



# Program Approval Form

For approval of new programs and deletions or modifications to an existing program.

**Action Requested:**

Create New (SCHEV approval required except for minors)  
 Inactivate Existing  
 Modify Existing (check **ALL** that apply)  
 Title (SCHEV approval required except for minors)  
 **Concentration** (Choose one):  Add  Delete  Modify  
 Degree Requirements  
 Admission Standards/ Application Requirements  
 Other  
 Changes: \_\_\_\_\_

**Type (Check one):**

B.A.  B.S.  Minor  
 Master's  
 Ph.D.  
 Undergraduate Certificate\*  
 Graduate Certificate\*  
 Bachelor's/Accelerated Master's  Other:

**College/School:** Volgenau School of Engineering **Department:** Bioengineering  
**Submitted by:** Laurence Bray **Ext:** 2218 **Email:** Lbray2@gmu.edu

**Effective Term:** Fall 2018 **Please note:** For students to be admitted to a new degree, minor, certificate or concentration, the program must be fully approved, entered into Banner, and published in the University Catalog.

**Justification:** (attach separate document if necessary)

See attached document

**Program Title:** (Required)

Title must identify subject matter. Do not include name of college/school/dept.

**Concentration(s):**

**Admissions Standards / Application**

**Requirements:** (Required only if different from those listed in the University Catalog)

**Degree Requirements:**

Consult University Catalog for models, attach separate document if necessary using track changes for modifications

Existing	New/Modified
	Minor in Bioengineering
	<p><b>Required Courses (9-10 credits):</b></p> <ul style="list-style-type: none"> <li>• BENG 101: Introduction to Bioengineering (3 credits)</li> <li>• BIOL 213: Cell Structure and Function or equivalent (3-4 credits)</li> <li>• BENG 313: Physiology for Engineers (3 credits)</li> </ul> <p><b>Technical Electives (9-11 credits):</b>            Select at least nine credits from the following list:</p> <p>Computational Modeling and Biomechanics:</p> <ul style="list-style-type: none"> <li>o BENG 304: Modeling and Control of Physiological Systems (3 credits)</li> <li>o BENG 406: Biomechanics (3 credits)</li> <li>o BENG 420: Bioinformatics for Engineers (3 credits)</li> </ul> <p>Biomedical Imaging &amp; Devices</p> <ul style="list-style-type: none"> <li>o BENG 301/302: Bioengineering Measurements (4 credits)</li> <li>o BENG 437: Medical Image Processing (3 credits)</li> </ul> <p>Nanomedicine &amp; Biomaterials</p> <ul style="list-style-type: none"> <li>o BENG 421: Tissue Engineering (3 credits)</li> <li>o BENG 441: Nanotechnology in Health (3 credits)</li> </ul> <p>Neuroengineering</p> <ul style="list-style-type: none"> <li>o BENG 327: Cellular, Neuro physiology, Pharmacology</li> </ul> <p>Neuroscience</p> <ul style="list-style-type: none"> <li>o BENG 429: Applied Neurotechnologies</li> </ul> <p>Study Abroad</p> <ul style="list-style-type: none"> <li>o BENG 417: Bioengineering World Health (3 credits)</li> </ul> <p>Research Experience</p> <ul style="list-style-type: none"> <li>o BENG 395: Mentored Research in Bioengineering (3 credits)</li> </ul> <p>Students may choose to substitute two of the technical electives (up to 6 credits) from the following:</p> <ul style="list-style-type: none"> <li>o ECE classes (ECE 370, ECE 410, ECE 422, ECE 431, and ECE 470)</li> <li>o ME classes (ME 221, ME 322, ME 313, ME 432)</li> <li>o SYST classes (OR 442, SYST 468, SYST 470)</li> <li>o NEUR classes (NEUR 327, NEUR 461)</li> <li>o BIOL classes (BIOL 311, BIOL 385, BIOL 484, BIOL 486)</li> </ul>


