

UC San Diego - WASC Exhibit 7.1

Inventory of Educational Effectiveness Indicators

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? <hr/> 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?
<p>Department: <i>Division of Biological Sciences</i></p> <p>Major: <i>General Biology</i></p>	<p style="text-align: center;">Yes</p>	<p>Understand:</p> <ul style="list-style-type: none"> ❖ evolution and diversity of living organism ❖ heredity and its molecular basis ❖ the correlation of biological structure, function and processes at all levels of biological organizations ❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems ❖ biotic interactions and the relationship of organisms to the physical environment ❖ how mathematics, physics and chemistry are integrated into the study of biology <p><i>Skills: What should students be able to do with their knowledge?</i></p> <ul style="list-style-type: none"> ❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to 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 ❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases 	<p>Data/Evidence:</p> <ol style="list-style-type: none"> 1. <i>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</i> <ol style="list-style-type: none"> a) <i>Key Core Courses (marked with an "a" in Learning Goal tables)</i> b) <i>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)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</i> d) <i>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).</i> 	<ul style="list-style-type: none"> ❖ 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 Education meet regularly to assure additional faculty input for all educational matters. 	<ul style="list-style-type: none"> ❖ 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. 	<p>2014-15</p>

		<ul style="list-style-type: none"> ❖ Clearly and accurately communicate biological concepts <p><i>Attitudes and Values: What should students value?</i></p> <ul style="list-style-type: none"> ❖ 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. ❖ Habitually analyze everyday events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources <p>Learning outcomes published:</p> <ul style="list-style-type: none"> ❖ Divisional Undergraduate website 	<ol style="list-style-type: none"> 2. Feedback from instructors teaching upper division courses 3. Surveys: <ol style="list-style-type: none"> a) Exit survey of graduating seniors solicits their opinions about the nature, extent, and scope of their learning b) Follow-up surveys done by the Career Service Center show how well the Division has prepared students for advanced work or future careers. c) Campus-wide surveys of current students, including the Undergraduate Experience Survey (UCUES), solicit their views about learning d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions about how much they have learned during the course. 			
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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	BILD 1	BILD 2	BILD 3	BILD 4	BIBC 102	BICD 100	UD Lab x 2*	UD Elective x 7**	Optional Advanced Studies - BI** 194+	Optional Advanced Studies - BISP195+	Optional Advanced Studies -BISP 196,197/199+
<i>Knowledge: What should our students know by the time they graduate?</i>											
Understand: ❖ evolution and diversity of living organisms			I	I				I/A	I/A		
❖ heredity and its molecular basis	I			I		A a		I/A	I/A		
❖ the correlation of biological structure, function and processes at all levels of biological organizations	I	I	I		A	A a		I/A	I/A		
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	I	I	I	I	A	A a		I/A	I/A		
❖ biotic interactions and the relationship of organisms to the physical environment			I	I				I/A	I/A		
❖ how mathematics, physics and chemistry are integrated into the study of biology	I	I	I	I	A	A	A a	A	I/A	I/A	A a

I= Introductory Level

A= Advanced Level

a= Could be used for program assessment activities

Learning Goals	BILD 1	BILD 2	BILD 3	BILD 4	BIBC 102	BICD 100	UD Lab x 2*	UD Elective x 7	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?											
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses				I	I	I	A a	I	I		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
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases				I			I/A a				A a
❖ Clearly and accurately communicate biological concepts				I			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.	I	I	I	I	I	A a	A	A	A	A	A a
❖ Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources	I	I	I	I	I	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

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

+ Content varies with instructor

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Inventory of Educational Effectiveness Indicators

