

# Articulation Agreement by Major

Effective during the 2022-2023 Academic Year

To: University of California, Berkeley  
2022-2023 General Catalog, Semester

From: De Anza College  
2022-2023 General Catalog, Quarter

## Chemical Biology, Lower Division B.S.

### COLLEGE ADMISSION REQUIREMENTS

The major in **Chemical Biology** is offered by the College of Chemistry. The major provides an understanding of the chemical principles of biological function by emphasizing the development of a solid background in chemistry. In addition to an introductory set of math and physics courses and a broad selection of the same chemistry courses required for the chemistry major, students pursuing the chemical biology major take general and cell biology, biochemistry, biological macromolecular synthesis, and bioinorganic chemistry. The curriculum highlights organic chemistry, quantitative thermodynamics, and kinetics, subjects necessary for understanding the logic of biological systems. The Chemical Biology major is intended for students who are interested in careers as professional chemists, or in the biological sciences including the biomedical, biotechnology, and pharmaceutical industries.

Please note that Chemical Biology is distinct from Biochemistry. Biochemistry at UC Berkeley is an emphasis within the Molecular and Cell Biology major, housed in the College of Letters and Science. For a detailed understanding of distinctions between Chemical Biology and Molecular & Cell Biology, review and compare upper-division course requirements and descriptions for both majors.

**Transfer applicants are expected to complete, at a minimum, coursework equivalent to Berkeley's:**

CHEMISTRY 1A + 1AL + 1B + 3A + 3AL + 3B + 3BL  
MATH 1A + 1B + 53  
PHYSICS 7A or 8A  
ENGLISH R1A + R1B

**Coursework must be completed by the end of the spring term that precedes fall enrollment at Berkeley.**

IGETC is not required. Students who choose to complete the entire IGETC pattern by the end of the spring term preceding fall enrollment at Berkeley may use IGETC to fulfill the Reading and Composition and Language Other Than English (LOTE) Requirements.

Lower division courses required for graduation (but not for admission) are also listed in this articulation agreement. Completion of those courses is strongly recommended in order to strengthen one's application. All major courses must be taken for a letter grade. High grades in major courses (B and A grades exclusively) are essential for applicants to be both competitive in the admissions process and to be adequately prepared to continue with junior year coursework at Berkeley.

The applicant's personal statement is important in the admissions process. The personal statement is reviewed for evidence of the student's interest in the chosen field and a thoughtful match between the intended major and academic and career objectives.

**For more information on College of Chemistry policies and degree programs:**

<https://chemistry.berkeley.edu/ugrad/degrees>

**For more information on admission to UC Berkeley:**

<https://admissions.berkeley.edu>

**For more information on majors at UC Berkeley:**

**Berkeley Academic Guide:** <http://guide.berkeley.edu>

**Additional questions about transferring to the College of Chemistry may be addressed to:**

Maura Daly, Director of Undergraduate Student Services  
mdaly@berkeley.edu  
(510) 643-0550

### ADDITIONAL REQUIREMENTS

**Chemical Biology majors** who transfer without having covered analytical chemistry are required to take CHEM 105 after transfer.

#### ORGANIC CHEMISTRY

CHEM 12A + 12B (organic chemistry) are required for the Chemical Biology B.S. degree.

**Completion of CHEM 3A + 3AL + 3B + 3BL combined with a score in the 75th percentile or higher on the American Chemical Society (ACS) Organic Chemistry Exam will constitute satisfactory completion of Berkeley's CHEM 12A + 12B.** Students are encouraged to take the exam through their community college, if possible.

**NOTE:** The College of Chemistry does not accept results from the 1994 and 1998 versions of the ACS Organic Chemistry Exam.

#### PHYSICS

**PHYSICS 7C** is not required for the Chemical Biology major, but it is acceptable toward the 7-Unit Upper Division Chemistry and

Allied Subjects Requirement.

#### **READING AND COMPOSITION REQUIREMENT**

Coursework equivalent to Berkeley's: English R1A + R1B; or

Entire IGETC pattern completed **by the end of the spring term preceding fall enrollment at Berkeley.**

You may also satisfy this requirement with a score/grade of:

4 or 5 on the AP exam in English Language and Composition satisfies ENGLISH R1A;

4 on the AP exam in English Literature and Composition satisfies ENGLISH R1A;

5 on the AP exam in English Literature and Composition satisfies ENGLISH R1A + R1B.

