

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>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>Courses that challenge students to integrate, synthesize and evaluate knowledge and new information(currently not done: will be implemented).</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 provide evidence of how well students can integrate and apply a body of knowledge in a culminating project. (Examples of Capstone laboratory courses: BICD 131, BMM 127, BIBC 104, BIBC 105, BICD 123; Examples of Capstone lecture courses: BICD 136, BIBC 120, BIPN 108, BIBC 130)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 190 and BISP 194</i> d) <i>Undergraduate Research Opportunities (BISP 196, BISP 197, BISP 199, AIP 199)which require students to present their findings via: presentation at UCSD's Undergraduate Research Conference; publication in divisional undergraduate peer-reviewed journal (Saltman Quarterly); poster at annual Spring Quarter Undergraduate Poster Session</i> 	<ul style="list-style-type: none"> ❖ The Education Committee (EC), a divisional committee with faculty representatives from each section (department), reports to and advises the Associate Dean for Education, who is ultimately responsible for the quality and effectiveness of the 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. ❖ CEP reviews education program via the Undergraduate Review Committee (every seven years). Associate Dean and EC work collaboratively to address issues identified in CEP review. ❖ Section Chairs (Department Chairs) and Associate Dean for Education meet regularly to assure additional faculty input for all educational matters. ❖ Individual faculty comment directly to Associate Dean if they perceive a problem with the prerequisites in preparing students for their courses. 	<ul style="list-style-type: none"> ❖ EC reviews assessment data annually and report back to the Associate Dean, who will initiate processes with the goal to eradicate shortcomings. Associate Dean 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>February 20, 2007</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 that depend directly on material students learned in lower division courses 3. Surveys: <ol style="list-style-type: none"> a) Exit survey of graduating seniors solicit 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 department has prepared students for advanced work or future careers. c) campus-wide surveys of current students, including the new 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	BIBC 102	BICD 100	UD Lab x 2 *	UD Elective x 7	Optional Advanced Studies – BISP194+	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/A	I/A		
❖ heredity and its molecular basis	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	A	A a		I/A	I/A		
❖ biotic interactions and the relationship of organisms to the physical environment			I				I/A	I/A		
❖ how mathematics, physics and chemistry are integrated into the study of biology	I	I	I	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	BIBC 102	BICD 100	UD Lab x 2 *	UD Elective x 7 *	Optional Advanced Studies – BISP194+	Optional Advanced Studies – BISP195+	Optional Advanced Studies – BISP 196, 197/199+
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<i>Skills: What should students be able to do with their knowledge?</i>										
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses				I	I	A a	I	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						A a				A a
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases						I a				A a
❖ Clearly and accurately communicate biological concepts						A a		A	A	A a
<i>Attitudes and Values: What should students value?</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.	I	I	I	I	A 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	A	A a	A	A	A	A a

