B.S. IN MICROBIOLOGY AND IMMUNOLOGY

http://www.as.miami.edu/mic/

Overview

The University of Miami is one of only four institutions in the United States that offers a four-year combined undergraduate program in Microbiology and Immunology. You will study, a) microorganisms (which can be good and bad for your health, found in food, and in our environments) and b) how your body's immune defense system defeats and controls harmful microorganisms. Our major provides you with courses of general interest as well as a solid preparation for future scientists or medical professionals. To apply this knowledge to health policy, we partnered with the School of Nursing Public Health program to offer an optional dual degree and double major track opportunity for our students.

Microorganisms: You will learn about bacteria that cause serious infections including the plague, meningitis, and tuberculosis; not so serious infections like staphylococci causing a boil; and those that inhabit your bodies in symbiotic relationships (your microbiome). Regarding viruses, you will learn about emerging viruses like SARS-CoV-2 (causative agent of COVID-19) and Zika, endemic and pandemic viruses like the flu, and those causing chronic infections like HIV/AIDS. Parasites such as those cause malaria and fungi round out the breadth and depth of our offered coursework.

Immune system: You will study its mechanisms to avoid microbial infections in the first place; how it will cause the body's resistance to them either by natural infection or vaccination; how pathogens like HIV and tumors are able to overcome the multiple barriers of the immune system to cause AIDS and cancer, and their up-to-date virological and, respectively, immunological therapies. Finally, you will understand how a mistuned immune system can cause allergies such as asthma or autoimmune diseases such as type I diabetes.

Our program provides you with:

- a broad knowledge base
- laboratory experiences and the opportunity to conduct research in one of our laboratories at the Miller School of Medicine
- the ability to attend a broad spectrum of seminars offered through our home department at the Miller School of Medicine
- opportunities to communicate and write in a scientific manner
- exposure to critical thinking within our field

Students that have finished our program have gone on to careers at other prestigious institutions which include research, medicine, dentistry, physician assistant, pharmacy, optometry, epidemiology, law and many more.

Curriculum Requirements

Code	Title	Credit Hours
Required MIC Courses		
Take the following: [1]		
MIC 301	Introduction to Microbes and the Immune System [4]	3
MIC 304	Introduction to Microbes and the Immune System (Lab) [4,7]	3
Select one of the following: [1]		3
MIC 319	Innate Immunity [2]	
MIC 321	Immunobiology [3]	
Select one of the following: [1]		3
MIC 201	Modern Plagues and Society [2]	
MIC 322	Medical Parasitology [3]	
MIC 323	Microbial Pathogenesis and Physiology [2]	
MIC 436	Fundamental and Medical Virology [3]	
Elective MIC Courses		**15**
MIC 201	Modern Plagues and Society [2]	
MIC 319	Innate Immunity [2]	
MIC 321	Immunobiology [3]	
MIC 322	Medical Parasitology [3]	
MIC 323	Microbial Pathogenesis and Physiology [2]	
MIC 436	Fundamental and Medical Virology [3]	
MIC 460	Advanced Topics in Microbiology and Immunology [3]	
Research in MIC for Credit		

(only 6 credit hours may be applied to count toward the 15 MIC Elective hours, any credits over 6 count as elective credits toward the 120 credits required for graduation or 150 credits for dual degree seeking students)		
MIC 451	Special Projects in Immunobiology [4,5]	
MIC 452	Special Projects in Parasitology [4,5]	
MIC 453	Special Projects in Pathogenic Bacteriology [4,5]	
MIC 454	Special Projects in Microbial Genetics [4,5]	
MIC 455	Special Projects in Immunogenetics [4,5]	
MIC 456	Special Projects in Virology [4,5]	
Outside Electives that can be taken to count toward the 15 credit hours above (2 courses maximum)		
BPH 206	Introduction to Public Health (Required for students pursuing an additional major or degree in Public Health) [9]	
BPH 208	Introductory Epidemiology (Required for students pursuing an additional major or degree in Public Health) [9]	
BIL 255	Cellular and Molecular Biology	
or BIL 250	Genetics	
GSC 309	Microbes and the Environment Either course is a Requirement for MIC/MSC double majors	
or MBE 465	Marine Comparative Immunology	
Total MIC Credits for Major = 12 cr. Required MIC courses + 15 cr. Elective MIC courses = 27		
Required Natural Science Courses		
Chemistry Courses:		16
CHM 121 & CHM 113	Principles of Chemistry and Chemistry Laboratory I	
CHM 221 & CHM 205	Introduction to Structure and Dynamics and Chemical Dynamics Laboratory	
CHM 222 & CHM 206	Organic Reactions and Synthesis and Organic Reactions and Synthesis Laboratory	
Other Required Natural Science Courses:		
BIL 150 & BIL 151	General Biology and General Biology Laboratory	
BIL 160 & BIL 161	Evolution and Biodiversity and Evolution and Biodiversity Laboratory	
BMB 401	Biochemistry for the Biomedical Sciences	
Select one of the following Physics Options:		10
Option 1:		
PHY 101 & PHY 106	College Physics I and College Physics Laboratory I	
PHY 102 & PHY 108	College Physics II and College Physics Laboratory II	
Option 2:		
PHY 201 & PHY 106	University Physics I for the Sciences and College Physics Laboratory I	
PHY 202 & PHY 108	University Physics II for the Sciences and College Physics Laboratory II	
Select one of the following Calculus Options: [6]		8
Option 1:		
MTH 140 & MTH 141 & MTH 162	Calculus Concepts with Foundations A and Calculus Concepts with Foundations B and Calculus II	
Option 2:		
MTH 161 & MTH 162	Calculus I and Calculus II	
Option 3:		
MTH 171 & MTH 172	Calculus I and Calculus II	

