Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? Where are they published? (Please specify)	(3) Other than GPA, what data/evidence is used to determine that graduates have achieved stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)		(4) prets the evidence? is the process?	(5) How are the findings used?	(6) Date of last Academic Senate Review?
Department: Division of Biological Sciences Major: General Biology	Yes	<ul> <li>Understand:</li> <li>evolution and diversity of living organism</li> <li>heredity and its molecular basis</li> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> <li>biotic interactions and the relationship of organisms to the physical environment</li> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> <li>Skills: What should students be able to do with their knowledge?</li> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> <li>Implement contemporary biological research techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them</li> <li>Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases</li> </ul>	<ol> <li>Data/Evidence:</li> <li>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</li> <li>A Key Core Courses (marked with an "a" in Learning Goal tables)</li> <li>Capstone courses requiring integration and application of a body of knowledge spanning multiple earlier courses (examples of capstone laboratory courses are BICD 123 and BICD145; examples of capstone lecture courses are BICD 136, BIBC 120, BIPN 140, BIEB 150)</li> <li>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</li> <li>Undergraduate Research (BISP 196, BISP 197, BISP 199, AIP 197). Students are required to report findings to research mentor via written or oral presentation. They also have the opportunity to present findings at UCSD's Undergraduate Research Conference, the Division of Biological Sciences Annual Research Showcase, and/or publish them in Divisional undergraduate peer-reviewed journal (Saltman Quarterly).</li> </ol>	<ul> <li>Director of they percess student ac objectives degree ob preparatio</li> <li>The Educ</li> <li>Divisional representa (departme the Director Education, responsible effectivene The EC ess learning of outcomes, review critic learning of program.</li> <li>UCSD Unco our educat years). Su Undergrac work collal identified i</li> <li>Section Ch and Direct</li> </ul>	I faculty comment to f Undergraduate Education if eve a general problem with chievement of learning in their courses, overall jectives, or student n for their courses. cation Committee (EC), a committee with faculty atives from each section nt), reports to and advises or of Undergraduate , who is ultimately e for the quality and ess of Academic Programs. stablishes programmatic bjectives, identifies learning and establishes curriculum eria that are aligned with bjectives of the education dergraduate Council reviews tional program every seven bsequently, Director of duate Education and EC boratively to address issues n this review. hairs (Department Chairs) or of Undergraduate meet regularly to assure faculty input for all al matters.	<ul> <li>EC reviews assessment data annually and reports back to the Director of Undergraduate Education, who will initiate processes with the goal to eradicate shortcomings. Director initiates major internal curricular reviews, which involves ad hoc Biological Sciences faculty workgroups.</li> <li>Ad hoc meetings with Vice Chairs for Education from Physics, Mathematics and Chemistry &amp; Biochemistry departments provide a forum for identifying and addressing changed or new educational needs in science and math courses outside the Biological Sciences.</li> </ul>	2014-15

<ul> <li>Clearly and accurately communicate biological concepts</li> <li>Attitudes and Values: What should students value?</li> <li>Recognize the interactions between biology and society: the impact of biological discoveries on society, the long-term and ethical implications of biological discoveries, and the impact of social context on scientific progress.</li> <li>Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources</li> </ul>	<ol> <li>Feedback from instructors teaching upper division courses</li> <li>Surveys:         <ul> <li>a) Exit survey of graduating seniors solicits their opinions about the nature, extent, and scope of their learning</li> <li>b) Follow-up surveys done by the Career Service Center show how well the Division has prepared students for advanced work or future careers.</li> <li>c) Campus-wide surveys of current students, including the Undergraduate Experience Survey (UCUES), solicit their views about learning</li> <li>d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions about how much they have</li> </ul> </li> </ol>		
value of information acquired	<ul> <li>d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions</li> </ul>		
Learning outcomes published:	3		
<ul> <li>Divisional Undergraduate website</li> </ul>			

### General Biology

#### Foundational Courses: 1 year of calculus 1 year of calculus based physics with lab 1 year of general chemistry with lab 2 quarters of organic chemistry with lab

	Learning Goals							2*				۵. <sub>+</sub>
	wledge: What should our students w by the time they graduate?	BILD 1	BILD 2	BILD 3	BILD 4	BIBC 102	BICD 100	UD Lab x2	UD Elective x 7**	Optional Advanced Studies – BI** 194+	Optional Advanced Studies – BISP195+	Optional Advanced Studies –BISP 196,197/199+
Unc I	lerstand: evolution and diversity of living organisms			Ι	Ι				I/A	I/A		
*	heredity and its molecular basis	Ι			Ι		A a		I/A	I/A		
*	the correlation of biological structure, function and processes at all levels of biological organizations	Ι	Ι	Ι		А	A a		I/A	I/A		
*	how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	Ι	Ι	Ι	Ι	А	A a		I/A	I/A		
*	biotic interactions and the relationship of organisms to the physical environment			Ι	Ι				I/A	I/A		
*	how mathematics, physics and chemistry are integrated into the study of biology	Ι	Ι	Ι	Ι	А	А	A a	А	I/A	I/A	A a

Learning Goals					32	00	× 2*	UD Elective x 7	9 · +	9. t	d -BISP 199+
	BILD 1	BILD 2	BILD 3	BILD 4	BIBC 102	BICD 100	UD Lab x 2*	UD Ele	Optional Advanced Studies – BI** 194+	Optional Advanced Studies – BISP195+	Optional Advanced Studies – BISP 196, 197/199+
Skills: What should students be able to do with their knowledge?			1		1						
<ul> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> </ul>				Ι	Ι	Ι	A a	Ι	Ι		Aa
Implement contemporary biological research techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them				I			A a				A a
<ul> <li>Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases</li> </ul>				Ι			I/A a				A a
<ul> <li>Clearly and accurately communicate biological concepts</li> </ul>				Ι			A a		А	А	A a
Attitudes and Values: What should students value?		·	·		·						
Recognize the interactions between biology and society: the impact of biological discoveries on society, the long-term and ethical implications of biological discoveries, and the impact of social context on scientific progress.	I	I	I	Ι	Ι	A a	А	А	А	А	A a
<ul> <li>Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources</li> </ul>	Ι	Ι	Ι	Ι	Ι	А	A a	А	А	А	A a

\* Must be chosen from the following: BIBC 103; BICD 123 or 145; BIEB 121, 131, 135, 143 or 167; BIMM 101 or 121; BIPN 105

\*\* Only one quarter or BISP 195 and one quarter of either BISP 196, 197, or 199 may be applied towards this requirement.

