# **FLOWCHARTS**

### FOR

# BIOMEDICAL ENGINEERING FOCUS AREA

## **DEGREE PLANNING**

The B.S. BME degree has six (6) electives that may be used in developing program of study to meet individual student career goals. These include two (2) biomedical engineering (BIOM) electives, three (3) engineering electives and one (1) technical elective.

The <u>BIOM electives</u> must be selected from the upper division BIOM courses. The <u>engineering electives</u> may be selected from upper division MECH, EECE, or CIVL engineering courses in the HCoE. The technical elective may be selected from upper division courses in BIOL, CHEM, Engineering (including BIOM), MATH, PHYS and Engineering Technology (TECH). These elective courses should be chosen with permission of your advisor. Students may need to take other courses to satisfy pre-requisite requirements for upper division courses outside of the department.

The following flowcharts provide highly recommended courses in the following focus areas:

- 1] Biomaterials/Tissue Engineering;
- 2] Bioelectrical Devices and Systems;
- 3] Biomechanics;
- 4] BioSensor Devices and Systems
- 5] BioImaging
- 6] Pre-medical Studies\*
- 7] General.

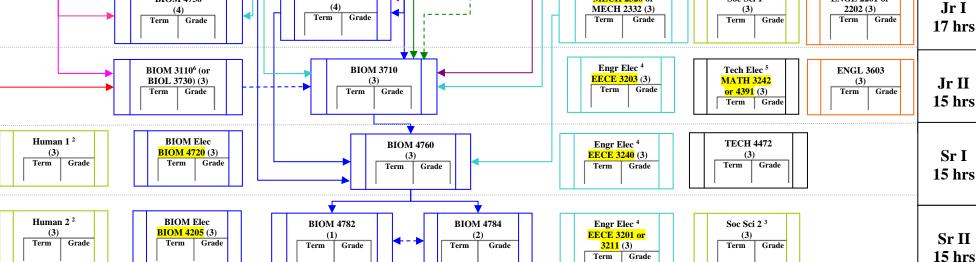
<u>Focus areas are not official degree designations</u> and students may develop curriculum to overlap/integrate one or more focus areas for their particular career goals or can develop other areas of focus or follow the *General* degree program. Not all possible electives have been specified for each focus area. Students should refer to the Advising Guide and consult with advisor on selection of electives.

\*To be able to meet BME degree requirements and pre-med requirements for medical applications/admissions, there are only two (2) engineering electives for the student to choose.

#### B.S BIOMEDICAL ENGINEERING DEGREE PROGRAM: Biomaterials/Tissue Engr Focus (Begin Fall 2023)

Date of beginning program: **UUID**: Advisor: Name: BIOM 1702 ENGL 1010 CHEM 1110 CHEM 1111 ENGR 1010 **MATH 1910 BIOM 1701 (1)** Fr I Grade Term 16 hrs BIOM 1720 MATH 1920 **PHYS 2110** PHYS 2111 ENGL 1020 **CHEM 1120 CHEM 1121** Fr II (3) Term Grade Term Grade Term Grade Term Term Grade 18 hrs Grade Term Grade Term BIOM 2720 **MATH 2120 BIOL 1110 BIOL 1111** PHYS 2120 PHYS 2121 So I (3) (1) Term Grade Term Grade Term Grade Term Grade 14 hrs Term Grade Term Grade EECE **MATH 2110 CIVL 2131**) **BIOL 1120** BIOL 2011 or So II 2201/2203 (4) (4) 2021(1) (3) Grade Term 15 hrs Term Grade Term Grade Grade Term Grade Term BIOM 3010 MECH 2320 or Soc Sci 13 ENGL 2201 or **BIOM 4730** Jr I **(4)** MECH 2332 (3) (3) 2202 (3) Grade Term Term Grade Grade Term Grade Term Grade Term 17 hrs **BIOM 3710** Engr Elec 4 Tech Elec 5 **ENGL 3603** BIOM 31106 (or **MECH 4340** BIOL 3730) (3) **BIOL 3130** (3) Jr II or 4360 (3) Term Grade Term Grade Term Grade Grade Term Grade 15 hrs Human 1<sup>2</sup> BIOM Elec **BIOM 4760** Engr Elec 4 **TECH 4472 BIOM 4150** (3) Sr I BIOM 4750 (3) Term Grade Term Grade Term Grade Term Grade Term Grade 15 hrs Human 2<sup>2</sup> **BIOM Elec BIOM 4782 BIOM 4784** Engr Elec 4 Soc Sci 2 3 **BIOM 4907 or** (3) **BIOM 4110** (3) **(1) (2)** (3) Sr II Term Grade **4902** (3) Term Grade Grade Term Grade Term Term 15 hrs "C-" or better in all engineering, math, physics, chemistry, and biology courses used toward graduation. 6 hours of Humanities from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212 Total hours = 1256 hours of Social Science from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212 Must be an upper division (3XXX/4XXX) Engineering course. TECH 4472 may also be applied as an Engineering Elective. updated March 2023 May be an upper division (3XXX/4XXX) Engineering, Science, Math or Technology course. (note TECH 4472 CAD is Fall term only) BIOM 3110 is Spring term only and BIOL 3730 is Fall term only

