

MICROBIOLOGY MAJOR INFORMATION

Department of Microbiology
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Required Prerequisites* to the Major

Credits from these courses do not count toward the 30 hours required to complete the Major; however, some are prerequisites for required major courses. All Prerequisites must be completed prior to graduation.

Biology 1113, 1114	8 hr.
Mathematics 1156 or 1151 and one of the following: Mathematics 1152 or 1157, or Statistics 1450, 2450 or 2480	8-10 hr.
Chemistry 1210, 1220	10 hr.
Chemistry 2510, 2520, 2540	10 hr.
Physics 1200 and 1201 or 1250 and 1251	10 hr.

*Honors courses can substitute where available.

Additional organic chemistry courses may be required or suggested for pre-professional students.

Microbiology Major Courses—General Information

The Microbiology Major consists of a minimum of 30 semester hours. Required Core courses make up 21 of these 30 hours. All students must complete the six Core Courses and nine (9) hours of elective courses (outlined below).

The elective courses are divided into two groups: Group 1 and Group 2. Students must take at least three (3) hours of Group 1 courses and may take all nine (9) elective hours from Group 1. Students are not required to take any Group 2 courses but may have up to six (6) hours from this group count as elective hours. Students are encouraged to discuss with their microbiology major advisor any courses that are not listed in Group 2 that would be suitable to include in the Microbiology Major.

A total of three (3) semester hours graded S/U may be counted toward the Microbiology Major. These are usually earned through Individual Study, Undergraduate Research or Honors Research (Microbiology 4193, 4998, 4998H, 4999 or 4999H). Individual Study courses may be arranged by contacting any faculty member in the department. You may also discuss your research options with the Coordinator of Undergraduate Research.

Students must receive a C- or better in Microbiology courses to use them as prerequisites for other courses. Students must earn a grade of C- or higher for a course to transfer to Ohio State. The only exception to this is courses transferred from a public institution in Ohio since 2006. In these cases, credit for courses with grades of D and D+ will transfer to Ohio State. This rule cannot be appealed.

**Microbiology Major Required Core Courses
21 Hours**

Department #	Credit Hours	Course Title (Semester taught)	Prerequisites*
Biochemistry 4511	4	Introduction to Biological Chemistry (Au, Sp, Su)	Chemistry 2310 or 2510 and one semester of Biological Sciences, or permission of instructor
Microbiology 4100	5	General Microbiology (Au, Sp)	Biology 1114**, Chemistry 2510 or concurrent
Microbiology 4110	3	Pathogenesis and Immunobiology (Sp)	Microbiology 4100 (C- or better)
Microbiology 4120	3	Microbial Physiology and Diversity (Au)	Microbiology 4100 (C- or better), Biochem 4511 or concurrently.
Microbiology 4130	3	Microbial Genetics (Au, Sp)	Microbiology 4100 (C- or better) or Molecular Genetics 4500 or 4606
Microbiology 4140	3	Molecular Microbiology Laboratory (Au, Sp)	Microbiology 4100 (C- or better), Microbiology 4130 or concurrently, or permission of instructor

*or honors equivalent

**Effective Autumn 2015

**Microbiology Major Courses
ELECTIVE COURSES, GROUP 1:
Take 3-9 hr. from this group**

Micro. Course No.	Credit Hours	Course Title (Semester taught)	Prerequisites
3704	3	HIV: From Microbiology to Macrohistory (Sp)	English 1110.xx, or permission of instructor. Not open to students with credit for History 3704
4193	1-3 <i>Graded S/U</i>	Individual Studies (Au, Sp, Su)	Permission of instructor. Maximum of 3 credit hours can be counted toward the Major
4591S	1 <i>Graded S/U</i>	DNA Fingerprinting; Service learning course (Sp)	Students present workshops at Columbus Public High Schools.
5122	2	Immunobiology (Au)	C- or better in either Microbiology 4000 or 4100
5129	3	Cellular and Molecular Biology of Pathogenic Eukaryotes (Sp)	Microbiology 4100 or permission of instructor
5147	3	Eukaryotic Pathogens (Au)	Microbiology 4100 (C- or better)
5149	3	Introductory Virology (Sp)	Microbiology 4100 (C- or better)
5150	3	Microbial Ecology (TBD)	C- or better in Microbiology 4000 or equivalent
5155	3	Environmental Microbiology (Au)	C- or better in Microbiology 4000 or equivalent
5160	3	Geomicrobiology (Sp)	Sr or Grad standing in School of Earth Sciences, Department of Microbiology, Department of Civil, Environmental, and Geodetic Engineering, or School of Environment and Natural Resources.

