

Undergraduate Major in Biochemistry Sample Curriculum
Data Science Concentration

First Year (31 total credits)

<u>Fall</u>		<u>Spring</u>	
BC 192	2 cr	LIFE 201B, 203	5 cr
LIFE 102	4 cr	CHEM 113, 114	4 cr
CHEM 111, 112	5 cr	CO 150	3 cr
MATH 155 or 160	<u>4 cr</u>	MATH 255 or 161	<u>4 cr</u>
	15 cr		16 cr

Sophomore Year (29-30 total credits)

<u>Fall</u>		<u>Spring</u>	
CHEM 341	3 cr	CHEM 343	3 cr
LIFE 210	3 cr	CHEM 344	2 cr
LIFE 212	2 cr	AUCC Cat 3B-E ¹	3 cr
AUCC Cat 3B-E ¹ (2)	6 cr	CS 163 or 164	4 cr
CS 152 or CS 150B (Cat 3B)	<u>2-3 cr</u>	STAT 158	<u>1 cr</u>
	16-17 cr		13 cr

Junior Year (30-31 total credits)

<u>Fall</u>		<u>Spring</u>	
BC 401	3 cr	PH 121 or 141	5 cr
BC 404	2 cr	BC 403	3 cr
CS 220	4 cr	DSCI 235	2 cr
STAT 315	3 cr	CO 300/301B or 302 or JTC 300 (AUCC Cat 2)	3 cr
BZ 360	<u>3 cr</u>	BC 406 or 475/487/495/496	<u>2-3 cr</u>
	15 cr		15-16

Senior Year (28-30 total credits)

<u>Fall</u>		<u>Spring</u>	
BC 411	4 cr	BC 465	3 cr
BC 463	3 cr	BC 499A/B	3 cr
BC 493	1 cr	AUCC Cat 3B-E ¹	3 cr
AUCC Cat 3B-E ¹	3 cr	DSCI 335	3 cr
STAT 341	<u>3 cr</u>	Free Elective ²	<u>2-4 cr</u>
	14 cr		15-16

¹ Select from the list of courses in categories 3B-3E (six credits [two courses] must come from 3B; one course each from categories 3C, 3D, and 3E) in the AUCC. Only 3 of the 6 credits required for Arts and Humanities may come from intermediate (L*** 200 and L*** 201) foreign language courses.

² Select enough elective credits to bring the program total to a minimum of 120 credits, of which at least 42 must be upper-division (300- to 400-level). Students are encouraged to fulfill their 3 free elective credits with additional Data Science electives, Bioscience electives or PH 122/142 Physics II or apply them to a minor.

Data Science Electives

Course	Cr	Title	Semester	Prerequisites
DSCI 320	3	Optimization Methods in Data Science	F	CS 163 or CS 164; MATH 151; MATH 261; DSCI 369 or MATH 369
DSCI 369	4	Linear Algebra for Data Science	SP	MATH 124; MATH 126
DSCI 445	3	Statistical Machine Learning	F	DSCI 320; DSCI 369; STAT 341
DSCI 473	2	Introduction to Geometric Data	F, SP, S	DSCI 369
DSCI 475	2	Topological Data Analysis	F, SP, S	DSCI 473
CS 320	3	Algorithms - Theory and Practice	F, SP	CS 165; CS 220; MATH 155 or MATH 160; DSCI 369 or MATH 229 or MATH 369
CS 345	3	Foundations of Machine Learning	F, SP	CS 220 and CS 150B or CS 152 or CS 165 or DSCI 235 and (MATH 155 or MATH 159 or MATH 160 and STAT 301 or ECE 303 or STAT 303 or STAT 307 C or STAT 315
CS 425	4	Introduction to Bioinformatics Algorithms	F	CS 320; ECE/STAT 303 or STAT 301 or STAT 307 or STAT 315
CS 435	4	Introduction to Big Data	F	CS 320 or CS 370
CS 445	4	Introduction to Machine Learning	SP	CS 320; CS 345; ECE/STAT 303 or STAT 301 or STAT 307 or STAT 315
MATH 151	1	Mathematical Algorithms in Matlab I	SP	MATH 141 or MATH 155 or MATH 160.
STAT 342	3	Statistical Data Analysis II	SP	STAT 301 or STAT 307 or ERHS 307 or STAT 311 or STAT 315
STAT 460	3	Applied Multivariate Analysis	SP	STAT 341; DSCI 369 or MATH 229 or MATH 340 or MATH 369