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? Where are they published? (Please specify)	(3) Other than GPA, what data/evidence is used to determine that graduates have achieved stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)		(4) Who interprets the evidence? What is the process?	(5) How are the findings used?	(6) Date of last Academic Senate Review?
Department: Division of Biological Sciences Major: Molecular Biology	Yes	<ul> <li>Understand:</li> <li>evolution and diversity of living organism</li> <li>heredity and its molecular basis</li> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> <li>biotic interactions and the relationship of organisms to the physical environment</li> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> <li><i>Have an in-depth understanding of:</i></li> <li>the properties, structures, and functions of biological molecules, and how they interact to accomplish processes that are essential and unique to living cells</li> <li>mechanisms regulating the expression of genetic information</li> <li><i>Skills: What should students be able to do with their knowledge?</i></li> </ul>	<ol> <li>Data/Evidence:</li> <li>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:         <ul> <li>Acy Core Courses (marked with an "a" in Learning Goal tables)</li> <li>Capstone courses requiring integration and application of a body of knowledge spanning multiple earlier courses (examples of capstone laboratory courses are BICD 123 and BICD145; examples of capstone lecture courses are BICD 136, BIBC 120, BIPN 140, BIEB 150)</li> <li>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</li> <li>Undergraduate Research (BISP 196, BISP 197, BISP 199, AIP199). Students are required to report findings to research mentor via written or oral presentation. They also have the opportunity to present findings at UCSD's Undergraduate Research Conference, the Division of Biological Sciences Annual Research Showcase, and/or publish them in Divisional undergraduate peer-reviewed journal (Saltman Quarterly).</li> </ul> </li> </ol>	*	Individual faculty comment to Director of Undergraduate Education if they perceive a general problem with student achievement of learning objectives in their courses, overall degree objectives, or student preparation for their courses. The Education Committee (EC), a Divisional committee with faculty representatives from each section (department), reports to and advises the Director of Undergraduate Education, who is ultimately responsible for the quality and effectiveness of Academic Programs. The EC establishes programmatic learning objectives, identifies learning outcomes, and establishes curriculum review criteria that are aligned with learning objectives of the education program. UCSD Undergraduate Council reviews our educational program every seven years). Subsequently, Director of Undergraduate Education and EC work collaboratively to address issues identified in this review. Section Chairs (Department Chairs) and Director of Undergraduate Educational matters.	<ul> <li>EC reviews assessment data annually and reports back to the Director of Undergraduate Education, who will initiate processes with the goal to eradicate shortcomings. Director initiates major internal curricular reviews, which involves ad hoc Biological Sciences faculty workgroups.</li> <li>Ad hoc meetings with Vice Chairs for Education from Physics, Mathematics and Chemistry &amp; Biochemistry departments provide a forum for identifying and addressing changed or new educational needs in science and math courses outside the Biological Sciences.</li> </ul>	2014-15

r	· · · · · ·		1	
	hypotheses to explain	2. Feedback from instructors		
	biological phenomena and	teaching upper division		
	design effective experiments	courses		
	to test the hypotheses	2		
	<ul> <li>Implement contemporary</li> </ul>	3. Surveys:		
	biological research	a) Exit survey of graduating		
	techniques to conduct	seniors solicits their opinions		
	experiments, and use	about the nature, extent,		
	quantitative and/or statistical			
	approaches to analyze the	b) Follow-up surveys done by		
	results and draw appropriate			
	conclusions from them Use digital technologies to	show how well the Division		
	<ul> <li>Use digital technologies to search the scientific</li> </ul>	has prepared students for advanced work or future		
	literature, and to retrieve	careers.		
	and analyze information	c) Campus-wide surveys of		
	from reliable databases	current students, including		
	<ul> <li>Conduct procedures widely</li> </ul>	the Undergraduate		
	used by molecular biologists			
	to isolate, separate, amplify	solicit their views about learning		
	and analyze nucleic acids,	d) Course evaluations (CAPE)		
	design experiments utilizing	at the end of the quarter		
	these procedures, and draw	solicits students' opinions		
	appropriate conclusions	about how much they have		
	from the results	learned during the course.		
		-		
	Attitudes and Values: What should			
	students value?			
	<ul> <li>Recognize the interactions</li> </ul>			
	between biology and			
	society: the impact of			
	biological discoveries on			
	society, the long-term and			
	ethical implications of			
	biological discoveries, and			
	the impact of social context			
	on scientific progress.			
	<ul> <li>Habitually analyze every- day events using the</li> </ul>			
	day events using the			
	principles of scientific inquiry to evaluate the credibility and	4		
	value of information acquired			
	from many different sources	·		
	non many unerent sources			
	Learning outcomes published:			
	Ecuring outcomes published.			
	<ul> <li>Divisional Undergraduate</li> </ul>			
	website			

#### Molecular Biology

#### Foundational Courses: 1 year of calculus 1 year of calculus based physics with lab 1 year of general chemistry with lab 2 quarters of organic chemistry with lab

Learning Goals																
Knowledge: What should our students know by the time they graduate?	BILD 1	BILD 3	BILD 4	BIBC 100	BIBC 102	BICD 100	BICD 110	BIMM 100	BIMM 101	BIMM 112	BIMM 122	UD Lab x 1*	UD Elective x 2	Optional Advanced Studies- BI** 194+	Optional Advanced Studies- BISP 195+	Optional Advanced Studies- BISP 196/197/199+
Understand: evolution and diversity of living organism		I	Ι										I/A	I/A		
<ul> <li>heredity and its molecular basis</li> </ul>	Ι		Ι			A a		А	A	A a	A		I/A	I/A		
<ul> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> </ul>	I	I		А	A	A a	A a	A a	A a	A a	A a		I/A	I/A		
<ul> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> </ul>	I	I	I		А	A a	A	A a	A	A a	A		I/A	I/A		
<ul> <li>biotic interactions and the relationship of organisms to the physical environment</li> </ul>		Ι	Ι										I/A	I/A		
<ul> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> </ul>	Ι	Ι	Ι	A	А	A	А	A a	A a	А	А	A a	А	I/A	I/A	А
<ul> <li>Have an in-depth understanding of:</li> <li>the properties, structures, and functions of biological molecules, and how they interact to accomplish processes that are essential and unique to living cells</li> </ul>				A	A	A	A	A a	A a							
<ul> <li>Mechanisms regulating the expression of genetic information</li> </ul>								Ι		A a	A a					

Learning Goals				1								1				
	_	3	4	100	102	100	110	100	101	112	122	o x 1*	UD Elective x 2	Optional Advances Studies- BI** 194+	Optional Advances Studies- BISP 195+	Optional Advances Studies- BISP 196/197/199+
	BILD 1	BILD	BILD 4	BIBC 100	BIBC 102	BICD 100	BICD 110	BIMM 100	BIMM 101	BIMM 112	BIMM 122	UD Lab x 1*	ND EI	Optior Advar Studie 194+	Optior Advar Studie 195+	Option Advar Studie BISP 196/1
Skills: What should students be able to do with their knowledge?																
<ul> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> </ul>			Ι	Ι	Ι	Ι	Ι	Ι	A a	Ι	Ι	A a	Ι	А		A a
<ul> <li>Implement contemporary biological research techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them</li> </ul>			I						A a			A a				A a
<ul> <li>Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases</li> </ul>			Ι						Ι			I/A a				A a
<ul> <li>Clearly and accurately communicate biological concepts</li> </ul>			Ι						A a			A a		А	А	A a
Conduct procedures widely used by molecular biologists to isolate, separate, amplify and analyze nucleic acids, design experiments utilizing these procedures, and draw appropriate conclusions from the results			I						A a							
Attitudes and Values: What should students value?																
Recognize the interactions between biology and society: the impact of biological discoveries on society, the long-term and ethical implications of biological discoveries, and the impact of social context on scientific progress.	I	I	I	I	Ι	A a	I	I	А	I	I	I	А	I/A	I	A a
<ul> <li>Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources</li> </ul>	Ι	I	Ι	Ι	Ι	A	Ι	Ι	А	Ι	Ι	А	A a	А	А	A a

\* Must be chosen from the following: BIBC 103; BICD 123 or 145; BIEB 121, 131, 135, 143 or 167; BIMM 121; BIPN 105

