Undergraduate Handbook
Integrative Biology

University of California, Berkeley

http://ib.berkeley.edu/undergrad/

INTEGRATIVE BIOLOGY

Undergraduate Student Services Office

Office Location
3060 Valley Life Sciences Building
University of California, Berkeley

Email Address
ibusso@berkeley.edu [answered daily]

Telephone
510.643.1667

Drop-in Advising Hours
Monday through Thursday, 9am – 12noon, 1pm – 4pm (closed 12 noon – 1 pm)
Friday, 9am – 12noon, 1pm – 3pm (closed 12 noon – 1 pm)

Mailing Address
IB Undergraduate Student Services Office
1005 Valley Life Sciences Building, #3140
Berkeley, CA 94720-3140

Web Address
http://ib.berkeley.edu/undergrad/

Facebook Page
UC Berkeley Integrative Biology

IB Student Clubs
DIBS
https://www.facebook.com/groups/210094582347737/

IB Undergraduate Staff Advisors
Amber Dillon, Academic Advisor
510.643.1667

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WELCOME and INTRODUCTION

Welcome to Integrative Biology (IB) at UC Berkeley

Congratulations on exploring Integrative Biology as your prospective major! This is an exciting time in biology on the Cal campus, as much of the groundbreaking and innovative research is being done in our department. Through choosing this major, you will have many opportunities to get involved and really become part of the IB community. We hope that you find this handbook a useful guide for the major. Please know that if you have any questions not covered in our handbook, we welcome you to stop by the office and talk with the IB peer and staff advisors. We are always here to help! Again, welcome to IB and we are looking forward to working with you!

More about IB…

The Department of Integrative Biology offers a program of instruction that emphasizes how structure, function, and process integrate to influence the biology, ecology, and evolution of organisms. It investigates integration at all levels of organization from molecules to the biosphere, and across all branches of the tree of life: plants, animals, fungi and microbes.

IB draws from many traditional and emerging fields, and levels of biological organization in forging new research directions and answering traditional questions in new ways. The faculty has special strengths in the disciplines of functional morphology, organismal physiology, animal behavior, biomechanics, ecology, systematic biology, paleo-biology, population genetics, and evolution.

Students who major in Integrative Biology will gain both broad and deep knowledge in the biological sciences, which provides an excellent foundation for those interested in the biology of organisms, populations, and communities, particularly students who might wish to pursue graduate studies in any of the sub-disciplines listed above or related emerging research areas. It also provides superb training for students interested in health-related professions (medicine, dentistry, veterinary medicine, physical therapy, optometry, etc.) or allied careers in human biology (e.g., psychology, sociology, demography, political science, environmental and resource management, law, etc.).

Through laboratory and/or field courses, independent research projects, or involvement in faculty or graduate student research, students will gain an understanding of scientific logic and methods, through experimental or comparative approaches, including the investigation of historical patterns and processes.

All IB students receive a Bachelor of Arts degree in Integrative Biology upon graduation. The first two years of coursework are similar for all IB majors. Juniors and seniors are then expected to take the courses specified for their particular track. It is critical that students contact a staff advisor or faculty advisor early in the decision-making process. These advisors are here to help, are your advocates, and can provide essential information and guidance.

IB Major Descriptions

TRACK 1: ECOLOGY, EVOLUTION AND ORGANISMAL BIOLOGY

Organismal diversity is the centerpiece of modern biology; efforts to characterize, understand, and protect this diversity underlie the research programs of many faculty in Integrative Biology. This diversity encompasses not just different taxonomic groups but also levels of organization, thereby providing the foundation for a comprehensive understanding of biology. The Ecology, Evolution and Organismal Biology track in the IB major will provide students with the broad expertise in biology needed to pursue graduate study and employment in this field while at the same time allowing students considerable opportunity to explore those aspects of biology that most capture their individual interests. We believe that undergraduates from our major, particularly those who have pursued honors research, should be exceptionally well prepared and highly competitive for admission to graduate study in their chosen area of biology.

TRACK 2: HUMAN BIOLOGY AND HEALTH SCIENCES

Health sciences in the 21st century will increasingly require a broad and integrated understanding of humans—their origins, diversity and interactions with their environment. IB is uniquely positioned to provide this perspective on human biology for students pursuing health-related careers. The creation of a Human Biology and Health Sciences track recognizes that IB is actively engaged in meeting the educational needs of students interested in the health sciences. Students are encouraged to fulfill some requirements by studying non-human organisms. We believe that this structure will address the intellectual desires of students in health sciences and make them very strong candidates for medical school and related career choices. They must also take two lab courses.

Advising and Student Services

IB has three levels of undergraduate advising: staff advising, faculty advising and peer advising.

UNDERGRADUATE STUDENT SERVICES OFFICE & STAFF ADVISORS

Staff advisors are trained to support students and assist them in successfully completing their IB major. They are excellent resources for questions concerning administration and academics, or finding out about other available services. Students should see a staff advisor to

- ask questions about major requirements,
- ask advice about schedule planning,
- begin the process of declaring the IB major,
- discuss research opportunities, graduate & professional schools, career opportunities, scholarships and internships,
- get their Advisor Code (AC) to access Tele-BEARS registration,
- get information and course control numbers for independent research,
- request general assistance, advice or information, and
- find out about upcoming events and programs.

Availability fall, spring, and summer in 3060 Valley Life Sciences Building:

Staff Advising Office Hours					
	MONDAY	**TUESDAY**	**WEDNESDAY**	**THURSDAY**	**FRIDAY**
9 am – 10 am	available	available	available	available	available
10 am - 11 am	available	available	available	available	available
11 am – 12 noon	available	available	available	available	available
12 noon – 1 pm	Office closed	Office closed	Office closed	Office closed	Office closed
1 pm – 2 pm	available	available	available	available	available
2 pm – 3 pm	available	available	available	available	available
3 pm – 4 pm	available	available	available	available	Office closed

FACULTY ADVISORS

The Undergraduate Student Services Office assigns a faculty member as your major advisor during the declaration process.

Develop a good student/advisor relationship.

- Your advisor can assist with questions about coursework to fulfill requirements and career goals.
- He/She can be a good mentor for your present and future goals.
- Share your future goals with your faculty advisor, even if they might change, including what has inspired you to establish such goals.

We also encourage you to meet and talk to other IB faculty, particularly those conducting research in areas that interest you.

PEER ADVISORS

The Peer Advising Program provides an excellent service to IB students and the department. Our IB peer advisors

- advise undeclared students,
- help with choosing a track,
- share firsthand knowledge of course demands,
- make suggestions on course combinations,
- provide general information about applying to medical, pre-health professional and graduate schools, and
- are a great resource for information about many other student experiences.

Availability (fall and spring only) in 3060 Valley Life Sciences Building.

Peer Advising Office Hours					
	MONDAY	**TUESDAY**	**WEDNESDAY**	**THURSDAY**	**FRIDAY**
10 am - 11 am	available	available	available	available	available
11 am – 12 noon	available	available	available	available	available
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1 pm – 2 pm	available	available	available	available	available
2 pm – 3 pm	available	available	available	available	available
3 pm – 4 pm	available	available	available	available	Office closed

STUDENT CLUBS

Getting actively involved in your educational interests is important to your academic success. There is one departmentally funded student organization, DIBS (Department of Integrative Biology Students). DIBS works independently with the USSO to plan interesting tours, events, workshops, and assist with undergraduate programs. Whether you want to be on the executive committee, volunteer, or just participate in one of their events, DIBS is glad to have you.

For more information, visit their Facebook page:

https://www.facebook.com/groups/210094582347737/

Major Course Requirements

Requirement Area	Track 1: Ecology, Evolution & Organismal Biology	Track 2: Human Biology & Health Sciences
Group A: Evolution & Genetics	1 course	1 course
Group B: Ecology, Behavior & Diversity	2 courses	1 course
Group C: Structure, Function & Human Health	1 course	2 courses: Either IB 131 or IB 132 and one additional course
Lab / Field Lab	2 courses: 1 lab and 1 field lab, or 2 field labs	2 courses: Chosen from list of labs and field labs.
Elective(s)	Additional approved electives to bring your total upper-division units to 24	Additional approved electives to bring your total upper-division units to 24

REQUIREMENT GROUP A: EVOLUTION & GENETICS

Course Number	Units	Title	Semester Expected
IB 141	3	Human Genetics	Su'11; each summer
IB 160	4	Evolution	Fa'11; each fall
IB 161	4	Population & Evollutionary Genetics	Sp'13; every 2 years
IB 162	4	Ecological Genetics	TBA
IB 163	4	Molecular Evolution	Sp'12; every 2 years
IB 164	4	Human Genetics & Genomics	Fa'11; each fall
IB 169	4	Evolutionary Medicine	Sp'12; each spring

REQUIREMENT GROUP B: ECOLOGY, BEHAVIOR & DIVERSITY

Course Number	Units	Title	Semester Expected
IB C101L ++	4	Diversity of Plants & Fungi	Fa'13; every 2 yrs
IB 102LF++	4	California Plants	Sp'13; every 2 yrs
IB 103LF++	5	Invertebrate Zoology	Sp'12; every 2 yrs
IB 104LF++	5	Natural History of Vertebrates	Sp'12; each spring
IB C107L ++	4	Principles of Plant Morphology	Fa'12; every 2 yrs
IB 113L	4	Paleobiology: Ecology & Evolution	Sp'12; each spring
IB 144	4	Animal Behavior	Fa'11; each fall
IB 146LF++	5	Behavioral Ecology	Sp'13; every 2 yrs
IB C149 (see C149L)	4	Molecular Ecology	TBA
IB 152	4	Environmental Toxicology	Sp'12; each spring
IB 153 (see 153LF)	3	Population / Community Ecology	Lec Fa'11
IB 154	3	Plant Population & Community Ecology	Lec Fa'12; lab TBA

IB C155	3	Holocene Paleoecology	Sp'13; every 2 yrs
IB C156	4	Conservation Biology	Fa'11; each fall
IB 157LF	4	Ecosystems of California	Fa'11; each fall
IB C158LF ++	13	Biology & Geomorphology of Tropical Islands	Fa'11; each fall
IB 159	3	The Living Planet: Impact of Biosphere	Fa'11; every 2 years
IB 160	4	Evolution	Fa'11; each fall
IB 162	4	Ecological Genetics	TBA
IB 166	4	Evolutionary Biogeography	Sp'12; every 2 yrs
IB 168L	4	Systematics of Vascular Plants	Sp'12; each spring
IB 173LF++	5	Mammalogy	Sp'14; every 2 yrs
IB 174LF++	4	Ornithology	Sp'13; every 2 yrs
IB 175LF++	4	Herpetology	Sp'14; usually every 2 yrs
IB 181	3	Paleobotany	Fa'12; every 2 yrs
IB 183L++	4	Evolution of Vertebrates	Sp'13; every 2 yrs
IB 184L++	4	Morphology of Vertebrate Skeleton	Fa'12; every 2 yrs
IB C185L++	5	Human Paleontology	Sp'13; every 2 yrs
IB 187	3	Human Biogeography of the Pacific	Sp'14; usually every 2 yrs

LF = Acceptable for Field Lab requirement for Track 1
++ = Satisfies TWO requirements within IB. OK for Requirement Group B and Lab or Field Lab.