Bioscience Electives

Course	Cr	Title	Semester	Prerequisites
BMS 300	4	Principles of Human Physiology	F, SP, S	BZ 101 or BZ 110 or LIFE 102; CHEM 103 or CHEM 107 or CHEM 111
BMS 301	2	Human Gross Anatomy	F, SP, S	BZ 110 or LIFE 102
BMS 305	4	Domestic Animal Gross Anatomy	SP	BZ 110 or LIFE 102
BMS 330	4	Microscopic Anat/Mam.	SP	BMS 300 or BMS 360
BMS 345	4	Functional Neuroanatomy	F, SP	BMS 300 or BMS 360
BMS 360	4	Fundamentals of Physiology	SP	BZ 110 or LIFE 102; CHEM 245 or concurrent registration or CHEM 341 or concurrent registration
BMS 420	3	Cardiopulmonary Physiology	F	BMS 300 or BMS 360
BMS 430	3	Endocrinology	F	BMS 300 or BMS 360
BMS 450	3	Pharmacology	SP	BMS 300 or BMS 360; BC 351 or LIFE 210
BMS 500	4	Mammalian Physiology	F	BMS 300 or BMS 360
ERHS 332	3	Principles of Epidemiology	SP	MIP 300 or concurrent registration; STAT 301 or concurrent registration or STAT 307 or concurrent registration
FSHN 350	3	Human Nutrition	F, SP, S	BMS 300 or concurrent registration; CHEM 245 or CHEM 341
HES 319	4	Neuromuscular Aspects of Human Movement	F, SP	BMS 300; HES 207
HES 403	4	Physiology of Exercise	F, SP, S	BMS 300 or BMS 360
VS 331	4	Histology	F, SP, S	BZ 100 or LIFE 102
BC 467	3	Biochemistry	SP	BC 401
BMS 325	3	Cellular Neurobiology	F	BMS 300 or BMS 360
BMS 405	3	Nerve & Muscle Toxins...	SP	BMS 325 or BMS 345
BZ 220	3	Introduction to Evolution	F, SP, S	BZ 110 or BZ 120 or LIFE 103
BZ 311	4	Developmental Biology	SP, S	BZ 310
BZ 346	3	Pop. And Evolut. Genetics	F	BZ 220; MATH 155; STAT 301 or STAT 307/ERHS 307

BZ 401	3	Comparative Animal Phys.	SP	BZ 214
BZ 402	4	Molecular Cytogenetics	SP	(BZ 310 or LIFE 210) and (BZ 350 or LIFE 201A or LIFE 201B or SOCR 330) may be CR
BZ 403	3	Comp. Endocrinology	F	BZ 310
BZ 440	3	Plant Physiology	SP	BZ 120 or LIFE 103
BZ 455	3	Human Heredity & Birth Def	SP	BZ 110 and BZ 111 or LIFE 103
BZ 476	3	Genetics of Model Orgs.	F even yr	BZ 350 or LIFE 201A or LIFE 201B or SOCR 330.
CHEM 334	1	Quantitative Analysis Lab	F,SP	CHEM 114 and CHEM 335, may be taken concurrently
CHEM 335	3	Intro to Analytical Chemistry	F,SP	CHEM 113 with a minimum grade of C and CHEM 334, may be taken concurrently
CHEM 433	3	Clinical Chemistry	SP	CHEM 334; BC 351 or BC 401
ERHS 450	3	Intro to Radiation Biology	SP	LIFE 102 and PH 122, may be taken concurrently
FSHN 470	3	Integrative Nutr. & Met	F,SP	BC 351 and FSHN 350
FTEC 350	2	Fermentation Microbiology	SP	CHEM 245 or FTEC 210 or LIFE 206 or MIP 302
FTEC 460	3	Brewing Sci & Technology	F,SP	(CHEM 245) and (MATH 118)
MIP 300	3	General Microbiology	F,SP,S	BZ 110 or BZ 120 or LIFE 102; CHEM 245 or CR, CHEM 341 or CR or CHEM 345 or CR
MIP 302	2	General Microbiology Lab	F,SP	MIP 300, may be taken concurrently
MIP 342	4	Immunology	F,SP	(CHEM 245 or 341 or 345; or CR) and (LIFE 201B or LIFE 210 or MIP 300)
MIP 343	2	Immunology Lab	SP	MIP 302 and MIP 342, may be taken concurrently
MIP 351	3	Medical Bacteriology	SP	MIP 342
MIP 352	3	Medical Bacteriology Lab	SP	MIP 302 and MIP 351, may be taken concurrently
MIP 420	4	Medical & Molecular Vir.	F	MIP 342; BC 351 or concurrent registration, or BC 401 or concurrent registration
MIP 425	2	Virology and Cell Culture Lab	F	MIP 302; MIP 420 or concurrent registration
MIP 450	3	Microbial Genetics	F	MIP 300; BC 351 or concurrent registration or BC 401 or concurrent registration
MIP 462	5	Parasitology & Vector Biol.	F	BZ 110 or LIFE 103; BZ 212 or LIFE 206 or MIP 302
NB 501	2	Cell & Molec. Neurophys.	F	One college-level course in each: biology, biochemistry, physics, calculus