

BIOMEDICAL SCIENCES WITH EGR SCI MINORFOR STUDENTS INTERESTED IN THE MASTER'S PROGRAM IN **BIOMEDICAL ENGINEERING, BioELECTRICAL EMPHASIS**THIS IS A **GENERAL** CURRICULUM GUIDE AND IS NOT APPLICABLE TO EVERY STUDENT. IT IS IMPORTANT TO MEET WITH YOUR ADVISOR.

Year One			
¹ BIO 120 General Biology I Prerequisites: High school chemistry, CHM 109, or CHM 115 strongly recommended (CHM 109 or 115 may be taken concurrently)	4 (6)	*MTH 202 Calculus II Prerequisite: MTH 201	4
*CHM 115 Principles of Chemistry I Prerequisites: High school chemistry and (MTH 110 or 122 or 125 or 201)	4 (6)	CHM 116 Principles of Chemistry II Prerequisites: CHM 115 and (MTH 122 or MTH 125 or MTH 201)	5 (7)
*MTH 201 Calculus I Prerequisites: MTH 122 and MTH 123 or proficiency through math placement Gen Ed	4 3	WRT 150 Strategies in Writing ⁹ Gen Ed SOC 105 (US + SBS)	4 3
<i>Numbers noted within (Parentheses) are contact hours</i> Total	15	Total	16*
Spring/Summer Year 1			
*STA 220: Statistical Modeling for Engineering *EGR 220: Engineering Measurement and Data Total	2 <u>1</u> 3	Gen Ed: ANT 215 (WP + HP)	3
Year Two			
*MTH 203 Calculus III Prerequisite: MTH 202	4	BIO 375 Genetics/ BIO 376 Genetics Laboratory Prerequisites: BIO 120. Concurrent enrollment in BIO 376 is required (Recommended for pre-med students) OR BIO 355 Human Genetics (lecture only)	3/1 (6) 3
*EGR 106 Introduction to Engineering Design I Co-requisite: MTH 201	3	*EGR 107 Introduction to Engineering Design II Prerequisite: C or higher in EGR 106 and C or higher in MTH 201	3
BMS 208 Human Anatomy Prerequisites: BIO 120 or BMS 202	3	CHM 242 Organic Chemistry for Life Sciences II Prerequisite: CHM 241	4 (6)
CHM 241 Organic Chemistry for Life Sciences I Prerequisite: CHM 116	5 (7)	*MTH 302 Linear And Differential Equations Prerequisite: MTH 203	4
Total	15	Total	14-15
Spring/Summer Year 2			
BMS 301 Introduction to Research in Biomedical Sciences Prerequisites: override and sophomore standing	3	Gen Ed PSY 101 (SBS)	3
Year Three			
BMS 290 Human Physiology Prerequisites: BMS 208 and two semesters of chemistry	3	BMS 212 Introductory Microbiology Prerequisites: BMS 208 and two semesters of chemistry	3
BMS 291 Laboratory in Human Physiology Prerequisites: BMS 290 or concurrent registration	1 (3)	BMS 213 Laboratory in Microbiology Prerequisite: BMS 212 or concurrent enrollment	1 (4)
*PHY 230 Principles of Physics 1 Prerequisites: MTH 201 (MTH 202 is recommended as a corequisite)	5	*EGR 214 Circuit Analysis I Prerequisites: C or better in MTH 202 and PHY 230	4
CHM 461 Biochemistry I (recommended for pre-med) Prerequisite: CHM 242 or CHM 247 and CHM 248	4	*PHY 231 Principles of Physics 2 Prerequisites: PHY 230 and MTH 202 Gen Ed or Issue	5 (7) 3
Total	14-15	Total	16
Spring/Summer Year 3			
*EGR 226 Introduction to Digital Systems	4 (6)	MCAT for pre-med	
Year Four			
² BMS 495 Concepts in Wellness (Capstone) SWS Prerequisites: BMS 208, BMS 212, BMS 290 or 291, and senior standing	3	Gen Ed Gen Ed	3 3
¹ BMS elective	3	*EGR 257 Electronic Materials & Devices Prerequisites: C or better in CHM 115 and PHY 234 or PHY 231	4 (7)
*EGR 326 Embedded System Design Prerequisites: ???	4	*EGR 209 Mechanics and Machines Prerequisites: C or better in EGR 107, MTH 202, EGR 220 and PHY 230	4
*EGR 314 Circuit Analysis II Prerequisites: C or better in EGR 214 and MTH 302	4 (7)	APPLY TO MSE BIOMEDICAL ENGINEERING	
Total	14	Total	14
Spring/Summer Year 4			
*EGR 323 Signals and Systems Analysis Prerequisite: C or better in EGR 314	3	¹ BMS elective	3
Total	3	Total	3

*The block tuition rate is for 12-15 credits. You will pay additional tuition for any credits over 15.