REQUIREMENT GROUP C: STRUCTURE, FUNCTION & HUMAN HEALTH

Course Number	Units	Title	Semester Expected
IB 115	4	Intro to Systems in Biology & Medicine	Sp'12; each spring
IB 116L	4	Medical Parasitology	Su'11; each summer
IB 117 (see 117LF)	2	Medical Ethnobotany	Each fall & summer
IB 118	3	Host-Pathogen Interactions: Transdiscipline	Fa'11; each fall
IB 123A (see 123AL) (reqs IB 132)	3	Exercise Physiology (note--lecture and lab must be taken together)	Fa'11; each fall
IB C125L	4	Intro to Biomechanics & Human Movement	Fa'11; each fall
IB 127 (see 127L) (reqs IB 132)	2	Motor Control (note--lecture and lab must be taken together)	Fa'11; each fall
IB 128	3	Sports Medicine	Su'11; each summer
IB C129L	3	Physiology Assessment	Su'11; each summer
IB 131 (see 131L)	3	Human Anatomy	Each fall & summer
IB 132 (see 132L)	3	Human/Mammalian Physiology	Each spring & summer
IB 135 (see C135L)	4	Mechanics of Organisms	Lec Fa'11
IB 137	4	General Endocrinology	Fa'11; each fall
IB 138	4	Comparative Endocrinology	Sp'12; each spring
IB C139	3	The Biology of Stress	Fa'11; each fall
IB 140	4	Human Reproduction	Sp'12; each spring
IB C142L	6	Human Osteology	Sp'12; every 2 years
IB C143A	3	Biological Clocks	Fa'12; every 2 years
IB C143B	3	Hormones & Behavior	Sp'12; each spring
IB 148	3	Comparative Animal Physiology	Fa'13; every 3 years
IB 151 (see 151L)	3	Plant Physiological Ecology	Sp'13; every 2 years

COURSES ACCEPTABLE FOR IB LAB OR FIELD LAB (LF) REQUIREMENT

Course Number	Units	Title	Semester Expected
IB C101L++	4	Diversity of Plants & Fungi	Fa'13; every 2 yrs
IB 102LF++	4	California Plants	Sp'13; every 2 yrs
IB 103LF++	5	Invertebrate Zoology	Sp'12; every 2 yrs
IB 104LF++	5	Natural History of Vertebrates	Sp'12; each spring
IB C107L++	5	Principles of Plant Morphology	Fa'12; every 2 years
IB 113L++	4	Paleobiology: Ecology & Evolution	Sp'12; each spring
IB 116L	4	Medical Parasitology	Su'11; each summer
IB 117LF	2	Medical Ethnobotany Lab	Each fall & summer
IB 123AL	2	Exercise Physiology	Fa'11; each fall
IB C125L	4	Intro to Biomechanics & Human Movement	Fa'11; each fall
IB 127L	1	Motor Control	Fa'11; each fall
IB C129L	3	Physiology Assessment	Su'11; each summer
IB 131L	2	Human Anatomy	Each fall, summer
IB 132L	2	Human/Mammalian Physiology	Each spring, summer
IB C135L	3	Mechanics of Organisms	Sp'12; each Spring
IB C142L	6	Human Osteology	Sp'12; every 2 yrs
IB 146LF++	5	Behavioral Ecology	Sp'13; every 2 yrs
IB C149L	2	Molecular Ecology	Lab TBA
IB 151L	2	Plant Physiological Ecology	Sp'13; usually every 2 yrs
IB 153LF	2	Population/Community Ecology	Lab TBA
IB 154L	2	Plant Population & Community Ecology	Lab TBA
IB 157LF	4	Ecosystems of California	Fa'11; each fall
IB C158 LF++	13	Biology & Geomorphology of Tropical Islands	Fa'11; each fall
IB 168L++	4	Systematics of Vascular Plants	Sp'12; every 2 yrs
IB 173LF++	5	Mammalogy	Sp'14; every 2 yrs
IB 174LF++	4	Ornithology	Sp'13; every 2 yrs
IB 175LF++	4	Herpetology	Sp'14; every 2 yrs
IB 183L++	4	Evolution of Vertebrates	Sp'13; every 2 yrs
IB 184L++	4	Morphology of Vertebrate Skeleton	Fa'12; every 2 yrs
IB C185L++	5	Human Paleontology	Sp'13; every 2 yrs

LF = Acceptable for the Field Lab requirement for Track 1

COURSES PRE-APPROVED FOR IB UPPER DIVISION ELECTIVES

No more than TWO upper-division courses from other departments may be taken as electives toward the minimum 24 upper-division unit requirements.

- The courses listed below have been approved by the IB faculty, and may be taken as electives without further approval from an IB Faculty Advisor.
- Students are responsible for determining that they have adequate prerequisites and background when enrolling in courses in other departments. If used for the major as an elective, such courses MUST be completed for a letter grade.
- The courses on this list may NOT be taken to satisfy Requirement Groups A, B, or C, or the IB lab requirement.

Course Number	Title	UNITS	Semester Expected
Bioengineering			
BioE 102	Biomechanics	4	Spring & Fall
BioE 110	Biomedical Physiology for Engineers	4	Spring
BioE C119/ME C176	Orthopaedic Biomechanics	4	Spring & Fall
Chemistry			
Chem 135	Chemical Biology	3	Spring & Fall
Environmental Science, Policy and Management			
ESPM 111	Ecosystem Ecology	4	Spring
ESPM 114	Wildlife Ecology	3	Spring
ESPM 132	Spider Biology	4	Spring
ESPM 144	Insect Physiology	3	Spring
ESPM 173	Introduction to Analysis of Ecological Data	3	Spring
***ESPM 174**	Design and Analysis of Ecological Research	4	Fall
*** = Advanced Course**			
Geography			
GEOG 148	Biogeography	4	Fall
Molecular and Cell Biology			
MCB C100A	Biophysical Chemistry	4	Fall
MCB 102	Biochemistry	4	Spring, Summer, Fall
***MCB 136**	Advanced Physiology	4	Fall
***Students who take IB132 cannot also receive elective credit towards the major for MCB136.**			
MCB 140	General Genetics	4	Fall
MCB C160, NEUROSCI C160	Introduction to Neurobiology	4	Spring, Fall
Plant & Microbial Biology			
PLANTBI 110/PLANTBI 110L	Biology of Fungi	2/2	Fall
***Students must take both courses in order to count it toward the IB major.**			
Psychology			
PSYCH 110	Biological Psychology	3	Spring, Summer
Public Health			
PH 142	Introduction to Probability and Statistics	4	Fall
PH 162A	Public Health Microbiology	3	Fall, Summer

Declaring the Major

ELIGIBILITY TO DECLARE

You are eligible to declare the IB major once you've

- completed 70 grade points in your lower division courses. ***NOTE*** grade points are different from units. Please see an advisor if you are unsure about whether or not you are eligible. You can find a guide online that shows you how to calculate grade points: http://ib.berkeley.edu/undergrad/pdf/grade_points.pdf.
- earned a GPA of 2.0 or higher in all courses taken for the major

TRANSFER STUDENTS: You must wait until you complete one full semester at Cal and have earned a 2.0 GPA in the courses taken for the major.

DECLARATION PROCESS

1. To begin the major declaration process, you must
    a. fill out the IB major declaration form on line: https://biology.berkeley.edu/internal/ib_undergrad/declaration/download
    b. and fill out the Petition to Declare a Major: http://ls-advise.berkeley.edu/fp/08Declar_Maj.pdf
2. Bring your Petition to Declare a Major to the USSO, no earlier than the next business day. We will
    a. review your academic plan,
    b. give you a Curriculum Planning Form and assign you a faculty advisor for final approval of your plan.
3. Once you have spoken with your faculty advisor and have obtained his/her signature, you must return all paperwork to the Undergraduate Student Services Office. We will make a copy for you and will send the original Petition to Declare to the College of Letters & Science.

Note: There is no existing minor program.

IB MAJOR PROBATION POLICY

An IB major must maintain a 2.0 grade point average (GPA) in the complete set of all upper-and lower-division courses taken for the major. Students for whom either GPA calculation falls below 2.0 will be placed on departmental probation for the following semester. If placed on probation, the student has one semester to raise both GPAs to the required 2.0, and will be subject to dismissal from the major if this is not achieved. The decision to dismiss will be made by the Academic Planning Committee and communicated to the student before the following semester begins. If dismissed from the major, students must work with an L & S advisor in order to pursue another major.

Questions concerning the IB probation and dismissal policy may be directed to the staff advisors in the IB Undergraduate Student Services Office.

Research in the Major

UC Berkeley is a world-renowned research institution, with many opportunities for undergraduates. You are not limited to research in an IB lab - explore your options and spend your time doing research that you find interesting and fulfilling. Start looking for a research position early! There are a number of resources available to help you determine whether or not research is for you and if so, how you'd go about setting it up.

