

# Biomedical Sciences

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**Program Director:** Fred 'Ted' Bertrand, PhD

The B.S. in Biomedical Sciences program curriculum is designed to prepare students for entry into the biomedical science workforce or for graduate and professional study in the health professions. Many of the prerequisites for admission to identified graduate programs can be incorporated into the student's program of study. This allows students to create a tailored undergraduate educational experience to prepare for further study in an area of choice such as physician assistant studies, medicine, dentistry, optometry, physical therapy, biotechnology, clinical laboratory science, genetic counseling, and many more. A practicum is not required in the BMD curriculum but if a student chooses to complete a practicum a Background Check and Drug Screening will be required.

## Admission Requirements

Admission options are based on the student's previous academic work and personal interests. Students intending to enroll in the B.S. in Biomedical Sciences program must meet all UAB undergraduate admission and academic requirements. The following additional requirements also apply and must be met prior to acceptance into the Biomedical Sciences program.

### Program Admission from High School

Must be a graduate of an accredited high school with a grade point average of a 2.75 or higher on a 4.0 scale for admission.  
 Must have earned an ACT Composite Score of 22 (or SAT equivalent) or higher.  
 Must place in College English 101 or higher.  
 Must meet all UAB undergraduate admission and academic requirements.  
 If accepted, complete the UAB Student Health and Wellness Immunization Form and provide proof of medical coverage. A background check and drug screening will be required prior to any practicum or lab placement.

### Program Admission from Community College or University, including UAB, and Degree-Seeking Post-Baccalaureate

Must meet all UAB undergraduate admission and academic requirements.  
 If accepted, complete the UAB Student Health and Wellness Immunization Form and provide proof of medical coverage.  
 Must place in College English 101 or higher.  
 Must hold a 2.75 or higher Overall GPA on a 4.0 scale for admission to the Biomedical Sciences Program.

A background check and drug screening will be required prior to any practicum or lab placement.

### Other Biomedical Sciences Program Requirements

Grades of C or better are required for any Biomedical Sciences curriculum requirements.

A minimum of 2.75 Overall GPA and 2.00 UAB institutional GPA must be maintained to remain enrolled in the B.S. in Biomedical Sciences program.

## Application Procedure

Applicants are accepted at any time, and students may be enrolled during any term. Applicants should submit the following materials:

**To the UAB Undergraduate Admissions Office:**

- Completed UAB undergraduate application form, including SHP as the school, and application fee, if applicable (if enrolled at UAB in another major, complete a Change of School/Major Request using the online form available on [BlazerNET](#)).
- Official transcripts from each college or university attended.

## Contact for additional information:

B.S. in Biomedical Sciences Program (BMD) Program  
 School of Health Professions Building  
 University of Alabama at Birmingham  
 1716 9th Avenue South  
 Telephone: (205) 996-0867  
 Email: [B\(bmd@uab.edu\)MD@uab.edu](mailto:B(bmd@uab.edu)MD@uab.edu) ([bmd@uab.edu](mailto:bmd@uab.edu))  
 Web address: [uab.edu/bmd](http://uab.edu/bmd)

The Biomedical Sciences (BMD) program partners with several graduate programs to provide students with enhanced opportunities to prepare for graduate professional education.

### B.S. in Biomedical Sciences to M.S. Degree in Medical Laboratory Science Fast Track

Qualified BMD juniors must have an overall minimum GPA of 3.0, a minimum grade of C or higher on all coursework, and a demonstrated interest in Medical Laboratory Science. Students are required to complete the internal BMD to MLS Fast Track application. In consultation with the MLS Admissions Coordinator and BMD advisor, BMD students admitted to the Medical Laboratory Science Fast Track will take selected graduate level courses to meet BMD degree and/or elective requirements. For more information, contact [BMD@uab.edu](mailto:BMD@uab.edu) ([bmd@uab.edu](mailto:bmd@uab.edu)). Background Check and Drug Screening required.

### B.S. in Biomedical Sciences to M.S. Degree in Biotechnology Fast Track

Qualified BMD juniors must have an overall minimum GPA of 3.0 and a demonstrated interest in Biotechnology. In consultation with the BT Admissions Coordinator and the BMD advisor, BMD students who are admitted to the Biotechnology Fast Track will take a total of 6 credit hours of BT courses to fulfill BMD degree or elective requirements: BT 650, BT 651, BT 652, and BT 676 (1 credit hour, taken over 3 semesters). For more information, contact [BMD@uab.edu](mailto:BMD@uab.edu) ([bmd@uab.edu](mailto:bmd@uab.edu)). Background Check and Drug Screening required.

