4+1 BIOLOGY BS/ ADOLESCENCE 7-12, TEACHING STUDENTS WITH DISABILITIES(ALL GRADES) MSED

The 4+1 Program (http://catalog.canisius.edu/graduate/division-arts-education-sciences/school-education-leadership-studies/educator-preparation/dual-degree-content-and-msed-swd/) offers a BS in Biology as well as a MSEd in Teaching Students with Disabilities All Grades. This program leads to Initial Adolescence Certification in Biology as well as Initial Certification in SWD (All Grades: PreK-Grade 12). Since it leads to two teaching certificates, candidates must meet the content requirements for both over the course of their curriculum. In most cases, the content area major covers those requirements. In some instances New York State has additional requirements. Please note, this 4+1 program can be completed in as little as 5 years if one summer is included.

An Ignatian Foundation

All undergraduate students must complete either the Canisius Core Curriculum (http://catalog.canisius.edu/undergraduate/academics/curricular-information/core-curriculum/) or the All-College Honors Curriculum (http://catalog.canisius.edu/undergraduate/academics/curricular-information/all-college-honors-program/). Many schools refer to their college-wide undergraduate requirements as "general education" requirements. We believe that the core curriculum and the honors curriculum are more than a series of required classes; they provide the basis for a Jesuit education both with content and with required knowledge and skills attributes that are central to our mission.

Free Electives

Students may graduate with a bachelor's degree with more but not less than 120 credit hours. Free electives are courses in addition to the Canisius Core Curriculum or All-College Honors Curriculum and major requirements sufficient to reach the minimum number of credits required for graduation. The number of credits required to complete a bachelor's degree may vary depending on the student's major(s) and minor(s).

Major Requirements

The Biology curriculum fulfills all requirements and prepares students well for graduate programs in the biological sciences, and for schools of allopathic (MD) and osteopathic (DO) medicine, dentistry, veterinary medicine, and several allied health programs including, but not limited to, chiropractic, optometry, physician's assistant, and podiatry.

Biology Major Course Requirements

Code	Title	Credits
BIO 111 & 111L	Introductory Biology I and Introductory Biology Laboratory I	4
BIO 112 & 112L	Introductory Biology II and Introductory Biology Laboratory II	4
or BIO 113 & BIO 112L	Introductory Biology II: Organismal Biology and Introductory Biology Laboratory II	
BIO 211 & 211L	Biochemistry and Cell Biology I and Biochemistry and Cell Biology Lab I	4
BIO 212 & 212L	Biochemistry and Cell Biology II and Biochemistry and Cell Biology Lab II	4
BIO 351	Biology Seminar I	1
BIO 353	Biology Seminar II	1
CHM 111 & 111L	General Chemistry I and General Chemistry I Laboratory	4
CHM 112 & 112L	General Chemistry II and General Chemistry II Laboratory	4
CHM 227 & 227L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHM 228 & 228L	Organic Chemistry II and Organic Chemistry II Laboratory	4
PHY 201 & 201L	College Physics I and College Physics I Laboratory	4
PHY 202 & 202L	College Physics II and College Physics II Laboratory	4
Select one of the following mathematics electives options:		8
Option 1:		
MAT 111	Calculus I	
MAT 141	Inferential Statistics and Computers for Science	
or PSY 201	Basic Statistics for Behavioral Sciences	
Option 2:		
MAT 111 & MAT 112	Calculus I and Calculus II	
Option 3:		
One year of statistics for sciences		
Biology Major Electives (6 courses as described below)		22
Total Credits		**72**

Major Electives

Code	Title	Credits
Select six 300- or 400-level lecture courses, four with associated laboratories		
Area 1 Elective and Lab		4
Area 2 Elective and Lab		4
Area 3 Elective and Lab		4
Biology Elective [1]		3
Biology Elective [1]		3
Biology Elective and Lab [2]		4
Total Credits		**22**

[1] The remaining three biology electives may come from within the three areas or from any other 300- or 400-level elective courses in biology listed below.

[2] At least one elective course must taken with a laboratory. A student enrolled in three semesters of BIO 301 Research Methods would fulfill this fourth laboratory requirement

ARea 1: Ecology and Evolution

Code	Title	Credits
BIO 305 & 305L	Medical Microbiology and its Ecological Basis and Medical Microbiology and its Ecological Basis Lab [1]	4
BIO 320 & 320L	Field Ecology and Field Ecology Lab	4

BIO 357 & 357L	Evolution and Evolution Laboratory	4
BIO 375 & 375L	Community Ecology and Community Ecology Laboratory	4
BIO 377 & 377L	Freshwater Biology and Freshwater Biology Laboratory	4
BIO 378 & 378L	Wetlands and Wetlands Laboratory	4
BIO 406 & 406L	Population and Conservation Genetics and Population and Conservation Genetics Laboratory	4
BIO 412 & 412L	Evolution & Development and Evolution & Development Lab	4

[1] If BIO 305 taken in Area 1, then BIO 307 cannot be taken for Area 2.