* Must be chosen from the following: BIBC 103, 105, BICD 101, 111, 123, 131, 133, 145, BIEB 121, 165, 167, 179, BIMM 101, 103, 121, 127, BIPN 105, 145 ** 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 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 of acquiring information about 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>Courses that challenge students to integrate, synthesize and evaluate knowledge and new information (currently not done: will be implemented).</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 provide evidence of how well students can integrate and apply a body of knowledge in a culminating project. (Examples of Capstone laboratory courses: BICD 131, BMM 127, BIBC 104, BIBC 105, BICD 123; Examples of Capstone lecture courses: BICD 136, BIBC 120, BIPN 108, BIBC 130)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 190 and BISP 194</i> d) <i>Undergraduate Research Opportunities (BISP 196, BISP 197, BISP 199, AIP 199) which require students to present their findings via: presentation at UCSD's Undergraduate Research Conference; publication in divisional undergraduate peer-reviewed journal (Saltman Quarterly); poster at annual Spring Quarter Undergraduate Poster Session</i> 	<ul style="list-style-type: none"> ❖ The Education Committee (EC), a divisional committee with faculty representatives from each section (department), reports to and advises the Associate Dean for Education, who is ultimately responsible for the quality and effectiveness of the 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. ❖ CEP reviews education program via the Undergraduate Review Committee (every seven years). Associate Dean and EC work collaboratively to address issues identified in CEP review. ❖ Section Chairs (Department Chairs) and Associate Dean for Education meet regularly to assure additional faculty input for all educational matters. ❖ Individual faculty comment directly to Associate Dean if they perceive a problem with the prerequisites in preparing students for their courses. 	<ul style="list-style-type: none"> ❖ EC reviews assessment data annually and report back to the Associate Dean, who will initiate processes with the goal to eradicate shortcomings. Associate Dean 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>February 20, 2007</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 	<p>2. Feedback from instructors teaching upper division courses that depend directly on material students learned in lower division courses</p> <p>3. Surveys:</p> <ul style="list-style-type: none"> a) Exit survey of graduating seniors solicit 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 department has prepared students for advanced work or future careers. c) campus-wide surveys of current students, including the new 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	BIBC 100	BIBC 102	BIBC 103	BICD 100	BICD 110	BIMM 100	BIMM101	BIMM112	BIMM122	UD Elective x 4	Optional Advances Studies- BISP 194+	Optional Advances Studies- BISP 195+	Optional Advances 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 /A	I /A		
❖ heredity and its molecular basis	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 a	I /A	I /A		
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	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	I /A		
❖ how mathematics, physics and chemistry are integrated into the study of biology	I	I	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 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	BIBC 100	BIBC 102	BIBC 103	BICD 100	BICD 110	BIMM 100	BIMM101	BIMM112	BIMM122	UD Elective x 4	Optional Advances Studies- BISP 194+	Optional Advances Studies- BISP 195+	Optional Advances Studies- BISP 196/197/199+
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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	A	I	I	I	A a	I	I	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					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 a
❖ Clearly and accurately communicate biological concepts					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					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	I	A	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	A	A	I	I	A	I	I	A	A	A	A a

+ 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>Courses that challenge students to integrate, synthesize and evaluate knowledge and new information (currently not done: will be implemented).</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 provide evidence of how well students can integrate and apply a body of knowledge in a culminating project. (Examples of Capstone laboratory courses: BICD 131, B1MM 127, BIBC 104, BIBC 105, BICD 123; Examples of Capstone lecture courses: BICD 136, BIBC 120, BIPN 108, BIBC 130)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 190 and BISP 194</i> d) <i>Undergraduate Research Opportunities (BISP 196, BISP 197, BISP 199, AIP 199) which require students to present their findings via: presentation at UCSD's Undergraduate Research Conference; publication in divisional undergraduate peer-reviewed journal (Saltman Quarterly); poster at annual Spring Quarter Undergraduate Poster Session</i> 	<ul style="list-style-type: none"> ❖ The Education Committee (EC), a divisional committee with faculty representatives from each section (department), reports to and advises the Associate Dean for Education, who is ultimately responsible for the quality and effectiveness of the 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. ❖ CEP reviews education program via the Undergraduate Review Committee (every seven years). Associate Dean and EC work collaboratively to address issues identified in CEP review. ❖ Section Chairs (Department Chairs) and Associate Dean for Education meet regularly to assure additional faculty input for all educational matters. ❖ Individual faculty comment directly to Associate Dean if they perceive a problem with the prerequisites in preparing students for their courses. 	<ul style="list-style-type: none"> ❖ EC reviews assessment data annually and report back to the Associate Dean, who will initiate processes with the goal to eradicate shortcomings. Associate Dean 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>February 20, 2007</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 everyday 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 that depend directly on material students learned in lower division courses</p> <p>3. Surveys:</p> <ol style="list-style-type: none"> a) Exit survey of graduating seniors solicit 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 department has prepared students for advanced work or future careers. c) campus-wide surveys of current students, including the new 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	BICD 100	BIEB 100	BIEB 102	BIEB 150	BIEB Elective x 5*	BIEB Elective Lab x 2*	UD Elective x 3**	Optional Additional Studies -BISP 194+	Optional Additional Studies -BISP 195+	Optional Additional 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			A	A a	A	A	I /A	I /A		
❖ heredity and its molecular basis	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	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			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	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	BICD 100	BIEB 100	BIEB 102	BIEB 150	BIEB Elective x 5*	BIEB Elective Lab x 2*	UD Elective x 3**	Optional Additional Studies -BISP 194+	Optional Additional Studies -BISP 195+	Optional Additional Studies -BISP 196/197/199+
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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	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									A a				A a
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases					I				A a				A a
❖ Clearly and accurately communicate biological concepts									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	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 different sources	I	I	I	A	I	A	A a	A	A	A			A a

