

Fall 2020 Course Descriptions as of 04/05/2020 08:10 PM

Information in Browse Course Catalog is subject to change. Information is term specific. Please refer to the appropriate term when searching for course content. Key to Course Descriptions may be found at: http://rcs.registrar.arizona.edu/course_descriptions_key.

Biochemistry (BIOC)

BIOC 195A: Great Experiments in Microbiology (1 unit)

Description: This course will present classical experiments and discoveries that served as the foundation of modern microbiology and immunology. Significant milestones, major figures, and their original writings will be discussed, as well as the application of the scientific method and the role of accidental discoveries in the progress of science.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Equivalent to: BIOC 195A, MCB 195A, MICR 195A

Also offered as: MIC 195A

Course typically offered:

Main Campus: Spring

Home department: Veterinary Science & Microbiology

Freshman Colloquia: Freshman Colloquia

BIOC 195E: Careers in Science and Math (1 unit)

Description: This colloquium will focus on discussions concerning the wide variety of career opportunities one may consider in the biological and physical sciences and in math. Discussions will include choosing and meeting career goals, unique opportunities in these fields, survival skills for succeeding, classification of one's strengths and weaknesses, evaluation of career options, development of skills in giving presentations, writing a resume, using professionals as a resource, learning about research and seminar opportunities on campus, and making use of advisors and mentors.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Course typically offered:

Main Campus: Fall

Freshman Colloquia: Freshman Colloquia

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 199: Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 12 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

Recommendations and additional information: BIOC199 enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

BIOC 199H: Honors Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Recommendations and additional information: BIOC 199H enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

BIOC 296B: Introduction to Biochemical Research (1 unit)

Description: To introduce sophomore biochemistry students to experimental design and data interpretation. Presentations by biochemistry faculty will alternate with group discussions on experimental controls, conclusions and alternate explanations for a single published experiment. A written summary is due the week following each discussion.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required
 Seminar May Be Offered

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: Biochemistry majors only, or consent of instructor.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 299: Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: BIOC 299 enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

BIOC 299H: Honors Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: BIOC 299H enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

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BIOC 392: Directed Research (1 - 6 units)

Description: Individual or small group research under the guidance of faculty.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 12 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

Recommendations and additional information: BIOC 392 enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

BIOC 392H: Honors Directed Research (1 - 6 units)

Description: Individual or small group research under the guidance of faculty.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 12 times.

Course typically offered:

Main Campus: Fall, Spring, Summer 1 and 2

Recommendations and additional information: BIOC 392H enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

BIOC 395A: Minority Biomedical Research Colloquium (1 unit)

Description: Weekly presentations on biomedical research projects or research opportunities with varied topics each week.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Repeatable: Course can be repeated for a maximum of 8 units.

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: Consent of instructor.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 395B: Scientific Writing (1 unit)

Description: Participants discuss their laboratory research and prepare a paper on this research in a journal format, or discuss, research and prepare an extensive scientific paper on ethics in biomedical research.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Repeatable: Course can be repeated for a maximum of 3 units.

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: Consent of instructor.

BIOC 396D: Visiting Scholars (1 unit)

Description: The Visiting Scholars course is designed to give University of Arizona students the opportunity to develop effective public speaking practices that can be utilized in the presentation of talks focusing on topics of interest in the STEM disciplines that are delivered at Tucson area high schools. The UA students choose a topic of interest to the general lay public in the fields of biochemistry, biomedical science, and chemistry and develop a 20 minute Power Point presentation to be delivered to high school students enrolled in AP or Honors biology, chemistry, or biotech courses. These presentations are intended to be at a level easily understood by and are designed to allow for interaction with the high school student audience. Formal training and practical experience in the preparation of talks and in public speaking are achieved by training from representatives from the Office of Instruction and Assessment as well as peer evaluation using a rubric developed by OIA. In addition, the UA students will engage in a dialogue with the high school students about making the transition from high school to college. The purpose of these visits is to encourage high school students to consider majoring in STEM disciplines in college, to realize that advantages of attending a R1 university such as the University of Arizona where tremendous opportunities exist for engaging in exciting and meaningful research, and to be aware of the academic preparation necessary to do well at the university or college level.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Seminar Required

