Program Change Request

Date Submitted: 12/05/18 10:59 am

Viewing: SC-BS-BIOL : Biology, BS

Last approved: 12/04/18 1:08 pm

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Changes proposed by: jbazaz

Catalog Pages Using this Program

Biology, BS

Are you completing this form on someone else's behalf?

Yes

Requestor:

In Workflow

1. **BIOL Program Chair**
2. **SC Curriculum Committee**
3. SC Associate Dean
4. SC CAT Editor
5. Assoc Provost-Undergraduate
6. Registrar-Programs

Approval Path

1. 12/05/18 12:12 pm Larry Rockwood (lrockwoo): Approved for BIOL Program Chair

History

1. Oct 23, 2017 by clmig-jwehrheim
2. Dec 5, 2017 by clmig-jwehrheim
3. Mar 1, 2018 by Jennifer Bazaz Gettys (jbazaz)
4. Mar 8, 2018 by Rebekah Zacharias (rzachari)
5. Mar 16, 2018 by Rebekah Zacharias (rzachari)
6. Dec 4, 2018 by Jennifer Bazaz Gettys (jbazaz)

Name	Extension	Email
Deborah Polayes	4543	dpolayes

Effective Catalog: 2019-2020

Program Level: Undergraduate

Program Type: Bachelor's

Degree Type: Bachelor of Science

Title: Biology, BS

Banner Title: **Biology, BS**

Registrar/OAPI Use Only – SCHEV Status Approved

Registrar's Office Use Only – Program Start Term

Registrar/OAPI Use Only – SCHEV Letter

Concentration(s):

	Associated Concentrations	Registrar's Office Use Only: Concentration Code
1	Bioinformatics	BNF
2	Biopsychology	BP
3	Biotechnology and Molecular Biology	BTMB
4	Environmental and Conservation Biology	ESCB
5	Microbiology	MIB

Registrar/IRR Use Only – Concentration CIP Code

College/School: College of Science

Department / Academic Unit: Biology

No

Jointly Owned Program?

Justification

- Replacing BIOL 310 & 330 with BIOL 300. Making credit total adjustments as a result.
- Adding elective options.
- Reformatting so credit totals are easier to decipher.

Total Credits Required: Total credits: minimum 120

Registrar's Office Use Only - Program Code:

SC-BS-BIOL

Registrar/IRR Use Only – Program CIP Code

Admission Requirements:

Admissions

University-wide admissions policies can be found in Undergraduate Admissions Policies.
To apply for this program, please complete the George Mason University Admissions Application.

Program-Specific Policies:

Policies

Students must fulfill all Requirements for Bachelor's Degrees, including the Mason Core.
Important information and departmental policies are listed in the Department of Biology.
BIOL 308 Foundations of Ecology and Evolution meets the writing intensive requirement for this major. Transfer students who have transferred in BIOL 308 Foundations of Ecology and Evolution but did not meet the writing intensive requirement may take MLAB 300 Science Writing to meet the writing intensive requirement.
For policies governing all undergraduate degrees, see AP.5 Undergraduate Policies.

Important Program Requirements

- Students may apply no more than 8 credits of BIOL 103 Introductory Biology I (Mason Core) or BIOL 107 Intro Biology II Lecture (Mason Core) and BIOL 106 Introductory Biology II Laboratory (Mason Core) toward elective credit (or equivalent transfer credit at the 100 to 200-level) if taken before successful completion of BIOL 213 Cell Structure and Function (Mason Core).

- Biology majors must earn a minimum grade of 'C' in all biology core courses. A grade of 'C' or better must be earned in BIOL 213 Cell Structure and Function (Mason Core) in order to advance to other core requirements.
- Students may repeat BIOL 213 Cell Structure and Function (Mason Core) once, but a second time only with permission from the Department of Biology.
- Students may **not** count BIOL 124 Human Anatomy and Physiology and/or BIOL 125 Human Anatomy and Physiology toward any biology major requirement.
- Students who take **BIOL 300 BioDiversity may** ~~BIOL 310 Biodiversity may~~ **not** count BIOL 303 Animal Biology and/or BIOL 304 Plant Biology toward any biology major requirement.
- 44 credits must be in biology coursework.
- BIOL 493 Honors Research in Biology, BIOL 495 Directed Studies in Biology, and BIOL 497 Special Problems in Biology do not satisfy the requirements of the BS degree which state that students must complete at least two upper division courses that include a laboratory. The courses do, however, count as non-laboratory electives.