* Must be chosen from the following: BIEB 121-BIEB 180. At least two of these courses must be laboratory or field courses (BIEB 121, 131, 165, 167 and/or 179) ** 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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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>Courses that challenge students to integrate, synthesize and evaluate knowledge and new information (currently not done: will be implemented).</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 provide evidence of how well students can integrate and apply a body of knowledge in a culminating project. (Examples of Capstone laboratory courses: BICD 131, BMM 127, BIBC 104, BIBC 105, BICD 123; Examples of Capstone lecture courses: BICD 136, BIBC 120, BIPN 108, BIBC 130)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 190 and BISP 194</i> d) <i>Undergraduate Research Opportunities (BISP 196, BISP 197, BISP 199, AIP 199) which require students to present their findings via: presentation at UCSD's Undergraduate Research Conference; publication in divisional undergraduate peer-reviewed journal (Saltman Quarterly); poster at annual Spring Quarter Undergraduate Poster Session</i> 	<ul style="list-style-type: none"> ❖ The Education Committee (EC), a divisional committee with faculty representatives from each section (department), reports to and advises the Associate Dean for Education, who is ultimately responsible for the quality and effectiveness of the 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. ❖ CEP reviews education program via the Undergraduate Review Committee (every seven years). Associate Dean and EC work collaboratively to address issues identified in CEP review. ❖ Section Chairs (Department Chairs) and Associate Dean for Education meet regularly to assure additional faculty input for all educational matters. ❖ Individual faculty comment directly to Associate Dean if they perceive a problem with the prerequisites in preparing students for their courses. 	<ul style="list-style-type: none"> ❖ EC reviews assessment data annually and report back to the Associate Dean, who will initiate processes with the goal to eradicate shortcomings. Associate Dean 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>February 20, 2007</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 ❖ <i>Attitudes and Values: What should students value?</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. ❖ 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 that depend directly on material students learned in lower division courses 3. Surveys: <ol style="list-style-type: none"> a) Exit survey of graduating seniors solicit 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 department has prepared students for advanced work or future careers. c) campus-wide surveys of current students, including the new 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	BIBC 102	BICD 100	BIMM 100	BIMM110	BIPN 100	1 or 2 from Human Physiology Cluster*	1 or 2 from Human Disease Cluster*	2 UD LAB**	UD Elective x 2	Optional Advanced Studies- BISP 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 2	BILD 3	BIBC 102	BICD 100	BIMM 100	BIMM110	BIPN 100	1 or 2 from Human Physiology Cluster*	1 or 2 from Human Disease Cluster*	2 UD LAB**	UD Elective x 2	Optional Advanced Studies- BISP 194+	Optional Advanced Studies- BISP 195+	Optional Advanced Studies- BISP 196/197/199+
Understand: ❖ evolution and diversity of living organism			I									I/A	I/A		
❖ heredity and its molecular basis	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	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				A			A		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	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	BIBC 102	BICD 100	BIMM 100	BIMM110	BIPN 100	1 or 2 from Human Physiology Cluster*	1 or 2 from Human Disease Cluster*	2 UD LAB**	UD Elective x 2	Optional Advanced Studies- BISP 194	Optional Advanced Studies- BISP 195	Optional Advanced Studies- BISP 196/197/199
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<i>Skills: What should students be able to do with their knowledge?</i>																
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses				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											A a				A a	
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases											I				A a	
❖ Clearly and accurately communicate biological concepts											A a		A	A	A a	
<i>Attitudes and Values: What should students value?</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.	I	I	I	I	A a	I	A 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	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, 148 b) Human Disease: BICD 136, BIMM 114, 118, 120, 124, 134, 166 ** Must be chosen from the following: BICB 103, 105, BICD 111, 131, 145, BIMM 101, 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>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>Courses that challenge students to integrate, synthesize and evaluate knowledge and new information (currently not done: will be implemented).</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 provide evidence of how well students can integrate and apply a body of knowledge in a culminating project. (Examples of Capstone laboratory courses: BICD 131, BMM 127, BIBC 104, BIBC 105, BICD 123; Examples of Capstone lecture courses: BICD 136, BIBC 120, BIPN 108, BIBC 130)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 190 and BISP 194</i> d) <i>Undergraduate Research Opportunities (BISP 196, BISP 197, BISP 199, AIP 199) which require students to present their findings via: presentation at UCSD's Undergraduate Research Conference; publication in divisional undergraduate peer-reviewed journal (Saltman Quarterly); poster at annual Spring Quarter Undergraduate Poster Session</i> 	<ul style="list-style-type: none"> ❖ The Education Committee (EC), a divisional committee with faculty representatives from each section (department), reports to and advises the Associate Dean for Education, who is ultimately responsible for the quality and effectiveness of the 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. ❖ CEP reviews education program via the Undergraduate Review Committee (every seven years). Associate Dean and EC work collaboratively to address issues identified in CEP review. ❖ Section Chairs (Department Chairs) and Associate Dean for Education meet regularly to assure additional faculty input for all educational matters. ❖ Individual faculty comment directly to Associate Dean if they perceive a problem with the prerequisites in preparing students for their courses. 	<ul style="list-style-type: none"> ❖ EC reviews assessment data annually and report back to the Associate Dean, who will initiate processes with the goal to eradicate shortcomings. Associate Dean 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>February 20, 2007</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 	<p>2. Feedback from instructors teaching upper division courses that depend directly on material students learned in lower division courses</p> <p>3. Surveys:</p> <ul style="list-style-type: none"> a) Exit survey of graduating seniors solicit 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 department has prepared students for advanced work or future careers. c) campus-wide surveys of current students, including the new 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	BIBC 102	BIBC 103	BICD 100	BICD 140	BIMM 100	BIMM114	BIMM120	BIMM121	BIMM124	UD Elective x 3	Optional Advanced Studies- BISP 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	BIBC 102	BIBC 103	BICD 100	BICD 140	BIMM 100	BIMM114	BIMM120	BIMM121	BIMM124	UD Elective x 3	Optional Advanced Studies- BISP 194+	Optional Advanced Studies- BISP 195+	Optional Advanced Studies- BISP 196/197/199+
Understand: ❖ evolution and diversity of living organism		I										I/A	I/A		
❖ heredity and its molecular basis	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		I/A	I/A		
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	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						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	A	A	A	I	A a	A	A	I	I	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	BIBC 102	BIBC 103	BICD 100	BICD 140	BIMM 100	BIMM114	BIMM120	BIMM121	BIMM124	UD Elective x 3	Optional Advanced Studies- BISP 194+	Optional Advanced Studies- BISP 195+	Optional Advanced Studies- BISP 196/197/199+
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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 a	I	I	I	I	I	A	I	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				A a						A					A a
❖ Use digital technologies to search the scientific literature, and to retrieve and analyze information from reliable databases				I						A			A		A a
❖ Clearly and accurately communicate biological concepts				A a						A			A	A	A a
❖ Isolate, grow, identify, and quantitate microorganisms										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 a	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	A	A	A a	I	A a	I	A	A a	A	A	A	A a