5161H	3	Bioinformatics and Molecular Microbiology (TBD)	Microbiology 4130 or Molecular Genetics 4500; Biochemistry 4511; or permission of instructor
5169	3	Microbial Evolution (Au)	6 semester hours of biological sciences course work
5169H	3	Microbial Evolution (TBD)	6 semester hours of biological sciences course work
5194	3	Microbial Natural Products: Discovery, Biosynthesis, and Antibiotic Activity (Sp)	C- or better in Microbiology 4120; or C- or better in Biochemistry 5614; or Graduate student standing (with equivalent background); or consent of the instructor.
5536	3	Food Microbiology Lecture (Au)	C- or better in either Microbiology 4000 or 4100
5546	3	Food Microbiology Laboratory (Sp)	Microbiology 5536
5800	2	Organelle Biology (Au)	Molecular Genetics 4500 or permission of instructor
Undergraduate Research			
4998/4998H 4999/4999H	1-5 <i>Graded S/U</i>	Undergraduate Research in Microbiology (Au, Sp, Su) Undergraduate Research in Microbiology—Thesis (Au, Sp, Su)	Permission of instructor. Maximum of 3 credit hours for any combination of these courses can be counted toward the Major. Completion of thesis requires a minimum of 4 cumulative credit hours and final thesis examination. Check with your advisor for details.

Students must meet with an advisor to have coursework pre-approved for Study at a Foreign Institution or a Domestic Study Tour. Credit (S/U) may be applicable to the Microbiology Major.

**Microbiology Major Courses
ELECTIVE COURSES, GROUP 2:
Take 0-6 hr. from this group**

Department	Credit Hours	Course Title (Semester taught)	Prerequisites
Microbiology 2200	1	Genome Biology (Sp)	Biology 1113
Microbiology 3300	2	The Biology of Pollution (TBD)	4 credit hours of biology
Microbiology 3798.05	4	HIV in Context: East Africa (Su)	English 1110.xx, or permission of instructor. Not open to students with credit for History 3798.05.
Biochemistry 5621	4	Introduction to Biological Chemistry Laboratory (Au, Sp)	Biochemistry 4511 or 5613 or equivalent
CBE 5765	3	Principles of Biochemical Engineering (Sp)	CBE 2523 or 3610, or Graduate standing or permission of instructor.
ENVENG 5120	3	Bioremediation of Groundwater and Soil (Sp 2015, 2017)	EnvEng 5110 and a class in Microbiology; Graduate Standing or permission of instructor.
ENR 5263	3	Biology of Soil Ecosystems (Sp)	ENR 3000 or Grad Standing
ENR 5266	3	Field Soil Investigation: Soil Chemistry, Fertility and Biology (Su)	Not open to students with credit for 740
Molecular Genetics 4500	3	General Genetics (Au, Sp, Su)	Biology 1101, 113, or 1113H, and 3 additional semester credit hours in Biological Sciences
Molecular Genetics 4501	1	General Genetics Laboratory (Au)	Molecular Genetics 4500 or permission of instructor
Molecular Genetics 4606	4	Molecular Genetics (Au, Sp)	Biology 1113, 1113H, 1114, 1114H, or Chem 1220 or equiv.
Plant Pathology 5010	2	Phylobacteriology (Sp)	Plant Pathology 3002 or Microbiology 4100, or permission of instructor
Plant Pathology 5020	2	Introduction to Plant Virology (Sp)	Plant Pathology 3001, Biochemistry 4511, or Microbiology 4000 or permission of instructor
Plant Pathology 5040	3	Science of Fungi: Mycology (Au)	Biology 1114 or Plant Pathology 3001

Sample Curriculum for a Microbiology B.S.