Several optional concentrations are available; details on each can be found in the Requirements tab.

Teacher Licensure

Students majoring in biology who wish to pursue a career teaching secondary school may consider applying for the Curriculum and Instruction Undergraduate Certificate offered by the College of Education and Human Development as an option in seeking an initial Virginia teaching license.

Other routes to licensure include the Biology, BA or BS/Curriculum and Instruction, Accelerated MEd (Secondary Education Biology Concentration) or select traditional Master's programs. Please contact the Undergraduate Advisor in College of Education and Human Development for more information.

Degree Requirements:

Students should refer to the Admissions & Policies tab for specific policies related to this program.

Students must complete their biology coursework and the supporting requirements which follow with a minimum GPA of 2.00.

All students must complete the **Core Courses** ~~biology core, chemistry, physics, mathematics, and computer science courses~~ listed below. Students then elect to complete the BS degree either with a concentration or without a concentration. ~~Biology~~

Core Courses ~~Chemistry Physics Mathematics Computer Science~~

~~1 Recommended by the Department of Biology~~

~~Course List~~

~~Code~~	~~Title~~	~~Credits~~
~~Select one from the following:~~		~~3~~
~~CDS 130~~	~~Computing for Scientists (Mason Core) 1~~	

Code	Title	Credits
Any course(s) that fulfills the Mason Core: Information Technology requirement		
Total Credits		0

Course List

Code	Title	Credits
Select one from the following:		3-6
MATH 111	Linear Mathematical Modeling (Mason Core)	
or MATH 113	Analytic Geometry and Calculus I (Mason Core)	
MATH 123	Calculus with Algebra/Trigonometry, Part A	
& MATH 124	and Calculus with Algebra/Trigonometry, Part B (Mason Core)	
Total Credits		0

Course List

Code	Title	Credits
Select from one from the following Mason Core: Natural Science sequences:		8
PHYS 243	College Physics I (Mason Core)	
& PHYS 244	and College Physics Lab (Mason Core)	
& PHYS 245	and College Physics II (Mason Core)	
& PHYS 246	and College Physics Lab (Mason Core)	
PHYS 160	University Physics I (Mason Core)	
& PHYS 161	and University Physics I Laboratory (Mason Core)	
& PHYS 260	and University Physics II (Mason Core)	
& PHYS 261	and University Physics II Laboratory (Mason Core)	
Total Credits		0

Course List

Code	Title	Credits
CHEM 211	General Chemistry I (Mason Core)	4
& CHEM 213	and General Chemistry Laboratory I (Mason Core) (Natural Science course)	
CHEM 212	General Chemistry II (Mason Core)	4
& CHEM 214	and General Chemistry Laboratory II (Mason Core) (Natural Science course)	
CHEM 313	Organic Chemistry I	3
CHEM 315	Organic Chemistry Lab I	2
Total Credits		0

Course List

Code	Title	Credits
Biology		
BIOL 213	Cell Structure and Function (Mason Core)	4
BIOL 214	Biostatistics for Biology Majors	4
BIOL 300	**BioDiversity**	**4**
BIOL 308	Foundations of Ecology and Evolution 1	5
		5

Code	Title	Credits
~~BIOL 310~~	~~Biodiversity~~	
~~& BIOL 330~~	~~and Biodiversity Lab and Recitation~~	
BIOL 311	General Genetics	4
Chemistry		
CHEM 211	**General Chemistry I (Mason Core)**	**4**
& CHEM 213	**and General Chemistry Laboratory I (Mason Core)**	
CHEM 212	**General Chemistry II (Mason Core)**	**4**
& CHEM 214	**and General Chemistry Laboratory II (Mason Core)**	
CHEM 313	**Organic Chemistry I**	**5**
& CHEM 315	**and Organic Chemistry Lab I**	
Physics		
Select from one of the following Mason Core Natural Science sequences:		**8**
PHYS 160	**University Physics I (Mason Core)**	
& PHYS 161	**and University Physics I Laboratory (Mason Core)**	
& PHYS 260	**and University Physics II (Mason Core)**	
& PHYS 261	**and University Physics II Laboratory (Mason Core)**	
PHYS 243	**College Physics I (Mason Core)**	
& PHYS 244	**and College Physics Lab (Mason Core)**	
& PHYS 245	**and College Physics II (Mason Core)**	
& PHYS 246	**and College Physics Lab (Mason Core)**	
Mathematics		
Select one from the following:		**3-6**
MATH 111	**Linear Mathematical Modeling (Mason Core)**	
or MATH 113	**Analytic Geometry and Calculus I (Mason Core)**	
MATH 123	**Calculus with Algebra/Trigonometry, Part A**	
& MATH 124	**and Calculus with Algebra/Trigonometry, Part B (Mason Core)**	
Computer Science		
Select one from the following:		**3**
CDS 130	**Computing for Scientists (Mason Core)** [2]	
Any course(s) that fulfills the Mason Core: Information Technology requirement		
Total Credits		48-51