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? Where are they published? (Please specify)	(3) Other than GPA, what data/evidence is used to determine that graduates have achieved stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)	(4) Who interprets the evidence? What is the process?	(5) How are the findings used?	(6) Date of last Academic Senate Review?
Department: Division of Biological Sciences Major: Ecology, Behavior, &Evolution	Yes	<ul> <li>Students graduating with a degree should be able to:</li> <li>Understand:</li> <li>evolution and diversity of living organisms</li> <li>heredity and its molecular basis.</li> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> <li>biotic interactions and the relationship of organisms to the physical environment</li> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> <li>Have an in-depth understanding of:</li> <li>the historical path of evolution sty natural selection shapes the behavior, morphology, and life history of organisms</li> <li>the interactions between organism (including humans) and the</li> </ul>	<ol> <li>Data/Evidence:</li> <li>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:         <ul> <li>(a) Key Core Courses (marked with an "a" in Learning Goal tables)</li> <li>(b) Capstone courses requiring integration and application of a body of knowledge spanning multiple earlier courses (examples of capstone laboratory courses are BICD 123 and BICD145; examples of capstone lecture courses are BICD 136, BIBC 120, BIPN 140, BIEB 150)</li> <li>(c) Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</li> <li>(d) Undergraduate Research (BISP 196, BISP 197, BISP 199, AIP199). Students are required to report findings to research mentor via written or oral presentation. They also have the opportunity to present findings at UCSD's Undergraduate Research Conference, the Division of Biological Sciences Annual Research Showcase, and/or publish them in Divisional undergraduate peer-reviewed journal (Saltman Quarterly).</li> </ul> </li> </ol>	<ul> <li>Individual faculty comment to Director of Undergraduate Education if they perceive a general problem with student achievement of learning objectives in their courses, overall degree objectives, or student preparation for their courses.</li> <li>The Education Committee (EC), a Divisional committee with faculty representatives from each section (department), reports to and advises the Director of Undergraduate Education, who is ultimately responsible for the quality and effectiveness of Academic Programs. The EC establishes programmatic learning objectives, identifies learning outcomes, and establishes curriculum review criteria that are aligned with learning objectives of the education program.</li> <li>UCSD Undergraduate Council reviews our educational program every seven years). Subsequently, Director of Undergraduate Education and EC work collaboratively to address issues identified in this review.</li> <li>Section Chairs (Department Chairs) and Director of Undergraduate Education meet regularly to assure additional faculty input for all educational matters.</li> </ul>	<ul> <li>EC reviews assessment data annually and reports back to the Director of Undergraduate Education, who will initiate processes with the goal to eradicate shortcomings. Director initiates major internal curricular reviews, which involves ad hoc Biological Sciences faculty workgroups.</li> <li>Ad hoc meetings with Vice Chairs for Education from Physics, Mathematics and Chemistry &amp; Biochemistry departments provide a forum for identifying and addressing changed or new educational needs in science and math courses outside the Biological Sciences.</li> </ul>	2014-15

environment on a hierarchy	2. Feedback from instructors		
of scale ( organismal to global)	teaching upper division courses		
giobal)	courses		
Skills: What should students be able	3. Surveys:		
to do with their knowledge?	a) Exit survey of graduating		
10 20 1	seniors solicits their opinions		
<ul> <li>Construct reasonable</li> </ul>	about the nature, extent,		
hypotheses to explain	and scope of their learning		
biological phenomena and	b) Follow-up surveys done by		
design effective experiments	the Career Service Center		
to test the hypotheses	show how well the Division		
<ul> <li>Implement contemporary</li> </ul>	has prepared students for		
biological research techniques to conduct	advanced work or future careers.		
experiments, and use	c) Campus-wide surveys of		
quantitative and/or statistical	current students, including		
approaches to analyze the	the Undergraduate		
results and draw appropriate	Experience Survey (UCUES),		
conclusions from them	solicit their views about learning		
<ul> <li>Use digital technologies to</li> </ul>	d) Course evaluations (CAPE)		
search the scientific	at the end of the quarter		
literature, and to retrieve	solicits students' opinions		
and analyze information from reliable databases	about how much they have learned during the course.		
<ul> <li>Clearly and accurately</li> </ul>	learned during the course.		
communicate biological			
concepts			
Attitudes and Values: What should			
students value?			
Decomplex the interactions			
<ul> <li>Recognize the interactions between biology and</li> </ul>			
society: the impact of			
biological discoveries on			
society, the long-term and			
ethical implications of			
biological discoveries, and			
the impact of social context			
on scientific progress.			
<ul> <li>Habitually analyze every- day events using the principles of</li> </ul>			
scientific inquiry to evaluate			
the credibility			
and value of information			
acquired from many different			
sources			
Learning outcomes published:			
Divisional Undergraduate			
website.			

### Ecology, Behavior, & Evolution

#### Foundational Courses: 1 year of calculus 1 year of calculus based physics with lab 1 year of general chemistry with lab 2 quarters of organic chemistry with lab

Learning Goals										*.					0	0
Knowledge: What should our stude know by the time they graduate?	ents	BILD 1	BILD 2	BILD 3	BILD 4	BICD 100	BIEB 100	BIEB 102	BIEB 150	BIEB Core x 4*	BIEB Lab **	UD Lab ***	UD Elective x 3	Optional Additional Studies –BI** 194+	Optional Additional Studies –BISP 195+	Optional Additional Studies –BISP 196/197/199+
Understand: evolution and diversity of live organism	/ing			Ι	Ι			А	A a	А	А		I/A	I/A		
<ul> <li>heredity and its molecular h</li> </ul>	basis	Ι			Ι	A a			А	I/A	I/A		I/A	I/A		
<ul> <li>the correlation of biologic structure, function and processes at all levels of biological organizations</li> </ul>		Ι	Ι	Ι		A a		A a	A a	А	А		I/A	I/A		
<ul> <li>how energy, nutrients, metabolites and informati are acquired and organiz and how they flow throug biological systems</li> </ul>	zed, jh	Ι	Ι	Ι	Ι	A a		A a	A a	A	A a		I/A	I/A		
<ul> <li>biotic interactions and the relationship of organisms the physical environment</li> </ul>	s to			Ι	Ι			A a		А	A a		I/A	I/A		
<ul> <li>how mathematics, physics and chemistry are integra into the study of biology</li> </ul>		Ι	Ι	Ι	Ι	А	А	А	Α	А	А	A a	А	I/A	I/A	A a
<ul> <li>Have an in-depth understanding</li> <li>the historical path of evolutional the processes and forces contributing to evolutional change and how evolution natural selection shapes behavior, morphology, an history of organisms</li> </ul>	lution, s ary on by the								A a	A	А			A	A	A a
<ul> <li>the interactions between organism (including huma and the environment on a hierarchy of scale (organismal to global)</li> </ul>	ans)							A	A a	A	A			Ι	А	A a

I= Introductory level

A=Advanced level

a= could be used for program assessment activities

Learning Goals														0	0
	BILD 1	BILD 2	BILD 3	BILD 4	BICD 100	BIEB 100	BIEB 102	BIEB 150	BIEB Core x 4*	BIEB Lab**	UD Lab***	UD Elective x 3	Optional Additional Studies –BI** 194+	Optional Additional Studies –BISP 195+	Optional Additional Studies – BISP 196/197/199+
Skills: What should students be able to do with their knowledge?			1			1		1		1	I	1	I	I	1
<ul> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> </ul>				Ι	Ι	Ι	I	Ι	I	A a	A a	I/A	А		A a
Implement contemporary biological research techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them				I						A a	A a				A a
<ul> <li>Use digital technologies to search the scientific literature, and to retrieve and analyze information from</li> </ul>				Ι		Ι				A a	I/A a				A a
<ul> <li>Clearly and accurately communicate biological concepts</li> </ul>				Ι						A a	A a				A a
Attitudes and Values: What should students value?		•				•		•		•					
Recognize the interactions between biology and society: the impact of biological discoveries on society, the long-term and ethical implications of biological discoveries, and the impact of social context on scientific progress.	Ι	Ι	Ι	Ι	A a	Ι	А	A a	А	А		A			A a
<ul> <li>Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many</li> </ul>	Ι	I	I	I	A	Ι	A	A a	A	A		A a			A a