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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>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 of acquiring information about 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>Courses that challenge students to integrate, synthesize and evaluate knowledge and new information(currently not done: will be implemented).</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 provide evidence of how well students can integrate and apply a body of knowledge in a culminating project. (Examples of Capstone laboratory courses: BICD 131, B1MM 127, BIBC 104, BIBC 105, BICD 123; Examples of Capstone lecture courses: BICD 136, BIBC 120, BIPN 108, BIBC 130)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 190 and BISP 194</i> d) <i>Undergraduate Research Opportunities (BISP 196, BISP 197, BISP 199, AIP 199)which require students to present their findings via: presentation at UCSD's Undergraduate Research Conference; publication in divisional undergraduate peer-reviewed journal (Saltman Quarterly; poster at annual Spring Quarter Undergraduate Poster Session</i> 	<ul style="list-style-type: none"> ❖ The Education Committee (EC), a divisional committee with faculty representatives from each section (department), reports to and advises the Associate Dean for Education, who is ultimately responsible for the quality and effectiveness of the 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. ❖ CEP reviews education program via the Undergraduate Review Committee (every seven years). Associate Dean and EC work collaboratively to address issues identified in CEP review. ❖ Section Chairs (Department Chairs) and Associate Dean for Education meet regularly to assure additional faculty input for all educational matters. ❖ Individual faculty comment directly to Associate Dean if they perceive a problem with the prerequisites in preparing students for their courses. 	<ul style="list-style-type: none"> ❖ EC reviews assessment data annually and report back to the Associate Dean, who will initiate processes with the goal to eradicate shortcomings. Associate Dean 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>February 20, 2007</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 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: Divisional Undergraduate website</p>	<p>2. Feedback from instructors teaching upper division courses that depend directly on material students learned in lower division courses</p> <p>3. Surveys:</p> <ul style="list-style-type: none"> a) Exit survey of graduating seniors solicit 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 department has prepared students for advanced work or future careers. c) campus-wide surveys of current students, including the new 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	BILD 1	BILD 2	BILD 3	BIBC 102	BICD 100	BIMM 100	AP&N CORE x 4*	1 Physiology LAB **	1 Elective LAB***	UD Elective x 3	Optional Advanced Studies BISP 194+	Optional Advanced Studies BISP 195+	Optional Advanced Studies BISP 196/197/199+
Understand: ❖ evolution and diversity of living organism			I				I / A			I / A	I / A		
❖ heredity and its molecular basis	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		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				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	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 whole organisms				A	A		A a	A			A	A	A a
❖ how the nervous system carries out its central role of acquiring information about information, and generating effective behavior							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	BIBC 102	BICD 100	BIMM 100	AP&N CORE x 4*	1 Physiology LAB **	1 Elective LAB***	UD Elective x 3	Optional Advanced Studies BISP 194+	Optional Advanced Studies BISP 195+	Optional Advanced Studies BISP 196/197/199+
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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 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								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 a
❖ Clearly and accurately communicate biological concepts								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	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	A	I	A a	A a	A a	A	A	A	A a