#### **LANGUAGE OTHER THAN ENGLISH (LOTE) REQUIREMENT**

The LOTE may be satisfied after transfer, but it should be satisfied by the end of the student's third (junior) year.

To satisfy this Requirement:

Complete a course equivalent to the third year of a language other than English in high school with a grade of C- or higher, or the second semester of a language other than English as taught at Berkeley; or

Complete the entire IGETC pattern by the end of the spring term preceding fall enrollment at Berkeley; or

You may satisfy this Requirement with a score/grade of:

550 on the SAT Subject Test, Language Other Than English, if taken before May 1995;

590 on the SAT II Subject Exam, if taken May 1995 or later;

3 or better on the Foreign Language AP Exam;

C or better on the GCE A-level or I/GCSE O-level Exam in a language other than English;

1-5 on the Foreign Service Institute (FSI) or Defense Language Institute (DLI) exam;

5 or better on the International Baccalaureate in the following exams:

Language (*other than English*) acquisition:

B Standard Level (SL)

B Higher Level (HL)

Studies in language (*other than English*) and literature:

A: literature Standard Level (SL)

A: literature Higher Level (HL)

A: language and literature Standard Level (SL)

A: language and literature Higher Level (HL)

#### **OR**

Courses that satisfy Language Other Than English requirement - See list of approved (FL-Foreign Language) courses below.  
(May be taken for a letter grade or pass/no pass.)

### **AP EXAM CREDIT**

#### **BIOLOGY**

You may also satisfy this requirement with a score/grade of:

4 or higher on the AP Biology exam.

#### **MATHEMATICS**

You may also satisfy this requirement with a score/grade of:

3 or higher on the AP Calculus AB exam satisfies MATH 1A;

3 or 4 on the AP Calculus BC exam satisfies MATH 1A;

5 on the AP Calculus BC exam satisfies MATH 1A + 1B.

#### **LANGUAGE OTHER THAN ENGLISH (LOTE) REQUIREMENT**

3 or better on the Foreign Language AP Exam

#### **READING AND COMPOSITION REQUIREMENT**

You may also satisfy this requirement with a score/grade of:

4 or 5 on the AP exam in English Language and Composition satisfies ENGLISH R1A;

4 on the AP exam in English Literature and Composition satisfies ENGLISH R1A;

5 on the AP exam in English Literature and Composition satisfies ENGLISH R1A + R1B.

See ADDITIONAL REQUIREMENTS section for additional options to satisfy requirements.

### **CHEMISTRY**

**\*\*REFER TO TOP OF AGREEMENT\*\***

**CHEM 1A** - General Chemistry (3.00)  
 --- And ---  
**CHEM 1AL** - General Chemistry Laboratory (2.00)

← Articulates as a Series Only

**CHEM 1B** - General Chemistry (4.00)

← Articulates as a Series Only

**CHEM 1A** - General Chemistry (3.00)  
 --- And ---  
**CHEM 1AL** - General Chemistry Laboratory (2.00)  
 --- And ---  
**CHEM 1B** - General Chemistry (4.00)

←

**CHEM 1A** - General Chemistry (5.00)  
 --- And ---  
**CHEM 1B** - General Chemistry (5.00)  
 --- And ---  
**CHEM 1C** - General Chemistry and Qualitative Analysis (5.00)  
 • *Regular and honors courses may be combined to complete this series*

--- Or ---

**CHEM 1AH** - General Chemistry - HONORS (5.00)  
 --- And ---  
**CHEM 1BH** - General Chemistry - HONORS (5.00)  
 --- And ---  
**CHEM 1CH** - General Chemistry and Qualitative Analysis - HONORS (5.00)  
 • *Regular and honors courses may be combined to complete this series*

## ORGANIC CHEMISTRY

**\*\*REFER TO TOP OF AGREEMENT\*\***

**CHEM 3A** - Chemical Structure and Reactivity (3.00)  
 --- And ---  
**CHEM 3AL** - Organic Chemistry Laboratory (2.00)

←

**CHEM 12A** - Organic Chemistry (5.00)  
 --- And ---  
**CHEM 12B** - Organic Chemistry (5.00)

**CHEM 3B** - Chemical Structure and Reactivity (3.00)  
 --- And ---  
**CHEM 3BL** - Organic Chemistry Laboratory (2.00)