[1] Fulfills writing intensive requirement.

Transfer students who have transferred in BIOL 308 but did not meet the writing intensive requirement may take MLAB 300 Science Writing to meet the writing intensive requirement.

[2] Recommended by the Department of Biology

BS without Concentration

Students who do not select an optional concentration must complete the biology core and shared courses shown above in addition to the curriculum requirements listed below.

Course List

Code	Title	Credits
Biology Electives		
Complete 23 credits of additional biology courses [1]		**23**
Additional Science Courses		
Students are encouraged to consult with a biology faculty advisor to determine which option (A, B, or C) best meets their career goals. Select one from the following options:		3-8
Option A:		
CHEM 314	Organic Chemistry II	
& CHEM 318	and Organic Chemistry Lab II	
Option B:		
One 3 credit chemistry course at the 300 or 400-level (not CHEM 314)		
Option C:		
GEOL 101	Introductory Geology I (Mason Core)	
& GEOL 102	and Introductory Geology II (Mason Core) (Natural Science courses)	
Total Credits		26-31

~~Biology Electives Additional Science Courses Students are encouraged to consult with a biology faculty advisor to determine which option (A, B, or C) best meets their career goals.~~Note:

~~1Of which, at least 14 credits must be upper division, and at least two of the upper division courses must include a laboratory.~~

~~Course List~~

~~Code~~	~~Title~~	~~Credits~~
~~Complete 22 credits of additional biology courses 1~~		~~22~~
~~Total Credits~~		~~0~~

Students expecting to enter a professional school are strongly encouraged to complete MATH 113 Analytic Geometry and Calculus I (Mason Core).

1Of which, at least 14 credits must be upper division, and at least two of the upper division courses must include a laboratory.

Concentration in Bioinformatics (BNF)

The highly interdisciplinary field of bioinformatics has emerged as a powerful modern science. There is a great demand for undergraduate and graduate-level trained individuals with a background in bioinformatics in industry as well as in academia.

Course List

Code	Title	Credits
Computer Science		3
Please note: CDS 130 is recommended to fulfill the Computer Science requirement in the shared core above.		
CDS 230	Modeling and Simulation I	
Bioinformatics		6

Code	Title	Credits
BINF 401	Bioinformatics and Computational Biology I	
BINF 402	Bioinformatics and Computational Biology II	
Biology		14-16
BIOL 312	Biostatistics for Bioinformatics	
BIOL 401	Phage Discovery	
BIOL 412	Phage Genomics	
Biology Lab Elective		
Select one from the following:		
BIOL 320	Comparative Chordate Anatomy	
BIOL 322	Developmental Biology	
& BIOL 323	and Lab for Developmental Biology	
BIOL 331	Invertebrate Zoology	
BIOL 332	Insect Biology	
BIOL 334	Vertebrate Paleontology	
BIOL 336	Invertebrate Paleontology	
BIOL 344	Plant Diversity and Evolution	
BIOL 345	Plant Ecology	
BIOL 350	Freshwater Ecosystems	
BIOL 355	Ecological Engineering and Ecosystem Restoration	
BIOL 379	RS: Ecological Sustainability (Mason Core)	
BIOL 385	Biotechnology and Genetic Engineering	
& BIOL 486	and Molecular Biology and Biotechnology Laboratory	
BIOL 405	Microbial Genetics	
BIOL 406	Microbial Physiology and Metabolism	
BIOL 407	Microbial Diversity	
BIOL 430	Advanced Human Anatomy and Physiology I	
BIOL 431	Advanced Human Anatomy and Physiology II	
BIOL 437	Orinthology	
BIOL 438	Mammalogy	
BIOL 439	Herpetology	
BIOL 452	Immunology	
& BIOL 453	and Immunology Laboratory	
BIOL 454	Marine Mammal Biology and Conservation	
& BIOL 455	and Marine Mammal Biology and Conservation Field Course	
BIOL 465	Histology	
BIOL 468	Vertebrate Natural History	
BIOL 472	Introductory Animal Behavior	
& BIOL 473	and Introductory Laboratory in Animal Behavior	