### B.S. in Biomedical Sciences to M.S. Degree in Health Physics Fast Track

Qualified BMD juniors must have an overall minimum GPA of 3.0 and a demonstrated interest in Health Physics. In consultation with the Health Physics Admissions Coordinator and BMD advisor, BMD students admitted to the Health Physics Fast Track will take selected

graduate level courses to meet BMD degree or elective requirements. For more information, contact [BMD@uab.edu](mailto:BMD@uab.edu) ([bmd@uab.edu](mailto:bmd@uab.edu)). Background Check and Drug Screening required.

## Early Acceptance Program with PharmD Degree at the Lake Erie College of Osteopathic Medicine

This opportunity is available for BMD majors prior to their third year of study, who are interested in obtaining a doctorate in Pharmacy after graduation. Students who qualify for admission into both the BMD program and the LECOM EAP program and maintain qualifying EAP LECOM credentials until completion of the BMD program will be admitted into LECOM PharmD program. Contact the BMD program director at [BMD@uab.edu](mailto:BMD@uab.edu) for more information.

## Bachelor of Science with a Major in Biomedical Sciences

Requirements	Hours
<b>Blazer Core Curriculum</b>	<b>41</b>
<b>First Year Experience</b>	
HRP 101 Experience the University Transition <sup>1</sup>	3
<b>Chemistry Requirements</b>	
CH 115 General Chemistry I or CH 125 General Chemistry I HONORS	3
CH 116 General Chemistry I Laboratory or CH 126 General Chemistry I HONORS Laboratory	1
CH 117 General Chemistry II or CH 127 General Chemistry II HONORS	3
CH 118 General Chemistry II Laboratory or CH 128 General Chemistry II HONORS Laboratory	1
CH 235 Organic Chemistry I or CH 245 Organic Chemistry I Honors	3
CH 235R Organic Chemistry I Recitation	0
CH 236 Organic Chemistry I Laboratory or CH 246 Organic Chemistry I Laboratory (Honors)	1
CH 237 Organic Chemistry II or CH 247 Organic Chemistry II Honors	3
CH 237R Organic Chemistry II Recitation	0
CH 238 Organic Chemistry II Laboratory or CH 248 Organic Chemistry II Laboratory (Honors)	1
<b>Nutrition Requirement</b>	
NTR 222 Nutrition and Health	3
<b>Statistics Requirement</b>	<b>3-4</b>
MA 180 Introduction to Statistics	
QM 214 Introduction to Business Statistics	
PUH 250 Biostatistics	
HCM 360 Statistics for Managers	
PY 216 Elementary Statistical Methods & 216L and Elementary Statistical Methods Laboratory	
<b>Biomedical Science Requirements</b>	
BMD 310 Clinical Anatomy and Histology	4
BMD 315 Clinical Physiology and Pharmacology for Health Professions I	4
BMD 317 Clinical Physiology and Pharmacology for Health Professions II	4
BMD 320 Survey of Cell Biology for Health Professions	3

BMD 330	Clinical Microbiology for Health Professions	3
BMD 380	Research Methods and Scientific Literacy for the Biomedical Sciences	3
BMD 410	Clinical Biochemistry for Health Professions	3
BMD 420	Pathophysiology for Health Professions	4
BMD 430	Clinical Immunology for Health Professions	3
BMD 440	Human Genetics for Health Professions	3
<b>Biomedical Science Electives <sup>2</sup></b>		<b>16-18</b>
<b>Total Hours</b>		<b>116-119</b>

<sup>1</sup> Or equivalent, University approved FYE course.

<sup>2</sup> Students may choose 16 to 18 hours of elective courses to tailor their degree to their career and educational goals. Six hours of these electives must be in 300-level courses or higher. Students are encouraged to select electives in consultation with their academic adviser.

<sup>3</sup> Students must graduate with a minimum of 120 semester hours.