RESOURCES FOR FINDING RESEARCH POSITIONS

1. Talk to people who are involved in research
   - Peer advisors. Learn how they found their research positions and hear about their experiences in labs.
   - IB Professors, Faculty Advisors.
     - Check out the IB Faculty Research webpage, http://ib.berkeley.edu/research/interests/ and determine which labs you are interested in.
     - Before contacting a professor, **review some of the latest publications** that have come out of his/her lab. You are not expected to understand the articles completely, but if you read some articles and try to understand the professors' research, they will be more convinced of the seriousness and depth of your interest.
     - **Set up appointments to meet with the professors you have selected.** When calling or emailing professors, it is more effective to express interest in their particular field of research and what you would like to discuss with them than simply asking, "Do you have space in your lab?" Once you make an appointment, keep the appointment and be on time! Otherwise, faculty may be less willing to make other appointments with you.
     - **Bring a resume, contact information, and your most recent UC Berkeley transcript** (an unofficial copy is fine) to your appointment with a professor. Professors often find this information useful so having it on hand is a good idea.
     - During your appointment, **ask the professor if he/she would be willing to accept you into his/her lab to do an independent research project.** Professors want students who are genuinely interested in their research, not students who are primarily interested in improving their resume. Be prepared to discuss the professor's work intelligently. Since there is so much competition for IB lab positions, it is wise to approach your search for a lab position with the same degree of professionalism with which you would approach any job search.
     - **Clearly indicate whether you are seeking a paid position or seeking work for academic credit.** In almost all cases, professors only offer unit credit during the academic year. Some professors will pay summer salaries to you if you continue into the summer after already working in the lab for the fall and spring. Discuss whether you would like to take IB 199 or, if you are eligible, H196A/B (honor research credit – see section on Honors). Be sure to find out how many hours a week the professor expects you to work. If you're going to earn units, 3 hours/week = 1 unit, during a 15 week semester.
   - Check out this additional IB research website for more guidelines and tips http://ib.berkeley.edu/undergrad/research.php
   - GSI's. Ask them about their research experiences (undergraduate and graduate) and find out how to get started.
2. Attend a research workshop sponsored by the Haas Scholar's Program. See http://research.berkeley.edu/resources.php for specific dates and times.
   - Workshop A – Getting started in undergraduate research.
   - Workshop B – Writing a research proposal.
3. Apply to Structured Research Programs, such as the Undergraduate Research Apprenticeship Program (URAP), at http://research.berkeley.edu/urap,
4. Sign up for research mailing lists.
   - Research listserv (Office of Undergraduate Research @ Berkeley), http://research.berkeley.edu/listserve.php
   - Health & Pre-Med Career Mail (Career Center), http://callisto.berkeley.edu.
5. Diversify your interests. Look in places outside of the IB department.
   - Non-IB departments. Anthropology, Chemistry, Environmental Science, Policy and Management, Molecular and Cellular Biology, Nutritional Sciences and Toxicology, Plant and Microbial Biology, Psychology-Biopsychology Group, and Public Health, just to name a few.
   - Off campus sites. Lawrence Berkeley National Laboratories (LBNL), Children's Hospital Research Institute (CHORI), and University of California, San Francisco (UCSF) are three examples and the most popular choices.
6. Online Resources;
   - Undergraduate research: http://research.berkeley.edu.
   - Search for faculty by keywords: http://research.chance.berkeley.edu.
   - Finding a faculty mentor: http://research.berkeley.edu/haas_scholars/documents/findmentor.html.
   - Finding a research mentor in the physical sciences: http://research.berkeley.edu/haas_scholars/documents/physcimentor.html

EARNING IB CREDIT FOR RESEARCH

A large percentage of IB majors gain valuable experience in scientific research under the guidance of a faculty sponsor and may receive academic credit for their work by enrolling in an independent study course such as IB 99, IB 199 or IB H196.

IB 99 and IB 199 are courses that are open to students with adequate backgrounds and to those who have arranged to work in a laboratory under the supervision of a UCB faculty member. (Research is not restricted to IB labs.)

IB 99 – Supervised Independent Study, variable units (1-4) – For students with freshman or sophomore standing (up to 60 units completed). You must have a minimum UCB GPA of 3.0.

IB 199 – Supervised Independent Study, variable units (1-4) – For students with junior or senior standing (60 or more units completed). You must have a minimum UCB GPA of 2.0.

General Information about IB 99/199

- Courses must be taken on a P/NP basis.
- 1 unit of credit equals 3 hours/week worked in the lab (or 45 hours/semester).
- You cannot aggregate more than 4 units of credit for independent studies or group studies in a single semester (courses numbered 98, 198, 99, or 199).
- You cannot earn credit for research for which you are getting paid.

To receive IB 99 or 199 credit for research, you must:

- find a UCB faculty member to sponsor your research,
- submit a completed IB 99 or 199 application to an advisor in the Undergraduate Student Services Office before the add/drop deadline, in order to obtain the course control number to add on Tele-BEARS (an application must be submitted each semester for which you wish to receive IB 199 credit) , and
- submit a written report on the research project to your UCB sponsor at the end of each semester for which you receive IB 199 credit.
- Be sure to clarify these guidelines with your PI and/or faculty sponsor at the beginning of the semester.

Departmental Honors

The honors program in Integrative Biology provides an exciting opportunity to gain valuable professional experience by working closely with a faculty Principal Investigator (PI) to complete an original research project. It is also a great way to receive recognition for your outstanding academic achievements. Students who fulfill all IB Honors criteria receive a notation on their transcript and diploma.

ELIGIBILITY TO PARTICIPATE IN HONORS

You must

- secure a research position in a lab and have a UCB faculty research sponsor,
- currently have (and maintain) a 3.3 GPA overall AND in the IB major, and
- enroll in IB H196A/B by submitting a completed application each semester.

REQUIREMENTS TO GRADUATE WITH HONORS

You must:

- write an honors thesis approved by your faculty sponsor to be turned in to the sponsor by the last weekday of instruction,
- present a poster describing their findings at Cal Day (a public event held each April), and to participate in several social events aimed at sharing their findings with the IB community,
- complete at least two semesters of research including 3 units each of IB H196A/B,
- have a cumulative UCB GPA of at least 3.3 or higher in all work completed at UCB, and
- have an IB major GPA of 3.3 or higher.

CALCULATING THE HONORS GPA

- We will not round any GPA. For example 3.295 does not equal a 3.3 and therefore is not eligible for honors.
- We will include grades of all courses you have taken for the major, even if you have earned AP credit that would have waived you from those requirements, e.g. if you received a 5 on the AP Calculus exam, then took Math 16A here and earned a C, we will include the C in your GPA calculation.
- Your GPA calculation will be based upon the grades in the courses you have taken to date, including electives for the major.

Additional information on H196 and receiving honors is available in the USSO.

HONORS COURSES H196A/H196B

General Information

- H196A and H196B are 3 units each
- Both courses must be taken for a letter grade

In order to sign up for H196A/H196B, you must

- find a UCB faculty member, if your PI is not a UCB faculty member, to sponsor your research and assign a grade,
- pick-up an application from the USSO, 3060 VLSB,
- write up a description of your project and take the form to your PI for his/her signature (UCB faculty sponsor if PI is off campus), and
- submit your completed IB H196A/H196B application to an advisor in the USSO by the end of the 4th week.

Beyond the B.A. in IB

MEDICAL SCHOOL & OTHER HEALTH SCHOOLS

There are numerous resources for you as a pre-health major. Most importantly, the Career Center has counselors who are trained to work with pre-health students (this includes pre-med). You can make appointments with them through their website and also gain access to a wealth of information about timing, planning, special programs, recommendations for courses, MCAT preparation, and the application process. Here are some valuable web resources:

- The Career Center, http://career.berkeley.edu/health/health.stm, for appointments with pre-health counselors, numerous resources and peer advising (https://career.berkeley.edu/Peers/Peers.stm) .
- Cal Biology / Pre-Health Clubs: https://career.berkeley.edu/Health/CalClubs.stm
- Career Services One Stop Access: http://callisto.berkeley.edu, a student portal, of sorts, for Career Services.
- Medical School Admissions Requirements (MSAR): https://www.aamc.org/students/applying/ or come in to the IB USSO to view a copy of the most recent book. The Career Center also has the current MSAR available for viewing.

GRAD SCHOOL IN BIOLOGICAL SCIENCE

Many of you will want to go on to graduate school in order to pursue careers as research scientists, teachers or professors. In addition to excellent academic achievement in appropriate courses and on entrance exams, such as the GRE, laboratory experience is generally required for pursuing graduate study in a biological science. Be sure to talk to your faculty advisors about your interest in graduate school. The Career Center has many resources to draw from, such as workshops, a letter service, individual counseling, graduate school fairs, and more:

- http://career.berkeley.edu/grad/grad.stm

CAREER OPTIONS WITH A B.A. IN IB

Students with undergraduate degrees in IB have many different career options. Here are some examples:

Laboratory technicians at universities, biotech companies, pharmaceutical companies, and research institutes • animal behavior/training • ecologist • environmental biologist and consultant • paleontology • medicine • pharmacy • dentistry • optometry • public health • public policy • education • Environmental Protection Agency (EPA) • Department of Health and Human Services (HHS) • science editing, writing, and illustration • museum scientist and curator • forest ranger • zoology, etc.

For more information about career opportunities, make an appointment with a career counselor at the Career Center.

- http://callisto.berkeley.edu

You may want to begin gathering preliminary information about career choices by visiting the Career and Educational Guidance Library. It's housed in the small building directly in front of the Tang center. They offer resources to help you assess where you may want to head in the future:

- http://www.uhs.berkeley.edu/Students/careerlibrary/index.shtml

Appendix 1: Course descriptions

LOWER-DIVISION REQUIREMENTS FOR THE IB MAJOR

Mathematics 16A: Analytic Geometry and Calculus. (3 Units)

Students will receive no credit for 16A after taking 1A. Two units of 16A may be used to remove a deficient grade in 1A. Two hours of lecture and one hour of discussion/workshop per week; at the discretion of the instructor, an additional one hour to one and one-half hours of lecture or discussion/workshop per week. *Prerequisites: Three years of high school math, including trigonometry, plus a satisfactory grade in one of the following: CEEB MAT test, an AP test, the UC/CSU math diagnostic exam, or 32. Consult the mathematics department for details.* This sequence is intended for majors in the life and social sciences. Calculus of one variable; derivatives, definite integrals and applications, maxima and minima, and applications of the exponential and logarithmic functions.