Sample 1							
Year	Autumn	Credit Hrs	Comment*	Spring	Credit Hrs	Comment	Year Total
1	Gen Chem 1210	5	GE-Nat Sci/Micro-PreRec	Gen Chem 1220	5	GE-Nat Sci/Micro-PreRec	
	Math 1151 or 1156	5	GE-Math/Micro-PreRec	Math 1152 (2) or Math 1157 (3) or Stats 1450(3) or Stats 2450 (3) or Stats 2480 (3)	3 - 5	Micro-PreRec	
	Bio 1113	4	GE-Nat Sci/Micro-PreRec	Bio 1114	4	GE-Open Opt/Micro-PreRec	
	Freshman Survey	1	GE	GE Comp I	3	GE	
	Semester Sum	15		Semester Sum	15-17		30 - 32
Year	Autumn	Credit Hrs	Comment*	Spring	Credit Hrs	Comment	Year Total
2	Org Chem 2510	4	Micro-PreRec	Org Chem 2520	4	Micro-PreRec	
	Physics 1200	5	GE-Open Opt/Micro-PreRec	Org Chem Lab 2540	2	Micro-PreRec	
	GE: F.L. 1	4	GE	Physics 1201	5	Micro-PreRec	
	GE: Comp II	3	GE	GE: F.L. 2	4	GE	
	Semester Sum	16		Semester Sum	15		31
Year	Autumn	Credit Hrs	Comment*	Spring	Credit Hrs	Comment	Year Total
3	Micro 4100	5	Micro-Core	Micro 4110	3	Micro-Core	
	BioChem 4511	4	Micro-Core	Micro 4130	3	Micro-Core	
	GE: F.L. 3	4	GE	#Micro Elective 1	3	Micro-Required	
	GE: Soc. Sci. I	3	GE	GE: Soc. Sci. 2	3	GE	
				GE: Literature	3	GE	
	Semester Sum	16		Semester Sum	15		31
Year	Autumn	Credit Hrs	Comment*	Spring	Credit Hrs	Comment	Year Total
4	Micro 4120	3	Micro-Core	Micro 4140	3	Micro-Core	
	Micro Elective 2	3	Micro-Required	Micro Elective 3	3	Micro-Required	
	GE: Visual Art	3	GE	GE: Cult. & Ideas	3	GE	
	GE: Historical Study	3	GE	Electives	4 - 6	Free elective	
	Electives	2	Free elective				
	Semester Sum	14		Semester Sum	13-15		27 - 29
						Total Hrs.	121

* Placement of specific GE courses will vary depending on the student's individual requirements and preferences. Where available, honors courses can substitute
Micro electives include 3-9 hours from Group 1 and 00-6 hours from Group 2 courses. Up to 3 hrs of S/U graded courses, including independent research (Micro 4998), can be counted toward the elective requirement.