Freshman			
First Term	Hours	Second Term	Hours
EH 101		3 EH 102	3
Core Area III (MA 106 or MA 107 or MA 125)		3 BY 123	4
CH 115 <sup>1</sup>		3 BY 123L	0
CH 116		1 CH 117	3
PY 101 or 201 <sup>2</sup>		3 CH 118	1
HRP 101		3 Core Area IV History course	3
			<b>14</b>
<b>Sophomore</b>			
First Term	Hours	Second Term	Hours
CH 235		3 CH 237	3
CH 236		1 CH 238	1
BY 124		4 NTR 222	3
BY 124L		0 BMD 310	4
Core Area II Literature course		3 Core Area II or Area IV course (based on sequence)	3
PY 212 (or equivalent Core Area IV equivalent course)		3 BMD elective	1
BMD 203		3	
			<b>15</b>
<b>Junior</b>			
First Term	Hours	Second Term	Hours
BMD 315		4 BMD 317	4
BMD 320		3 BMD 330	3
CMST 101		3 Core Area II or Core Area IV course (based on sequence)	3
HCM 360, MA 180, or PY 216		3-4 BMD 380, HCM 460, or PY 315	3-4
PH 201 or 221		4 PH 202 or 222	4
			<b>17-18</b>

Senior			
First Term	Hours	Second Term	Hours
BMD 410		3 BMD 440	3
BMD 420		4 BMD Elective	6
BMD 430		3 Core Area II Fine Art 3	6
BMD Elective		6	
		<b>16</b>	<b>15</b>

Total credit hours: 127-129

<sup>1</sup> any Honors courses substituted for an original course requirement will require completion of the corresponding lab and/or recitation.

<sup>2</sup> or equivalent Core Area IV course applicable to requirement

<sup>3</sup> see Major for approved Statistics courses.

## Minor in Biomedical Sciences

All courses (including prerequisites) must be completed with a grade of C or better and students must maintain a 2.75 overall GPA. Please contact [BMD@uab.edu](mailto:BMD@uab.edu) for more information on the BMD minor.

Requirements		Hours
<b>Required Courses</b>		
CH 115	General Chemistry I	3
CH 116	General Chemistry I Laboratory	1
CH 117	General Chemistry II	3
CH 118	General Chemistry II Laboratory	1
BY 123	Introductory Biology I	4
BY 123L	Introductory Biology I Laboratory	0
BY 124	Introductory Biology II	4
BY 124L	Introductory Biology II Laboratory	0
BMD 315	Clinical Physiology and Pharmacology for Health Professions I	4
BMD 317	Clinical Physiology and Pharmacology for Health Professions II	4
<b>Choose 3-4 Semester Hours of BMD/CDS Elective Courses</b>		<b>6</b>
BMD 310	Clinical Anatomy and Histology	4
BMD 320	Survey of Cell Biology for Health Professions	3
BMD 330	Clinical Microbiology for Health Professions	3
BMD 410	Clinical Biochemistry for Health Professions	3
BMD 420	Pathophysiology for Health Professions	4
BMD 430	Clinical Immunology for Health Professions	3
BMD 331	Microbiology Lab for Health Professions	1
Total Minors Hours: 27-28		

## Courses

### BMD 150. Introduction to the Biomedical Sciences. 1 Hour.

Introduction to career paths within the Biomedical Sciences. Topics will address student needs and interests and current trends in the Biomedical Sciences. Emphasis will be placed on developing an individualized educational plan based on a student's academic and professional interests.

### BMD 201. Contemporary Issues in Biomedical Sciences. 2 Hours.

A survey of current policy topics and industry trends in biomedical sciences, health, and medicine.

### BMD 202. Survey of the Biomedical Sciences Literature. 1 Hour.

Techniques for searching, retrieving, reading, and analyzing the expert information used by biomedical researchers and health professions practitioners.

### BMD 203. Contemporary Issues and the Literature in Biomedical Sciences. 3 Hours.

Synthesizing contemporary topics in biomedical sciences with techniques for searching, retrieving, reading, and analyzing expert information.

### BMD 300. Laboratory Techniques in Biotechnology I. 2 Hours.

Basic laboratory techniques in biotechnology utilizing a lab notebook, basic lab instruments, and making solutions. Basic molecular biology and mammalian cell culture techniques used in studying gene regulation.