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? <hr/> 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?
<p>Department: <i>Division of Biological Sciences</i></p> <p>Major: <i>Molecular Biology</i></p>	<p style="text-align: center;">Yes</p>	<p>Understand:</p> <ul style="list-style-type: none"> ❖ evolution and diversity of living organism ❖ heredity and its molecular basis ❖ the correlation of biological structure, function and processes at all levels of biological organizations ❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems ❖ biotic interactions and the relationship of organisms to the physical environment ❖ how mathematics, physics and chemistry are integrated into the study of biology <p><i>Have an in-depth understanding of:</i></p> <ul style="list-style-type: none"> ❖ the properties, structures, and functions of biological molecules, and how they interact to accomplish processes that are essential and unique to living cells ❖ mechanisms regulating the expression of genetic information <p><i>Skills: What should students be able to do with their knowledge?</i></p> <ul style="list-style-type: none"> ❖ Construct reasonable 	<p>Data/Evidence:</p> <ol style="list-style-type: none"> 1. <i>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</i> <ol style="list-style-type: none"> a) <i>Key Core Courses (marked with an "a" in Learning Goal tables)</i> b) <i>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)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</i> d) <i>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).</i> 	<ul style="list-style-type: none"> ❖ 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 Education meet regularly to assure additional faculty input for all educational matters. 	<ul style="list-style-type: none"> ❖ 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. 	<p>2014-15</p>

		<p>hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</p> <ul style="list-style-type: none"> ❖ 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 ❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases ❖ 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 <p><i>Attitudes and Values: What should students value?</i></p> <ul style="list-style-type: none"> ❖ 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. ❖ Habitually analyze everyday events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources <p>Learning outcomes published:</p> <ul style="list-style-type: none"> ❖ Divisional Undergraduate website 	<ol style="list-style-type: none"> 2. Feedback from instructors teaching upper division courses 3. Surveys: <ol style="list-style-type: none"> a) Exit survey of graduating seniors solicits their opinions about the nature, extent, and scope of their learning b) Follow-up surveys done by the Career Service Center show how well the Division has prepared students for advanced work or future careers. c) Campus-wide surveys of current students, including the Undergraduate Experience Survey (UCUES), solicit their views about learning d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions about how much they have learned during the course. 			
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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	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+
<i>Knowledge: What should our students know by the time they graduate?</i>																
Understand: ❖ evolution and diversity of living organism		I	I										I/A	I/A		
❖ heredity and its molecular basis	I		I			A a		A	A	A a	A		I/A	I/A		
❖ the correlation of biological structure, function and processes at all levels of biological organizations	I	I		A	A	A a	A a	A a	A a	A a	A a		I/A	I/A		
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	I	I	I		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		I	I										I/A	I/A		
❖ how mathematics, physics and chemistry are integrated into the study of biology	I	I	I	A	A	A	A	A a	A a	A	A	A a	A	I/A	I/A	A
<i>Have an in-depth understanding of:</i> ❖ the properties, structures, and functions of biological molecules, and how they interact to accomplish processes that are essential and unique to living cells				A	A	A	A	A a	A a							
❖ Mechanisms regulating the expression of genetic information								I		A a	A a					

I= Introductory Level

A= Advanced Level

a= Could be used for program assessment activities

Learning Goals	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 Advances Studies- BI* 194+	Optional Advances Studies- BISP 195+	Optional Advances Studies- BISP 196/197/199+
Skills: What should students be able to do with their knowledge?																
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses			I	I	I	I	I	I	A a	I	I	A a	I	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
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases			I						I			I/A a				A a
❖ Clearly and accurately communicate biological concepts			I						A a			A a		A	A	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	I	A a	I	I	A	I	I	I	A	I/A	I	A a
❖ Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources	I	I	I	I	I	A	I	I	A	I	I	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 121; BIPN 105

+ Content varies with instructor

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Inventory of Educational Effectiveness Indicators