AREA 2: Organismal Biology

Code	Title	Credits
BIO 307 & 307L	Microbiology and Microbiology Laboratory	4
BIO 324 & 324L	Human Anatomy and Human Anatomy Lab	4
BIO 335 & 335L	Plant Biology and Plant Biology Lab	4
BIO 340 & 340L	Physiology and Physiology Laboratory	4
BIO 343 & 343L	Entomology and Entomology Lab	4
BIO 366 & 366L	Ornithology and Ornithology Laboratory	4

Area 3: molecular and cellular biology

Code	Title	Credits
BIO 404 & 404L	Genetics and Genetics Laboratory	4
BIO 419 & 419L	Cell Biology and Cell Biology Laboratory	4
BIO 425 & 425L	Cellular Neurobiology and Cellular Neurobiology Laboratory	4
BIO 426 & 426L	Immunochemistry and Immunochemistry Laboratory	4
BIO 430 & 430L	Advanced Cellular Biochemistry and Metabolism and Advanced Cellular Biochemistry and Metabolism Laboratory	4
BIO 432 & 432L	Developmental Biology and Developmental Biology Laboratory	4
BIO 435 & 435L	Developmental Neurobiology and Develop Neurobiology Laboratory	4
BIO 450 & 450L	Molecular Biology and Molecular Biology Laboratory	4

Biology Electives

Code	Title	Credits
BIO 312	Primatology	3
BIO 317	Sex, Evolution and Behavior	3
BIO 322	Conservation Biology	3
BIO 345	Functional Neuroanatomy	3
BIO 357	Evolution	3
BIO 360	Environmental Health	3
BIO 364	Zoology: Diversity of Animal Life	3
BIO 424	Epigenetics and Disease	3
BIO 441	Neurobiology of Nervous System Disorders	3
BIO 444	Cancer Biology	3

Please note, 6 credits of math, 6 credits of science, 6 credits of English, and 6 credits of social studies (including history) are needed for SWD certification. (Keep in mind that NYSED requires a course grade of C or better for certification).

Education course list:

The education curriculum is provided below for the MSEd portion of the 4+1 programs. Notice that several foundation courses are taken at the undergraduate level intermingled with other undergraduate requirements. The graduate courses begin at the 500 level and continue until completion.

Code	Title	Credits
Undergraduate Requirements		
EDS 101	Human Growth and Social Development: Adolescence	3
EDS 223	Foundations of Adolescent Literacy (20 hours of field experience required)	3
EDS 360	Evaluation and Teaching Strategies (30 hours of field experience required)	3
EDU 250	Foundations of Education	3
SPE 341	Inclusive Strategies	3
SPE 356	Assessment for Diverse Learners	3
Please select one of the following:		3
EDS 402	Methods of Teaching English: Adolescence (30 hours of field experience required)	
or EDS 403	Methods of Teaching Mathematics: Adolescence	
or EDS 405	Methods of Teaching Science: Adolescence	
or EDS 406	Methods of Teaching Social Studies: Adolescence	
Graduate Requirements		
EDU 570	Pre-Student Teaching (Requires 50 hours of field experience)	3
EDU 595	Child Abuse Workshop	0
EDU 596	Prevention of School Violence Workshop	0
EDU 597	Dignity for All Students Workshop	0
EDU 615	Research Methods	3
SPE 580	Classroom Management	3
SPE 631	Reading and Writing Process for Students with Learning and Behavioral Disorders (25 hours of field experience required)	3
SPE 640	Learning and Behavioral Disabilities (LBD); Etiology and Research Based Interventions	3
SPE 644	Collaborative Practices on a Transdisciplinary Team	3
SPE 649	Transition for Adolescents with Disabilities	3
SPE 650	Intellectual Disabilities and Autism Spectrum Disorders: Etiology & Educational Needs	3
SPE 652	Functional Curriculum for Students with Severe Disabilities and ASD (25 hours of field experience required)	3
SPE 693	Student Teaching	9

SPE 697	Student Teaching Seminar	0
Total Credits		**57**

Roadmap

Freshman

Fall	Spring
BIO 111 & 111L	BIO 112 & 112L
CHM 111 & 111L[1]	CHM 112 & 112L[1]
MAT (Calculus or Statistics)	MAT (Calculus or Statistics)
	HIS Course

Sophomore

Fall	Spring
BIO 211 & 211L	BIO 212 & 212L
CHM 227 & 227L	BIO 351
EDS 101	CHM 228 & 228L
EDU 250	BIO Elective
	SPE 341

Junior

Fall	Spring
BIO Elective with lab	BIO Elective
PHY 201 & 201L	PHY 202 & 202L
EDS 223	EDS 405
EDS 360	HIS Course

Senior

Fall	Spring
BIO Elective with lab	BIO Elective with lab
BIO Elective with lab	EDU 615
BIO 353	SPE 649
SPE 356	Core Capstone
SPE 644	

Fifth Year

Fall	Spring
SPE 580	EDU 595
SPE 631	EDU 596
SPE 640	EDU 597
SPE 698	SPE 693
	SPE 697