final exam dates and times, class sizes and location, and more. The link also leads to information on important deadline dates for the current academic year, registration policies, billing and fees information, financial support, academic counseling, URSA, enrollment, official notices, libraries, emergency instructions, student services, and listings of GE classes and impacted courses.

<http://www.registrar.ucla.edu/schedule>

### MyUCLA

View and model your DPR, receive important messages

Course Planner, webmail, virtual counseling, GPA calculator, helpful links, grades, class information from professors

<http://www.my.ucla.edu/>

### University Records System Access – URSA

This is where you go to enroll in courses and access your official University academic records. You can also set up and manage third-party access for others to access your data and Billing and Receivable (BAR) account. You can also access BruinAlert, which is in place to alert you in the event of a UCLA emergency. You can receive alerts via email and text messaging if contact information is provided.

<http://www.ursa.ucla.edu>

## Campus Resources

### Registrar

Need to get an official or unofficial transcript or verify that you are a full time student? The Registrar's Office is the place to go. Academic calendars, final exam schedules

<http://www.registrar.ucla.edu>

### Career Center

Career counseling, workshops, graduate and professional school services, pre-health services including list of required courses for professional school and a library of resources.

<http://career.ucla.edu>

### International Education Office

Interested in studying abroad? We have had students take Chemistry and Biochemistry courses in England, Australia, South Korea, Spain, China, and France, just to name a few places. You can go for a summer or a whole year, so go ahead and get out of here!

<http://www.ieo.ucla.edu>

### **Counseling and Psychological Services (CAPS)**

While the transition to UCLA can be an exciting challenge, some students may be coping with personal, financial, health, and other stressors. The cornerstone of CAPS services is their confidential individualized therapy and psychiatric care, provided by a diverse and multiculturally competent professional staff. And they also offer a range of group services and wellness workshops. Their website also provides a free, anonymous screening (On-Line Mental Health Screening link) to help you decide whether professional consultation would be useful.

<http://www.counseling.ucla.edu>

### **Student Legal Services**

Did you know that as a currently registered and enrolled UCLA student, you have access to legal counseling on campus?

<http://www.studentlegal.ucla.edu>

### **Financial Aid**

The mission of the Financial Aid Office is to help remove financial barriers to assist student in meeting the rising cost of attendance at UCLA. Financial aid types include Scholarships, Grants, Work Study, and Loans.

<http://www.fao.ucla.edu>

### **Dean of Students – Academic Dishonesty Policy**

Cheating will result in disciplinary action taken against you by the Dean of Student Office. Cheating includes, but is not limited to:

- Copying or permitting copying from notes or another student's exam
- Plagiarizing on laboratory reports or from scientific papers
- Altering an exam or lab report before resubmitting for a grade

Presenting false medical excuses for missing an exam is also grounds for disciplinary action.

The consequences of cheating include dismissal from the University.

[www.deanofstudent.ucla.edu](http://www.deanofstudent.ucla.edu)

# COURSE OFFERINGS FOR 2010 - 2011

## Tentative Course Offerings by Quarter 2010 - 2011

Course	Fall	Winter	Spring		Course	Fall	Winter	Spring
2					C123B/C223B		X	
14A	X	X			125	X		
14B		X	X		C126A/C226A			
14BL	X	X	X		136			X
14C	X		X		C140/C240		X	
14CL	X	X	X		C143A/C243A		X	
14D	X	X	X		C143B/C243B			X
17					144	X		
20A	X	X			C145/C245			X
20AH					153A	X	X	X
20B		X	X		153B	X	X	X
20BH					153C	X	X	X
20L	X	X	X		153L	X	X	X
30A	X		X		154	X	X	X
30AL	X		X		156	X	X	X
30B	X	X			C159A/C259A			X
30BL	X	X	X		C159B/C259B			X
30C		X	X		CM160A/CM260A			
30CL	X	X	X		CM160B/C260B			
103			X		C161A/C261A	X		
C105/CM205A			X		C163/M263		X	
C108/C208					C164/C264			
110A	X	X	X		C165/C265			X
110B			X		171	X	X	
113A	X	X	X		172			X
C113B/C213B		X			C174/C274		X	
114/114H	X		X		C175/C275			
C115A/C215A	X				C176/C276A		X	
C115B/C215B		X			C179/C279			X
118					C180/C280			X
M120					C181/C281			
121	X				184		X	
C123A/C223A	X				C185/C285			X

All Information is Subject to Change