Course typically offered:

Main Campus: Fall

Recommendations and additional information: Instructor consent.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 399: Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: Course Requisites: BIOC 399 enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

BIOC 399H: Honors Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: BIOC 399H enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

BIOC 434: Biology Teaching Methods for Secondary Teachers (3 units)

Description: Methods for students preparing to teach secondary science. Students will create curriculum and lesson plans, compile resources for science teaching, examine lab safety regulations, and practice teaching science lessons. Assumes knowledge of reform-based teaching theory.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Recommendations and additional information: Prerequisite or concurrent registration, STCH 310; STCH 250 or equivalent.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 443: Research Animal Methods (3 units)

Description: Regulations, care, diseases and techniques involving common laboratory animals used in research and teaching programs.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: ANS 443, BIOC 443, MIC 443, MICR 443

Also offered as: ACBS 443, MIC 443

Co-convened with: BIOC 543

Course typically offered:

Main Campus: Fall

Home department: School of Animal & Comparative Biomedical Sciences

BIOC 448A: Plant Biochemistry and Metabolic Engineering (3 units)

Description: Covering topics in plant metabolic engineering; photosynthesis; carbohydrate, nitrogen and lipid metabolism; specialized metabolism. This course covers biochemical processes specific to plants and allows students to gain an understanding and appreciation of how (bio)chemical components are synthesized and utilized by plants during growth and development and in their interactions with their environment, as well as how these processes can be manipulated. A background in plant biology, general biochemistry or chemistry is expected. Note that concurrent registration in any of these courses will NOT meet this requirement. Students must have completed both semesters of O-chem and a biochemistry course that covers general metabolism prior to taking this course.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Equivalent to: BIOC 448A, CHEM 448A, ECOL 448A, MCB 448A

Also offered as: CHEM 448A, ECOL 448A, MCB 448A, PLS 448A

Co-convened with: BIOC 548A

Course typically offered:

Main Campus: Fall

Recommendations and additional information: CHEM 241A/B or CHEM 242A/B; BIOC 462A/B or BIOC 460 or consent of instructor.

Home department: School of Plant Science

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 462A: Biochemistry (4 - 5 units)

Description: Introduction to the properties and metabolism of proteins, nucleic acids, enzymes, carbohydrates and lipids. Designed primarily for majors and minors in chemistry, biochemistry and biology. For honors credit register for 5 units.

Grading basis: Student Option ABCDE/PF

Career: Undergraduate

Course Components:	Discussion	Required
	Lecture	Required
	Seminar	May Be Offered

Course typically offered:

Main Campus: Fall

Recommendations and additional information: Honors section available for 5 honor units. Credit allowed for only one of the following, BIOC 462A or BIOC 384. Pass/Fail option for qualified students.

Enrollment requirement: [BIOCBS or BIOC BA] and MCB 181R and [CHEM 241B or CHEM 242B or CHEM 246B] and [CHEM 243B or CHEM 247B] and [MATH 122B or MATH 125 or MATH 124] or department consent.

BIOC 462B: Biochemistry (4 - 5 units)

Description: Introduction to the properties and metabolism of proteins, nucleic acids, enzymes, carbohydrates and lipids. Designed primarily for majors and minors in chemistry, biochemistry and biology. For honors credit register for 5 units.

Grading basis: Student Option ABCDE/PF

Career: Undergraduate

Course Components:	Discussion	Required
	Lecture	Required
	Seminar	May Be Offered

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Honors section available for 5 honor units. Credit allowed for only one of the following, BIOC 462B or BIOC 385.

Enrollment requirement: BIOC 462A

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 463A: Biochemical Laboratory Techniques (4 units)

Description: An introductory laboratory course in biochemical techniques and methodology.

The course will place an emphasis on biophysical techniques including: UV-visible spectroscopy, protein (enzyme) purification, protein assays, enzyme kinetics, and thermodynamic measurements. Molecular biology techniques such as restriction endonuclease digestion of plasmids, cell transformation, gene expression will also be covered.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$150

Course Components:	Laboratory	Required
	Lecture	Required

Course typically offered:

Main Campus: Fall, Spring

Enrollment requirement: BIOC BS and (prerequisite or concurrent enrollment in BIOC 462A) or department approval.