\* Must be chosen from the following: BIBC 103; BICD 123 or 145; BIEB 121, 131, 135, 143 or 167; BIMM 101 or 121; BIPN 105

\*\* Must be chosen from the following: BIEB 121, 131, 135, 143 or 167 + Content varies with instructor

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? Where are they published? (Please specify)	(3) Other than GPA, what data/evidence is used to determine that graduates have achieved stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)	,	(4) Who interprets the evidence? What is the process?	(5) How are the findings used?	(6) Date of last Academic Senate Review?
Department: Division of Biological Sciences Major: Human Biology	Yes	<ul> <li>Understand:</li> <li>evolution and diversity of living organism</li> <li>heredity and its molecular basis</li> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> <li>biotic interactions and the relationship of organisms to the physical environment</li> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> <li>Have an in-depth understanding of:</li> <li>the many biological characteristics that the human species shares with a vast array of other living species</li> <li>the physiological mechanisms that coordinate function within and between organ systems and how these change disease states</li> <li>Skills: What should students be able to do with their knowledge?</li> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments</li> </ul>	<ol> <li>Data/Evidence:</li> <li>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</li> <li>Key Core Courses (marked with an "a" in Learning Goal tables)</li> <li>Capstone courses requiring integration and application of a body of knowledge spanning multiple earlier courses (examples of capstone laboratory courses are BICD 123 and BICD145; examples of capstone lecture courses are BICD 136, BIBC 120, BIPN 140, BIEB 150)</li> <li>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</li> <li>Undergraduate Research (BISP 196, BISP 197, BISP 199, AIP199). Students are required to report findings to research mentor via written or oral presentation. They also have the opportunity to present findings at UCSD's Undergraduate Research Conference, the Division of Biological Sciences Annual Research Showcase, and/or publish them in Divisional undergraduate peer-reviewed journal (Saltman Quarterly).</li> </ol>	*	Individual faculty comment to Director of Undergraduate Education if they perceive a general problem with student achievement of learning objectives in their courses, overall degree objectives, or student preparation for their courses. The Education Committee (EC), a Divisional committee with faculty representatives from each section (department), reports to and advises the Director of Undergraduate Education, who is ultimately responsible for the quality and effectiveness of Academic Programs. The EC establishes programmatic learning objectives, identifies learning outcomes, and establishes curriculum review criteria that are aligned with learning objectives of the education program. UCSD Undergraduate Council reviews our educational program every seven years). Subsequently, Director of Undergraduate Education and EC work collaboratively to address issues identified in this review. Section Chairs (Department Chairs) and Director of Undergraduate Educational matters.	<ul> <li>EC reviews assessment data annually and reports back to the Director of Undergraduate Education, who will initiate processes with the goal to eradicate shortcomings. Director initiates major internal curricular reviews, which involves ad hoc Biological Sciences faculty workgroups.</li> <li>Ad hoc meetings with Vice Chairs for Education from Physics, Mathematics and Chemistry &amp; Biochemistry departments provide a forum for identifying and addressing changed or new educational needs in science and math courses outside the Biological Sciences.</li> </ul>	2014-15

to toot the hypotheses	2 Foodbook from instructors		I
to test the hypotheses	2. Feedback from instructors		
<ul> <li>Implement contemporary</li> </ul>	teaching upper division		
biological research	courses		
techniques to conduct			
experiments, and use	3. Surveys:		
quantitative and/or statistical	<ul> <li>a) Exit survey of graduating</li> </ul>		
approaches to analyze the	seniors solicits their opinions		
results and draw appropriate	about the nature, extent,		
conclusions from them	and scope of their learning		
<ul> <li>Use digital technologies to</li> </ul>	b) Follow-up surveys done by		
search the scientific	the Career Service Center		
literature, and to retrieve	show how well the Division		
and analyze information	has prepared students for		
from reliable databases	advanced work or future		
<ul> <li>Clearly and accurately</li> </ul>	careers.		
communicate biological	c) Campus-wide surveys of		
concepts	current students, including		
	the Undergraduate		
Attitudes and Values: What should	Experience Survey (UCUES),		
students value?	solicit their views about learning		
	d) Course evaluations (CAPE)		
<ul> <li>Recognize the interactions</li> </ul>	at the end of the quarter		
between biology and	solicits students' opinions		
society: the impact of	about how much they have		
biological discoveries on	learned during the course.		
society, the long-term and			
ethical implications of			
biological discoveries, and			
the impact of social context			
on scientific progress.			
<ul> <li>Habitually analyze every-</li> </ul>			
day events using the			
principles of scientific inquiry			
to evaluate the credibility and			
value of information acquired			
from many different sources			
Learning outcomes published:			
<ul> <li>Divisional Undergraduate</li> </ul>			
website			
		1	

### Human Biology

#### Foundational Courses: 1 year of calculus 1 year of calculus based physics with lab 1 year of general chemistry with lab 2 quarters of organic chemistry with lab

Learning Goals												*	x 2	*	_ <del>C</del>	– d +
Knowledge: What should our students know by the time they graduate?	BILD 1	BILD 2	BILD 3	BILD 4	BIBC 102	BICD 100	BIMM 100	BIMM110	BIPN 100	Human Physiology	Human Disease*	UD Labs x 2**	UD Elective x 2	Optional Advanced Studies- BI** 194+	Optional Advanced Studies- BISP 195+	Optional Advanced Studies- BISP 196/197/199+
Understand: evolution and diversity of living organism			Ι	Ι									I/A	I/A		
<ul> <li>heredity and its molecular basis</li> </ul>	Ι			Ι		A a	A a	A a					I/A	I/A		
<ul> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> </ul>	Ι	Ι	Ι		А	A a	A a	А	А	A a	A a		I/A	I/A		
<ul> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> </ul>	I	I	I	I	A	A a	A a		A	A a	A a		I/A	I/A		
<ul> <li>biotic interactions and the relationship of organisms to the physical environment</li> </ul>			Ι	Ι				А			А		I/A	I/A		
<ul> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> </ul>	Ι	Ι	Ι	Ι	А	А	А	А	А	А	А	A a	А	I/A	I/A	A a
Have an in-depth understanding of: ◆ the many biological characteristics that the human species shares with a vast array of other living species									A	A						
<ul> <li>the physiological mechanisms that coordinate function within and between organ systems and how these change disease states</li> </ul>								A	A a	A a	A					

I= Introductory Level

A= Advanced Level

a= Could be used for program assessment activities

Learning Goals				1												
	BILD 1	BILD 2	BILD 3	BILD 4	BIBC 102	BICD 100	BIMM 100	BIMM110	BIPN 100	Human Physiology*	Human Disease*	UD Labs x 2**	UD Elective x 2	Optional Advanced Studies- BISP** 194+	Optional Advanced Studies- BISP 195+	Optional Advanced Studies- BISP 196/197/199+
Skills: What should students be able to do with their knowledge?				•						•			•			
<ul> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> </ul>				Ι	А	Ι	I	Ι	А	A	A	A a	Ι			A a
<ul> <li>Implement contemporary biological research techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them</li> </ul>				I								A a				A a
<ul> <li>Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases</li> </ul>				Ι								I/A a				A a
<ul> <li>Clearly and accurately communicate biological concepts</li> </ul>				Ι								A a		А	А	A a
Attitudes and Values: What should students value?		1		1				1						I	L	
Recognize the interactions between biology and society: the impact of biological discoveries on society, the long-term and ethical implications of biological discoveries, and the impact of social context on scientific progress.	Ι	I	I	I	I	A a	I	A a	А	A a	A a	А	А	I/A	Ι	A a
<ul> <li>Habitually analyze everyday events using scientific inquiry to evaluate the credibility and value of information acquired from many different sources</li> </ul>	Ι	Ι	Ι	Ι	Ι	А	Ι	A a	A	A a	A a	A a	A	А	А	A a