←

**CHEM 12B** - Organic Chemistry (5.00)  
 --- And ---  
**CHEM 12C** - Organic Chemistry (5.00)

**CHEM 3A** - Chemical Structure and Reactivity (3.00)  
 --- And ---  
**CHEM 3AL** - Organic Chemistry Laboratory (2.00)  
 --- And ---  
**CHEM 3B** - Chemical Structure and Reactivity (3.00)  
 --- And ---  
**CHEM 3BL** - Organic Chemistry Laboratory (2.00)

←

Articulates as Course-to-Course Only

## MATHEMATICS

**\*\*REFER TO TOP OF AGREEMENT\*\***

<b>MATH 1A</b> - Calculus (4.00)	←	<div> <b>MATH 1A</b> - Calculus (5.00) <div>--- And ---</div> <b>MATH 1B</b> - Calculus (5.00) <ul style="list-style-type: none"> <li><i>Regular and honors courses may be combined to complete this series</i></li> </ul> </div> <div>--- Or ---</div> <div> <b>MATH 1AH</b> - Calculus - HONORS (5.00) <div>--- And ---</div> <b>MATH 1BH</b> - Calculus - HONORS (5.00) <ul style="list-style-type: none"> <li><i>Regular and honors courses may be combined to complete this series</i></li> </ul> </div>
<b>MATH 1B</b> - Calculus (4.00)	←	<div> <b>MATH 1B</b> - Calculus (5.00) <div>--- And ---</div> <b>MATH 1C</b> - Calculus (5.00) <ul style="list-style-type: none"> <li><i>Regular and honors courses may be combined to complete this series</i></li> </ul> </div> <div>--- Or ---</div> <div> <b>MATH 1BH</b> - Calculus - HONORS (5.00) <div>--- And ---</div> <b>MATH 1CH</b> - Calculus - HONORS (5.00) <ul style="list-style-type: none"> <li><i>Regular and honors courses may be combined to complete this series</i></li> </ul> </div>
<b>MATH 53</b> - Multivariable Calculus (4.00)	←	<div> <b>MATH 1C</b> - Calculus (5.00) <div>--- And ---</div> <b>MATH 1D</b> - Calculus (5.00) <ul style="list-style-type: none"> <li><i>Regular and honors courses may be combined to complete this series</i></li> </ul> </div> <div>--- Or ---</div> <div> <b>MATH 1CH</b> - Calculus - HONORS (5.00) <div>--- And ---</div> <b>MATH 1DH</b> - Calculus - HONORS (5.00) <ul style="list-style-type: none"> <li><i>Regular and honors courses may be combined to complete this series</i></li> </ul> </div>
<b>MATH 54</b> - Linear Algebra and Differential Equations (4.00)	←	<div> <b>MATH 2A</b> - Differential Equations (5.00) <div>--- And ---</div> <b>MATH 2B</b> - Linear Algebra (5.00) <ul style="list-style-type: none"> <li><i>Regular and honors courses may be combined to complete this series</i></li> </ul> </div> <div>--- Or ---</div> <div> <b>MATH 2AH</b> - Differential Equations - HONORS (5.00) <div>--- And ---</div> <b>MATH 2BH</b> - Linear Algebra - HONORS (5.00) <ul style="list-style-type: none"> <li><i>Regular and honors courses may be combined to complete this series</i></li> </ul> </div>

PHYSICS

<b>PHYSICS 7A</b> - Physics for Scientists and Engineers (4.00)	←	<b>PHYS 4A</b> - Physics for Scientists and Engineers: Mechanics (6.00)
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**PHYSICS 7B** - Physics for Scientists and Engineers (4.00)



