

# MOLECULAR BIOTECHNOLOGY, BACHELOR OF SCIENCE (738)

## Program Coordinator

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Molecular biotechnology uses molecular and genetic tools to improve the human condition either directly through medical improvements or indirectly through improvements of the environment and agriculture. It does so through modification of nucleic acids and proteins.

The molecular biotechnology major allows students to be part of exciting new developments like genomics, personalized medicine, cloning, organoid research, stem cell research, and genome editing. The skills acquired may be applied to the development of new pharmaceutical drugs or other medical products, industrial chemicals, food products, energy sources, pollution-control products, or agricultural products. Employment can be found in both industry and academia. Industry jobs range from biotechnological product development and sales, to research and development. Graduates of this major will also have the broad science training in molecular tools that will enable them to pursue advanced degrees via medical or professional school, or graduate school.

## Program Requirements (55 hours)

A baccalaureate degree requires a minimum of 120 unduplicated semester hours. More information can be found at [www.wku.edu/registrar/degree\\_certification.php](http://www.wku.edu/registrar/degree_certification.php). ([https://www.wku.edu/registrar/degree\\_certification.php](https://www.wku.edu/registrar/degree_certification.php))

Students who began WKU in the Fall 2014 and thereafter should review the Colonnade requirements located at: <https://www.wku.edu/colonnade/colonnaderequirements.php>. (<https://www.wku.edu/colonnade/colonnaderequirements.php>)

This major requires a minimum of 55 hours of molecular biotechnology – related courses in biology that involve subjects such as genome discovery, molecular biology, microbiology, bioinformatics, and research experience or an internship, among others. At least 28 of these hours must be at the 300 or higher level. No minor is required.

Code	Title	Hours
<b>Core Courses</b>		
BIOL 120 & BIOL 121	Biological Concepts: Cells Metabolism and Genetics and Biological Concepts: Cells, Metabolism, and Genetics Lab	4
BIOL 122 & BIOL 123	Biological Concepts: Evolution, Diversity, and Ecology and Biological Concepts: Evolution, Diversity, and Ecology Lab	4
BIOL 212	Genome Discovery Exploration	2
BIOL 226 & BIOL 227	Microbial Biology and Diversity and Microbial Biology and Diversity Lab	4
BIOL 312	Bioinformatics	4

BIOL 319 & BIOL 322	Introduction to Molecular and Cell Biology and Introduction to Molecular and Cell Biology Laboratory	4
BIOL 327 & BIOL 337	Genetics and Genetics Laboratory	4
BIOL 350	Introduction to Recombinant Genetics	3
BIOL 369 or BIOL 399	Internship in Biology Research in the Biological Sciences	3
BIOL 382	Introductory Biostatistics	3
BIOL 388	Contemporary Issues in Biotechnology <sup>1</sup>	1
BIOL 411	Cell Biology	3
BIOL 446 & BIOL 447	Biochemistry I and Biochemistry Laboratory	5
BIOL 489	Professional Aspects of Biology	1
<b>Select 10 credit hours from the following electives:</b>		<b>10</b>
BIOL 222 & BIOL 223 or BIOL 224 & BIOL 225	Plant Biology and Diversity and Plant Biology and Diversity Lab Animal Biology and Diversity and Animal Biology and Diversity Lab	
BIOL 316	Evolution: Theory and Process	
BIOL 328	Immunology	
BIOL 330	Animal Physiology	
BIOL 331	Animal Physiology Laboratory	
BIOL 335	Neurobiology	
BIOL 403	Molecular Basis of Cancer	
BIOL 404	Techniques and Theory of Electron Microscopy	
BIOL 407	Virology	
BIOL 412	Cell Biology Laboratory	
BIOL 420	Introduction to Toxicology	
BIOL 440	Developmental Genetics	
BIOL 464	Endocrinology	
BIOL 467	Biochemistry II	
BIOL 470	Pathogenic Microbiology	
BIOL 490	Plants as Alternative Therapeutics	
BIOL 495	Molecular Genetics	
BIOL 496	Plant Biotechnology	
<b>Total Hours</b>		<b>55</b>

<sup>1</sup> Students must also take BIOL 388 every semester for a minimum of 5 at 0 credit hours before being able to take the course for 1 credit hour in their last semester.