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? <hr/> 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?
<p>Department: <i>Division of Biological Sciences</i></p> <p>Major: <i>Ecology, Behavior, & Evolution</i></p>	<p>Yes</p>	<p>Students graduating with a degree should be able to:</p> <p>Understand:</p> <ul style="list-style-type: none"> ❖ evolution and diversity of living organisms ❖ heredity and its molecular basis. ❖ the correlation of biological structure, function and processes at all levels of biological organizations ❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems ❖ biotic interactions and the relationship of organisms to the physical environment ❖ how mathematics, physics and chemistry are integrated into the study of biology <p>Have an in-depth understanding of:</p> <ul style="list-style-type: none"> ❖ the historical path of evolution, the processes and forces contributing to evolutionary change and how evolution by natural selection shapes the behavior, morphology, and life history of organisms ❖ the interactions between organism (including humans) and the 	<p>Data/Evidence:</p> <ol style="list-style-type: none"> 1. <i>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</i> <ol style="list-style-type: none"> a) <i>Key Core Courses (marked with an "a" in Learning Goal tables)</i> b) <i>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)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</i> d) <i>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).</i> 	<ul style="list-style-type: none"> ❖ 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 Education meet regularly to assure additional faculty input for all educational matters. 	<ul style="list-style-type: none"> ❖ 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. 	<p>2014-15</p>

		<p>environment on a hierarchy of scale (organismal to global)</p> <p><i>Skills: What should students be able to do with their knowledge?</i></p> <ul style="list-style-type: none"> ❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to 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 ❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases ❖ Clearly and accurately communicate biological concepts <p><i>Attitudes and Values: What should students value?</i></p> <ul style="list-style-type: none"> ❖ 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. ❖ Habitually analyze every- day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources <hr/> <p>Learning outcomes published:</p> <ul style="list-style-type: none"> • <i>Divisional Undergraduate website.</i> 	<p>2. Feedback from instructors teaching upper division courses</p> <p>3. Surveys:</p> <ul style="list-style-type: none"> a) Exit survey of graduating seniors solicits their opinions about the nature, extent, and scope of their learning b) Follow-up surveys done by the Career Service Center show how well the Division has prepared students for advanced work or future careers. c) Campus-wide surveys of current students, including the Undergraduate Experience Survey (UCUES), solicit their views about learning d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions about how much they have learned during the course. 			
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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	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 -BT** 194+	Optional Additional Studies -BISP 195+	Optional Additional Studies -BISP 196/197/199+
Knowledge: What should our students know by the time they graduate? Understand: ❖ evolution and diversity of living organism			I	I			A	A a	A	A		I/A	I/A		
❖ heredity and its molecular basis	I			I	A a			A	I/A	I/A		I/A	I/A		
❖ the correlation of biological structure, function and processes at all levels of biological organizations	I	I	I		A a		A a	A a	A	A		I/A	I/A		
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	I	I	I	I	A a		A a	A a	A	A a		I/A	I/A		
❖ biotic interactions and the relationship of organisms to the physical environment			I	I			A a		A	A a		I/A	I/A		
❖ how mathematics, physics and chemistry are integrated into the study of biology	I	I	I	I	A	A	A	A	A	A	A a	A	I/A	I/A	A a
Have an in-depth understanding of: ❖ the historical path of evolution, the processes and forces contributing to evolutionary change and how evolution by natural selection shapes the behavior, morphology, and life history of organisms								A a	A	A			A	A	A a
❖ the interactions between organism (including humans) and the environment on a hierarchy of scale (organismal to global)							A	A a	A	A			I	A	A a

I= Introductory level

A=Advanced level

a= could be used for program assessment activities

Learning Goals	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?															
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses				I	I	I	I	I	I	A a	A a	I/A	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
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from				I		I				A a	I/A a				A a
❖ Clearly and accurately communicate biological concepts				I						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.	I	I	I	I	A a	I	A	A a	A	A		A			A a
❖ Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many	I	I	I	I	A	I	A	A a	A	A		A a			A a

* Must be chosen from the following: BIEB 121-BIEB 176

***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

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Inventory of Educational Effectiveness Indicators

