Date Submitted: 11/11/24 12:33 pm

Viewing: BS-BCHM-4 ~~BS-BCHM-3~~ : Bachelor of Science in Biochemistry

Last approved: 05/07/24 1:39 pm

Last edit: 11/11/24 12:33 pm

Changes proposed by: menhart

Catalog Pages Using this Program
Bachelor of Science in Biochemistry

Program Status	Active		
Requestor menhart@iit.edu	Name	Nicholas Menhart	E-mail
Origination Date	2024-11-11 ~~2024-3-1~~		
Is this an interdisciplinary program?	No		
Academic Unit College	Administrative ~~Biological Sciences~~ Administrative ~~Lewis College of Science and Letters~~		
Program Title	Bachelor of Science in Biochemistry		
Effective Academic Year	2025 ~~2024~~ - 2026 ~~2025~~	Effective Term	Fall 2025
Academic Level	Undergraduate		

In Workflow

1. CHEM Curriculum Committee Chair
2. BIOL Chair
3. PHYS Chair
4. CHEM Chair
5. BIOL Chair
6. Academic Affairs
7. Undergraduate Academic Affairs
8. LS Dean
9. AM Dean
10. LS Dean
11. LS Dean
12. LS Dean
13. Undergraduate Studies Committee Chair
14. Faculty Council Chair
15. Academic Affairs

Approval Path

1. 12/19/24 10:14 am Katherine Leight (kleight1): Approved for CHEM Curriculum Committee Chair

History

1. Oct 25, 2017 by clmig-jwehrheim
2. Nov 3, 2017 by Sarah Pariseau (sparisea)
3. Apr 27, 2018 by Sarah Pariseau (sparisea)
4. May 1, 2018 by Sarah Pariseau

(sparisea)
5. May 1, 2018 by Sarah Pariseau (sparisea)
6. Oct 23, 2020 by Holli Pryor-Harris (pryor)
7. May 7, 2024 by Nicholas Menhart (menhart)

If all courses in a subject in your department are required, please enter each subject followed by the number ranges in the "Quick Add" field in the pop up box when you click the green plus button below. For example: ARCH 100-499.

What courses will factor the major GPA?

Program Type Degree

Degree Type Bachelor of Science (BS)

CIP Code
26.0202 - Biochemistry.

Is there more than one Academic Unit proposer?

Yes ~~No~~

Which Academic Units?

Academic Unit
Biological Sciences
Chemical Sciences
Physics

Program Code BS-BCHM-4 ~~BS-BCHM-3~~

Program Attribute

Total Program Credit Hours 120 ~~126~~

Rationale for change in program credit hours.

we trying to make the program more achievable, and complying with university strategic initiatives

Please provide a summary and rationale for the requested program revision.

We are revising this program to:
*make it achievable in 120 ch, pursuant to the universities reduction in minimum ch for BS. ~~Change of control to interdisciplinary status under the interdisciplinary programspolicy.Steering committee to have 2 reps from BIO, 2 reps form CHEM, and 1 formPHYS.~~this ~~The proposal~~ is expected ~~linked~~ to make the program more achievable ~~similar proposals to put BS-MBB~~ and increase student success and graduation and retention rates
*incorporate as specialization programs roughly equivalent to BS-MBB and BS-COMC is approved. ~~under the control of this same steering committee~~ those programs will be eliminated once this program is approved. BS-COMC is currently on hiatus.
*add new specialization in pre-health, advanced biochemistry, and chemistry to increase interdisciplinarity and engagement of relevant AUs, as well as provide enhanced student engagement and professional development

NB: Last year, AY2023, control ~~Change~~ of this program and BS-MBB and BS-COMC was passed ~~control~~ to an interdisciplinary oversight committee with representatives form Biology, Chemistry and Physics, ~~status~~ under the interdisciplinary programs policy. Steering committee has ~~to have~~ 2 reps from BIO, 2 reps form CHEM, and 1 form PHYS.

Program Narrative and Justification

Narrative description of how the institution determined the need for the program. For example, describe what need this program will address and how the institution became aware of that need. If the program is replacing a current program(s), identify the current program(s) that is being replaced by the new program(s) and provide details describing the benefits of the new program(s). If the program will be offered in connection with, or in response to, an initative by a governmental entity, provide details of that initiative.

this is an existing program.

incorporation of two small programs as specializations is in line with university initiatives to reduce the number of small enrollment programs, while also providing a pathway to recruit and serve students interested in these programs.