Chemistry 1A: General Chemistry (3 units)

Prerequisites: High school chemistry recommended. Credit option: Students will receive no credit for 1A after taking 4A. Description: Stoichiometry of chemical reactions, quantum mechanical description of atoms, the elements and periodic table, chemical bonding, real and ideal gases, thermochemistry, introduction to thermodynamics and equilibrium, acid-base and solubility equilibria, introduction to oxidation-reduction reactions.

Chemistry 1AL: General Chemistry Laboratory (1 unit)

Students will receive no credit for 1AL after taking 4A. One hour of lecture and three hours of laboratory per week. *Prerequisites: 1A (may be taken concurrently).* An experimental approach to chemical sciences with emphasis on developing fundamental, reproducible laboratory technique and a goal of understanding and achieving precision and accuracy in laboratory experiments. Proper use of laboratory equipment and standard wet chemical methods are practiced. Areas of investigations include chemical equilibria, spectroscopy, nanotechnology, green chemistry, and thermochemistry. Concurrent enrollment in 1A is recommended.

Chemistry 3A: Chemical Structure and Reactivity (3 units)

112A will restrict credit if completed before 3A. Three hours of lecture per week. *Prerequisites: 1A with a grade of C- or higher, or a score of 4 or 5 on the Chemistry AP test.* Introduction to organic chemical structures, bonding, and chemical reactivity. The organic chemistry of alkanes, alkyl halides, alcohols, alkenes, alkynes, and organometallics.

Chemistry 3AL: Organic Chemistry Laboratory (2 units)

Students will receive no credit for 3AL after taking 112A. One hour of lecture and four hours of laboratory per week. Prerequisites: 1A and 1AL or equivalent with a grade of C- or higher, or a score of 4 or 5 on Chemistry AP test; 3A (may be taken concurrently). Introduction to the theory and practice of methods used in the organic chemistry laboratory. An emphasis is placed on the separation and purification of organic compounds. Techniques covered will include extraction, distillation, sublimation, recrystalization, and chromatography. Detailed discussions and applications of infrared and nuclear magnetic resonance spectroscopy will be included.

Chemistry 3B: Chemical Structure and Reactivity (3 units)

Students will receive no credit for 3B after taking 112B. Three hours of lecture per week. *Prerequisites: 3A with a grade of C- or higher.* Conjugation, aromatic chemistry, carbonyl compounds, carbohydrates, amines, carboxylic acids, amino acids, peptides, proteins, and nucleic acid chemistry. Ultraviolet spectroscopy and mass spectrometry will be introduced.

Chemistry 3BL: Organic Chemistry Laboratory (2 units)

Students will receive no credit for 3BL after taking 112B. One hour of lecture and four hours of laboratory per week. *Prerequisites: 3AL; 3B (may be taken concurrently).* The synthesis and purification of organic compounds will be explored. Natural product chemistry will be introduced. Advanced spectroscopic methods including infrared, ultraviolet, and nuclear magnetic resonance spectroscopy and mass spectrometry will be used to analyze products prepared and/or isolated. Qualitative analysis of organic compounds will be covered.

Biology 1A: General Biology Lecture. (3 units)

Prerequisites: A grade of C- or better in Chemistry 3A/3AL or 112A. General introduction to cell structure and function, molecular and organism genetics, animal development, form and function. Intended for biological sciences majors, but open to all qualified students. Sponsored by MCB.

Biology 1AL: General Biology Laboratory (2 units)

Laboratory that accompanies Bio 1A lecture course. Intended for biological science majors, but open to all qualified students. Must be taken concurrently with Bio 1A, unless exempt by major. Sponsored by MCB.

Biology 1B: General Biology (4 units)

Description: General introduction to plant development, form, and function; population genetics, ecology, and evolution. Intended for students majoring in the biological sciences, but open to all qualified students. Students must take both Biology 1A and 1B to complete the sequence. Sponsored by Integrative Biology.

Physics 8A: Introductory Physics (4 units)

Prerequisites: Mathematics 16A or equivalent or consent of instructor. Credit option: Students with credit for 7A will not receive credit for 8A. Description: Introduction to forces, kinetics, equilibria, fluids, waves, and heat. This course presents concepts and methodologies for understanding physical phenomena, and is particularly useful preparation for upper-division study in biology and architecture.

Physics 8B: Introductory Physics (4 units)

Prerequisites: 8A or equivalent. Credit option: Students with credit for 7B or 7C will not receive credit for Physics 8B. Description: Introduction to electricity, magnetism, electromagnetic waves, optics, and modern physics. The course presents concepts and methodologies for understanding physical phenomena, and is particularly useful preparation for upper-division study in biology and architecture.

LOWER-DIVISION IB DEPARTMENTAL COURSES (NOT REQUIRED FOR THE MAJOR)

IB 24: Freshmen Seminars. (1 unit)

Course may be repeated for credit as topic varies. One hour of seminar per week. Sections 1-4 to be graded on a letter-grade basis. Sections 5-8 to be graded on a *passed/not passed* basis. The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester. (F,SP) *Staff*

IB 31: Animal Biology: A Behavioral View. (3 units)

Students will receive no credit for 31 after taking C144 or Psychology C115B. Two hours of lecture, one hour of film/demonstration and one hour of discussion per week. *Prerequisites: Open to all students; designed for those not specializing in biology.* Principles of evolution biology as they relate to animal behavior and behavioral ecology with broad coverage of animal groups. Special attention will be paid to the emerging discipline of behavioral ecology. (SP) *Caldwell*

IB 35AC: Human Biological Variation. (3 units)

Three hours of lecture per week. This course addresses modern human biological variation from historical, comparative, evolutionary, biomedical, and cultural perspectives. It is designed to introduce students to the fundamentals of comparative biology, evolutionary theory, and genetics. This course satisfies the American cultures requirement. (F) *Hlusko*

IB 39C: Topic in Integrative Biology- vet. Medicine. (2-3 units)

Two hours of discussion per week. Must be taken on a *passed/not passed* basis. *Prerequisites: Preferentially open to freshmen; consent of instructor.* Reading and discussion of the literature on particular topics in the field of integrative biology. Term paper and oral presentation. Section topics will vary from semester to semester. Students should check with department secretary for each semester's offerings. (F,SP) *Staff*

IB 41: Marine Mammals. (2 units)

Two hours of lecture per week. *Prerequisites: Designed for those not specializing in Integrative Biology.* A survey of marine mammal evolution, biology, behavior, ecology, and politics with a concentration on those species found in the North Pacific. Coverage would include: origin and evolution of cetaceans, pinnipeds, sirenians, and sea otters; basic biology and anatomy of marine mammal groups, and North Pacific species in particular; ecological interactions and role in nearshore and pelagic marine communities; and interactions between humans and marine mammals. (F) *Lindberg*

IB C82: Introduction to Oceans. (2 units)

Two hours of lecture per week. *Prerequisites: One of the following courses at high school level: physics, chemistry, or biology is recommended.* The geology, physics, chemistry, and biology of the world oceans. The application of oceanographic sciences to human problems will be explored through special topics such as energy from the sea, marine pollution, food from the sea, and climate change. Also listed as Geography C82 and Earth and Planetary Science C82. (F) *Bishop, Rhew*

IB 84: Sophomore Seminar. (1-2 units)

Course may be repeated for credit as topic varies. One hour of seminar per week per unit for fifteen weeks. One and one half hours of seminar per week per unit for 10 weeks. Two hours of seminar per week per unit for eight weeks. Three hours of seminar per week per unit for five weeks. Sections 1-2 to be graded on a *passed/not passed* basis. Sections 3-4 to be graded on a letter-grade basis. *Prerequisites: At discretion of instructor.* Sophomore seminars are small interactive courses offered by faculty members in departments all across the campus. Sophomore seminars offer opportunity for close, regular intellectual contact between faculty members and students in the crucial second year. The topics vary from department to department and semester to semester. Enrollment limited to 15 sophomores. (F,SP) *Staff*

IB 95: Special Field Study Section for Biology 1B. (1 unit)

Four hours of special field research per week. Must be taken on a *passed/not passed* basis. *Prerequisites: Consent of instructor; selected by interview.* Students enrolled in Biology 1B can participate in special field research in addition to attending regular laboratory sections. Students work independently with minimal supervision. Students will learn how to develop a project, collect and record data, conduct and analyze experiments, write a report, and make an oral presentation. Project may require traveling to off-campus sites. Students are required to attend at least three department seminars and write a short critique of each. (F,SP) *Staff*

IB C96: Studying the Biological Sciences (BSP). (1 unit)

Two hours of lecture per week. Must be taken on a *passed/not passed* basis. *Prerequisites: Consent of instructor.* Freshmen will be introduced to the "culture" of the biological sciences, along with an in-depth orientation to the academic life and the culture of the university as they relate to majoring in biology. Students will learn concepts, skills, and information that they can use in their major course, and as future science professionals. Restricted to freshmen in the biology scholars program. Also listed as Plant and Microbial Biology C96 and Molecular and Cell Biology C96. (F) *Matsui*

UPPER-DIVISION IB DEPARTMENTAL COURSES

C101L. Diversity of Plants and Fungi with Laboraory. (4)

Two hours of lecture and four hours of laboratory per week, plus two one-day field trips. Prerequisites: Biology 1A-1B. An integrated treatment of the biology and evolution of the major groups in the plant, algal, and fungal kingdoms. Also listed as Plant and Microbial Biology C102L. Offered alternate years. (F) Staff

102LF. Introduction to California Plant Life with Laboratory. (4)

Two hours of lecture and six hours of laboratory per week. Prerequisites: Biology 1B or consent of instructor. Formerly 102L. The relationship of the main plant groups and the plant communities of California to climate, soils, vegetation, geological and recent history and conservation. Laboratory will also include at least two Saturday field trips and focus on main plant groups and major plant families in California, and use of keys to identify introduced and especially native pteridophytes, conifers, and flowering plants of the state. Offered alternate years. (SP) Staff

103LF. Invertebrate Zoology with Laboratory. (5)

Three hours of lecture and six hours of laboratory per week, plus several weekend field trips. Prerequisites: Biology 1A-1B. Formerly 103L. Introductory survey of the biology of invertebrates, stressing comparative functional morphology, phylogeny, natural history, and aspects of physiology and development. Laboratory study of invertebrate diversity and functional morphology, and field study of the natural history of local marine invertebrates. Offered alternate years. (SP) Lindberg