\* Note: Both groups must be included: a) Human Physiology: BIBC 120, BICD 130, 134, 140, 150, BIMM 116, BIPN 102, 108, 140, 148 b) Human Disease: BICD 136, BIMM 114, 118, 120, 124, 134, BIPN 150, 152

\*\* Must be chosen from the following: BIBC 103, BICD 123, 145, BIEB 121, 131, 135, 143, 167, BIMM 101, 121, BIPN 105

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? Where are they published? (Please specify)	(3) Other than GPA, what data/evidence is used to determine that graduates have achieved stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)		(4) Who interprets the evidence? What is the process?	Ho	(5) w are the findings used?	(6) Date of last Academic Senate Review?
Department: Division of Biological Sciences Major: Microbiology	Yes	<ul> <li>Understand:</li> <li>evolution and diversity of living organism</li> <li>heredity and its molecular basis</li> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> <li>biotic interactions and the relationship of organisms to the physical environment</li> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> <li><i>Have an in-depth understanding of:</i></li> <li>structure, physiology, and diversity of microorganisms</li> <li>interactions of microbes with their hosts, including microbial diseases</li> <li><i>Skills: What should students be able to do with their knowledge?</i></li> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> <li>Implement contemporary biological research techniques to conduct</li> </ul>	<ul> <li>Data/Evidence: <ol> <li>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge: </li> <li>Key Core Courses (marked with an "a" in Learning Goal tables)</li> <li>Capstone courses requiring integration and application of a body of knowledge spanning multiple earlier courses (examples of capstone laboratory courses are BICD 123 and BICD145; examples of capstone lecture courses are BICD 136, BIBC 120, BIPN 140, BIEB 150)</li> <li>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BICD 194, BISP 197, BISP 199, AIP199). Students are required to report findings to research mentor via written or oral presentation. They also have the opportunity to present findings at UCSD's Undergraduate Research Conference, the Divisional undergraduate peer-reviewed journal (Saltman Quarterly).</li> </ol></li></ul>	*	our educational program every seven years). Subsequently, Director of Undergraduate Education and EC work collaboratively to address issues identified in this review.	*	EC reviews assessment data annually and reports back to the Director of Undergraduate Education, who will initiate processes with the goal to eradicate shortcomings. Director initiates major internal curricular reviews, which involves ad hoc Biological Sciences faculty workgroups. Ad hoc meetings with Vice Chairs for Education from Physics, Mathematics and Chemistry & Biochemistry departments provide a forum for identifying and addressing changed or new educational needs in science and math courses outside the Biological Sciences.	2014-15

quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them       3.       Su         ◆ Use digital technologies to search the scientific       a) Exi search the scientific       ser         and analyze information       and analyze information       and and analyze information       and and analyze information         ★ Clearly and accurately communicate biological       b) Fo       shar concepts       hat         ★ Isolate, grow, identify, and quantitate microorganisms       car       c) Ca         Attiludes and Values: What should students value?       cu       sol         ◆ Recognize the interactions between biology and society: the impact of biological discoveries on society, the long-term and       sol	seeback from instructors aching upper division urses it survey of graduating niors solicits their opinions out the nature, extent, d scope of their learning llow-up surveys done by c Career Service Center ow how well the Division s prepared students for vanced work or future reers. mpus-wide surveys of rent students, including e Undergraduate perience Survey (UCUES), licit their views about learning purse evaluations (CAPE) the end of the quarter licits student's opinions out how much they have arned during the course.
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### Microbiology

#### Foundational Courses: 1 year of calculus 1 year of calculus based physics with lab 1 year of general chemistry with lab 2 quarters of organic chemistry with lab

	Learning Goals													x 2	*	ę.	4 + +
	vledge: What should our students v by the time they graduate?	BILD 1	BILD 3	BILD 4	BIBC 102	BICD 100	BICD 140	BIMM 100	BIMM 114	BIMM 120	BIMM 121	BIMM 124	UD Lab*	UD Elective x 2	Optional Advanced Studies- BI** 194+	Optional Advanced Studies- BISP 195+	Optional Advanced Studies- BISP 196/197/199+
Unde I	erstand: evolution and diversity of living organism		Ι	Ι										I/A	I/A		
*	heredity and its molecular basis	Ι		Ι		A a		А		А				I/A	I/A		
*	the correlation of biological structure, function and processes at all levels of biological organizations	Ι	Ι		A a	A a	A a	A a	А	А	А			I/A	I/A		
*	how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	Ι	Ι	Ι	A a	A a	A	A a			A	A a		I/A	I/A		
*	biotic interactions and the relationship of organisms to the physical environment		Ι	Ι					А	A a	A a	A a		I/A	I/A		
*	how mathematics, physics and chemistry are integrated into the study of biology	Ι	Ι	Ι	А	А	Ι	A a	A	А	Ι	Ι	A a	А	I/A	I/A	A a
Have *	an in-depth understanding of: structure, physiology, and diversity of microorganisms								A a	A a	A a	A a					
*	interactions of microbes with their hosts, including microbial diseases						A a		A a		A a	A a					

Learning Goals									1	1	1					
	BILD 1	BILD 3	BILD 4	BIBC 102	BICD 100	BICD 140	BIMM 100	BIMM 114	BIMM 120	BIMM 121	UD Lab*	BIMM 124	UD Elective x 2	Optional Advanced Studies- B1** 194+	Optional Advanced Studies- BISP 195+	Optional Advanced Studies- BISP 196/197/199+
Skills: What should students be able to do with their knowledge?			•			•	•	1						•	•	
<ul> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> </ul>			Ι	Ι	Ι	Ι	I	Ι	Ι	A a	A a	A a	Ι	A		A a
Implement contemporary biological research techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them			I							A a	A a	A a				A a
<ul> <li>Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases</li> </ul>			Ι							I a	I/A a	Ι		А		A a
<ul> <li>Clearly and accurately communicate biological concepts</li> </ul>			Ι							A a	A a	A a		А	А	A a
<ul> <li>Isolate, grow, identify, and quantitiate microorganisms</li> </ul>			Ι							A a						
Attitudes and Values: What should students value?						1	1							1	1	
Recognize the interactions between biology and society: the impact of biological discoveries on society, the long-term and ethical implications of biological discoveries, and the impact of social context on scientific progress.	Ι	Ι	Ι	Ι	A a	A a	I	A a	Ι	A	A	Ι	A	A	Ι	A a
<ul> <li>Habitually analyze everyday events using scientific inquiry to evaluate the credibility and value of information acquired from many different sources</li> </ul>	Ι	Ι	Ι	Ι	А	A a	Ι	A a	Ι	A	A a	A	A	А	А	A a

\* Must be chosen from the following: BIBC 103, BICD 123, 145, BIEB 121, 131, 135, 143, 167, BIMM 101, BIPN 105