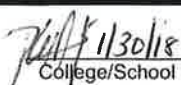

	o CHEM classes (CHEM 313, 314, 463)
TOTAL CREDITS REQUIRED:	18-21

Courses offered via distance:  
(if applicable)

TOTAL CREDITS REQUIRED:

\*For Certificates Only: Indicate whether students are able to pursue on a  Full-time basis  Part-time basis

**Approval Signatures**


1/29/18
 1/30/18
 1/30/18  
 Department \_\_\_\_\_ Date \_\_\_\_\_ College/School \_\_\_\_\_ Date \_\_\_\_\_

If this program may impact another unit or is in collaboration with another unit at Mason, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

**For Undergraduate Programs only**

Undergraduate Council Member \_\_\_\_\_ Provost Office \_\_\_\_\_ Undergraduate Council Approval Date \_\_\_\_\_

**For Graduate Programs Only**

Graduate Council Member \_\_\_\_\_ Provost Office \_\_\_\_\_ Graduate Council Approval Date \_\_\_\_\_

**For Registrar Office's Use Only:** Received \_\_\_\_\_ Banner \_\_\_\_\_ Catalog \_\_\_\_\_ revised 9/2/2016

## Minor in Bioengineering Catalog 2018-2019

### Bioengineering minor (18-21 credits)

#### Required Courses (9 credits):

- **BENG 101:** Introduction to Bioengineering (3 credits)
- **New: BENG 213:** Introduction to Biocellular Engineering (3 credits)
- **BENG 313:** Physiology for Engineers (3 credits)

#### Technical Electives (9-12 credits):

- Select **nine credits** from the following list:
  - Computational Modeling and Biomechanics:
    - BENG 304: Modeling and Control of Physiological Systems (3 credits)
    - BENG 406: Biomechanics (3 credits)
    - BENG 420: Bioinformatics for Engineers (3 credits)
  - Biomedical Imaging & Devices
    - BENG 301/302: Bioengineering Measurements (4 credits)
    - BENG 437: Medical Image Processing (3 credits)
  - Nanomedicine & Biomaterials
    - BENG 421: Tissue Engineering (3 credits)
    - BENG 441: Nanotechnology in Health (3 credits)
  - Neuroengineering
    - BENG 327: Cellular, Neuro physiology, Pharmacology Neuroscience
    - BENG 429: Applied Neurotechnologies
  - Study Abroad
    - BENG 417: Bioengineering World Health (3 credits)
  - Research Experience
    - BENG 395: Mentored Research in Bioengineering (3 credits)
- Students may choose to **substitute two** of the technical electives from the following:
  - ECE classes (ECE 370, ECE 410, ECE 422, ECE 431, and ECE 470)
  - ME classes (ME 221, ME 322, ME 313, ME 432)
  - SYST classes (OR 442, SYST 468, SYST 470)
  - NEUR classes (NEUR 327, NEUR 461)
  - BIOL classes (BIOL 311, BIOL 385, BIOL 484, BIOL 486)
  - CHEM classes (TBD)

### **Minor in Bioengineering**

The field of Bioengineering is a highly interdisciplinary field involving the application of engineering concepts and tools to solve problems in biology and medicine. The proposed Minor in Bioengineering provides an opportunity for students to gain an understanding of biology and engineering fundamentals, and develop skills to apply engineering concepts to biological systems.

The program includes elective coursework to provide students with an opportunity to enhance their knowledge on a variety of additional bioengineering sub-disciplines and their applications.

The minor requires completion of 18-21 credits of coursework, with 9-credit hours of basic core requirements in bioengineering, biocellular engineering, and physiology for engineers. The remaining credits (9-12) are technical electives from multiple disciplines, such as bioengineering, mechanical engineering, electrical and computer engineering, systems engineering, neuroscience, biology and chemistry.

#### **Admissions Requirements:**

Students must have completed MATH 114 (Calculus II) with a grade of B- or better to be admitted to the minor.