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? <hr/> 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?
<p>Department: <i>Division of Biological Sciences</i></p> <p>Major: <i>Human Biology</i></p>	<p style="text-align: center;">Yes</p>	<p>Understand:</p> <ul style="list-style-type: none"> ❖ evolution and diversity of living organism ❖ heredity and its molecular basis ❖ the correlation of biological structure, function and processes at all levels of biological organizations ❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems ❖ biotic interactions and the relationship of organisms to the physical environment ❖ how mathematics, physics and chemistry are integrated into the study of biology <p><i>Have an in-depth understanding of:</i></p> <ul style="list-style-type: none"> ❖ the many biological characteristics that the human species shares with a vast array of other living species ❖ the physiological mechanisms that coordinate function within and between organ systems and how these change disease states <p><i>Skills: What should students be able to do with their knowledge?</i></p> <ul style="list-style-type: none"> ❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments 	<p>Data/Evidence:</p> <ol style="list-style-type: none"> 1. <i>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</i> <ol style="list-style-type: none"> a) <i>Key Core Courses (marked with an "a" in Learning Goal tables)</i> b) <i>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)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</i> d) <i>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).</i> 	<ul style="list-style-type: none"> ❖ 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 Education meet regularly to assure additional faculty input for all educational matters. 	<ul style="list-style-type: none"> ❖ 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. 	<p>2014-15</p>

		<ul style="list-style-type: none"> ❖ to 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 ❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases ❖ Clearly and accurately communicate biological concepts <p><i>Attitudes and Values: What should students value?</i></p> <ul style="list-style-type: none"> ❖ 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. ❖ Habitually analyze everyday events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources <p>Learning outcomes published:</p> <ul style="list-style-type: none"> ❖ Divisional Undergraduate website 	<ol style="list-style-type: none"> 2. Feedback from instructors teaching upper division courses 3. Surveys: <ol style="list-style-type: none"> a) Exit survey of graduating seniors solicits their opinions about the nature, extent, and scope of their learning b) Follow-up surveys done by the Career Service Center show how well the Division has prepared students for advanced work or future careers. c) Campus-wide surveys of current students, including the Undergraduate Experience Survey (UCUES), solicit their views about learning d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions about how much they have learned during the course. 			
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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	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+
<i>Knowledge: What should our students know by the time they graduate?</i>																
Understand: ❖ evolution and diversity of living organism			I	I									I/A	I/A		
❖ heredity and its molecular basis	I			I		A a	A a	A a					I/A	I/A		
❖ the correlation of biological structure, function and processes at all levels of biological organizations	I	I	I		A	A a	A a	A	A	A a	A a		I/A	I/A		
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	I	I	I	I	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			I	I				A			A		I/A	I/A		
❖ how mathematics, physics and chemistry are integrated into the study of biology	I	I	I	I	A	A	A	A	A	A	A	A a	A	I/A	I/A	A a
<i>Have an in-depth understanding of:</i> ❖ the many biological characteristics that the human species shares with a vast array of other living species									A	A						
❖ the physiological mechanisms that coordinate function within and between organ systems and how these change disease states								A	A a	A a	A					

I= Introductory Level

A= Advanced Level

a= Could be used for program assessment activities

Learning Goals	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?																	
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses				I	A	I	I	I	A	A	A	A a	I				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
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases				I								I/A a					A a
❖ Clearly and accurately communicate biological concepts				I								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.	I	I	I	I	I	A a	I	A a	A	A a	A a	A	A	I/A	I		A a
❖ Habitually analyze everyday events using scientific inquiry to evaluate the credibility and value of information acquired from many different sources	I	I	I	I	I	A	I	A a	A	A a	A a	A a	A	A	A		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