TOTAL HEADS
BCHM MBB COMC total
2021 26 2 0 28
2022 30 2 0 32
2023 29 3 3 35
2024 24 3 1 28
2025 24 3 1 28

Narrative description of how the program was designed to meet local market needs, or for an online program, regional or national market needs. For example, indicate if Bureau of Labor Statistics data or State labor data systems information was used, and/or if State, regional, or local workforce agencies were consulted. Include how the course content, program length, academic level, admission requirements, and prerequisites were decided; including information received from potential employers about course content; and information regarding the target students and employers.

Narrative description of any wage analysis the institution may have performed, including any consideration of Bureau of Labor Statistics wage data related to the new program.

Narrative description of how the program was reviewed or approved by, or developed in conjunction with, one or more of the following: a) business advisory committees; b) program integrity boards; c) public or private oversight or regulatory agencies (not including the state licensing/authorization agency and accrediting agency); and d) businesses that would likely employ graduates of the program. For example, describe the steps taken to develop the program, identify when and with whom discussions were held, provide relevant details of any proposals or correspondence generated, and/or describe any process used to evaluate the program.

this program revision was developed by he Biochemistry steering committee, in consultation with the biology, chemistry and physics departments

Admission Entry Details

What are the enrollment estimates?

Year 1 30 Year 2 35 Year 3 40

Attach Additional Program Justification Document(s)

Academic Information

Advising

Since quality advising is a key component of good retention, graduation, and career placement, how will students be mentored? What student professional organizations will be formed? How will the department work with the Career Services office to develop industry connections?

How will advising responsibilities be shared between the departments?

Program Resources

Which program resources are necessary to offer this program?

Proposed Catalog Entry

Admission Requirements

Course Requirements

Required Courses

Biology Requirements		(24)
BIOL 107	General Biology Lectures	3
BIOL 109	General Biology Laboratory	1
BIOL 115	Human Biology	3

BIOL 117	Human Biology Laboratory	1
BIOL 214	Genetics	3
BIOL 401	Introductory Biochemistry	3
BIOL 402	Metabolic Biochemistry	3
BIOL 404	Biochemistry Laboratory	3
BIOL 445	Cell Biology	3
BIOL 495	Biology Colloquium	1
Chemistry Requirements		(24)
CHEM 124	Principles of Chemistry I with Laboratory	4
CHEM 125	Principles of Chemistry II with Laboratory	4
CHEM 237	Organic Chemistry I	4
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Laboratory	2
CHEM 343	Physical Chemistry I	3
~~CHEM 344~~	~~Physical Chemistry II~~	~~3-4~~
~~or CHEM 438~~	~~Physical Biochemistry~~	
CHEM 438	Physical Biochemistry	3
or CHEM 344	Physical Chemistry II	
CHEM 485	Chemistry Colloquium	1
Biology or Chemistry classes		(7-8)
BIOL 100	Introduction to the Profession	2
or CHEM 100	Introduction to the Profession	
BIOL 451	Biological Literature	2-3
or CHEM 451	Undergraduate Seminar	
Select any >300 biology or chemistry lab class, or other approved labc ourse:		3
BIOL 431	Animal Physiology Laboratory	3
BIOL 446	Cell Biology Laboratory	3
BIOL 455	Macromolecular Techniques	3
CHEM 416	Advanced Chemistry Laboratory	3
CHEM 461	Bioanalytical Chemistry Laboratory	3
CHEM 463	Analytical Method Development Laboratory	0 TO 3
CHEM 476	Forensic Chemistry Laboratory	0 OR 3

PHYS 300	Instrumentation Laboratory	4
Biochemistry Technical Electives		**(11)**
Select 11 credit hours from >300 biology or chemistry or		11
BIOL 210	Microbiology	3
BIOL 225	Microbiology Laboratory	2
CHEM 247	Analytical Chemistry	3
MATH 252	Introduction to Differential Equations	4
FDSN 401	Nutrition, Metabolism, and Health	3
PHYS 410	Molecular Biophysics	3
Any 300+ level BIOL or CHEM course		3
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	General Physics II: Electricity and Magnetism	4
Mathematics Requirements		**(17)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate and Vector Calculus	4
MATH 425	Statistical Methods	3
Computer Science Requirement		**(2)**
~~CS 105~~	~~Introduction to Computer Programming~~	~~2~~
~~or CS 110~~	~~Computing Principles~~	
~~or CS 115~~	~~Object-Oriented Programming I~~	
any CS core class		2
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E		6
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C		21
Total Credit Hours		120-121