Sample 2							
Year	Autumn	Credit Hrs	Comment*	Spring	Credit Hrs	Comment	Year Total
1	Gen Chem 1210	5	GE-Nat Sci/Micro-PreRec	Gen Chem 1220	5	GE-Nat Sci/Micro-PreRec	
	Math 1151 or 1156	5	GE-Math/Micro-PreRec	Bio 1113	4	GE-Nat Sci/Micro-PreRec	
	*GE: F.L. 1	4	GE	GE: F.L. 2	4	GE	
	Arts Sci 1100.07	1	GE	GE: Comp 1	3	GE	
	Semester Sum	15		Semester Sum	16		31
Year	Autumn	Credit Hrs	Comment*	Spring	Credit Hrs	Comment	Year Total
2	Org Chem 2510	4	Micro-PreRec	Org Chem 2520	4	Micro-PreRec	
	Bio 1114	4	GE-Open Opt/Micro-PreRec	Org Chem Lab 2540	2	Micro-PreRec	
	GE: F.L. 3	4	GE	Micro 4100	5	Micro-Core	
	Math 1152 (2) or Math 1157 (3) or Stats 1450(3) or Stats 2450 (3) or Stats 2480 (3)	3 - 5	Micro-PreRec	GE: Comp 2	3	GE	
	Semester Sum	15-17		Semester Sum	14		29 - 31
Year	Autumn	Credit Hrs	Comment*	Spring	Credit Hrs	Comment	Year Total
3	Physics 1200	5	GE-Open Opt/Micro-PreRec	Physics 1201	5	Micro-PreRec	
	BioChem 4511	4	Micro-Core	Micro 4110	3	Micro-Core	
	GE: Soc. Sci 1	3	GE	Micro 4130	3	Micro-Core	
	GE: Literature	3	GE	GE: Soc. Sci 2	3	GE	
	Semester Sum	15		Semester Sum	15		30
Year	Autumn	Credit Hrs	Comment*	Spring	Credit Hrs	Comment	Year Total
4	Micro 4120	3	Micro-Core	Micro 4140	3	Micro-Core	
	#Micro Elective 1	3	Micro-Required	Micro Elective 3	3	Micro-Required	
	Micro Elective 2	3	Micro-Required	GE: Cult & Ideas	3	GE	
	GE: Visual Art	3	GE	Electives	5 - 7	Free elective	
	GE: Historical Study	3	GE				
	Semester Sum	15		Semester Sum	14-16		29 - 31
						Total Hrs.	121

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Sample 3

Year	Autumn	Credit Hrs	Comment*	Spring	Credit Hrs	Comment	Year Total
1	Math 1148	4	GE-Math	Math 1149	3	GE-Math	
	GE: Cult. & Ideas	3	GE	Gen Chem 1210	5	GE: Nat. Sci/Micro-PreRec	
	GE: Soc. Sci. 1	3	GE	Bio 1113	4	GE-Nat Sci/Micro-PreRec	
	GE: Visual Art	3	GE	GE: Comp I	3	GE	
	ArtsSci 1100.07	1	GE				
	Semester Sum	14		Semester Sum	15		29
2	Gen Chem 1220	5	GE-Nat Sci/Micro-PreRec	Org Chem 2510	4	Micro-PreRec	
	Bio 1114	4	GE-Open Opt/Micro-PreRec	Org Chem Lab 2540	2	Micro-PreRec	
	GE: Comp II	3	GE	GE: F.L. 1	4	GE	
	Math 1151 or 1156	5	GE-Math/Micro-PreRec	Math 1152 (2) or Math 1157 (3) or Stats 1450(3) or Stats 2450 (3) or Stats 2480 (3)	3 - 5	Micro-PreRec	
		Semester Sum	17		Semester Sum	13-15	
3	GE: F.L. 2	4	GE	GE: F.L. 3	4	GE	
	Org Chem 2520	4	Micro-PreRec	Micro 4110	3	Micro-Core	
	Micro 4100	5	Micro-Core	Micro 4130	3	Micro-Core	
	GE: Historical Study	3	GE	BioChem 4511	4	Micro-Core	
		Semester Sum	16		Semester Sum	14	
4	Micro 4120	3	Micro-Core	Micro 4140	3	Micro-Core	
	#Micro Elective 1	3	Micro-Required	Micro Elective 3	3	Micro-Required	
	Micro Elective 2	3	Micro-Required	Physics 1201	5	Micro-PreRec	
	Physics 1200	5	GE-Open Opt/Micro-PreRec	GE: Literature	3	GE	
				Electives	1-3	Free Electives	
	Semester Sum	15		Semester Sum	15-17		30-32
						Total Hrs.	121

* Placement of specific GE courses will vary depending on the student's individual requirements and preferences. Where available, honors courses can substitute

Micro electives include 3-9 hours from Group 1 and 00-6 hours from Group 2 courses. Up to 3 hrs of S/U graded courses, including independent research (Micro 4998), can be counted toward the elective requirement.