+ Content varies with instructor

UC San Diego - WASC Exhibit 7.1

Inventory of Educational Effectiveness Indicators

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? <hr/> 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?
<p>Department: <i>Division of Biological Sciences</i></p> <p>Major: <i>Microbiology</i></p>	<p>Yes</p>	<p>Understand:</p> <ul style="list-style-type: none"> ❖ evolution and diversity of living organism ❖ heredity and its molecular basis ❖ the correlation of biological structure, function and processes at all levels of biological organizations ❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems ❖ biotic interactions and the relationship of organisms to the physical environment ❖ how mathematics, physics and chemistry are integrated into the study of biology <p><i>Have an in-depth understanding of:</i></p> <ul style="list-style-type: none"> ❖ structure, physiology, and diversity of microorganisms ❖ interactions of microbes with their hosts, including microbial diseases <p><i>Skills: What should students be able to do with their knowledge?</i></p> <ul style="list-style-type: none"> ❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses ❖ Implement contemporary biological research techniques to conduct 	<p>Data/Evidence:</p> <ol style="list-style-type: none"> 1. <i>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</i> <ol style="list-style-type: none"> a) <i>Key Core Courses (marked with an "a" in Learning Goal tables)</i> b) <i>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)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</i> d) <i>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).</i> 	<ul style="list-style-type: none"> ❖ 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 Education meet regularly to assure additional faculty input for all educational matters. 	<ul style="list-style-type: none"> ❖ 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. 	<p>2014-15</p>

		<p>experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them</p> <ul style="list-style-type: none"> ❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases ❖ Clearly and accurately communicate biological concepts ❖ Isolate, grow, identify, and quantitate microorganisms <p><i>Attitudes and Values: What should students value?</i></p> <ul style="list-style-type: none"> ❖ 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. ❖ Habitually analyze everyday events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources <p>Learning outcomes published:</p> <ul style="list-style-type: none"> ❖ Divisional Undergraduate website 	<ol style="list-style-type: none"> 2. Feedback from instructors teaching upper division courses 3. Surveys: <ol style="list-style-type: none"> a) Exit survey of graduating seniors solicits their opinions about the nature, extent, and scope of their learning b) Follow-up surveys done by the Career Service Center show how well the Division has prepared students for advanced work or future careers. c) Campus-wide surveys of current students, including the Undergraduate Experience Survey (UCUES), solicit their views about learning d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions about how much they have learned 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	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+
<i>Knowledge: What should our students know by the time they graduate?</i>	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+
Understand: ❖ evolution and diversity of living organism		I	I										I/A	I/A		
❖ heredity and its molecular basis	I		I		A a		A		A				I/A	I/A		
❖ the correlation of biological structure, function and processes at all levels of biological organizations	I	I		A a	A a	A a	A a	A	A	A			I/A	I/A		
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	I	I	I	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		I	I					A	A a	A a	A a		I/A	I/A		
❖ how mathematics, physics and chemistry are integrated into the study of biology	I	I	I	A	A	I	A a	A	A	I	I	A a	A	I/A	I/A	A a
<i>Have an in-depth understanding of:</i> ❖ 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					

I= Introductory level

A=Advanced level

a= could be used for program assessment activities

Learning Goals	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- 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?																
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses			I	I	I	I	I	I	I	A a	A a	A a	I	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
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases			I							I a	I/A a	I		A		A a
❖ Clearly and accurately communicate biological concepts			I							A a	A a	A a		A	A	A a
❖ Isolate, grow, identify, and quantitate microorganisms			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	A a	A a	I	A a	I	A	A	I	A	A	I	A a
❖ Habitually analyze everyday events using scientific inquiry to evaluate the credibility and value of information acquired from many different sources	I	I	I	I	A	A a	I	A a	I	A	A a	A	A	A	A	A a