Sample Curriculum/Program Requirements

Bachelor of Science in Biochemistry Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 100 or CHEM 100	2	BIOL 115	3
BIOL 107	3	BIOL 117	1
BIOL 109	1	CHEM 125	4
CHEM 124	4	MATH 152	5
MATH 151	5	Humanities 200-level Course	3
	15		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 214	3	~~BIOL 210~~	~~3~~
CHEM 237	4	CHEM 239	3
PHYS 123	4	CHEM 240	2
MATH 251	4	PHYS 221	4
~~CS 105, 110, or 115~~	~~2~~	Social Sciences Elective	3
		CS core	2
	15		14

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
~~Biology Laboratory Elective[1]~~	~~3~~	~~CHEM 344 or 438~~	~~3-4~~
~~BIOL 445~~	~~3~~	BIOL 402	3
~~CHEM 247~~	~~3~~	CHEM 438 or 344	3
BIOL 401	3	BIOL 404	3
CHEM 343	3	MATH 425	3
CHEM 485	1	Biochemistry Elective[2]	3
Biochemistry Elective[2]	3	~~IPRO Elective I~~	~~3~~
IPRO	3	~~Social Sciences Elective (300+)~~	~~3~~
Social Sciences Elective	3		
	16		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
~~BIOL 401~~	~~3~~	~~BIOL 402~~	~~3~~
~~BIOL 404~~	~~3~~	BIOL 451 or CHEM 451	2
~~BIOL 495~~	~~1~~	~~Biochemistry Technical Elective[2]~~	~~2-3~~
~~Biochemistry Technical Elective[2]~~	~~3~~	BIOL 495	1
BIOL 445	3	Biochemistry Elective[2]	3
Biochemistry Elective[2]	2	Humanitied or Social Sciences Elective	3

Biochemistry Lab Elective[1]	3	Humanities Elective (300+)	3
IPRO	3	Social Sciences Elective (300+)	3
Humanities Elective (300+)	3		
	14		15

Total Credit Hours: 120

[1] Select from the following courses: BIOL 431, BIOL 446, BIOL 455, CHEM 461, CHEM 463, or CHEM 476, or CS 331* required for computational biochemistry specialization

[2] Select from the following courses: BIOL 225, FDSN 401, MATH 252, PHYS 410, or any 300+ level BIOL or CHEM course.

Specialization Requirements

Pre-health: choose 3 of BIOL 210BIOL 327, BIOL 410, BIOL 415, BIOL 440, BIOL 470, BIOL 475, FDSN 401, PSYC 411, or PSYC 414

Advanced Biochemistry: CHEM 247, CHEM 434 , BIOL 512

Chemistry: CHEM 247, CHEM 434 , CHEM 415

Computational Biochemistry: CS 116, CS 331*, (MATH 252 or MATH 332), CHEM 456 *can also satisfy upper level lab requirement

Biophysics: MATH 252 , PHYS 224 , PHYS 410

Program Outcomes and Assessment Process

What are your learning objectives in this program? Please list each learning objective in the boxes below:

Note: These should be the same as described in your assessment plan at the bottom of this form.

Students will be able to demonstrate... technical skills in a laboratory setting and investigate biochemical questions experimentally by collecting, analyzing, and interpreting quantitative data.

" Students will be able to Analyze and respond to biochemical questions using foundational technical knowledge in relevant areas, namely:
(a) metabolism; "

" Students will be able to Analyze and respond to biochemical questions using foundational technical knowledge in relevant areas, namely:
; (b) organic chemistry;."

" Students will be able to Analyze and respond to biochemical questions using foundational technical knowledge in relevant areas, namely:
(c) thermodynamics and kinetics; "

" Students will be able to Analyze and respond to biochemical questions using foundational technical knowledge in relevant areas, namely:
(d) macromolecular structure;"

" Students will be able to Analyze and respond to biochemical questions using foundational technical knowledge in relevant areas, namely:
(e) spectroscopy; "

" Students will be able to Analyze and respond to biochemical questions using foundational technical knowledge in relevant areas, namely:
(e) spectroscopy; "

Specialization LOs:

1. Pre-health:
Students will demonstrate an understanding of the role and impact of biochemical systems in health and medicine.

. 2Advanced biochemistry
Students will demonstrate an understanding of biochemical molecules and systems beyond that required for the non-specialized program

3. Chemistry
Students will demonstrate the ability to apply quantitative analytical chemistry methods to biochemical systems.

4. Computational biochem
Students will demonstrate the ability to apply computational tools to the study of biochemical macromolecules and systems

5. Biophysics
Students will demonstrate an understanding of the physical basis of the structure and function of biochemical macromolecules and systems, and methods of studying this physical basis.