Select one of the following Computer Science or Statistics courses:		3
BPH 202	Introductory Statistics in Health Care	
or BPH 465	Public Health Statistics and Data Management	
CSC 120	Computer Programming I	
CSC 210	Computing for Scientists	
MTH 224	Introduction to Probability and Statistics	
PSY 292	Introduction to Biobehavioral Statistics Section B	
SOC 211	Quantitative Methods for Sociologists	
General Education Requirements		
Written Communication Skills:		
WRS 105	First-Year Writing I	3
ENG 106	Writing About Literature and Culture	3
or WRS 106	First-Year Writing II	
or WRS 107	First-Year Writing II: STEM	
Quantitative Skills:		
MTH 140	Calculus Concepts with Foundations A fulfilled through the major	
or MTH 161	Calculus I	
or MTH 171	Calculus I	
Areas of Knowledge:		
Arts and Humanities Cognate		9
People and Society Cognate (BPH fulfills if Dual Degree or Dual Major)		9
STEM Cognate (9 credits) (fulfilled through the major)		
Additional Required Courses		
SOC 101 and PSY 110 are required for students that are Premed and/or are using to satisfy a cognate		
SOC 101	Introduction to Sociology	3
PSY 110	Introduction to Psychology	3
Language Courses		9
Electives		17
Total Credit Hours		**120**

1 Required of all Microbiology and Immunology majors.
2 MIC 201, MIC 319, MIC 323, GSC 309 Fall Semester only or by announcement
3 MIC 321, MIC 322, MIC 436, MIC 460 Spring Semester only or by announcement
4 MIC 301, MIC 304, Fall and Spring Semesters
5 MIC 451, MIC 452, MIC 453, MIC 454, MIC 455, MIC 456 all require that you have already completed MIC 304 and earned at least a B and have a 3.0 cumm GPA with permission of Program Director or Roger, Fall and Spring Semesters
6 Depends on Math placement from SAT/ACT or ALEKS score.
7 University writing credit course
8 CHM 121 requires as a prerequisite or co-requisite MTH 140
9 BPH 206 and BPH 208 can both count toward MIC, if you are pursuing an additional major or degree in MIC. BPH minors, may only use BPH 206 or 208 toward the MIC major elective credits.
* All MIC majors are required to have a minor (science or non-science). Students will receive a CHM minor provided that they earn a C- or better in every course of the minor while in residence at UM. A total of 19 credits are required for the CHM minor. All students should declare their CHM minor when they begin our program in ASHE 200 by filling out a change of major form. On this form, you can declare also additional majors/minors as well as cognates.
** Transfer students seeking a Microbiology and Immunology major must earn at least 12 credit hours taken in residence in the UM Department of Microbiology and Immunology beyond MIC 301 in the courses listed above for majors.

Sample Plan of Study

This is a 4 year sample plan of study that assumes courses are taken during the fall and spring.

This is a guide and is not meant to take the place of the advice of your major advisor, you should consult with them before making any changes.