Code	Title	Credits
BIOL 484	Eukaryotic Cell Biology	
& BIOL 485	and Eukaryotic Cell Biology Laboratory	
BIOL 509	DNA Analysis of Biological Evidence	
& BIOL 510	and Forensic DNA Analysis Laboratory	
BIOL 543	Tropical Ecosystems	
or BIOL 305	Biology of Microorganisms	
& BIOL 306	and Biology of Microorganisms Laboratory	
Additional Science Courses		
Select one from the following options: [1]		3-8
Option A:		
CHEM 314	Organic Chemistry II	
CHEM 318	Organic Chemistry Lab II	
Option B:		
One 3 credit chemistry course at the 300 or 400-level [2]		
Option C:		
GEOL 101	Introductory Geology I (Mason Core)	
GEOL 102	Introductory Geology II (Mason Core)	
Total Credits		26-33

1Students are encouraged to consult with a biology advisor to determine which option (A, B, or C) best meets their career goals.

2 CHEM 314 Organic Chemistry II does not fulfill this requirement.

Concentration in Biopsychology (BP)

The biopsychology concentration consists of a selection of courses designed to address the needs and interest of students who wish to study biology in more depth while simultaneously exploring psychology and neurobiology. This concentration will help prepare students for the MCAT section related to psychology and provide veterinary students with a background in animal learning/behavior.

Course List

Code	Title	Credits
Biopsychology Courses		
BIOL 430	Advanced Human Anatomy and Physiology I	4
BIOL 431	Advanced Human Anatomy and Physiology II	4
PSYC 372	Biopsychology	3
PSYC 373	Biopsychology Laboratory	1
Additional Psychology/Neuroscience Course		
Select 3-4 credits from the following:		3-4
PSYC 304	Principles of Learning	
PSYC 376	Brain and Behavior	
PSYC 406	Psychology of Communication (Mason Core)	

Code	Title	Credits
NEUR 327	Cellular, Neurophysiological, and Pharmacological Neuroscience	
NEUR 335	Molecular, Developmental, and Systems Neuroscience	
Additional Biology Courses		
~~Select 6-7 credits from the following:~~		~~6-7~~
Select 7-8 credits from the following:		**7-8**
BIOL 305	Biology of Microorganisms	
BIOL 306	Biology of Microorganisms Laboratory	
BIOL 314	Introduction to Research Design and Analysis	
BIOL 322	Developmental Biology	
BIOL 323	Lab for Developmental Biology	
BIOL 437	Orinthology	
BIOL 438	Mammalogy	
BIOL 472	Introductory Animal Behavior	
BIOL 473	Introductory Laboratory in Animal Behavior	
BIOL 483	General Biochemistry	
Additional Chemistry Courses		
Select one from the following options: [1]		3-5
Option A:		
CHEM 314	Organic Chemistry II	
& CHEM 318	and Organic Chemistry Lab II	
Option B:		
One chemistry course at the 300 or 400-level [2]		
Total Credits		25-29

[1]Students are encouraged to consult with a biology faculty advisor to determine which option best meets their career goals.

[2]CHEM 314 Organic Chemistry II alone does not fulfill this requirement.

Concentration in Biotechnology and Molecular Biology (BTMB)

The biotechnology and molecular biology concentration consists of a selection of courses that provide essential skills to students who seek employment in the field or wish to include an applied component in their undergraduate training in biology.