104LF. Natural **History** of the Verterates with Laboratory. (5)

Three hours of lecture, three hours of laboratory, and a four hour field trip per week, plus special field projects. Prerequisites: Biology 1A-1B. Formerly 104L. Biology of the vertebrates, exclusive of fish. Laboratory and field study of local vertebrates exclusive of fish. (SP) McGuire, Bowie

106A. Physical and Chemical Environment of the Ocean. (4)

Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1B; Chemistry 1A or 4A; Mathematics 1A or 16A; Physics 7A or 8A. Recommended: 82. The biological implications of marine physics and chemistry. History and properties of seawater. Geophysical fluids. Currents and circulations. Deep sea. Waves, tides, and bottom boundary layers. The coastal ocean; estuaries. Air/sea interaction. Mixing. Formation of water masses. Modeling biological and geochemical processes. Ocean and climate change. Offered alternate years. (SP) Powell

C107L. Principles of Plant Morphology. (5)

Two hours of lecture, one hour of discussion, and six hours of laboratory per week. Prerequisites: Biology 1A-1B; must be taken concurrently with 107. An analysis of the structural diversity of multicellular plants, especially the higher forms, with emphasis on the developmental mechanisms responsible for this variation in form and the significance of this diversity in relation to the environments in which plants grow. Also listed as Plant and Microbial Biology C107LF. Offered alternate years. (F) Specht

112. Horticultural Methods in the Botanical Garden. (1)

Three hours of direct participation of field work per week. Must be taken on a passed/not passed basis. Prerequisites: Consent of instructor. Formerly 112L. An introduction to horticultural techniques utilizing the diverse collections of the University Botanical Garden. (F,SP) Licht

113L. Paleobiological Perspectives on Ecology and Evolution. (4)

Three hours of lecture and three hours of laboratory per week. Prerequisites: Prior biology experience, or consent of instructor. No paleontological or geological background required. Formerly 108. This course will center around answering the following questions: What do the fossil and geologic records have to tell us about the nature of ecological and evolutionary processes? What do they teach us that cannot be learned from the living world alone? In answering these questions, the course will provide an introduction to the analysis of key problems in paleobiology, with an emphasis on how evolutionary and ecological processes operate on geologic timescales. (SP) Marshall

115. Introduction to Systems in Biology and Medicine. (4)

Two hours of lecture and two hours of computer laboratory per week. Prerequisites: Biology 1A, Mathematics 1A or 16B. This course is aimed at students wishing to understand the general principles of how biological systems operate. Topics include feedback regulation; competition and cooperation; genetic switches and circuits; random processes; chaos; mechanisms for error correction; and the properties of networks. Examples are selected from many fields including medicine, physiology, ecology, biochemistry, cell biology, and genetics. Students will learn to conceptualize and quantify interactions within biological systems using simple mathematical models and computer programs. No previous experience in programming is required. (SP) Lim

117. Medical Ethnobotany. (2)

Two hours of lecture per week. Biological diversity and ethno-linguistic diversity sustain traditional botanical medicine systems of the world. Major topics covered in this course include cultural origins of medicinal plant knowledge on plant-derived pharmaceuticals and phytomedicines; field research methods in ethnobotany and ethnopharmacology; examples of how traditional botanical medicines provide safe, effective, affordable, and sustainable primary health care to tropical countries; human physiology, human diseases, and mechanisms of action of plant-derived drugs. (F, Su) Carlson

117LF. Medical Ethnobotany Laboratory. (2)

Six hours of laboratory per week. Formerly 117L. Laboratory will focus on studying medicinal plants from the major ecosystems and geographical regions of the world. Students will learn common names, scientific names, plant families, field identification, habitats, and ethnomedical uses of medicinal plants. How the medicinal plant is prepared, administered, and used as a phytomedicine will also be discussed. There will be reference to the phylogenetic relationships between the plant families and genera represented by the medicinal plants. (F, Su) Carlson

118. Host-Pathogen Interactions: A Trans-Discipline Outlook. (3)

Three hours of lecture per week. Prerequisites: Biology 1A-1B. The second half of the 20th century has been marked by great strides in the battle against infectious diseases. However, the forces that drive bacterial evolution are not dormant and continue to pose new challenges for science and medicine. In this course we will cover various aspects relating to host-pathogen interactions in animals and in plants, learning about viral pathogens, fungi, parasitic nematodes, and focusing on bacterial pathogens. We will examine the ecological context in which such interactions take place and how these interactions are shaped by evolution. We will further focus on prominent molecular mechanisms that participate in both pathogen and host in this warfare and learn how ancient mechanisms are used and reused in diverse organisms spanning hundreds of millions of years of evolution and how they integrate with more recently evolved mechanisms. The course will examine how such mechanisms contribute to disease, but also how the understanding of these mechanisms could suggest new strategies for fighting infectious diseases. (F) Portnoy, Shapira

123A. Exercise Physiology. (3)

Three hours of lecture per week. Prerequisites: Biology 1A, Chemistry 3B, and either 132 or Molecular and Cell Biology 136. 123A should be taken concurrently with 123AL. Discussions of how chemical energy is captured within cells and how potential chemical energy is converted to muscular work. Energetics, direct and indirect calorimetry, pathways of carbon flow in exercise, ventilation, circulation, skeletal muscle fiber types. (F) Brooks

123AL. Exercise Physiology Laboratory. (2)

Three hours of laboratory per week. Prerequisites: Biology 1A, Chemistry 3B and Integrative Biology 132 or Molecular and Cell Biology 136. Discussion of how chemical energy is captured within cells and how potential chemical energy is converted to muscular work. Energetics, direct and indirect calorimetry, pathways of carbon flow in exercise, ventilation, circulation, skeletal muscle fiber types. Laboratory component of the course is to obtain practical experience in the measurement of physiological parameters and to be able to compile, compare, contrast, and interpret physiological data. Laboratory demonstrations and exercises will explain lecture content. (F) Brooks

C125L. Introduction to the Biomechanical Analysis of Human Movement. (4)

Three hours of lecture and three hours of laboratory per week. Prerequisites: Physical Education 9 and Integrative Biology 131 and 131L. Formerly C165. Basic biomechanical and anatomical concepts of human movement and their application to fundamental movement patterns, exercise, and sport skills. Also listed as Physical Education C165. (F) Scott

127L. Motor Control with Laboratory. (3)

Two hours of lecture and two hours of laboratory per week. Prerequisites: 132 or Molecular and Cell Biology 136. Neural control of movement in humans and other animals. Lectures introduce basic theories of information and control, analyze motor control at the spinal level, survey anatomy and physiology of motor systems of the brain, and synthesize theory and physiology to understand control systems that regulate posture, locomotion, and voluntary movements. In laboratories, students learn theory and motor physiology hands-on, and design and perform independent investigations. (F) Lehman

128. Sports Medicine. (3)

Two hours of lecture and one hour of discussion per week. Prerequisites: Background in anatomy, physiology, or exercise physiology recommended. Survey course of sports medicine including topics of athletic injury (cause, evaluation, and treatment options), exercise physiology, exercise and health, fitness testing, issues specific to female athletes, drug abuse in sports, environmental issues (heat, altitude, sun exposure), nutrition, careers in sports medicine, introduction to clinical research. (Su) McLaughlin

C129L. Human Physiological Assessment. (3)

Two hours of lecture and three hours of laboratory per week. Prerequisites: 123A, 123AL (may be taken concurrently). Formerly C129. Principles and theories of human physiological assessment in relation to physical activity and conditioning. Performance of laboratory procedures in the measurement and interpretation of physiological fitness (cardiorespiratory endurance, body composition, musculoskeletal fitness). Also listed as Physical Education C129. (Su) Johannessen

131. General Human Anatomy. (3)
Three hours of lecture per week. Prerequisites: Biology 1A-1B or Chemistry 1A. The functional anatomy of the human body as revealed by gross and microscopic examination. Designed to be taken concurrently with 131L. (F, Su) Carlson

131A. Applied Anatomy. (1)
Course may be repeated once for credit. One hour of lecture per week. Must be taken on a passed/not passed basis. A series of 15 lectures by former students of 131 who have become successful physicians and surgeons. The purpose is to provide the practical applications of anatomy, e.g., plastic surgeons, neurosurgeons, vascular surgeons, pathologists, etc. (F) Diamond

131L. General Human Anatomy Laboratory. (2)
Four hours of laboratory per week. Prerequisites: Biology 1A-1B or Chemistry 1A. 131 (may be taken concurrently). Prepared human dissections, models, and microscopic slides. (F, Su) Carlson

132. Survey of Human Physiology. (3)
Students will receive no credit for 132 after taking Physiology 100 or 101 or Molecular and Cell Biology 32, 136. Three hours of lecture per week. Prerequisites: 131, Biology 1A. Mechanisms by which key physiological priorities are maintained in healthy humans. From a basis in elementary theories of information and control, we develop an understanding of homeostasis of cellular composition, structure, and energy metabolism. We then study neural and endocrine signaling in humans, and develop the key concepts of control and homeostasis in all the major organ and multi-organ systems, including cardiovascular, respiratory, renal, metabolic, reproductive, and immune systems, growth and development, and sensory and motor systems. (SP, Su) Brooks, Kaufer, Lehman

132L. Mammalian Physiology Laboratory. (2)
Students will receive no credit for 132L after taking Molecular and Cell Biology 32L or 136L, or if currently enrolled in similar courses. Three hours of laboratory per week. Prerequisites: Previous or concurrent enrollment in 132 or equivalent, or consent of instructor. In the laboratory component of Integrative Biology 132, students gain hands-on experience measuring physiological parameters, interpreting physiological data, designing experiments, and communicating ideas in writing and orally. Guided investigations include measurements of membrane potentials, responses of skeletal muscle to electrical stimulation, electromyography, pulmonary and cardiovascular measurements in humans, contractility and regulation of the frog heart, human electrocardiography, and renal control of body fluids. In two independent investigations, students identify their own questions, develop hypotheses, design and perform experiments, and present their studies in symposia. Background in elementary statistics, data analysis and oral presentation are also provided. (SP, Su) Brooks, Kaufer, Lehman