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

+ Content varies with instructor

UC San Diego - WASC Exhibit 7.1

Inventory of Educational Effectiveness Indicators

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? <hr/> 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?
<p>Department: <i>Division of Biological Sciences</i></p> <p>Major: <i>Physiology & Neuroscience</i></p>	<p style="text-align: center;">Yes</p>	<p>Understand:</p> <ul style="list-style-type: none"> ❖ evolution and diversity of living organism ❖ heredity and its molecular basis ❖ the correlation of biological structure, function and processes at all levels of biological organizations ❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems ❖ biotic interactions and the relationship of organisms to the physical environment ❖ how mathematics, physics and chemistry are integrated into the study of biology <p><i>Have an in-depth understanding of:</i></p> <ul style="list-style-type: none"> ❖ the physiological mechanisms that coordinate functions within and between organ systems, considering all levels of organization from molecules to whole organisms ❖ how the nervous system carries out its central role in acquiring information and generating effective behavior <p><i>Skills: What should students be able to do with their knowledge?</i></p> <ul style="list-style-type: none"> ❖ Construct reasonable 	<p>Data/Evidence:</p> <ol style="list-style-type: none"> 1. <i>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</i> <ol style="list-style-type: none"> a) <i>Key Core Courses (marked with an "a" in Learning Goal tables)</i> b) <i>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)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</i> d) <i>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).</i> 	<ul style="list-style-type: none"> ❖ 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 Education meet regularly to assure additional faculty input for all educational matters. 	<ul style="list-style-type: none"> ❖ 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. 	<p>2014-15</p>

		<p>hypotheses to explain biological phenomena and design effective experiments to test the hypotheses</p> <ul style="list-style-type: none"> ❖ 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 ❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases ❖ Clearly and accurately communicate biological concepts <p><i>Attitudes and Values: What should students value?</i></p> <ul style="list-style-type: none"> ❖ 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. ❖ Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources <p>Learning outcomes published:</p> <p>Divisional Undergraduate website</p>	<ol style="list-style-type: none"> 2. Feedback from instructors teaching upper division courses 3. Surveys: <ol style="list-style-type: none"> a) Exit survey of graduating seniors solicits their opinions about the nature, extent, and scope of their learning b) Follow-up surveys done by the Career Service Center show how well the Division has prepared students for advanced work or future careers. c) Campus-wide surveys of current students, including the Undergraduate Experience Survey (UCUES), solicit their views about learning d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions about how much they have learned during the course. 			
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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															
<i>Knowledge: What should our students know by the time they graduate?</i>	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 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			I	I						I/A		I/A	I/A		
❖ heredity and its molecular basis	I			I		A a	A					I/A	I/A		
❖ the correlation of biological structure, function and processes at all levels of biological organizations	I	I	I		A	A a	A a	A	A a	A a		I/A	I/A		
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	I	I	I	I	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			I	I					A a	A a		I/A	I/A		
❖ how mathematics, physics and chemistry are integrated into the study of biology	I	I	I	I	A	A	A	A	A a	A	A a	I/A	I/A	I/A	A
<i>Have an in-depth understanding of:</i> ❖ the physiological mechanisms that coordinate functions within and between organ systems, considering all levels of organization from molecules to the whole						A	A a	A	A	A a			A	A	A a
❖ how the nervous system carries out its central role in acquiring information and generating effective behavior							A a	A a	A	A a			I	A	A a

I= Introductory level

A=Advanced level

a= could be used for program assessment activities

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?															
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses				I	I	I	I	A	A a	A	A a	A	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
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases				I					I		I/A a				A a
❖ Clearly and accurately communicate biological concepts				I					A a		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.	I	I	I	I	I	A a	I	A	A a	A a	A	A	I/A	I	A a
❖ Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources	I	I	I	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

+ Content varies with instructor

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Inventory of Educational Effectiveness Indicators