Course List

Code	Title	Credits
Biotechnology Courses		
BIOL 305	Biology of Microorganisms	3
BIOL 306	Biology of Microorganisms Laboratory	1
BIOL 385	Biotechnology and Genetic Engineering	3
BIOL 483	General Biochemistry	4
Additional Biology Courses		

Code	Title	Credits
~~Select 11 credits from the following, at least one of the courses must include a laboratory:~~		~~11~~
Select 12 credits from the following, at least one of the courses must include a laboratory:		**12**
Laboratory Courses:		
BIOL 402	Applied and Industrial Microbiology	
& BIOL 403	and Techniques in Applied and Industrial Microbiology	
BIOL 405	Microbial Genetics	
BIOL 406	Microbial Physiology and Metabolism	
BIOL 452	Immunology	
& BIOL 453	and Immunology Laboratory	
BIOL 465	**Histology**	
BIOL 486	Molecular Biology and Biotechnology Laboratory	
Non-laboratory Courses:		
BIOL 314	Introduction to Research Design and Analysis	
BIOL 382	Introduction to Virology	
BIOL 401	**Phage Discovery**	
BIOL 411	Advanced General Genetics	
BIOL 412	**Phage Genomics**	
BIOL 417	Selected Topics in Molecular and Cellular Biology [1]	
BIOL 418	Current Topics in Microbiology [1]	
BIOL 420	Vaccines	
BIOL 421	Genetics of Human Diseases	
BIOL 422	Stem Cell Biology and Regenerative Medicine	
BIOL 482	Introduction to Molecular Genetics	
BIOL 484	Eukaryotic Cell Biology	
BIOL 497	Special Problems in Biology [1]	
Additional Chemistry Courses		
CHEM 314	Organic Chemistry II	3
CHEM 318	Organic Chemistry Lab II	2
Total Credits		28

[1]Registration for BIOL 417 Selected Topics in Molecular and Cellular Biology, BIOL 418 Current Topics in Microbiology, or BIOL 497 Special Problems in Biology is subject to approval by the Director of Undergraduate Studies and the Chairman of the Department of Biology.

Concentration in Environmental and Conservation Biology (ESCB)

This concentration is offered to students seeking a biology degree that focuses on ecology and organismal biology and prepares them for graduate work or employment in environmental and conservation fields, such as natural resources management, fisheries, forestry, water quality management, aquatic and wetland ecology, and conservation biology. The concentration is staffed and supported by the Department of Environmental Science and Policy.

Course List

Code	Title	Credits
Environmental and Conservation Biology		
BIOL 318	Conservation Biology	3
BIOL 377	Applied Ecology	3
Biology Electives		
~~Select 16 credits from the following: 1~~		~~16~~
Select 17 credits from the following: 1		**17**
BIOL 309	Introduction to Oceanography	
BIOL 314	Introduction to Research Design and Analysis	
BIOL 326	Animal Physiology	
BIOL 331	Invertebrate Zoology	
BIOL 332	Insect Biology	
BIOL 344	Plant Diversity and Evolution	
BIOL 345	Plant Ecology	
BIOL 350	Freshwater Ecosystems	
BIOL 355	Ecological Engineering and Ecosystem Restoration	
BIOL 378	**Applied Ecology Laboratory**	
BIOL 379	RS: Ecological Sustainability (Mason Core)	
BIOL 437	**Orinthology**	
BIOL 438	**Mammalogy**	
BIOL 439	**Herpetology**	
BIOL 440	Field Biology	
BIOL 446	Ecological and Evolutionary Physiology	
BIOL 449	Marine Ecology	
BIOL 450	Marine Conservation	
BIOL 454	Marine Mammal Biology and Conservation	
BIOL 455	Marine Mammal Biology and Conservation Field Course	
BIOL 457	Reproductive Strategies	
BIOL 459	Fungi and Ecosystems	
BIOL 468	Vertebrate Natural History	
BIOL 472	Introductory Animal Behavior	
& BIOL 473	and Introductory Laboratory in Animal Behavior	
BIOL 480	The Diversity of Fishes	
BIOL 497	**Special Problems in Biology 4**	
Additional Science Courses		
Select one from the following options: 2		3-8
Option A:		
CHEM 314	Organic Chemistry II	
& CHEM 318	and Organic Chemistry Lab II	

Code	Title	Credits
Option B:		
One chemistry course at the 300 or 400-level [3]		
Option C:		
GEOL 101	Introductory Geology I (Mason Core)	
& GEOL 102	and Introductory Geology II (Mason Core)	
Total Credits		26-31

[1]Of which, two courses must be selected from the list above and must have either: 2 laboratory courses or 1 laboratory course and 1 field course (consult with an advisor for guidance).