¹ Biomedical Science Electives must consist of at least 6 hours of upper-division Biomedical Science courses. See list on the back for elective options.² Students must complete two courses with an SWS attribute.

MSE Biomedical Engineering:

- BMS undergraduate students can prepare to for the Master of Science in Engineering in Biomedical Engineering by completing the indicated *courses.
- Students will earn a minor in Engineering Science. The courses listed above are also undergraduate courses in the engineering foundations.
- For additional advising about Engineering, please see Prof. Samhita Rhodes (rhodesam@gvsu.edu) or Sara Wheeler (wheelesa@gvsu.edu).

Declaring the BMS Major:

1. In myBanner, select “Student” > “Student Records” > “Change Major” > “Change Major 1/Program”
2. Choose “**Biomedical Science-BS**” from the drop-down box. You have the option of adding an emphasis in Nutrition or Microbiology but this is not required.
3. Click “Submit” and then “Change to New Program”
4. Declare “**Pre-professional Preparation**” as your SECOND MAJOR if you are planning on medical, dental, pharmacy, or optometry school.
→If you are Pre-Veterinary, the **Biology with Pre-Veterinary emphasis** is recommended
5. Declare “**Engineering Science**” as your MINOR.

Pre-Professional Students

(Pre-Chiropractic, Pre-Dental, Pre-Medical, Pre-Optometry, Pre-Pharmacy, Pre-Podiatry, & Pre-Veterinary)

Keep in mind that you may choose any major as long as you complete the prerequisites for your professional program.

General Education Overlap

General Education Categories fulfilled by the Biomedical Sciences Major:	
Life Sciences with Lab: BIO 120	Physical Sciences with Lab: CHM 115
Mathematical Sciences: STA 215, MTH 122, MTH 123	
Additional Overlap for Pre-Professional Students	
Social and Behavioral Sciences: PSY 101 and SOC 101	

Biomedical Science Elective Courses (6 credits required)

Anatomy	Microbiology	Nutrition
BMS 309 Laboratory in Human Anatomy (1) ² BMS 355 Anatomy of Joints (2) w/Lab BMS 393 Laboratory Assistant in Human Anatomy (1) ¹ BMS 427 Neuroanatomy (1) ¹ BMS 450 Human Histology (4) w/Lab ² BMS 460 Regional Human Anatomy (4) w/Lab ¹ BIO 422 Embryology (3) w/Lab	¹ BMS 312 Bacterial Genetics (3) (only offered in even-numbered years) ¹ BMS 313 Bacterial Genetics Laboratory (1) (only offered in even-numbered years) ¹ BMS 410 Immunology (3) ² BMS 411 Immunology Laboratory (1) ² BMS 412 Medical Bacteriology (3) ² BMS 413 Medical Bacteriology Laboratory (2) ¹ BMS 422 Bacterial Physiology (3) (only offered in odd-numbered years) ¹ BMS 423 Bacterial Physiology Laboratory (2) (only offered in odd-numbered years) ² BMS 431 Medical Virology (3) ¹ BMS 433 Medical Parasitology (3) w/Lab	BMS 305 Clinical Nutrition (3) ¹ BMS 306 Advanced Human Nutrition (3) ² BMS 404 Community Nutrition (3) BMS 407 Nutrition in the Life Cycle (3) ² BMS 415 Nutrition and Physical Performance (3)
Physiology		General
BMS 310 Basic Pathophysiology (3) BMS 311 Pharmacological Aspects of Biomedical Sciences (3) ¹ BMS 375 The Biology of Aging (3) BMS 392 Laboratory Assistant in Physiology (1) ² BMS 426 Sensory Systems Neuroscience: Anatomy and Physiology (3) ² BMS 428 Neurosciences (3) ² BMS 475 The Pathology of Aging (3) ² BMS 508 Advanced Human Physiology (3)		BMS 380/480 Special Topics in the Biomedical Sciences (1-4) BMS 399 Readings in the Biomedical Sciences (1-3) BMS 492 Biomedical Sciences Internship (1-4) BMS 499 Research in the Biomedical Sciences (1-3) CMB 405 Cell and Molecular Biology (4) CMB 406 Cell and Molecular Biology Laboratory (2) ² CMB 440 Research Applications in Drosophila Genomics (3) w/Lab <i>Numbers in parentheses indicate # of credits</i> ¹ Offered in Fall Only ² Offered in Winter Only

The CLAS Academic Advising Center is located in C-1-140 MAK, 616-331-8585

<http://www.gvsu.edu/clasadvising> (Also find us on Orgsync, Facebook, and Twitter!)

Jo Ann Litton
littonj@gvsu.edu

Julie Amon
amonju@gvsu.edu

Jason Prowant
prowanja@gvsu.edu

See <http://gvsu.edu/s/zY> for additional details regarding professional school information.
Follow the Pre-Professional Blog: <https://preprofessionallakers.wordpress.com>