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? Where are they published? (Please specify)	(3) Other than GPA, what data/evidence is used to determine that graduates have achieved stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)	(4) Who interprets the evidence? What is the process?	(5) How are the findings used?	(6) Date of last Academic Senate Review?
Department: Division of Biological Sciences Major: Physiology & Neuroscience	Yes	<ul> <li>Understand:</li> <li>evolution and diversity of living organism</li> <li>heredity and its molecular basis</li> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> <li>biotic interactions and the relationship of organisms to the physical environment</li> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> <li>Have an in-depth understanding of:</li> <li>the physiological mechanisms that coordinate functions within and between organ systems, considering all levels of organization from molecules to whole organisms</li> <li>how the nervous system carries out its central role in acquiring information and generating effective behavior</li> <li><i>Skills: What should students be able to do with their knowledge</i>?</li> <li>Construct reasonable</li> </ul>	<ol> <li>Data/Evidence:         <ol> <li>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:                 <ul></ul></li></ol></li></ol>	<ul> <li>representatives from each section (department), reports to and advises the Director of Undergraduate Education, who is ultimately responsible for the quality and effectiveness of Academic Programs. The EC establishes programmatic learning objectives, identifies learning outcomes, and establishes curriculum review criteria that are aligned with learning objectives of the education program.</li> <li>UCSD Undergraduate Council review: our educational program every seven years). Subsequently, Director of Undergraduate Education and EC work collaboratively to address issues identified in this review.</li> <li>Section Chairs (Department Chairs) and Director of Undergraduate Education meet regularly to assure additional faculty input for all educational matters.</li> </ul>	<ul> <li>the Director of Undergraduate Education, who will initiate processes with the goal to eradicate shortcomings. Director initiates major internal curricular reviews, which involves ad hoc Biological Sciences faculty workgroups.</li> <li>Ad hoc meetings with Vice Chairs for Education from Physics, Mathematics and Chemistry &amp; Biochemistry departments provide a forum for identifying and addressing changed or new educational needs in science and math courses outside the Biological Sciences.</li> </ul>	2014-15

<ul> <li>hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> <li>Implement contemporary biological research techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them</li> <li>Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases</li> <li>Clearly and accurately communicate biological concepts</li> <li>Attitudes and Values: What should students value?</li> <li>Recognize the interactions between biology and society: the impact of biological discoveries on society, the long-term and ethical implications of biological discoveries, and the impact of social context on scientific progress.</li> <li>Habitually analyze every- day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different</li> </ul>	<ol> <li>Feedback from instructors teaching upper division courses</li> <li>Surveys:         <ul> <li>a) Exit survey of graduating seniors solicits their opinions about the nature, extent, and scope of their learning</li> <li>b) Follow-up surveys done by the Career Service Center show how well the Division has prepared students for advanced work or future careers.</li> <li>c) Campus-wide surveys of current students, including the Undergraduate Experience Survey (UCUES), solicit their views about learning</li> <li>d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions about how much they have learned during the course.</li> </ul> </li> </ol>		
scientific inquiry to evaluate the credibility			

### Physiology and Neuroscience

Foundational Courses: 1 year of calculus 1 year of calculus based physics with lab 1 year of general chemistry with lab 2 quarters of organic chemistry with lab

Learning Goals										2*		x 3	_ = == *	sp <sup>d</sup>	d SP 99+
Knowledge: What should our students know by the time they graduate?	BILD 1	BILD 2	BILD 3	BILD 4	BIBC 102	BICD 100	BIMM 100	BIPN 100	BIPN 105	P&N Core x2*	UD Lab**	UD Elective x	Optional Advanced Studies- BI** 194+	Optional Advanced Studies- BISP 195+	Optional Advanced Studies- BISP 196/197/199+
Understand: evolution and diversity of living organism			Ι	Ι						I/A		I/A	I/A		
<ul> <li>heredity and its molecular basis</li> </ul>	Ι			Ι		A a	А					I/A	I/A		
<ul> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> </ul>	I	Ι	Ι		А	A a	A a	A	A a	A a		I/A	I/A		
<ul> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> </ul>	Ι	Ι	Ι	Ι	A	A a	A a	А	A a	A a		I/A	I/A		
<ul> <li>biotic interactions and the relationship of organisms to the physical environment</li> </ul>			Ι	Ι					A a	A a		I/A	I/A		
<ul> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> </ul>	Ι	Ι	Ι	Ι	А	А	А	А	A a	А	A a	I/A	I/A	I/A	А
<ul> <li>Have an in-depth understanding of:</li> <li>the physiological mechanisms that coordinate functions within and between organ systems, considering all levels of organization from molecules to the whole</li> </ul>						A	A a	A	A	A a			A	А	A a
<ul> <li>how the nervous system carries out its central role in acquiring information and generating effective behavior</li> </ul>							A a	A a	А	A a			Ι	А	A a

I= Introductory level

A=Advanced level

a= could be used for program assessment activities

La service a Oscala		-								-	1	-			
Learning Goals	BILD 1	BILD 2	BILD 3	BILD 4	BIBC 102	BICD 100	BIMM 100	BIPN 100	BIPN 105	P&N CORE x 2*	UD Lab**	UD Elective x 3	Optional Advanced Studies BI** 194+	Optional Advanced Studies BISP 195+	Optional Advanced Studies BISP 196/197/199+
Skills: What should students be able to do with their knowledge?															
<ul> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> </ul>				Ι	Ι	Ι	Ι	A	A a	A	A a	A	А		A a
Implement contemporary biological research techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them				Ι					A a		A a				A a
<ul> <li>Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases</li> </ul>				Ι					Ι		I/A a				A a
<ul> <li>Clearly and accurately communicate biological concepts</li> </ul>				I					A a		A a		А	А	A a
Attitudes and Values: What should students value?															
Recognize the interactions between biology and society: the impact of biological discoveries on society, the long-term and ethical implications of biological discoveries, and the impact of social context on scientific progress.	Ι	Ι	Ι	I	I	A a	Ι	A	A a	A a	А	A	I/A	Ι	A a
<ul> <li>Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources</li> </ul>	Ι	Ι	Ι	I	I	A	I	A	A a	A a	A a	A	A	A	A a

\* BIPN 102, 106, 108, 140, 142, 144, 146, 148, 150, 152 \*\*Must be chosen from the following: BIBC 103, BICD 123, 145, BIEB 121, 131, 135, 143, 167, BIMM 101,121

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? Where are they published? (Please specify)	(3) Other than GPA, what data/evidence is used to determine that graduates have achieved stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)		(4) Who interprets the evidence? What is the process?	(5) How are the findings used?	(6) Date of last Academic Senate Review?
Department: Division of Biological Sciences Major: Biochemistry & Cell Biology	Yes	<ul> <li>Understand:</li> <li>evolution and diversity of living organism</li> <li>heredity and its molecular basis</li> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> <li>biotic interactions and the relationship of organisms to the physical environment</li> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> <li>Have an in-depth understanding of:</li> <li>the properties, structures, and functions of biological molecules, and how they interact to accomplish processes that are essential and unique to living cells</li> <li>Skills: What should students be able to do with their knowledge?</li> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> <li>Implement contemporary biological research</li> </ul>	<ol> <li>Data/Evidence:</li> <li>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</li> <li>(a) Key Core Courses (marked with an "a" in Learning Goal tables)</li> <li>(b) Capstone courses requiring integration and application of a body of knowledge spanning multiple earlier courses (examples of capstone laboratory courses are BICD 123 and BICD145; examples of capstone lecture courses are BICD 136, BIBC 120, BIPN 140, BIEB 150)</li> <li>(c) Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</li> <li>(d) Undergraduate Research (BISP 196, BISP 197, BISP 199, AIP199). Students are required to report findings to research mentor via written or oral presentation. They also have the opportunity to present findings at UCSD's Undergraduate Research Conference, the Division of Biological Sciences Annual Research Showcase, and/or publish them in Divisional undergraduate peer-reviewed journal (Saltman Quarterly).</li> </ol>	*	Individual faculty comment to Director of Undergraduate Education if they perceive a general problem with student achievement of learning objectives in their courses, overall degree objectives, or student preparation for their courses. The Education Committee (EC), a Divisional committee with faculty representatives from each section (department), reports to and advises the Director of Undergraduate Education, who is ultimately responsible for the quality and effectiveness of Academic Programs. The EC establishes programmatic learning objectives, identifies learning outcomes, and establishes curriculum review criteria that are aligned with learning objectives of the education program. UCSD Undergraduate Council reviews our educational program every seven years). Subsequently, Director of Undergraduate Education and EC work collaboratively to address issues identified in this review. Section Chairs (Department Chairs) and Director of Undergraduate Educational matters.	<ul> <li>EC reviews assessment data annually and reports back to the Director of Undergraduate Education, who will initiate processes with the goal to eradicate shortcomings. Director initiates major internal curricular reviews, which involves ad hoc Biological Sciences faculty workgroups.</li> <li>Ad hoc meetings with Vice Chairs for Education from Physics, Mathematics and Chemistry &amp; Biochemistry departments provide a forum for identifying and addressing changed or new educational needs in science and math courses outside the Biological Sciences.</li> </ul>	2014-15