133. Anatomy Enrichment Program. (2)
Course may be repeated for credit. Fieldwork--minimum of four hours per week arranged. Must be taken on a passed/not passed basis. Prerequisites: 131 with a grade of A or B. The purpose of the course is for University students to teach human anatomy to grades K-7 in the public schools. The UCB students work in groups of 2-3 to plan their presentations of the systems of the body and then enter the school rooms to teach what they have learned in 131. (SP) Diamond

135. The Mechanics of Organisms. (4)
Three hours of lecture and one hour of discussion per week. Prerequisites: Introductory physics and biology recommended. Organism design in terms of mechanical principles; basics of fluid and solid mechanics with examples of their biological implications, stressing the dependence of mechanical behavior and locomotion on the structure of molecules, tissues, structural elements, whole organisms, and habitats. Offered alternate years. (F) Dudley, Full, Koehl

C135L. Laboratory in the Mechanics of Organisms. (3)
Students will receive no credit for C135L after taking 135L. Six hours of laboratory and one hour of discussion per week, plus one field trip. Prerequisites: Integrative Biology 135 or consent of instructor; for Electrical Engineering and Computer Science students, Electrical Engineering 105, 120 or Computer Science 184. Formerly Integrative Biology 135L. Introduction to laboratory and field study of the biomechanics of animals and plants using fundamental biomechanical techniques and equipment. Course has a series of rotations involving students in experiments demonstrating how solid and fluid mechanics can be used to discover the way in which diverse organisms move and interact with their physical environment. The laboratories emphasize sampling methodology, experimental design, and statistical interpretation of results. Latter third of course devoted to independent research projects. Written reports and class presentation of project results are required. Also listed as Electrical Engineering C145O and Bioengineering C136L. (SP) Staff, Full

137. Human Endocrinology. (4)
Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1A-1B; human physiology (132) strongly recommended. Course will address the role of hormones in physiology with a focus on humans. Regulation of hormone secretion and mechanisms of hormone action will be discussed. Physiological processes to be addressed include reproduction, metabolism, water balance, growth, fetal development. Experimental and clinical aspects will be addressed. (F) Hayes

138. Comparative Endocrinology. (4)

Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1A-1B. Organic Chemistry recommended. The primary goal of this course is to provide students with a broad understanding of the evolution of hormonal systems. A comparative approach allows us to envisage how the complex mammalian endocrine system presumably evolved from that of more primitive vertebrates. Students will learn about endocrine pathways and endocrine-based behaviors of jawless fishes, fishes, amphibia, reptiles, birds, and mammals. In addition, students will gain an understanding of the experimental methods used in endocrine research. The class teaches students how to read and interpret the primary scientific literature; thus it encourages the critical thinking that is a fundamental skill for any scientist. (SP) Bentley

C139. The Biology of Stress. (3)

Two hours of lecture and one hour of discussion per week. Prerequisites: Biology 1A or Psychology 110. This is an upper-division undergraduate course designed to explore the impact of stress (as a product of genes, environment, hormones) on brain and behavior. It will adopt both a multidisciplinary and a transdisciplinary approach to the concept of stress. What is stress, how is it measured, what are differences between acute and chronic stressor exposure on physiological processes, on the brain, how does stress affect gene expression or neurogenesis, what are the relationships between stress and disease? All of these questions will be addressed in this course. Also listed as Psychology C112. (F)

140. Human Reproduction. (4)

Three hours of lecture and one hour of discussion per week. Prerequisites: A course in physiology (e.g., 132, Molecular and Cell Biology 32, or consent of instructor). Evaluation of human reproduction, social problems and demographics, anatomy and physiology of reproductive organs, endocrinology of the menstrual cycle; puberty, psycho-physiology of copulation and orgasm; fertilization and implantation infertility and sexual dysfunction; conception and contraception; pregnancy and abortion; birth and lactation; sexual differentiation of brain and reproductive organs; homosexuality and transexualism. (SP) Carlson

141. Human Genetics. (3)

Principles of inheritance, especially as applied to human traits, including molecular aspects of genetics, the genetic constitutions of populations, and questions of heredity/environment. (Su)

C142L. Introduction to Human Osteology. (6)

Six hours of lecture and fourteen hours of laboratory per week. Prerequisites: Anthropology 1, Biology 1B. Formerly C142. An intensive study of the human skeleton, reconstruction of individual and population characteristics, emphasizing methodology and analysis of human populations from archaeological and paleontological contexts, taphonomy, and paleopathology. Also listed as Anthropology C103. Offered alternate years. (SP) White

C143A. Biological Clocks: Physiology and Behavior. (3)

Two hours of lecture and one hour of discussion per week. Prerequisites: Completion of biological prerequisites for the major and one of the following: Psychology 110 or a course in animal organismal physiology (Integrative Biology 132, 140, 148, or Molecular and Cell Biology 160). A consideration of the biological clocks that generate daily, lunar, seasonal and annual rhythms in various animals including people. Emphasis on neuroendocrine substrates, development and adaptive significance of estrous cycles, feeding rhythms, sleep-wakefulness cycles, reproductive and hibernation cycles, body weight and migratory cycles. Also listed as Psychology C113. Offered alternate years. (F)

C143B. Hormones and Behavior. (3)

Two hours of lecture and one hour of discussion per week. Prerequisites: Completion of biological prerequisites for the major and consent of instructor; a course in mammalian physiology recommended. This course provides a comprehensive overview of behavorial endocrinology beginning with hormone production and actions on target issues and continuing with an exploration of a variety of behaviors and their hormonal regulation/consequences. The course uses a comparative approach to examine the reciprocal interactions between the neuroendocrine system and behavior, considering the effects of hormone on development and adult behavior in addition to how behavior regulates endocrine physiology. While much of the course focuses on non-human vertebrate species, the relevance to humans is explored where appropriate. Topics include sexual differentiation and sex differences in behavior, reproductive, parental, and aggressive behaviors, and hormonal and behavioral homeostatic regulation. Also listed as Psychology C116. (SP)

144. Animal Behavior. (4)

Students will receive no credit for 144 after taking C144, 145, or Psychology C115B. Three hours of lecture and one hour of discussion/demonstration per week. Prerequisites: Biology 1A, 1B, or Environmental Science, Policy, and Management 140. Molecular and Cell Biology 140 and C160 recommended. An introduction to comparative animal behavior and behavioral physiology in an evolutionary context, including but not limited to analysis of behavior, genetics and development, learning, aggression, reproduction, adaptiveness, and physiological substrates. (F) Staff

146LF. Behavioral Ecology with Laboratory. (5)

Two hours of lecture, one hour of discussion, and three hours of laboratory per week, plus one weekend field trip. Prerequisites: 144 or C144 or consent of instructor. Formerly 146L. An in-depth examination of the ecological and evolutionary bases for behavioral diversity. Topics covered include behavior as an adaptive response, sexual selection, animal mating systems, group living, and cooperative and competitive interactions. Current conceptual approaches to these topics are explored, with an emphasis upon rigorous testing of hypotheses drawn from primary literature. Hands-on laboratory training in the methods of experimental design, data collection, and data analysis. Offered alternate years. (SP) Lacey

148. Comparative Animal Physiology. (3)

Students will receive no credit for 148 after taking 100A. Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1A-1B. Comparative study of physiological systems among animal phyla. General physiological principles will be illustrated by examining variation in neural, muscular, endocrine, cardiovascular, respiratory, digestive, and osmoregulatory systems. Students will read original literature and give a group presentation in a symposium. Offered alternate years. (F) Full, Dudley, Koehl

151. Plant Physiological Ecology with Laboratory. (5)

Three hours of lecture per week. Prerequisites: Biology 1B or consent of instructor (an introductory course in ecology, plant physiology, and biochemistry is very helpful). This course is a detailed survey of the physiological approaches used in understanding the relationships between plants and their environment from the functional perspective. Lectures explore physiological adaptation; limiting factors; resources acquisition and allocation; photosynthesis, carbon, and energy balance; water use and water relations; nutrient relations; linking physiology; stable isotope applications in ecophysiology; stress physiology; life history and physiology; the evolution of physiological performance; and physiology at the population, community, and ecosystem levels. The purpose of the laboratory is to allow you to become familiar with the approaches and methodology used in plant physiology ecology. The course will introduce students to a number of techniques and make measurements on different plant species growing in the field or greenhouse. Offered alternate odd years. (SP) Dawson

152. Environmental Toxicology. (4)

Three hours of lecture and one hour of discussion per week. Prerequisites: Background in biology or chemistry is recommended. The environmental fate and effect of toxic substances from human activities, with emphasis on aquatic systems, including their biological effects from the molecular to the community level. Course will review pollutant types, principal sources, impacts on aquatic organisms, monitoring approaches, and regulatory issues. (SP) Weston

153. Ecology. (3)

Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1B or consent of instructor. Principles of microbial, animal, and plant population ecology, illustrated with examples from marine, freshwater, and terrestrial habitats. Consideration of the roles of physical and biological processes in structuring natural communities. Observational, experimental, and theoretical approaches to population and community ecology will be discussed. Topics will include quantitative approaches relying on algebra, graph analysis, and elementary calculus. Discussion section will review recent literature in ecology. (F) Ackerly

153LF. Laboratory in Population and Community Ecology. (3)

Eight hours of laboratory per week, plus two or three weekend field trips. Prerequisites: 153 (may be taken concurrently) or consent of instructor; introductory course in statistics strongly recommended. Formerly 153L. Introduction to field and laboratory study of ecological patterns and processes in nature. Course begins with a series of group field exercises conducted in local terrestrial, aquatic, and marine habitats. These exercises emphasize sampling methodology, experimental design, and statistical interpretation of results. Latter half of course devoted to independent research projects. A written report and class presentation of project results are required. (TBA)

154. Plant Population and Community Ecology. (3)

Three hours of lecture/discussion per week. Prerequisites: Biology 1B. Enrollment in accompanying lab course 154L is encouraged but not required. An introduction to ecology of plants, covering individuals, populations, communities, and global processes. Topics include: form and function, population ecology, life histories, community structure and dynamics, disturbance and succession, diversity and global change. Offered alternate years (F) Ackerly