**Prerequisites:** BMD 320 [Min Grade: C]

### BMD 310. Clinical Anatomy and Histology. 4 Hours.

Exploration of the functional anatomy of the human body through gross and microscopic studies of cells, tissues, and organ systems; survey of body systems; correlations between the structures and functions of the body's various systems; association of major embryonic developmental events with functional gross anatomy.

**Prerequisites:** BY 124 [Min Grade: C](Can be taken Concurrently) and CH 235 [Min Grade: C](Can be taken Concurrently) or CH 245 [Min Grade: C](Can be taken Concurrently) and CH 236 [Min Grade: C](Can be taken Concurrently)

### BMD 315. Clinical Physiology and Pharmacology for Health Professions I. 4 Hours.

Basic concepts of physiology and pharmacology related to human organ systems and drug categories; human physiological principles and their application to pharmacology; membrane physiology, muscle physiology, physiology of the autonomic nervous system and the cardiovascular system; application of physiologic principles to drug pharmacokinetic and pharmacodynamics models.

**Prerequisites:** (CH 115 [Min Grade: C] or CH 125 [Min Grade: C]) and (CH 116 [Min Grade: C] or CH 126 [Min Grade: C]) and (CH 117 [Min Grade: C] or CH 127 [Min Grade: C]) and (CH 118 [Min Grade: C] or CH 128 [Min Grade: C]) and BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (CH 235 [Min Grade: C] or CH 245 [Min Grade: C] and CH 236 [Min Grade: C]) and BMD 310 [Min Grade: C] and CH 237 [Min Grade: C](Can be taken Concurrently) or CH 247 [Min Grade: C] (Can be taken Concurrently) and CH 238 [Min Grade: C](Can be taken Concurrently)

### BMD 317. Clinical Physiology and Pharmacology for Health Professions II. 4 Hours.

Basic concepts of physiology and pharmacology related to human organ systems and drug categories; human physiological principles and their application to pharmacology; renal, respiratory, gastrointestinal and endocrine systems; application of physiological principles to drug pharmacokinetic and pharmacodynamics models.

**Prerequisites:** BMD 315 [Min Grade: C]

**BMD 320. Survey of Cell Biology for Health Professions. 3 Hours.**

Molecular and cellular biosciences from a highly-integrated systems perspective; principles of eukaryotic cell structure and function, macromolecules, gene expression, signaling, division, differentiation, energy transformation and metabolism in cells; endocytosis, intramembrane transport, protein targeting, organelle biosynthesis, protein sorting, exocytosis, cell shape, motility, and cell-to-cell interaction; signal transduction processes and cellular functions required for cell growth and programmed cell death.

**Prerequisites:** (CH 115 [Min Grade: C] or CH 125 [Min Grade: C]) and (CH 116 [Min Grade: C] or CH 126 [Min Grade: C]) and (CH 117 [Min Grade: C] or CH 127 [Min Grade: C]) and (CH 118 [Min Grade: C] or CH 128 [Min Grade: C]) and BY 123 [Min Grade: C] and BY 124 [Min Grade: C](Can be taken Concurrently) and (CH 235 [Min Grade: C] or CH 245 [Min Grade: C] and CH 236 [Min Grade: C]) and CH 237 [Min Grade: C](Can be taken Concurrently) or CH 247 [Min Grade: C] (Can be taken Concurrently) and CH 238 [Min Grade: C](Can be taken Concurrently)

**BMD 330. Clinical Microbiology for Health Professions. 3 Hours.**

Clinically-based study of bacteriology, parasitology, mycology, and virology and the human host response to each; mechanisms of microbial pathogenicity and complex interactions with the host that produce symptoms of disease.

**Prerequisites:** (CH 115 [Min Grade: C] or CH 125 [Min Grade: C]) and (CH 116 [Min Grade: C] or CH 126 [Min Grade: C]) and (CH 117 [Min Grade: C] or CH 127 [Min Grade: C]) and (CH 118 [Min Grade: C] or CH 128 [Min Grade: C]) and BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and BMD 320 [Min Grade: C]

**BMD 331. Microbiology Lab for Health Professions. 1 Hour.**

Practice of laboratory safety, correct operation of a compound light microscope, preparation and interpretation of various stains, cultivate, isolate and identify pathogenic microorganisms, and perform and interpret simple serologic assays.