* BIPN 100, 102, 106, 140, 142, 144, 146, 148 ** Must be chosen from the following: BICD 131, 133, BIPN 105, 145 *** Must be chosen from the following: BIBC 103, 105, BICD 101, 111, 123, 131, 145, BIEB 121, 131, 165, 167M 179, BIMM 101, 103, 121, 127, BIPN 105, 145. This lab can be selected from those in the ** category that the student has not already taken + 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>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>Courses that challenge students to integrate, synthesize and evaluate knowledge and new information (currently not done: will be implemented).</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 provide evidence of how well students can integrate and apply a body of knowledge in a culminating project. (Examples of Capstone laboratory courses: BICD 131, BMM 127, BIBC 104, BIBC 105, BICD 123; Examples of Capstone lecture courses: BICD 136, BIBC 120, BIPN 108, BIBC 130)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 190 and BISP 194</i> d) <i>Undergraduate Research Opportunities (BISP 196, BISP 197, BISP 199, AIP 199) which require students to present their findings via: presentation at UCSD's Undergraduate Research Conference; publication in divisional undergraduate peer-reviewed journal (Saltman Quarterly); poster at annual Spring Quarter Undergraduate Poster Session</i> 	<ul style="list-style-type: none"> ❖ The Education Committee (EC), a divisional committee with faculty representatives from each section (department), reports to and advises the Associate Dean for Education, who is ultimately responsible for the quality and effectiveness of the 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. ❖ CEP reviews education program via the Undergraduate Review Committee (every seven years). Associate Dean and EC work collaboratively to address issues identified in CEP review. ❖ Section Chairs (Department Chairs) and Associate Dean for Education meet regularly to assure additional faculty input for all educational matters. ❖ Individual faculty comment directly to Associate Dean if they perceive a problem with the prerequisites in preparing students for their courses. 	<ul style="list-style-type: none"> ❖ EC reviews assessment data annually and report back to the Associate Dean, who will initiate processes with the goal to eradicate shortcomings. Associate Dean 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>February 20, 2007</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 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> <ul style="list-style-type: none"> ❖ Divisional Undergraduate website 	<p>2. Feedback from instructors teaching upper division courses that depend directly on material students learned in lower division courses</p> <p>3. Surveys:</p> <ul style="list-style-type: none"> a) Exit survey of graduating seniors solicit 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 department has prepared students for advanced work or future careers. c) campus-wide surveys of current students, including the new 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	BILD 1	BILD 3	BIBC 100	BIBC 102	BIBC 103	BICD 100	BICD 110	BIMM 100	CAPSTONE*	UD LAB x 2**	UD Elective x 4	Optional Advanced Studies – BISP 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/A	I/A		
❖ heredity and its molecular basis	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		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	I/A		
❖ how mathematics, physics and chemistry are integrated into the study of biology	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