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? <hr/> 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?
<p>Department: <i>Division of Biological Sciences</i></p> <p>Major: <i>Biochemistry & Cell Biology</i></p>	<p style="text-align: center;">Yes</p>	<p>Understand:</p> <ul style="list-style-type: none"> ❖ evolution and diversity of living organism ❖ heredity and its molecular basis ❖ the correlation of biological structure, function and processes at all levels of biological organizations ❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems ❖ biotic interactions and the relationship of organisms to the physical environment ❖ how mathematics, physics and chemistry are integrated into the study of biology <p><i>Have an in-depth understanding of:</i></p> <ul style="list-style-type: none"> ❖ the properties, structures, and functions of biological molecules, and how they interact to accomplish processes that are essential and unique to living cells <p><i>Skills: What should students be able to do with their knowledge?</i></p> <ul style="list-style-type: none"> ❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses ❖ Implement contemporary biological research 	<p>Data/Evidence:</p> <ol style="list-style-type: none"> 1. <i>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</i> <ol style="list-style-type: none"> a) <i>Key Core Courses (marked with an "a" in Learning Goal tables)</i> b) <i>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)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIBM 194, BIEB 194</i> d) <i>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).</i> 	<ul style="list-style-type: none"> ❖ 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 Education meet regularly to assure additional faculty input for all educational matters. 	<ul style="list-style-type: none"> ❖ 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. 	<p>2014-15</p>

		<p>techniques to conduct experiments, and use quantitative and/or statistical approaches to analyze the results and draw appropriate conclusions from them</p> <ul style="list-style-type: none"> ❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases ❖ Clearly and accurately communicate biological concepts ❖ 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 <p><i>Attitudes and Values: What should students value?</i></p> <ul style="list-style-type: none"> ❖ 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. ❖ Habitually analyze everyday events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources <p>Learning outcomes published:</p> <ul style="list-style-type: none"> ❖ Divisional Undergraduate website 	<ol style="list-style-type: none"> 2. Feedback from instructors teaching upper division courses 3. Surveys: <ol style="list-style-type: none"> a) Exit survey of graduating seniors solicits their opinions about the nature, extent, and scope of their learning b) Follow-up surveys done by the Career Service Center show how well the Division has prepared students for advanced work or future careers. c) Campus-wide surveys of current students, including the Undergraduate Experience Survey (UCUES), solicit their views about learning d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions about how much they have learned during the course. 			
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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																
<i>Knowledge: What should our students know by the time they graduate?</i>	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		I	I									I/A	I/A			
❖ heredity and its molecular basis	I		I				A a		A			I/A	I/A			
❖ the correlation of biological structure, function and processes at all levels of biological organizations	I	I		A	A a	A	A a	A	A a	A a		I/A	I/A			
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	I	I	I		A a		A a	A	A a	A a		I/A	I/A			
❖ biotic interactions and the relationship of organisms to the physical environment		I	I									I/A	I/A			
❖ how mathematics, physics and chemistry are integrated into the study of biology	I	I	I	A	A	A a	A	A	A a	A a	A a	A	I/A	I/A	A a	
Have an in-depth understanding of: ❖ the properties, structures, and functions of biological molecules, and how they interact to accomplish processes that are essential and unique to living cells				A	A	A	A	A	A	A a						

I= Introductory Level

A= Advanced Level

a= Could be used for program assessment activities

Learning Goals	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+
Skills: What should students be able to do with their knowledge?															
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses			I	I	I	A a	I	I	I	I	A a	I			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
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases			I			I					I/A a				A a
❖ Clearly and accurately communicate biological concepts			I			A a					A a		A	A	A a
❖ 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			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	I	I	A a	I	I	A a	A	A	I/A	I	A a
❖ Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources	I	I	I	I	I	A a	A	I	I	A a	A a	A	A	A	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