C155. Holocene Paleoecology: How Humans Changed the Earth. (3)

Students will receive no credit for C155 after taking 155 and/or Anthropology 129D. Deficient grade in 155 and/or 129D may be removed by taking C129D. Three hours of lecture per week. Prerequisites: Either Anthropology 2 or Biology 1A. Since the end of the Pleistocene and especially with the development of agriculturally based societies humans have had cumulative and often irreversible impacts on natural landscapes and biotic resources worldwide. Thus "global change" and the biodiversity crisis are not exclusively developments of the industrial and post-industrial world. This course uses a multi-disciplinary approach, drawing upon methods and data from archaeology, palynology, geomorphology, paleontology, and historical ecology to unravel the broad trends of human ecodynamics over the past 10,000 years. Also listed as Anthropology C129D. Offered alternate years (SP) Kirch

C156. Principles of Conservation Biology. (4)

Three hours of lecture and one and one-half hours of discussion per week. Prerequisites: Biology 1A-1B or equivalent. A survey of the principles and practices of conservation biology. Factors that affect the creation, destruction, and distribution of biological diversity at the level of the gene, species, and ecosystem are examined. Tools and management options derived from ecology and evolutionary biology that can recover or prevent the loss of biological diversity are explored. Also listed as Environ Sci, Policy, and Management C103. (F) Beissinger

157LF. Ecosystems of California. (4)

Six hours of fieldwork per week. Prerequisites: Biology 1B or consent of instructor. Formerly 157L. The ecosystems of California are studied from both an ecological and historical biogeographical perspective with a focus on terrestrial plant communities. Students learn how to identify about 150 species of native plants (mostly trees, but also other dominant plants from the non-forest biomes). Field trips occur each Friday and over several weekends. Students conduct group projects that involve plant inventories and data collection as well as how to collect plant specimens and use the Herbarium. (F) Fine

158LF. Biology and Geomorphology of Tropical Islands. (13)

Nine hours of lecture for 6 weeks; field projects for 6 weeks; three hours of lecture for 3 weeks. Formerly C158. Natural history and evolutionary biology of island terrestrial and freshwater organisms, and of marine organisms in the coral reef and lagoon systems will be studied, and the geomorphology of volcanic islands, coral reefs, and reef islands will be discussed. Features of island biogeography will be illustrated with topics linked to subsequent field studies on the island of Moorea (French Polynesia). Also listed as Environ Sci, Policy, and Management C107. (F) Staff

159. The Living Planet: Impact of the Biosphere on the Earth System. (3)

Students will receive two units of credit after taking Earth and Planetary Science 8, Earth and Planetary Science C141/Geography C141, or Geography 40. Two hours of lecture and two hours of discussion per week. Prerequisites: Biology 1B or consent of instructor. Earth is a complex dynamic system. Interplay between its components (solid earth, oceans, and atmosphere) governs conditions on the planet's outside that we and other biota inhabit. In turn, life asserts a vast influence on the abiotic components; in fact, the biosphere itself is a crucial system component. We will explore the effect that 3.5 billion years of evolving biosphere had on System Earth and vice versa (e.g., in terms of climate), including the recent human impact on the system. Offered alternate years. (F) Looy, Duijnstee

160. Evolution. (4)

Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1B. An analysis of the patterns and processes of organic evolution. History and philosophy of evolutionary thought; the different lines of evidence and fields of inquiry that bear on the understanding of evolution. The major features and processes of evolution through geologic times; the generation of new forms and new lineages; extinction; population processes of selection, adaptation, and other forces; genetics, genomics, and the molecular basis of evolution; evolutionary developmental biology; sexual selection; behavorial evolution; applications of evolutionary biology to medical, agricultural, conservational, and anthropological research. (F) Boore, Moritz, Padian

161. Population and Evolutionary Genetics. (4)

Course may be repeated for credit. Three hours of lecture and two hours of computer and/or discussion per week. Prerequisites: Biology 1B and Mathematics 16A or equivalent. Population genetics provides the theoretical foundation for modern evolutionary thinking. It also provides a basis for understanding genetic variation within populations. We will study population genetic theory and use it to illuminate a number of different topics, including the existence of sex, altruism and cooperation, genome evolution speciation, and human genetic variation and evolution. Offered alternate years. (SP) Nielson

162. Ecological Genetics. (4)

Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1B. This course integrates ecology, genetics, and evolutionary biology. It presents contemporary approaches to studying evolution in natural populations, including analyzing heritability of ecologically important traits, using molecular techniques to decompose genotypes, documenting and measuring the magnitude of selection in natural systems, and using models to predict evolution in natural populations. Case studies are used to examine evolutionary effects of ecological interactions among organisms, the importance of population size and structure, and interactions among populations through migration and dispersal. (TBA) Simms

163. Molecular and Genomic Evolution. (3)

Three hours of lecture per week. Prerequisites: Biology 1A-1B. This course will introduce undergraduates to the study of evolution using molecular and genomic methods. Topics included will be rates of evolution, evolution of sex chromosomes, insertions and deletions of DNA sequences, evolution of regulatory genetic elements, methods of phylogenetic inference, gene duplication, multigene families, transposons, genome organization, gene transfer, and DNA polymorphism within species. Offered alternate years. (SP) Bachtrog, Slatkin

164. Human Genetics and Genomics. (4)

Three hours of lecture and two hours of computer laboratory per week. Prerequisites: Biology 1A, 1B, and Math 16A, or equivalent. This course will introduce students to basic principles of genetics, including transmissions genetics, gene regulation, pedigree analysis, genetic mapping, population genetics, and the principles of molecular evolution. The course will also introduce students to recent developments in genomics as applied to problems in human genetic diseases, human history, and the relationship between humans and their closest relatives. (F) Bachtrog, Nielsen, Slatkin

166. Evolutionary Biogeography. (4)

Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1B, 11, Geography 148 or Earth and Planetary Science 50. The goals of the course are to (a) examine how geographically-linked characteristics of species influence their potential for evolution and extinction; and (b) provide an overview of the analytical techniques and applications for studying the interplay between geographic ranges, environment, evolution, and extinction. Accordingly, the course begins by examining what geographic ranges of species are and what controls them. We then will explore how geographic-range characteristics influence and interact with speciation and extinction processes. With that foundation, we will examine how species assemble into communities and how ecological processes govern distributions at the community and landscape levels, touching on such topics as community energetics, scaling issues, and the influences of humans on "natural" ecosystems. The last third of the course will be devoted to an overview of quantitative analytical techniques that commonly are used to study interactions between biogeogeographic ranges, evolutionary processes, extinction, and environmental change. Offered alternate years. (SP) Barnosky

168L. Systematics of Vascular Plants with Laboratory. (4)

Two hours of lecture and six hours of laboratory per week. Prerequisites: Biology 1A-1B. A discussion of the philosophy, principles, techniques, and history of botanical systemics. An outline of the major group of vascular plant and their evolution. Laboratory course devoted to a survey on a world-wide basis of the diversity of vascular plant families. Offered alternate years. (SP) Baldwin

169. Evolutionary Medicine. (4)

Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1B, or equivalent. Formerly 163. This course explores the ways that evolutionary theory can illuminate our understanding of human health and disease. The integration of evolutionary concepts into health sciences can deepen our understanding of the origins of diseases and how human populations evolve in response to these ailments. The course begins with an introduction to evolutionary medicine (two hours of lecture) followed by an overview of human genetic variation and natural selection (six hours of lecture). With this foundation, we study the evolution of human diet and the evolution of human ecological relationships with the environment (six hours of lecture). We then explore the fascinating topic of infectious disease ecology from the perspective of both microbial and human evolutionary responses (nine hours of lecture). Next, we evaluate the fields of reproductive biology, gynecology, and infant/child health through an evolutionary lens (twelve hours of lecture). Finally, we examine evolutionary concepts in chronic metabolic and degenerative diseases associated with aging and lifestyle (ten hours of lecture). (SP) Carlson

173LF. Mammalogy with Laboratory. (5)

Two hours of lecture and six hours of laboratory per week, plus two weekend field trips. Prerequisites: 104LF. Formerly 173L. An advanced course in the biology of mammals. Topics covered include elements of modern mammalian biology such as morphology, physiology, ecology, and behavior. For all topics, the traits that define mammals are emphasized, as is the variation on these themes evident within modern mammalian lineages. Laboratory and field explore the biology of modern mammals. Laboratories use the extensive collections of the Museum of Vertebrate Zoology to introduce students to mammalian diversity in a phylogenetic context. Offered alternate years. (SP) Lacey

174LF. Ornithology with Laboratory. (4)

Two hours of lecture and six hours of laboratory per week, plus one weekend field trip. Prerequisites: 104L or consent of instructor. Formerly 174L. An advanced course in the biology of birds. Laboratory: an introduction to the diversity, morphology, and general ecology of birds of the world. Offered alternate years. (SP) Bowie

175LF. Herpetology with Laboratory. (4)

Two hours of lecture and four hours of laboratory per week, plus two field trips. Prerequisites: 104LF. Formerly 175L. Lectures will introduce students to the diversity of amphibians and reptiles on a world-wide basis, with an emphasis on systematics, ecology, morphology, and life history. Laboratories will teach students the diagnostic characteristics and some functional attributes of amphibians and reptiles on a world-wide basis. Field trips will acquaint students with techniques for collecting, preserving, identifying, and studying amphibians and reptiles. Offered alternate years. (SP) McGuire

181. Paleobotany - The 500-Million Year History of a Greening Planet. (3)

Two hours of lecture and one and one-half hours of discussion per week. Prerequisites: Courses in botany and geology are recommended. Introduction to evolution of plants and their ecosystems through time. Earliest plant life, transition to land, and the emergence of terrestrial ecosystems. Follow the evolution of major plant groups during important moments in time through the Phanerozoic (last 650 million years). Explore ancient fossilized plant communities, their ecological properties, and examine how major environmental upheavals affected their evolution. The profound impact plants have on the functioning of our planet's surface and atmosphere. Offered alternate years. (F) Looy

183L. Evolution of the Vertebrates with Laboratory. (4)

Three hours of lecture and two hours of laboratory per week. Prerequisites: Biology 1B; introductory courses in earth history and zoology are recommended. Introduction to vertebrate paleontology, focusing on the history and phylogeny of vertebrates ranging from fishes to humans. Emphasis: evolution, taxonomy, functional morphology, faunas through time, problems in vertebrate history, including diversity through time and extinction. Laboratory: vertebrate fossils, focusing on demonstration and study of problems related to taxonomy, evolution, functional morphology, structures, preservation of fossil vertebrates, and their faunas through time. Offered alternate years. (F) Padian

184L. Morphology of the Vertebrate Skeleton with Laboratory. (4).