Student Engagement Activity: Discovery

Student Engagement Competency: Professionalism

Writing Emphasis: Writing Emphasis Course

BIOC 466: Biochemistry of Nucleic Acids (4 units)

Description: The biochemistry of nucleic acids including replication, repair, recombination, restriction of DNA, transcription, processing and translation of RNA, gene regulation and biochemical and genomic techniques to study these processes with a molecular emphasis. Designed primarily for majors and minors in biochemistry and chemistry.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Discussion	Required
	Lecture	Required

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Credit allowed for only BIOC 466, BIOC 461 or MCB 411.

Enrollment requirement: BIOC 462A

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: Principles of cell and molecular biology with a focus on applications and current research appropriate for secondary school biology. This course is designed for prospective and in-service science teachers who need to develop a deeper understanding of central ideas in cell and molecular biology. Core topics in the course include structure function relationships, gene expression, membrane biology, cell structure, and regulation of cell division.

Career: Undergraduate

Co-convened with: BIOC 570

BIOC 471: Ecological Principles for Teachers (3 units)

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Co-convened with: BIOC 571

BIOC 472: Advanced Genetics for Teachers (3 units)

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Recommendations and additional information: CHEM 151, CHEM 152, MCB 181R or equivalents. Excluded majors: Chemistry, Biochemistry, Molecular Cellular Biology, Physiology, Nutrition Science, Microbiology, Ecology and Evolutionary Biology and Biology.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 491: Preceptorship (1 - 3 units)

Description: Specialized work on an individual basis, consisting of instruction and practice in actual service in a department, program, or discipline. Teaching formats may include seminars, in-depth studies, laboratory work and patient study. Requires faculty member approval, preceptor application on file with department.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 6 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

Recommendations and additional information: BIOC 491 enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

BIOC 491H: Honors Preceptorship (1 - 3 units)

Description: Specialized work on an individual basis, consisting of instruction and practice in actual service in a department, program, or discipline. Teaching formats may include seminars, in-depth studies, laboratory work and patient study. Requires faculty member approval, preceptor application on file with department.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 6 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

Recommendations and additional information: BIOC 491H enrollment is done manually by a CBC advisor in Old Chemistry 210, and requires a completed proposal form found at <http://cbc.arizona.edu>.

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 492: Directed Research (1 - 6 units)

Description: Individual or small group research under the guidance of faculty.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 12 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

Recommendations and additional information: BIOC 492 enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

BIOC 492H: Honors Directed Research (1 - 6 units)

Description: Individual or small group research under the guidance of faculty.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 12 times.

Course typically offered:

Main Campus: Fall, Spring, Summer 1 and 2

Recommendations and additional information: BIOC492H enrollment is completed manually by a CBC Advisor in Old Chemistry 210, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 498: Senior Capstone (3 units)

Description: A culminating experience for majors involving a substantive project that demonstrates a synthesis of learning accumulated in the major, including broadly comprehensive knowledge of the discipline and its methodologies. Senior standing required.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 6 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

Recommendations and additional information: BIOC 498 enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Enrollment requirement: BIOC 463A

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

Writing Emphasis: Writing Emphasis Course

BIOC 498H: Honors Thesis (3 units)

Description: An honors thesis is required of all the students graduating with honors. Students ordinarily sign up for this course as a two-semester sequence. The first semester the student performs research under the supervision of a faculty member; the second semester the student writes an honors thesis.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 9 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

Recommendations and additional information: BIOC 498H enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Enrollment requirement: BIOC 463A. Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

Writing Emphasis: Writing Emphasis Course

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 499: Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: BIOC 499 enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

BIOC 499H: Honors Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: BIOC 499H enrollment is completed manually by a CBC Academic Advisor, and requires a completed proposal form found at <https://cbc.arizona.edu/education/undergrad/forms>.