**PHYS 4B** - Physics for Scientists and Engineers: Electricity and Magnetism (6.00)

--- And ---

**PHYS 4C** - Physics for Scientists and Engineers: Fluids, Waves, Optics and Thermodynamics (6.00)

**PHYSICS 7C** - Physics for Scientists and Engineers (4.00)



**PHYS 4C** - Physics for Scientists and Engineers: Fluids, Waves, Optics and Thermodynamics (6.00)

--- And ---

**PHYS 4D** - Physics for Scientists and Engineers: Modern Physics (6.00)

**PHYSICS 7A** - Physics for Scientists and Engineers (4.00)

--- And ---

**PHYSICS 7B** - Physics for Scientists and Engineers (4.00)



Articulates as Course-to-Course Only

**PHYSICS 7A** - Physics for Scientists and Engineers (4.00)

--- And ---

**PHYSICS 7B** - Physics for Scientists and Engineers (4.00)

--- And ---

**PHYSICS 7C** - Physics for Scientists and Engineers (4.00)



Articulates as Course-to-Course Only

--- Or ---

**PHYSICS 8A** - Introductory Physics (4.00)



**PHYS 4A** - Physics for Scientists and Engineers: Mechanics (6.00)

--- And ---

**PHYS 4B** - Physics for Scientists and Engineers: Electricity and Magnetism (6.00)

--- Or ---

**PHYS 2A** - General Introductory Physics (5.00)

--- And ---

**PHYS 2C** - General Introductory Physics (5.00)

**PHYSICS 8B** - Introductory Physics (4.00)



**PHYS 4C** - Physics for Scientists and Engineers: Fluids, Waves, Optics and Thermodynamics (6.00)

--- And ---

**PHYS 4D** - Physics for Scientists and Engineers: Modern Physics (6.00)

--- Or ---

**PHYS 2B** - General Introductory Physics (5.00)

--- And ---

**PHYS 2C** - General Introductory Physics (5.00)

**PHYSICS 8A** - Introductory Physics (4.00)

--- And ---

**PHYSICS 8B** - Introductory Physics (4.00)



Articulates as Course-to-Course Only

## BIOLOGY

**\*\*REFER TO TOP OF AGREEMENT\*\***

**BIOLOGY 1A** - General Biology Lecture (Cells, Genetics, Animal Form & Function) (3.00)

--- And ---

**BIOLOGY 1AL** - General Biology Laboratory (2.00)



**BIOL 6A** - Form and Function in the Biological World (6.00)

--- And ---

**BIOL 6B** - Cell and Molecular Biology (6.00)

--- Or ---

**BIOL 6AH** - Form and Function in the Biological World - HONORS (6.00)

--- And ---

**BIOL 6B** - Cell and Molecular Biology (6.00)

**BIOLOGY 1A** - General Biology Lecture (Cells, Genetics, Animal Form & Function) (3.00)

--- And ---

**BIOLOGY 1AL** - General Biology Laboratory (2.00)

--- And ---

**BIOLOGY 1B** - General Biology (Plant Form & Function, Ecology, Evolution) (4.00)



Articulates as Course-to-Course Only

## READING AND COMPOSITION (R&C)

**\*\*REFER TO TOP OF AGREEMENT\*\***

**ENGLISH R1A** - Reading and Composition (4.00)



**EWRT 1A** - Composition and Reading (5.00)

--- Or ---

**EWRT 1AH** - Composition and Reading - HONORS (5.00)

--- Or ---

**ESL 5** - Advanced Composition and Reading (5.00)

**ENGLISH R1B** - Reading and Composition (4.00)



**EWRT 1B** - Reading, Writing and Research (5.00)

--- Or ---

**EWRT 2** - Critical Reading, Writing and Thinking (5.00)

--- Or ---

**EWRT 1BH** - Reading, Writing and Research - HONORS (5.00)

--- Or ---

**EWRT 2H** - Critical Reading, Writing and Thinking - HONORS (5.00)

## LANGUAGE OTHER THAN ENGLISH

**\*\*REFER TO TOP OF AGREEMENT\*\***

FL-Foreign Language



**FREN 3** - Elementary French (Third Quarter) (5.00)

**GERM 3** - Elementary German (Third Quarter) (5.00)

**HNDI 3** - Elementary Hindi (Third Quarter) (5.00)

**ITAL 3** - Elementary Italian (Third Quarter) (5.00)

**JAPN 3** - Elementary Japanese (Third Quarter) (5.00)

**KORE 3** - Elementary Korean (Third Quarter) (5.00)

**MAND 3** - Elementary Mandarin (Third Quarter) (5.00)

**PERS 3** - Elementary Persian (Third Quarter) (5.00)

**SIGN 3** - Elementary American Sign Language (Third Quarter) (5.00)

**SPAN 3** - Elementary Spanish (Third Quarter) (5.00)

**VIET 3** - Elementary Vietnamese (Third Quarter) (5.00)

**END OF AGREEMENT**