Microbiology Faculty (<https://microbiology.osu.edu/directory>)

Name	Scientific Focus	@osu.edu
Stephen Abedon	Bacteriophage ecology; phage therapy (OSU-Mansfield)	abedon.1
Brian Ahmer	Detection of microbes and host environment by Salmonella	ahmer.1
Birgit Alber	Biochemistry of central carbon metabolism	alber.8
Juan Alfonzo	tRNA in mitochondrial bio-genesis and disease	alfonzo.1
Amal Amer	Innate immunity against Legionella and Burkholderia	amer.13
Matthew Anderson	Phenotypic consequences of genomic variation	anderson.3196
Irina Artsimovitch	Regulation of transcription	artsimovitch.1
Charles Bell	Molecular and cellular biochemistry	bell.489
Tammy Bullwinkle	tRNA biology	bullwinkle.1
Ross Dalbey	Membrane protein assembly; proteases; biophysics	dalbey.1
Charles Daniels	Molecular biology of the archaea; archaeal SNO-RNAs	daniels.7
Rajendar Deora	Molecular determinants of pathogenesis and biofilm development	deora.6
Kurt Fredrick	Mechanistic studies of protein biosynthesis	fredrick.5
Venkat Gopalan	Protein-aided RNA catalysis	gopalan.5
John Gunn	Salmonella and Francisella host-pathogen interactions	gunn.43
Patrice Hamel	Mitochondria and chloroplast membrane biogenesis	hamel.16
Tina Henkin	Transcription termination control in Gram positive bacteria; RNA structure/function	henkin.3
Mette Ibba	General microbiology	ibba.2
Michael Ibba	Translation of the genetic code; tRNA biology	ibba.1
Kou-San Ju	Natural products; microbial metabolism; biocatalysis	ju.109
Pravin Kaumaya	Peptide and protein design and folding; antigenic determinants	kaumaya.1
Joseph Krzycki	Biochemistry and molecular biology of methanogenic archaea	krzycki.1
Jesse Kwiek	HIV pathogenesis and public health	kwiek.2
Thomas Magliery	Combination and statistical approaches to protein stability	magliery.1
Madhura Pradhan	Microbial pathogenesis and immunology	pradhan.2
Chad Rappleye	Molecular mechanisms of fungal virulence	rappleye.1
John Reeve (<i>Emeritus</i>)	Molecular biology of archaea; molecular adaptations to extreme environments	reeve.2
Virginia Rich	Global change microbiology; microbial meta-omics; Genes-to-Ecosystems inquiry	rich.270
Yasuko Rikihisa	Obligatory intracellular bacteria; Anaplasma, Ehrlichia, and Neorickettsia	rikihisa.1
Natividad Ruiz	Envelope biogenesis in Gram-negative bacteria	ruiz.82
Zakee Sabree	Insect microbe interactions; nutrient cycling; microbial evolution and ecology	sabree.8
Abhay Satoskar	Immune mechanisms	satoskar.2
Stephanie Seveau	Bacterial toxins and infectious diseases	seveau.1
Paul Stoodley	Biofilm development and dynamics	stoodley.4
Matthew Sullivan	Phage ecology, evolution, host interaction, and discovery through (meta)genomics	sullivan.948
Robert Tabita	Microbial physiology; carbon sequestration; bioenergy/biofuel production	tabita.1
Olli Tuovinen (<i>Emeritus</i>)	Environmental and industrial microbiology	tuovinen.1
Hua Wang	Biofilm formation involving food-borne pathogens	wang.707
Michael Wilkins	Interactions between microorganisms and their environment	wilkins.231
Marshall Williams	Deoxyuridine metabolism in eukaryotic systems; DNA repair and replication	williams.70
David Wood	Applied protein engineering for biotechnology development	wood.750
Daniel Wozniak	Bacterial pathogenesis; gene regulation	wozniak.1
Kelly Wrighton	Mechanistic understanding of carbon emissions in wetlands	wrighton.1
Li Wu	HIV host interaction, replication, and pathogenesis	wu.840
Jacob Yount	Post-translational modifications; protein fatty-acylation; innate immunity to viruses	yount.37
Ahmed Yousef	Microbial safety of food; foodborne pathogens; preservation technologies	yousef.1
Shan-Lu Liu	Host restriction to viral infection; innate immunity to viruses; viral oncogenesis	liu.6244