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 537: Medical Biochemistry (4 units)

Description: This course will combine lecture podcasts from the University of Arizona medical curriculum with regular meetings with basic-science faculty to introduce students to the concepts of Medical Biochemistry. Students will gain knowledge of not only basic-science aspects of these highly interrelated topics, but also medical aspects of these topics. This course provides a flexible learning format with less formal in-class instruction than traditional courses. Students will view course content in podcast format on their own (or with other students), and meet once per week as a class with faculty for group discussion and review of the content. The expected outcomes are for students to 1) gain fundamental knowledge of the principles of metabolic biochemistry, 2) apply these biochemical principles to cellular and pathophysiologic contexts and 3) demonstrate knowledge of and prediction and diagnosis of pathophysiologic medical case studies.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Discussion	Required
	Lecture	Required

Course typically offered:

Main Campus: Fall

Enrollment requirement: BIOC 462B or BIOC 385 or equivalent.

BIOC 543: Research Animal Methods (3 units)

Description: Regulations, care, diseases and techniques involving common laboratory animals used in research and teaching programs. Graduate-level requirements include an in-depth research paper on one of the lecture topics presented in the course plus research proposal preparation.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
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Equivalent to: ANS 543, BIOC 543, IMB 543, MBIM 543, MICR 543

Also offered as: ACBS 543, IMB 543

Co-convened with: ANS 443

Course typically offered:

Main Campus: Fall

Home department: School of Animal & Comparative Biomedical Sciences

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: Covering topics in plant metabolic engineering; photosynthesis; carbohydrate, nitrogen and lipid metabolism; specialized metabolism. This course covers biochemical processes specific to plants and allows students to gain an understanding and appreciation of how (bio)chemical components are synthesized and utilized by plants during growth and development and in their interactions with their environment, as well as how these processes can be manipulated. A background in plant biology, general biochemistry or chemistry is expected. Note that concurrent registration in any of these courses will NOT meet this requirement. Students must have completed both semesters of O-chem and a biochemistry course that covers general metabolism prior to taking this course. Graduate-level requirements include 2 or 3 short individual oral presentations and a term paper.

Career: Graduate

Equivalent to: BIOC 548A, CHEM 548A, ECOL 548A, MCB 548A

Also offered as: CHEM 548A, ECOL 548A, MCB 548A, PLS 548A

Co-convened with: BIOC 448A

Course typically offered:

Main Campus: Fall

Home department: School of Plant Science

Description: Computational, functional, and evolutionary approaches to genomics, including bioinformatics and laboratory methods relevant to many modern research approaches in biology. Graduate-level requirements include students completing independently designed lab exercises and relate these to the primary literature in a paper. Undergraduate students will only complete defined lab exercises.

Career: Graduate

Course Components:	Lecture	Required
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Equivalent to: BIOC 553, BIOC 553R, ECOL 553R, MCB 553

Also offered as: ECOL 553, EIS 553, MCB 553

Co-convened with:

Course typically offered:

Main Campus: Fall

Recommendations and additional information: Concurrent registration, ECOL 553L for first year IGERT fellows.

Home department: Ecology & Evolutionary Biology

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 553L: Functional and Evolutionary Genomics - Laboratory (1 unit)

Description: Computational, functional, and evolutionary approaches to genomics, including bioinformatics and laboratory methods. Graduate-level requirements include completion of independently designed lab exercises and relating them to the primary literature in a paper.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Laboratory	Required
	Lecture	May Be Offered

Equivalent to: BIOC 553L

Also offered as: ECOL 553L

Co-convened with: BIOC 453L

Course typically offered:

Main Campus: Fall

Recommendations and additional information: Concurrent registration, ECOL 553R.

Home department: Ecology & Evolutionary Biology

BIOC 555: Methods of Physical Biochemistry (3 units)

Description: Fundamental concepts in physical biochemistry; techniques necessary to understand the structure and function of biomacromolecules, especially proteins. Biophysical techniques to study protein interactions. Advanced understanding of protein structure/function, methods in protein biochemistry, enzyme mechanisms, protein--mediated cell signaling. This course is designed for advanced graduate students.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
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Equivalent to: GENE 555, INSC 555, MCB 555

Course typically offered:

Main Campus: Fall

Recommendations and additional information: Pre-requisite: BIOC 565.