Two hours of lecture, six hours of laboratory, and one hour of discussion per week. Prerequisites: Anthropology 1 and Biology 1B. Lectures on comparative osteology of vertebrates, with emphasis on selected groups of terrestrial vertebrates considered in paleoecological, paleoclimatological, and biostratigraphic analyses. Laboratory: comparative osteology of vertebrates, with emphasis on selected groups of vertebrates. Structure, anatomy, morphology, function, and development of the vertebrate skeleton. Offered alternate years. (F) Barnosky

C185L. Human Paleontology. (5)

Three hours of lecture and three hours of laboratory per week. Prerequisites: Anthropology 1, Biology 1A-1B. Formerly C185. Origin and relationships of the extinct forms of mankind. Also listed as Anthropology C100. Offered alternate years. (SP) White

187. Human Biogeography of the Pacific. (3)

Students will receive no credit for C187 after taking 187. A deficient grade in 187 maybe removed by taking C187 and/or Anthropology C124C. Three hours of lecture per week. Prerequisites: Anthropology 1 or Biology 1B or consent of instructor. This course examines the history of human dispersal across Oceania from the perspectives of biogeography and evolutionary ecology. H. sapiens faced problems of dispersal, colonization, and extinction, and adapted in a variety of ways to the diversity of insular ecosystems. A dual evolutionary model takes into account cultural evolution and transmission, as well as biological evolution of human populations. This course also explores the impacts of human populations on isolated and fragile insular ecosystems, and the reciprocal effects of anthropogenic change on human cultures. Also listed as Anthropology C124C. Offered alternate years. (SP) Kirch

Appendix 2: Sample curriculum plans

TRACK 1 — ECOLOGY, EVOLUTION & ORGANISMAL BIOLOGY

FOR UCB STUDENTS ADMITTED AS FRESHMEN

Fall ____	Units	Spring ____	Units	Summer ____	Units
Chem 1A/1AL	3/1	Chem 3A/3AL	3/2		
Math 16A or 1A	3-4	Math 16B (not req'd for major) or Bio1B	3-4		
Total Units		**Total Units**		**Total Units**	
Fall ____	**Units**	**Spring ____**	**Units**	**Summer ____**	**Units**
Chem 3B/3BL	3/2	Bio 1A/1AL	3/2		
Bio 1B (if not done)	4	Physics 8A	4		
Total Units		**Total Units**		**Total Units**	
Fall ____	**Units**	**Spring ____**	**Units**	**Summer ____**	**Units**
Physics 8B	4	IB Group B w/ Lab	3-5		
IB Group A or B	3-4	IB Group C	3-4		
		IB Research?	1-4		
Total Units		**Total Units**		**Total Units**	
Fall ____	**Units**	**Spring ____**	**Units**	**Summer ____**	**Units**
IB Group A (if not already completed)	2-4	IB Group B w/ Field Lab	4-5		
IB Elective	3-4	IB Elective	2-4		
IB Honors?	3	IB Honors	3		
Total Units		**Total Units**		**Total Units**	

TRACK 2 —HUMAN BIOLOGY & HEALTH SCIENCES

FOR UCB STUDENTS ADMITTED AS FRESHMEN

Fall ____	Units	Spring ____	Units	Summer ____	Units
Chem 1A/1AL	4	Chem 3A/3AL	3/2		
Math 16A or 1A	3-4	Math 16B (not req'd for major) or Bio1B	3-4		
Total Units		**Total Units**		**Total Units**	
Fall ____	**Units**	**Spring ____**	**Units**	**Summer ____**	**Units**
Chem3B/3BL	3/2	Bio 1A/1AL	3/2		
Bio 1B (if not done)	4	Physics 8A	4		
Total Units		**Total Units**		**Total Units**	
Fall ____	**Units**	**Spring ____**	**Units**	**Summer ____**	**Units**
Physics 8B	4	IB Group C	4-5	IB Elective or Lab?	
IB Group C	3-5	IB Group B	4-5		
		IB Research?	1-4		
Total Units		**Total Units**		**Total Units**	
Fall ____	**Units**	**Spring ____**	**Units**	**Summer ____**	**Units**
IB Group A	4	IB 2nd Lab	2-4		
IB Lab	2-4	IB Elective	2-4		
IB Honors?	3	IB Honors	3		
Total Units		**Total Units**		**Total Units**	

TRANSFER STUDENTS

TRACK 1 — ECOLOGY, EVOLUTION & ORGANISMAL BIOLOGY

SAMPLE PLAN FOR THOSE WHO HAVE COMPLETED ALL PREREQUISITES

Fall ____	Units	Spring ____	Units	Summer ____	Units
IB Group B	3-4	IB Group B w/ Field Lab	4-5		
IB Group C	2-4	IB Elective	3-4		
		IB Research?	1-4		
Total Units		**Total Units**		**Total Units**	
Fall ____	**Units**	**Spring ____**	**Units**	**Summer ____**	**Units**
IB Group A	4	IB Group B w/ Lab	4-5		
IB Elective	3-4				
IB Research or Honors?	3	IB Honors?	3		
Total Units		**Total Units**		**Total Units**	

SAMPLE PLAN FOR THOSE LACKING PREREQUISITES

Fall ____	Units	Spring ____	Units	Summer ____	Units
Last LD courses	4-9	IB Group B w/ Lab	4-5		
IB Group B or C	3-4	IB Group C or Elective	3-4		
		IB Research?	1-4		
Total Units		**Total Units**		**Total Units**	
Fall ____	**Units**	**Spring ____**	**Units**	**Summer ____**	**Units**
IB Group A	4	IB Group B w/ Field Lab	4-5		
IB Elective	1-4	IB Elective	3-4		
IB Research or Honors?	3-4				
Total Units		**Total Units**		**Total Units**	

TRANSFER STUDENTS

TRACK 2 — HUMAN BIOLOGY & HEALTH SCIENCES

SAMPLE PLAN FOR THOSE WHO HAVE COMPLETED ALL PREREQUISITES

Fall ____	Units	Spring ____	Units	Summer ____	Units
IB Group A or B	4	IB Group C	4-5		
IB Group C	4-5	IB B or Elective	2-4		
		IB Research?	1-4		
Total Units		**Total Units**		**Total Units**	
Fall ____	**Units**	**Spring ____**	**Units**	**Summer ____**	**Units**
IB Group A	4	IB 2nd Lab or Group B	4		
IB 2nd Lab	2-4	IB Elective	4		
IB Honors?	3	IB Honors?	3		
Total Units		**Total Units**		**Total Units**	

SAMPLE PLAN FOR THOSE LACKING PREREQUISITES

Fall ____	Units	Spring ____	Units	Summer ____	Units
Last LD courses	4-9	IB Group B	4	IB Elective or Group C	
IB Group C	3-4	IB Group	4		
		IB Research?	1-4		
Total Units		**Total Units**		**Total Units**	
Fall ____	**Units**	**Spring ____**	**Units**	**Summer ____**	**Units**
IB Group A	4	IB 2nd Lab			
IB Lab Course	1-4	IB Elective			
Total Units		**Total Units**		**Total Units**	

Appendix 3: 2011-2012 Academic calendar

FALL SEMESTER 2011	
FALL SEMESTER BEGINS	Thursday, August 18, 2011
Welcome Activities	Monday-Friday, August 22-26, 2011
Instruction begins	Thursday, August 25, 2011
Early drop **DEADLINE**	Friday, September 2, 2011
Labor Day Holiday	Monday, September 5, 2011
DEADLINE to add/drop classes	Friday, September 23, 2011
DEADLINE to withdraw without semester-out rule imposed	Friday, October 14, 2011
Tele-BEARS for spring 2012 registration begins	Monday, October 17, 2011
DEADLINE to change grading option from letter grade to P/NP or P/NP to letter grade.	Friday, October 28, 2011
DEADLINE to apply for readmission for spring 2012	Tuesday, November 1, 2011
Veteran's Day Holiday	Friday, November 11, 2011
Thanksgiving Holiday	Thursday, November 24 - Friday, November 25, 2011
RRR Week	December 5-9, 2011
Last day of instruction; **DEADLINE** to withdraw (semester-out rule imposed)	Friday, December 9, 2011
Final examinations	Monday, December 12 - Friday, December 16, 2011
FALL SEMESTER ENDS	Friday, December 16, 2011
Winter Holiday	Monday, December 26 – Tuesday, December 27, 2011
New Year's Holiday	Thursday, December 29 – Friday, December 30, 2011

SPRING SEMESTER 2012	
SPRING SEMESTER BEGINS	Tuesday, January 10, 2012
MLK, Jr. Holiday	Monday, January 16, 2012
Instruction begins	Tuesday, January 17, 2012
Early drop **DEADLINE**	Friday, January 27, 2012
DEADLINE to add/drop classes	Friday, February 17, 2012
President's Day Holiday	Monday, February 20, 2012
DEADLINE to withdraw without semester-out rule imposed	Friday, March 9, 2012
Spring Recess	Monday, March 26 - Friday, March 30, 2012
DEADLINE to change grading option from letter grade to P/NP or P/NP to letter grade.	Friday, March 23, 2012
Cesar Chavez Holiday	Friday, March 30, 2012
Tele-BEARS for fall 2012 begins	Monday, April 16, 2012
Cal Day	Saturday, April 21, 2012
RRR week	April 23-27, 2012
Last day of instruction; **DEADLINE** to withdraw (semester-out rule imposed)	Friday, May 4, 2012
Final examinations	Thursday, May 7 - Thursday, May 11, 2012
SPRING SEMESTER ENDS	Thursday, May 11, 2012
IB Undergraduate Commencement	TBD (between May 13 - 17, 2012)
Memorial Day Holiday	Monday, May 28, 2012
DEADLINE to apply for readmission for Fall 2012	Friday, June 1, 2012