	techniques to conduct	2. Feedback from instructors		
	experiments, and use	teaching upper division		
	quantitative and/or statistical	courses		
	approaches to analyze the			
	results and draw appropriate	3. Surveys:		
	conclusions from them	a) Exit survey of graduating		
	<ul> <li>Use digital technologies to</li> </ul>	seniors solicits their opinions		
	search the scientific	about the nature, extent,		
	literature, and to retrieve	and scope of their learning		
	and analyze information	b) Follow-up surveys done by		
	from reliable databases	the Career Service Center		
	<ul> <li>Clearly and accurately</li> </ul>	show how well the Division		
	communicate biological			
		has prepared students for		
	concepts	advanced work or future		
	<ul> <li>Conduct procedures widely</li> </ul>	careers.		
	used by biochemists and	c) Campus-wide surveys of		
	molecular biologists to	current students, including		
	isolate, separate, and	the Undergraduate		
	analyze proteins and nucleic	Experience Survey (UCUES),		
	acids, design experiments	solicit their views about learning		
	utilizing these procedures,	d) Course evaluations (CAPE)		
	and draw appropriate	at the end of the quarter		
	conclusions from the results	solicits students' opinions		
		about how much they have		
A	Attitudes and Values: What should	learned during the course.		
S	students value?	······································		
	<ul> <li>Recognize the interactions</li> </ul>			
	between biology and			
	society: the impact of			
	biological discoveries on			
	society, the long-term and			
	ethical implications of			
	biological discoveries, and			
	the impact of social context			
	on scientific progress.			
	<ul> <li>Habitually analyze every-</li> </ul>			
	day events using the			
	principles of scientific inquiry			
	to evaluate the credibility and			
	value of information acquired			
	from many different sources			
L	earning outcomes published:			
	<ul> <li>Divisional Undergraduate</li> </ul>			
	website			
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### Biochemistry & Cell Biology

#### Foundational Courses: 1 year of calculus 1 year of calculus based physics with lab 1 year of general chemistry with lab 2 quarters of organic chemistry with lab

Learning Goals															
Knowledge: What should our students know by the time they graduate?	BILD 1	BILD 3	BILD 4	BIBC 100	BIBC 102	BIBC 103	BICD 100	BICD 110	BIMM 100	Capstone*	UD Lab **	UD Elective x 3	Optional Advanced Studies – BI** 194+	Optional Advanced Studies – BISP 195+	Optional Advanced Studies – BISP 196/197/199+
Understand: evolution and diversity of living organism		Ι	Ι									I/A	I/A		
<ul> <li>heredity and its molecular basis</li> </ul>	Ι		Ι				A a		А			I/A	I/A		
<ul> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> </ul>	Ι	I		А	A a	А	A a	А	A a	A a		I/A	I/A		
<ul> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> </ul>	Ι	I	I		A a		A a	A	A a	A a		I/A	I/A		
<ul> <li>biotic interactions and the relationship of organisms to the physical environment</li> </ul>		Ι	Ι									I/A	I/A		
<ul> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> </ul>	Ι	Ι	Ι	А	А	A a	А	А	A a	A a	A a	А	I/A	I/A	A a
<ul> <li>Have an in-depth understanding of:</li> <li>the properties, structures, and functions of biological molecules, and how they interact to accomplish processes that are essential and unique to living cells</li> </ul>				A	A	A	A	A	A	A a					

I= Introductory Level

A= Advanced Level

a= Could be used for program assessment activities

Learning Goals									1						
Ĵ												е х 3	B.*	BISP	BISP 99+
	BILD 1	BILD 3	BILD 4	BIBC 100	BIBC 102	BIBC 103	BICD 100	BICD 110	BIMM 100	Capstone*	UD Lab **	UD Elective x 3	Optional Advanced Studies – Bl** 194+	Optional Advanced Studies – BISP 195+	Optional Advanced Studies – BISP 196/197/199+
	ш	ш	ш	ш	ш	ш	ш	ш	ш	0			OANL	0401	0401
Skills: What should students be able to do with their knowledge?															
<ul> <li>Construct reasonable</li> </ul>			1												
hypotheses to explain biological phenomena and design effective experiments to			Ι	Ι	Ι	A a	Ι	Ι	Ι	Ι	A a	Ι			A a
test the hypotheses															
Implement contemporary biological research techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them			I			A a					A a				A a
Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases			I			I					I/A a				A a
<ul> <li>Clearly and accurately communicate biological concepts</li> </ul>			Ι			A a					A a		А	А	A a
<ul> <li>Conduct procedures widely used by biochemists and molecular biologists to isolate, separate, and analyze proteins and nucleic acids, design experiments utilizing these procedures, and draw appropriate conclusions from the results</li> </ul>			I			A a									
Attitudes and Values: What should														1	<u> </u>
<ul> <li>students value?</li> <li>Recognize the interactions</li> </ul>	+		T				T	r	T	T	1	r	1	I	
between biology and society: the impact of biological discoveries on society, the long-term and ethical implications of biological discoveries, and the impact of social context on scientific progress.	I	I	I	I	I	I	A a	I	Ι	A a	А	А	I/A	Ι	A a
<ul> <li>Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources</li> </ul>	Ι	Ι	Ι	I	I	A a	A	Ι	Ι	A a	A a	A	А	А	A a

\* Must be selected from the following: BIBC 120, BICD 130, 134, 140, BIMM 110, 114, 116, 118, 120, 124, 130, BIPN 140, 142, 148, 150, 152 \*\* Must be chosen from the following: BICD 123, 145, BIEB 121, 131, 135, 143, 167, BIMM 101, 121, BIPN 105