BIOC 565: Proteins and Enzymes (3 units)

Description: Advanced consideration of enzyme structure and function.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
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Equivalent to: CHEM 565

Course typically offered:

Main Campus: Fall

Recommendations and additional information: BIOC 462A, CHEM 480B.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: Chemistry, structure, and function of nucleic acids; replication, transcription translation, gene organization, regulation of gene expression and organelle nucleic acids. Both prokaryotic and eucaryotic systems will be considered.

Career: Graduate

Equivalent to: BIOC 568B, GENE 568, GENE 568B, INSC 568, MCB 568, MCB 568B, NFS 568, N SC 568

Also offered as: GENE 568

Course typically offered:

Main Campus: Fall

Recommendations and additional information: BIOC 411 or consent of instructor.

Interdisciplinary Interest Area: MCB - Molecular & Cell Biology

Description: Principles of ecology with a focus on applications and current research appropriate for teachers of secondary school biology. This course is designed for prospective and in-service science teachers who wish to develop a deeper understanding of ecology. Basic themes include how organisms interact with other organisms and their environment, factors that influence the size and stability of populations, how geography affects biodiversity and the application of these principles to current ecological issues including global warming and invasive species. This course is designed to be on-line. In-service science teachers may take the course for graduate credit by completing additional graduate-level course work. Graduate-level requirements include developing a lesson plan at the end of each major unit that incorporates the key ecological concepts of the unit into their curriculum.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Co-convened with: BIOC 471

Recommendations and additional information: CHEM 151, CHEM 152, ECOL 182R or equivalents. Excluded majors: CHEM, BIOC, MCB, PSIO, NSC, MIC, and ECOL.

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 573: Recombinant DNA Methods and Applications (4 units)

Description: This course offers an intensive lab experience to teach students the practical and theoretical aspects of modern molecular biology. In the first part of the course, recombinant DNA methods and bioinformatics are used to clone and identify an unknown gene. In the second part of the course DNA microarray technology is used to determine the effect of environmental stress on the global gene expression program in yeast, and to identify genes that control the stress response. Weekly lectures compliment the lab sessions, covering the theory and principles underlying the experiments performed during the course. Graduate level requirements will include additional assignments, such as presenting and discussing research papers applicable to the lab projects or recent advances in molecular biology techniques.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$150

Course Components: Discussion Required
 Lecture Required

Equivalent to: BIOC 573, GENE 573, MIC 573, MICR 573, PLS 573

Also offered as: GENE 573, MCB 573, MIC 573, PLS 573

Course typically offered:

Main Campus: Spring

Home department: Molecular & Cellular Biology

Enrollment requirement: (MCB 181R and 181L) or MCB 184.

BIOC 585A: Biological Structure 1 (2 units)

Description: Biological Structure I covers one of two major methods for acquiring atomic structures of proteins and nucleic acids, X-ray crystallography. Biological Structure II covers the other major method, NMR spectroscopy. The emphasis is more conceptual than mathematical and focuses on the strengths and weaknesses of each approach.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall

BIOC 585B: Biological Structure 2 (2 units)

Description: Biological Structure II covers one of two major methods for acquiring atomic structures of proteins and nucleic acids, NMR spectroscopy. Biological Structure I covers the other major method, X-ray crystallography. The emphasis is more conceptual than mathematical and focuses on the strengths and weaknesses of each approach.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Spring

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 588: Principles of Cellular and Molecular Neurobiology (4 units)

Description: Detailed introduction to the biology of nerve cells, emphasizing cellular neurophysiology, synaptic mechanisms, and analysis of neural development.

Grading basis: Regular Grades

Career: Graduate

Course Components: Laboratory May Be Offered
Lecture Required

Equivalent to: ANAT 588, BIOC 588, CBA 588, EIS 588, INSC 588, MCB 588, PSIO 588

Also offered as: CMM 588, EIS 588, MCB 588, NRSC 588, PSIO 588

Course typically offered:

Main Campus: Fall

Recommendations and additional information: Consult program office before enrolling.