Freshman Year		
Fall		**Credit Hours**
MIC 304, 201, 301, or 319	Introduction to Microbes and the Immune System (Lab) or Modern Plagues and Society or Introduction to Microbes and the Immune System or Innate Immunity	3
BIL 150	General Biology	4
BIL 151	General Biology Laboratory	1
CHM 121	Principles of Chemistry	4
CHM 113	Chemistry Laboratory I	1
WRS 105	First-Year Writing I	3
PSY 110	Introduction to Psychology (People & Society Cognate)	3
	Credit Hours	**19**
Spring		
MIC 301	Introduction to Microbes and the Immune System	3
MIC 304	Introduction to Microbes and the Immune System (Lab)	2
BIL 160	Evolution and Biodiversity	4
BIL 161	Evolution and Biodiversity Laboratory	1
CHM 221	Introduction to Structure and Dynamics	4
CHM 205	Chemical Dynamics Laboratory	1
WRS 106, ENG 106, or WRS 107	First-Year Writing II or Writing About Literature and Culture or First-Year Writing II: STEM	3
	Credit Hours	**18**
Sophomore Year		
Fall		
MIC 319 or 201	Innate Immunity (and MIC 304 if MIC 303 taken prior) or Modern Plagues and Society	3
CHM 222	Organic Reactions and Synthesis	4
CHM 206	Organic Reactions and Synthesis Laboratory	2
MTH 161	Calculus I	4
Arts and Humanities Cognate Course		3
Foreign Language		3
	Credit Hours	**19**
Spring		
MIC 321	Immunobiology (or MIC 322 or MIC 436 or MIC 460)	3
BMB 401	Biochemistry for the Biomedical Sciences	4
MTH 162	Calculus II	4
BIL 255 or 250	Cellular and Molecular Biology (Optional elective in MIC) or Genetics	3
SOC 101	Introduction to Sociology (or Foreign Language)	3
Recommended MCAT, GRE, DAT or OAT...		
	Credit Hours	**17**
Junior Year		
Fall		
MIC 323	Microbial Pathogenesis and Physiology	3
GSC 309 or MBE 465	Microbes and the Environment (Optional elective credit in MIC) or Marine Comparative Immunology	3
PHY 101	College Physics I	4
PHY 106	College Physics Laboratory I	1
Foreign Language		3
	Credit Hours	**14**

Spring		
MIC 436	Fundamental and Medical Virology	3
People and Society Cognate		3
PHY 102	College Physics II	4
PHY 108	College Physics Laboratory II	1
Statistics or Computer Science Course		3-4
CSC 120	Computer Programming I	
CSC 210	Computing for Scientists	
MTH 224	Introduction to Probability and Statistics	
PSY 292	Introduction to Biobehavioral Statistics Section B	
SOC 211	Quantitative Methods for Sociologists	
Arts and Humanities Cognate Course		3
Possible MCAT, GRE, DAT or OAT...		
	Credit Hours	**17-18**
Senior Year		
Fall		
Choose one of the following:		2-6
MIC 451	Special Projects in Immunobiology	
MIC 452	Special Projects in Parasitology	
MIC 453	Special Projects in Pathogenic Bacteriology	
MIC 454	Special Projects in Microbial Genetics	
MIC 455	Special Projects in Immunogenetics	
MIC 456	Special Projects in Virology	
Applications to Medical or Graduate School		
CHM Elective for Minor		3
Elective		3
People and Society Cognate Course		3
	Credit Hours	**11-15**
Spring		
MIC 322	Medical Parasitology	3
Choose one of the following:		2-6
MIC 451	Special Projects in Immunobiology	
MIC 452	Special Projects in Parasitology	
MIC 453	Special Projects in Pathogenic Bacteriology	
MIC 454	Special Projects in Microbial Genetics	
MIC 455	Special Projects in Immunogenetics	
MIC 456	Special Projects in Virology	
Elective		3
Arts and Humanities Cognate Course		3
	Credit Hours	**11-15**
	Total Credit Hours	**126-135**

Mission

Our primary goal is to emphasize basic as well as medical-focused science and instill in our students the desire for lifelong learning. We are unique program in that we have a dual presence at the Miller School of Medicine as well as the Coral Gables Campuses. Research opportunities and laboratory engagement help create knowledge in our students while preparing them to become active members of the scientific and public communities.

Student Learning Outcomes

- Students will learn to write scientifically using the appropriate style, terminology and methodology pertaining to their major area of study.
- Students will demonstrate practical knowledge in microbiology and immunology.
- Students will be able to apply their knowledge in scientific manner to deduce outcomes.