+ Content varies with instructor

UC San Diego - WASC Exhibit 7.1

Inventory of Educational Effectiveness Indicators

Academic Program	(1) Have formal learning outcomes been developed?	(2) What are these learning outcomes? <hr/> 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?
<p>Department: <i>Division of Biological Sciences</i></p> <p>Major: <i>Bioinformatics</i></p>	<p style="text-align: center;">Yes</p>	<p>Understand:</p> <ul style="list-style-type: none"> ❖ evolution and diversity of living organism ❖ heredity and its molecular basis ❖ the correlation of biological structure, function and processes at all levels of biological organizations ❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems ❖ how mathematics, physics and chemistry are integrated into the study of biology <p>Have an in-depth understanding of:</p> <ul style="list-style-type: none"> ❖ biological processes and properties as complex systems, including how they are analyzed and modeled to make heuristic predictions ❖ methods used to organize, search, and analyze large sets of biological information ❖ data functions & designs, and analysis of algorithms <p><i>Skills: What should students be able to do with their knowledge?</i></p> <ul style="list-style-type: none"> ❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses 	<p>Data/Evidence:</p> <ol style="list-style-type: none"> 1. <i>Student work (usually projects or presentations, sometimes test scores) in courses that challenge students to integrate, synthesize and evaluate knowledge:</i> <ol style="list-style-type: none"> a) <i>Key Core Courses (marked with an "a" in Learning Goal tables)</i> b) <i>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)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 194, BIBC 194, BICD 194, BIMM 194, BIEB 194</i> d) <i>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).</i> 	<ul style="list-style-type: none"> ❖ 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 Education meet regularly to assure additional faculty input for all educational matters. 	<ul style="list-style-type: none"> ❖ 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. 	<p>2014-15</p>

		<ul style="list-style-type: none"> ❖ 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 ❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases ❖ Clearly and accurately communicate biological concepts ❖ Develop and implement computational solutions to biological problems <p><i>Attitudes and Values: What should students value?</i></p> <ul style="list-style-type: none"> ❖ 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. ❖ Habitually analyze everyday events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources <p>Learning outcomes published:</p> <ul style="list-style-type: none"> ❖ Divisional Undergraduate website 	<ol style="list-style-type: none"> 2. Feedback from instructors teaching upper division courses 3. Surveys: <ol style="list-style-type: none"> a) Exit survey of graduating seniors solicits their opinions about the nature, extent, and scope of their learning b) Follow-up surveys done by the Career Service Center show how well the Division has prepared students for advanced work or future careers. c) Campus-wide surveys of current students, including the Undergraduate Experience Survey (UCUES), solicit their views about learning d) Course evaluations (CAPE) at the end of the quarter solicits students' opinions about how much they have learned during the course. 			
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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	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 3	Optional Advanced Studies – BI** 194+	Optional Advanced Studies – BISP195+	Optional Advanced Studies – BISP196/197 /100L
<i>Knowledge: What should our students know by the time they graduate?</i>																											
Understand: ❖ evolution and diversity of living organism			I								I			A											I/A	I/A	
❖ heredity and its molecular basis	I		I				A a		A	A															I/A	I/A	
❖ the correlation of biological structure, function and processes at all levels of biological organizations	I	I			A	A	A a	A	A a	A a		A	A		A	A									I/A	I/A	
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	I	I	I		A		A a	A	A a	A		A	A		A	A									I/A	I/A	
❖ how mathematics, physics and chemistry are integrated into the study of biology	I	I	I	I	A	A a	A	A	A a	A a	A	A	A a	A	A	A							I	A	I/A	I/A	A a
Have an in-depth understanding of: ❖ biological processes and properties as complex systems, including how they are analyzed and modeled to make heuristic predictions											A	A	A		A												
❖ methods used to organize, search, and analyze large sets of biological information				I							A a	A		A	A		I	I	I	A	A		A				
❖ data functions & designs, and analysis of algorithms											A a	A	A a	A	A		I	I	I	A	A		A				

I= Introductory Level

A= Advanced Level

a= Could be used for program assessment activities

Learning Goals	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?																													
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the			I		A	A	A	I	I	I	A a	A	A	A	A a	A									I	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			I			A	I				A a	A	A	A	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 a	A										A		A a	
❖ Clearly and accurately communicate biological concepts			I			A					A a		I	I	A a	I										A	A	A a	
❖ Develop and implement computational solutions to biological problems			I									A	A	A	A a	A	I	I	I	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.	I	I	I	I	I	I	A a	I	I	A a	I														A	A	I	A a	
❖ Habitually analyze every-day events using the principles of scientific inquiry to evaluate the credibility and value of information acquired from many different sources	I	I	I	I	A	I	A	I	I	A	I	I	I		I										I	A	A	A	A a