Home department: Committee on Neuroscience

BIOC 593A: Biology Internship for Teachers (1 - 3 units)

Description: Practicing teachers participate in a supervised internship experience with UA biology or related faculty members.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 12 units.

Recommendations and additional information: Participants must be practicing K-12 teachers and must have been accepted into a summer internship program for teachers.

BIOC 595A: Oncogenes and Signal Transduction (1 unit)

Description: The exchange of scholarly information and/or secondary research, usually in a small group setting. Instruction often includes lectures by several different persons. Research projects may or may not be required of course registrants.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Repeatable: Course can be repeated for a maximum of 5 units.

Equivalent to: BIOC 595A, SURG 595A

Also offered as: CBIO 595A, SURG 595A

Recommendations and additional information: Open to graduate students in biological discipline, exceptionally qualified undergraduates.

Home department: Committee on Cancer Biology

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 595B: Journal Club (1 unit)

Description: The exchange of scholarly information and/or secondary research, usually in a small group setting. Instruction often includes lectures by several different persons. Research projects may or may not be required of course registrants.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Colloquium Required

Repeatable: Course can be repeated a maximum of 6 times.

Equivalent to: CHEM 595B, MCB 595B

Course typically offered:

Main Campus: Fall, Spring

Interdisciplinary Interest Area: CHEM - Chemistry

BIOC 596F: Cognitive Psychology (3 units)

Description: Investigation of research and ideas on a specialized topic within cognitive psychology, including the psychology of language, visual perception and cognitive memory, decision, and learning. The discussion and exchange of scholarly information in a small group setting, papers and student presentations.

Grading basis: Regular Grades

Career: Graduate

Course Components: Seminar Required

Also offered as: CMM 596F, LING 596F, MGMT 596F, PSY 596F

Course typically offered:

Main Campus: Fall, Spring

Home department: Psychology

BIOC 599: Independent Study (1 - 5 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 633: Secondary Biology Laboratory Curriculum (3 units)

Description: Contemporary secondary science curriculum materials and teaching approaches. Course taught jointly by science and education faculty. The use of laboratories in teaching is discussed in the broad context of the national recommendations for science education.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Equivalent to: TTE 633

Recommendations and additional information: open to middle and high school biology teachers only; 18 units of biological sciences.

BIOC 651: Biology Nutrition for Teachers (3 units)

Description: Students will explore topics related to nutrition presented in the context of biology. Topics include biochemistry of nutrition digestion, absorption, and metabolism of nutrients. Students will learn the nutritional, metabolic and physiological significance of the digestion of carbohydrates proteins, amino acids, lipids, vitamins, minerals, trace elements and non-nutrient substances

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
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Course typically offered:

Main Campus: Summer

Recommendations and additional information: BIOC 623C (may be concurrent) or equivalent of MCB 181.

BIOC 655: Plant Biology for Teachers (3 units)

Description: Course is designed for teachers: includes concepts of plant form and function; plant physiology, growth and development; genetics and evolution; and a survey of the plant kingdom.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
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Recommendations and additional information: Consent of instructor; Open to in-service middle and high school biology teachers only.

BIOC 656: Ornithology for Teachers (3 units)

Description: Through online discussions independent research projects, and other activities students will develop a greater understanding of avian life history, behavior, physiology, and conservation, and how to teach these concepts.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
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Field trip: Two to three field trips done on individual basis.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 693: Internship (1 - 6 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring

BIOC 695D: Human Genetic Disease Colloquium (3 units)

Description: The course will cover a few medical genetic disorders in depth, with different topics each year. Clinical presentation, pathophysiology, genetic mechanisms and biochemical features will be considered. Readings will come mainly from the primary biomedical literature.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Repeatable: Course can be repeated a maximum of 4 times.