* Must be selected from the following: BIBC 104, 110, 120, 130, BICD 118, BIMM 118, 130 ** Must be chosen from the following: BIBC 105, BICD 101, 111, 123, 131, 133, 145, BIMM 101, 103, 121, 127, 141, BIPN 105, 145, or Chem 143C + Content varies with instructor

Learning Goals	BILD 1	BILD 3	BIBC 100	BIBC 102	BIBC 103	BICD 100	BICD 110	BIMM 100	CAPSTONE*	UD LAB x 2**	UD Elective x 4	Optional Advanced Studies – BISP 194+	Optional Advanced Studies – BISP 195+	Optional Advanced Studies – BISP 196/197/199+
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<i>Skills: What should students be able to do with their knowledge?</i>														
❖ Construct reasonable hypotheses to explain biological phenomena and design effective experiments to test the hypotheses			I	I	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					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 a
❖ Clearly and accurately communicate biological concepts					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					A									
<i>Attitudes and Values: What should students value?</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.	I	I	I	I	I	A a	I	I	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	I	A a	A a	A	A	A	A a

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>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>Courses that challenge students to integrate, synthesize and evaluate knowledge and new information (currently not done: will be implemented).</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 provide evidence of how well students can integrate and apply a body of knowledge in a culminating project. (Examples of Capstone laboratory courses: BICD 131, B1MM 127, BIBC 104, BIBC 105, BICD 123; Examples of Capstone lecture courses: BICD 136, BIBC 120, BIPN 108, BIBC 130)</i> c) <i>Special Topics Upper Division Seminar courses: BISP 190 and BISP 194</i> d) <i>Undergraduate Research Opportunities (BISP 196, BISP 197, BISP 199, AIP 199) which require students to present their findings via: presentation at UCSD's Undergraduate Research Conference; publication in divisional undergraduate peer-reviewed journal (Saltman Quarterly); poster at annual Spring Quarter Undergraduate Poster Session</i> 	<ul style="list-style-type: none"> ❖ The Education Committee (EC), a divisional committee with faculty representatives from each section (department), reports to and advises the Associate Dean for Education, who is ultimately responsible for the quality and effectiveness of the 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. ❖ CEP reviews education program via the Undergraduate Review Committee (every seven years). Associate Dean and EC work collaboratively to address issues identified in CEP review. ❖ Section Chairs (Department Chairs) and Associate Dean for Education meet regularly to assure additional faculty input for all educational matters. ❖ Individual faculty comment directly to Associate Dean if they perceive a problem with the prerequisites in preparing students for their courses. 	<ul style="list-style-type: none"> ❖ EC reviews assessment data annually and report back to the Associate Dean, who will initiate processes with the goal to eradicate shortcomings. Associate Dean 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>February 20, 2007</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 	<p>2. Feedback from instructors teaching upper division courses that depend directly on material students learned in lower division courses</p> <p>3. Surveys:</p> <ul style="list-style-type: none"> a) Exit survey of graduating seniors solicit 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 department has prepared students for advanced work or future careers. c) campus-wide surveys of current students, including the new 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

Math 20F

Learning Goals <i>Knowledge: What should our students know by the time they graduate?</i>	BILD 1	BILD 2	BILD 94	BIBC 102	BIBC 103	BIBC 110/ Chem 127	BICD 100	BICD 110	BIMM 100	BIMM 101	BIMM181	BIMM182	BIMM 184	BIMM185	BENG183	CSE 11	CSE 12	CSE 21/ Math 15B	CSE 100/ Math 176	CSE 101/ Math 188	Math 186	UD Elective x 3	Optional Advanced Studies – BISP194	Optional Advanced Studies – BISP195	Optional Advanced Studies – BISP196/197 /199	
Understand: ❖ evolution and diversity of living organism											I			A									I/A	I/A		
❖ heredity and its molecular basis	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								I/A	I/A		
❖ how energy, nutrients, metabolites and information are acquired and organized, and how they flow through biological systems	I	I		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	A	A	A	A	A	A	A	A	A	A	A	A							I	A	I/A	I/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	I	I	I	A	A	A					
❖ data functions & designs, and analysis of algorithms											A	A	A	A	A	I	I	I	A	A	A					

I= Introductory Level

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