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? Where are they published? (Please specify)	(3) Other than GPA, what data/evidence is used to determine that graduates have achieved stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)		(4) Who interprets the evidence? What is the process?	(5) How are the findings used?	(6) Date of last Academic Senate Review?
Department: Division of Biological Sciences Major: Bioinformatics	Yes	<ul> <li>Understand:</li> <li>evolution and diversity of living organism</li> <li>heredity and its molecular basis</li> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> <li>Have an in-depth understanding of:</li> <li>biological processes and properties as complex systems, including how they are analyzed and modeled to make heuristic predictions</li> <li>methods used to organize, search, and analyze large sets of biological information</li> <li>data functions &amp; designs, and analysis of algorithms</li> <li><i>Skills: What should students be able to do with their knowledge</i>?</li> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</li> </ul>	<ol> <li>Data/Evidence:</li> <li>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:         <ul> <li>Acy Core Courses (marked with an "a" in Learning Goal tables)</li> <li>Capstone courses requiring integration and application of a body of knowledge spanning multiple earlier courses (examples of capstone laboratory courses are BICD 123 and BICD145; examples of capstone lecture courses are BICD 136, BIBC 120, BIPN 140, BIEB 150)</li> <li>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</li> <li>Undergraduate Research (BISP 196, BISP 197, BISP 199, AIP199). Students are required to report findings to research mentor via written or oral presentation. They also have the opportunity to present findings at UCSD's Undergraduate Research Conference, the Division of Biological Sciences Annual Research Showcase, and/or publish them in Divisional undergraduate peer-reviewed journal (Saltman Quarterly).</li> </ul> </li> </ol>	*	Individual faculty comment to Director of Undergraduate Education if they perceive a general problem with student achievement of learning objectives in their courses, overall degree objectives, or student preparation for their courses. The Education Committee (EC), a Divisional committee with faculty representatives from each section (department), reports to and advises the Director of Undergraduate Education, who is ultimately responsible for the quality and effectiveness of Academic Programs. The EC establishes programmatic learning objectives, identifies learning outcomes, and establishes curriculum review criteria that are aligned with learning objectives of the education program. UCSD Undergraduate Council reviews our educational program every seven years). Subsequently, Director of Undergraduate Education and EC work collaboratively to address issues identified in this review. Section Chairs (Department Chairs) and Director of Undergraduate Educational matters.	<ul> <li>EC reviews assessment data annually and reports back to the Director of Undergraduate Education, who will initiate processes with the goal to eradicate shortcomings. Director initiates major internal curricular reviews, which involves ad hoc Biological Sciences faculty workgroups.</li> <li>Ad hoc meetings with Vice Chairs for Education from Physics, Mathematics and Chemistry &amp; Biochemistry departments provide a forum for identifying and addressing changed or new educational needs in science and math courses outside the Biological Sciences.</li> </ul>	2014-15

<ul> <li>Implement contemporary</li> </ul>	2. Feedback from instructors		
biological research	teaching upper division		
techniques to conduct	courses		
experiments, and use	<b>a</b>		
quantitative and/or statistical	3. Surveys:		
approaches to analyze the	a) Exit survey of graduating		
results and draw appropriate	seniors solicits their opinions		
conclusions from them	about the nature, extent,		
<ul> <li>Use digital technologies to</li> </ul>	and scope of their learning		
search the scientific	b) Follow-up surveys done by		
literature, and to retrieve	the Career Service Center		
and analyze information from reliable databases	show how well the Division has prepared students for		
<ul> <li>Clearly and accurately</li> </ul>	advanced work or future		
communicate biological	careers.		
concepts			
<ul> <li>Develop and implement</li> </ul>	<li>c) Campus-wide surveys of current students, including</li>		
computational solutions to	the Undergraduate		
biological problems	Experience Survey (UCUES),		
biological problems	solicit their views about learning		
Attitudes and Values: What should	d) Course evaluations (CAPE)		
students value?	at the end of the quarter		
	solicits students' opinions		
<ul> <li>Recognize the interactions</li> </ul>	about how much they have		
between biology and	learned during the course.		
society: the impact of	<u> </u>		
biological discoveries on			
society, the long-term and			
ethical implications of			
biological discoveries, and			
the impact of social context			
on scientific progress.			
<ul> <li>Habitually analyze every-</li> </ul>			
day events using the			
principles of scientific inquiry			
to evaluate the credibility and			
value of information acquired			
from many different sources			
Learning outcomes published:			
Learning outcomes published.			
<ul> <li>Divisional Undergraduate</li> </ul>			
website			
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#### Bioinformatics Foundational Courses: 1 year of calculus 1 year of calculus based physics 1 year of general chemistry with lab 2 quarters of organic chemistry

Learning Goals																								x 3			7
Knowledge: What should our students know by the time they graduate?	BILD 1	BILD 2	BILD 4	BILD 94	BIBC 102	BIBC 103	BICD 100	BICD 110	BIMM 100	BIMM 101	BIMM181	BIMM182	BIMM 184	BIMM 185	BENG183	Chem 127	CSE 11	CSE 12	CSE 21	CSE 100	CSE 101	Math 20F	Math 186	UD Elective x	Optional Advanced Studies – BI** 194+	Optional Advanced Studies – BISP195+	Optional Advanced Studies – BISP196/197
Understand: evolution and diversity of living organism			Ι								Ι			A										I/A	I/A		
<ul> <li>heredity and its molecular basis</li> </ul>	Ι		Ι				A a		А	А														I/A	I/A		
<ul> <li>the correlation of biological structure, function and processes at all levels of biological organizations</li> </ul>	Ι	Ι			A	А	A a	A	A a	A a		А	A		A	A								I/A	I/A		
<ul> <li>how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems</li> </ul>	Ι	I	I		А		A a	A	A a	A		А	A		A	A								I/A	I/A		
<ul> <li>how mathematics, physics and chemistry are integrated into the study of biology</li> </ul>	I	Ι	Ι	Ι	A	A a	А	A	A a	A a	A	A	A a	A	A	A							Ι	A	I/A	I/A	A a
Have an in-depth understanding of:											A	А	A		A												
<ul> <li>methods used to organize, search, and analyze large sets of biological information</li> </ul>				I							A a	А		А	A		Ι	I	Ι	А	A		A				
<ul> <li>data functions &amp; designs, and analysis of algorithms</li> </ul>											A a	А	A a	А	А		Ι	Ι	Ι	А	А		Α				

I= Introductory Level

a= Could be used for program assessment activities

Learning Goals																								ŝ			
	BILD 1	BILD 2	BILD 4	BILD 94	BIBC 102	BIBC 103	Chem 127	BICD 100	BICD 110	BIMM 100	BIMM 101	BIMM181	BIMM182	BIMM 184	BIMM 185	BENG 183	CSE 11	CSE 12	CSE 21	CSE 100	CSE 101	Math 20F	Math 186	UD Elective x 3	Optional Advanced Studies – BI** 194+	Optional Advanced Studies – BISP 195+	Optional Advanced Studies – BISP196/197 / 199+
Skills: What should students be able to do with their knowledge?								I				I					I										11
<ul> <li>Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the</li> </ul>			Ι		A	A	A	Ι	Ι	Ι	A a	A	A	A	A a	A								Ι	А		A a
Implement contemporary biological research techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate			Ι			A	Ι				A a	A	A	A	A a	A							A				A a
<ul> <li>Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases</li> </ul>			Ι			Ι					Ι	A	А	A	A a	A									A		A a
<ul> <li>Clearly and accurately communicate biological concepts</li> </ul>			Ι			А					A a		Ι	Ι	A a	Ι									А	А	A a
<ul> <li>Develop and implement computational solutions to biological problems</li> </ul>			Ι									A	А	А	A a	A	Ι	Ι	Ι	А	А		А				
Attitudes and Values: What should students value?					1	1	1															1	11			I	
Recognize the interactions between biology and society: the impact of biological discoveries on society, the long-term and ethical implications of biological discoveries, and the impact of social context on scientific progress.	Ι	Ι	Ι	I	Ι	Ι	A a	Ι	Ι	A a	Ι													A	A	I	A a
<ul> <li>Habitually analyze every- day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources</li> </ul>	Ι	Ι	I	I	А	Ι	А	I	Ι	А	Ι	I	Ι		Ι						Ι			A	A	A	A a