Equivalent to: BIOC 695D, GENE 695D, MCB 695D, NRSC 695D, PSIO 695D

Also offered as: CMM 695D, GENE 695D, MCB 695D, NRSC 695D, PSIO 695D

Course typically offered:

Main Campus: Spring

Home department: Cellular & Molecular Medicine

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 695L: Advanced Topics: Modulation of the Biology of Aging by Inflammation, Infection and Immunity (1 unit)

Description: An interactive graduate-level course focused on how inflammation and immune function/dysfunction contributes to key biological and medical aspects of aging. This course will evaluate the basic biology of aging with a focus on how the aging immune system impacts geriatric principles of care, common geriatric syndromes and aging-associated disease, the biologic basis of health disparities (where known), and other unique issues related to aging research. The course is open to both graduate students and medical students/residents. Graduate students funded through the Training Grant will be required to attend in their 3rd and 4th year in place of Journal Club. The course is comprised of three aspects: literature review, topic discussion, and attendance in the Advances in Aging Lecture Series (Grand Rounds). Students will be assigned relevant literature to review in advance of in-class discussion on topics in aging research. Each discussion will be led by an expert in the field. The Advances in Aging Lecture Series are 1-hour Grand Rounds that meet once per month and will add clinical perspective to the field of aging research. More information on Advances in Aging Lecture Series topics and archived lectures is available at <http://aging.arizona.edu/program/advances-aging-lecture-series>. Topics that will be covered in the course include: Introduction to Aging Research, Aging Theories, and Model Organisms; Replicative Senescence as a Driver of Age-Associated Inflammation; DNA Damage, Repair, and Oncogenesis; Mitochondrial Aging and Metabolism; Musculoskeletal Changes in Aging and Frailty; Infection and Immunosenescence; Aging with HIV in the age of ART; Microbiota in Aging; Neural Changes, Neurodegeneration, and Alzheimer's Disease; Cardiovascular Aging and Stroke; Stem Cell Aging and Longevity Extension/Rejuvenation Research.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Repeatable: Course can be repeated a maximum of 2 times.

Also offered as: CHEM 695L, CMM 695L, CPH 695L, IMB 695L, NURS 695L, PHCL 695L, PSIO 695L

Home department: Immunobiology

BIOC 696A: Laboratory Presentations and Discussion (1 - 3 units)

Description: Laboratory small group presentations and discussion.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Seminar Required

Repeatable: Course can be repeated for a maximum of 9 units.

Equivalent to: MCB 696A

Course typically offered:

Main Campus: Fall, Spring

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 696D: Seminar in Biochemistry (1 - 3 units)

Description: The scope of work shall consist of attendance at the weekly Biochemistry seminar; along with individual research by course registrants within their groups, and the development and exchange of scholarly information through discussion, reports, and/or papers

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Seminar Required

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: Enrollment is restricted to students in the Biochemistry and Chemistry graduate programs, or to those with instructor approval.

BIOC 697A: Microbiology for Teachers (3 units)

Description: Microbiology for Teachers is a graduate-level online course for secondary school teachers. Teachers enrolled in the course will refresh their knowledge of microbiology, discuss current advances in the field, and develop ways to incorporate microbiology into their curricula.

Grading basis: Regular Grades

Career: Graduate

Course Components: Workshop Required

BIOC 699: Independent Study (1 - 3 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 795A: Introduction to Research (1 - 6 units)

Description: The exchange of scholarly information and/or secondary research, usually in a small group setting. Instruction often includes lectures by several different persons. Research projects may or may not be required of course registrants.

Grading basis: Regular Grades

Career: Graduate

Course Components: Colloquium Required

Repeatable: Course can be repeated for a maximum of 10 units.

Equivalent to: CHEM 795A, MCB 795A, PHSC 795A

Also offered as: PHSC 795A

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: Open to MCB, CHEM, PHSC, and BIOC majors only.

Interdisciplinary Interest Area: CHEM - Chemistry

BIOC 799: Independent Study (1 - 5 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring

BIOC 900: Research (1 - 9 units)

Description: Individual research, not related to thesis or dissertation preparation, by graduate students.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BIOC 910: Thesis (1 - 9 units)

Description: Research for the master's thesis (whether library research, laboratory or field observation or research, artistic creation, or thesis writing). Maximum total credit permitted varies with the major department.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

BIOC 920: Dissertation (1 - 9 units)

Description: Research for the doctoral dissertation (whether library research, laboratory or field observation or research, artistic creation, or dissertation writing).

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.