[2]Students are encouraged to consult with a biology faculty advisor to determine which option best meets their career goals.

[3]CHEM 314 Organic Chemistry II alone does not fulfill this requirement.

[4]Registration in BIOL 497 Special Problems in Biology is subject to approval by the Director of Undergraduate Studies and the Chairman of the Department of Biology.

Concentration in Microbiology (MIB)

This concentration offers lecture and laboratory courses in microbiology to prepare students for employment or advanced study in microbial genetics, physiology, diversity, and related fields.

Course List

Code	Title	Credits
Microbiology Courses		
BIOL 305	Biology of Microorganisms	3
BIOL 306	Biology of Microorganisms Laboratory	1
BIOL 405	Microbial Genetics	4
BIOL 407	Microbial Diversity	4
Biology Electives		
~~Select 10 credits from the following:~~		~~10~~
Select 11 credits from the following:		**11**
BIOL 314	Introduction to Research Design and Analysis	
BIOL 382	Introduction to Virology	
BIOL 385	Biotechnology and Genetic Engineering	
BIOL 401	**Phage Discovery**	
BIOL 402	Applied and Industrial Microbiology	
BIOL 403	Techniques in Applied and Industrial Microbiology	
BIOL 404	Medical Microbiology	
BIOL 412	**Phage Genomics**	
BIOL 418	Current Topics in Microbiology	
BIOL 420	Vaccines	
BIOL 452	Immunology	
BIOL 453	Immunology Laboratory	

Code	Title	Credits
BIOL 459	Fungi and Ecosystems	
BIOL 483	General Biochemistry	
Additional Chemistry Courses		
CHEM 314	Organic Chemistry II	3
CHEM 318	Organic Chemistry Lab II	2
Total Credits		28

Retroactive Requirements Updates:

Plan of Study:

Honors Information:

Honors in the Major

Admissions

Minimum requirements for invitation:

- GPA in biology courses must be 3.33 or better
- GPA in supporting requirements (math and other science) must be 3.00 or better
- Grade of 'B' or better in BIOL 213 Cell Structure and Function (Mason Core)

Students should apply for admission to the Honors Program during their first or second year at the university. Contact the Department of Biology for information on applying.

Retention Requirements

Students in honors biology must maintain a biology GPA of 3.33 or better and a supporting GPA of 3.00 or better from the time they have accumulated 30 hours and thereafter. Students who fall below this standard will be given a one semester probationary period in which to bring their GPA back up to the minimum standard.

Requirements to Graduate with Biology Honors

Students are required to take 6 to 8 credits in honors courses in BIOL including three semesters of BIOL 494 Honors Seminar in Biology or two semesters of BIOL 494 Honors Seminar in Biology and one semester of BIOL 493 Honors Research in Biology. BIOL 498 Research Seminar may count towards one of the semester requirements of BIOL 494 Honors Seminar in Biology. The GPA requirements are as follows:

- Minimum 3.33 GPA in honors biology courses
- Minimum 3.33 GPA in biology requirements
- Minimum 3.00 GPA in supporting requirements
- Minimum 3.00 GPA overall

Additional Program Information

This information is required by the Office of Accreditation and Program Integrity.

Courses offered via distance (if applicable):

What is the primary delivery format for the program?

Face-to-Face Only

Does any portion of this program occur off-campus?

No

Are you working with a vendor / other collaborators to offer your program?

No

Related Departments

Could this program prepare students for any type of professional licensure, in Virginia or elsewhere?

No

Are you adding or removing a licensure component?

No

Additional SCHEV & SACSCOC Information

Are you changing the total number of credits required for this program?

Are you changing the delivery format in any way (e.g adding an online option)?

Are you adding/removing a licensure option which was approved by SCHEV?

Will any portion of this program be offered at an off-campus location?

Are you adding significant new content areas to the program?

Will this program change affect any specialized accreditation?

Green Leaf Program Designation

Is this a Green Leaf program? No

Does this program cover material which crosses into another department?

No

Additional Attachments

SCHEV Proposal

Executive Summary

Reviewer Comments

Additional Comments

Is this course required of all students in this degree program?

%wi_required.eschtml%