**Prerequisites:** BMD 330 [Min Grade: C](Can be taken Concurrently)

**BMD 380. Research Methods and Scientific Literacy for the Biomedical Sciences. 3 Hours.**

Introduction to basic research methodology; review of statistical methods in health professions research. Emphasis will be given to preparing students to critically evaluate medical and scientific literature as well as web-based materials.

**Prerequisites:** MA 106 [Min Grade: C] or MA 107 [Min Grade: C] or MA 125 [Min Grade: C] or MA 168 [Min Grade: C] and BMD 203 [Min Grade: C]

**BMD 400. Laboratory Techniques in Biotechnology II. 2 Hours.**

Laboratory techniques used in biotechnology, including cloning genes into an expression vector; transforming into *E. coli*; and transfection into mammalian cells for study of gene regulation and expression.

**Prerequisites:** BMD 300 [Min Grade: C]

**BMD 410. Clinical Biochemistry for Health Professions. 3 Hours.**

Current concepts of human biochemistry and molecular biology; protein structure and function, enzymes, intermediary metabolism, biosynthesis of lipids, and utilization of lipids; special emphasis on the molecular basis of inherited genetic diseases, acquired diseases, and clinically-related biochemistry.

**Prerequisites:** (CH 235 [Min Grade: C] or CH 245 [Min Grade: C]) and CH 236 [Min Grade: C] and (CH 237 [Min Grade: C] or CH 247 [Min Grade: C]) and CH 238 [Min Grade: C] and BMD 320 [Min Grade: C]

**BMD 420. Pathophysiology for Health Professions. 4 Hours.**

Problem-oriented capstone study of general disease processes and the major subdivisions of general pathology: cellular adaptations, tissue injury and renewal, neoplasia, environmental and nutritional pathology, and pediatric disorders; cellular alterations and inflammation, genetic, immunological, nutritional and circulatory disorders; effects of infection, chemical and physical agents, blood and vascular diseases, neoplasia and aging as they apply to selected organ systems.

**Prerequisites:** BMD 317 [Min Grade: C] and BMD 380 [Min Grade: C]

**BMD 430. Clinical Immunology for Health Professions. 3 Hours.**

Basic immunology and the fundamental principles relating to the immune response in normal and disease states; antigens, antibodies, cells and structures of the immune system; process of immunity, allergies, transplantation and diseases; emphasis on the genetics, mechanisms, and regulation of the immune system in human health and disease.

**Prerequisites:** BMD 320 [Min Grade: C] and BMD 330 [Min Grade: C] (Can be taken Concurrently) and BMD 410 [Min Grade: C](Can be taken Concurrently)

**BMD 440. Human Genetics for Health Professions. 3 Hours.**

Upper level exploration of molecular basis and clinical presentations of human genetic disorders using a systems based approach; analysis relevant to clinical diagnosis and disease monitoring; ethical and moral issues associated with gathering and use of genetic information for non-medical activities; high level predictions of genetic evolution.

**Prerequisites:** BMD 320 [Min Grade: C](Can be taken Concurrently)

**BMD 475. Capstone Experience in the Biomedical Sciences. 2-4 Hours.**

Mentored capstone project to explore an area of student interest demonstrating curriculum integration. The capstone project should culminate in a formal scholarly work. Senior Standing required.

**Prerequisites:** BMD 315 [Min Grade: C] and BMD 317 [Min Grade: C] and BMD 320 [Min Grade: C]

**BMD 478. Special Topics in Biomedical Sciences. 1-4 Hour.**

Exploration of current issues in Biomedical Sciences.

**BMD 490. Directed Readings in Biomedical Sciences. 1-3 Hour.**

Directed readings and/or literature review under the direction of a faculty member. Approval of faculty sponsor and program director required.

**BMD 495. Practicum in Biomedical Sciences. 1-6 Hour.**

Course combines the practical workplace experience gained through an internship or service learning activity with a seminar component to guide reflective assessment of the total experience. Approval of faculty sponsor and program director required.

**BMD 497. Directed Biomedical Sciences Research Studies. 1-6 Hour.**

Students will conduct a field, laboratory, or literary study project culminating in a formal paper and/or presentation as directed by the supervising instructor. Approval of faculty sponsor and program director required.