Upload your assessment plan here:
BS-BCHM Assessment Plan_revised 2024.xlsx

Undergraduate Program Requirements

What courses will factor the major GPA?

BIOL 105 - Introduction to Biology
BIOL 100 - Introduction to the Profession
BIOL 114 - Introduction to Human Biology
BIOL 115 - Human Biology
BIOL 214 - Genetics
BIOL 401 - Introductory Biochemistry
BIOL 402 - Metabolic Biochemistry
BIOL 404 - Biochemistry Laboratory
BIOL 445 - Cell Biology
CHEM 100 - Introduction to the Profession
CHEM 124 - Principles of Chemistry I with Laboratory
CHEM 123 - General Chemistry Laboratory
CHEM 126 - Principles of Chemistry II Without Laboratory
CHEM 140 - Principles of Chemistry II Lab
CHEM 125 - Principles of Chemistry II with Laboratory
CHEM 122 - Principles of Chemistry I Without Laboratory
CHEM 235 - Organic Chemistry I-Lecture
CHEM 237 - Organic Chemistry I
CHEM 236 - Organic Chemistry I-Lab
CHEM 239 - Organic Chemistry II
CHEM 240 - Organic Chemistry Laboratory
CHEM 343 - Physical Chemistry I
CHEM 344 - Physical Chemistry II
CHEM 438 - Physical Biochemistry

Undergraduate Degree Requirements

Minimum credit hours

120 ~~126~~

Specialization required?

~~No~~
Optional

Notes about specialization requirement

see above in specialization requirements. Students to not NEED to do a specialization, but can elect to do so by taking the specialization required classes, which can fit into the technical electives.

Minor required?

No

Proposed General Curriculum

Degree credit hours required	
Specialization credit hour requirement	9
List Major Course Requirements	
List Mathematics Requirements	
List Science Requirements	
List Computer Science Requirements	
List Humanities and Social Sciences Requirements	
List Interprofessional Project (IPRO) Requirements	
List Technical Elective Course Options	
List Free Elective Credit Hours (if applicable)	
Semester-by-semester plan of study for the degree program	

Specialization

To which degree does this specialization / concentration apply?

Title of Specialization / Concentration

Prehealth

How many credit hours are required for this specialization / concentration?

9

Can credit hours be shared between specialization / concentration and major requirements?

Yes

Explain:

these can fit into 3 technical electives

List specialization/concentration courses, including any required choices from formal course groups. Please include the credit hour minimums for all course categories.

3 of BIO 210 225 305 327 410 440 470 475 FDSN 401 PSYC 411 414

To which degree does this specialization / concentration apply?

Title of Specialization / Concentration

Advanced biochemistry

How many credit hours are required for this specialization / concentration?

9

Can credit hours be shared between specialization / concentration and major requirements?

Yes

Explain:

they can fit into TEs

List specialization/concentration courses, including any required choices from formal course groups. Please include the credit hour minimums for all course categories.

CHEM 247 and 434, BIO 512 (will be crosslisted in the future)

To which degree does this specialization / concentration apply?

Title of Specialization / Concentration

Chemistry

How many credit hours are required for this specialization / concentration?

9

Can credit hours be shared between specialization / concentration and major requirements?

Yes

Explain:

List specialization/concentration courses, including any required choices from formal course groups. Please include the credit hour minimums for all course categories.

CHEM 247 434 415

To which degree does this specialization / concentration apply?

Title of Specialization / Concentration

Computational Biochemistry

How many credit hours are required for this specialization / concentration?

11

Can credit hours be shared between specialization / concentration and major requirements?

Yes

Explain:

these can fit into technical electives, and CS331 can count as the upper level lab elective

List specialization/concentration courses, including any required choices from formal course groups. Please include the credit hour minimums for all course categories.

CS 116 and 331, (MATH 252 or 333), CHEM 465

To which degree does this specialization / concentration apply?

Title of Specialization / Concentration

Biophysics

How many credit hours are required for this specialization / concentration?

9

Can credit hours be shared between specialization / concentration and major requirements?

Yes

Explain:

these can fit into TEs

List specialization/concentration courses, including any required choices from formal course groups. Please include the credit hour minimums for all course categories.

MATH 252, PHYS 224 and 410

Reviewer Comments

Lei li (li129) (11/22/24 3:46 pm): I REJECT any changes related to the biological department's biochemistry program. The biology faculty have never discussed it, never voted on this, and as a department chair, I have never approved anything for any changes in the biology department's biochemistry BS programs. Thank you.

Key: 33