Because an understanding of mathematics, chemistry, and physics is required for a full understanding of Molecular Biotechnology and because an understanding of workplace-related issues is important for a successful application of molecular biotechnology, students are required to complete the supporting courses:

Code	Title	Hours
<b>Required Supporting Courses</b>		
MATH 117	Trigonometry	3

or MATH 136	Calculus I	
CHEM 120 & CHEM 121	College Chemistry I and College Chemistry I Laboratory	5
CHEM 222 & CHEM 223	College Chemistry II and College Chemistry II Laboratory	5
CHEM 340 & CHEM 341	Organic Chemistry I and Organic Chemistry Laboratory I	5
PHYS 231 & PHYS 232	Introduction to Physics and Biophysics I and Laboratory for Physics and Biophysics I	4
PHYS 332 & PHYS 233	Introduction to Physics and Biophysics II and Laboratory for Physics and Biophysics II	4
MFGE 371 or MFGE 390 or MFGE 430	Quality Assurance Project Management Technology Management / Supervision / Team Building	3
<b>Total Hours</b>		<b>29</b>

## Finish in Four Plan

### First Year

Fall	Hours	Spring	Hours
BIOL 120 & BIOL 121		4 BIOL 122 & BIOL 123	4
MATH 116 (or higher)		3 MATH 117 (or higher)	3
ENG 100		3 BIOL 312	4
BIOL 212		2 CHEM 120 & CHEM 121	5
BIOL 388*		0 BIOL 388*	0
COMM 145		3	
		<b>15</b>	<b>16</b>

### Second Year

Fall	Hours	Spring	Hours
BIOL 226 & BIOL 227		4 BIOL 319 & BIOL 322	4
BIOL 327 & BIOL 337		4 BIOL 388*	0
BIOL 388*		0 BIOL 399 & BIOL 369**	2-6
CHEM 222 & CHEM 223		5 CHEM 340 & CHEM 341	5
Colonnade - Social & Behavioral Science		3 ENG 200	3
		HIST 101 or HIST 102	3
		<b>16</b>	<b>17-21</b>

### Third Year

Fall	Hours	Spring	Hours
BIOL 350		3 BIOL 382	3
BIOL 388*		0 BIOL 388*	0
BIOL 399 or BIOL 369		1 BIOL 399 or BIOL 369	1
CHEM 342 & CHEM 343		5 BIOL 446 & BIOL 447	5
PHYS 231 & PHYS 232		4 PHYS 332 & PHYS 233	4
Colonnade - Arts & Humanities		3 Colonnade - Writing in the Disciplines	3
		<b>16</b>	<b>16</b>

### Fourth Year

Fall	Hours	Spring	Hours
BIOL 388*		0 BIOL 388	1
BIOL TECH Elective		3 BIOL 489	1
BIOL TECH Elective		3 BIOL 411	3
Colonnade - Connections		3 BIOL TECH Elective	3
Colonnade - Connections		3 MFGE 371, MFGE 390, or MFGE 430	3
		Colonnade - Connections	3
		<b>12</b>	<b>14</b>

**Total Hours 122-126**

\* BIOL 388: Examination of recent advances, ethics and career opportunities in Biotechnology through discussions, seminars and field trips. All majors will take this course together every semester with credit bearing in the last semester. The course meets a few times in a semester.

\*\* BIOL 369 or 399: Students have the opportunity to choose a 369 Cooperative Internship in place of 399 Research in Biology or take both. The internship or research course can also be taken during the summer.