B.S BIOMEDICAL ENGINEERING DEGREE PROGRAM: Bioelectr Devices & Systems Focus (Begin Fall 2023) Date of beginning program: Name: **UUID**: **Advisor: CHEM 1110 CHEM 1111** ENGR 1010 **MATH 1910 BIOM 1701 BIOM 1702** ENGL 1010 (3) **(1)** (3) Fr I Grade Term Grade Term Grade Term Grade Term Grade Term Grad Term Grade 16 hrs **BIOM 1720** MATH 1920 **PHYS 2110** PHYS 2111 ENGL 1020 **CHEM 1120 CHEM 1121** Fr II (3) (4) (3) **(1)** (3) **(1)** Term Grade Term Grade Grade Term Grade Term Term Grade 18 hrs Term Grade Term Grade **MATH 2120 BIOM 2720 BIOL 1110 BIOL 1111** PHYS 2120 PHYS 2121 So I (3) (3) (3) **(1)** (3) **(1)** Grade Grade Term Grade Grade Term Term Term 14 hrs Grade Term Grade EECE **MATH 2110 CIVL 2131**) **BIOL 1120** BIOL 2011 or So II 2201/2203 (4) (3) 2021(1) (4) Term Grade 15 hrs Term Grade Term Grade Term Grade Term Grade **BIOM 3010 BIOM 4730** MECH 2320 or Soc Sci 13 ENGL 2201 or

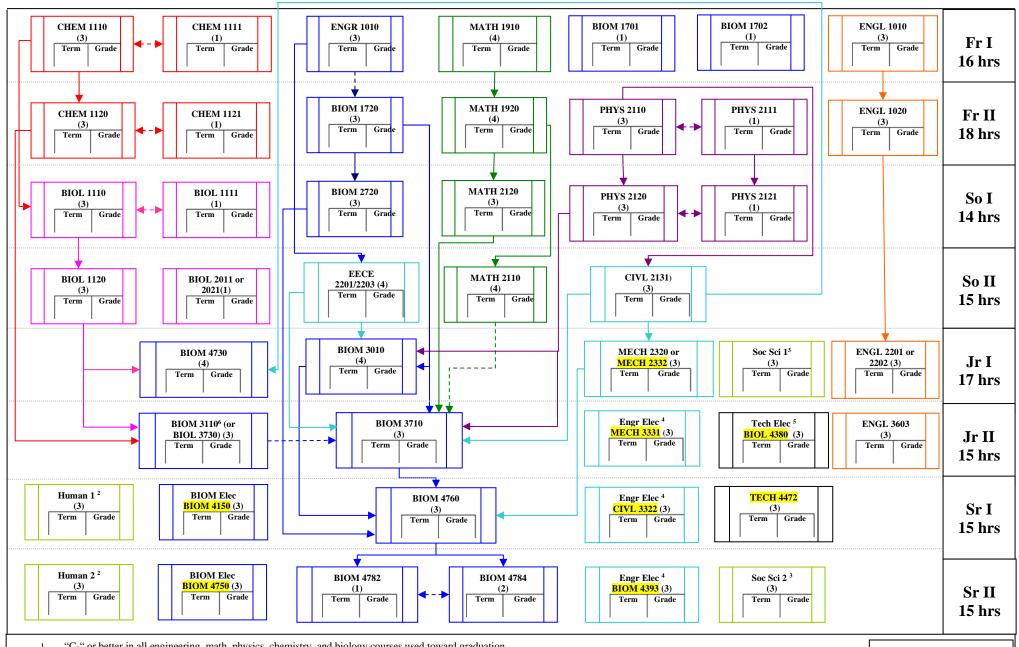


- 1. "C-" or better in all engineering, math, physics, chemistry, and biology courses used toward graduation.
- 2. 6 hours of Humanities from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212
- 3. 6 hours of Social Science from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212
- 4. Must be an upper division (3XXX/4XXX) Engineering course. TECH 4472 may also be applied as an Engineering Elective.
- 5. May be an upper division (3XXX/4XXX) Engineering, Science, Math or Technology course. (note TECH 4472 CAD is Fall term only)
- 6. BIOM 3110 is Spring term only and BIOL 3730 is Fall term only

Total hours = 125

#### **B.S BIOMEDICAL ENGINEERING DEGREE PROGRAM: Biomechanics Focus** (Begin Fall 2023)

Date of beginning program: Name: **UUID**: Advisor:



- "C-" or better in all engineering, math, physics, chemistry, and biology courses used toward graduation.
- 6 hours of Humanities from approved list, https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212
- 6 hours of Social Science from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212
- Must be an upper division (3XXX/4XXX) Engineering course. TECH 4472 may also be applied as an Engineering Elective.
- May be an upper division (3XXX/4XXX) Engineering, Science, Math or Technology course. (note TECH 4472 CAD is Fall term only)
- BIOM 3110 is Spring term only and BIOL 3730 is Fall term only

Total hours = 125

B.S BIOMEDICAL ENGINEERING DEGREE PROGRAM: Biosensors & Devices Focus (Begin Fall 2023) **UUID: Date of beginning program:** Name: **Advisor:** CHEM 1110 BIOM 1701 **BIOM 1702 ENGL 1010** CHEM 1111 **ENGR 1010 MATH 1910 (1)** (3) Fr I Term Grade Grade Grade Term Grade Term Term Grade Term Grade Term Grade 16 hrs **BIOM 1720 MATH 1920** PHYS 2110 PHYS 2111 **ENGL 1020 CHEM 1121 CHEM 1120** Fr II (4) **(1)** (3) (3) Term Grade Term Grade Term Grade Term Grade Grade Term 18 hrs Term Grade Term Grade **BIOL 1111 BIOM 2720 MATH 2120 BIOL 1110 PHYS 2120** PHYS 2121 So I (3) (3) (1) (3) Term Grade Grade Term Grade Term Grade Term 14 hrs Grade Term Grade Term EECE **MATH 2110 CIVL 2131**) **BIOL 1120** BIOL 2011 or So II 2201/2203 (4) (4) 2021(1) (3) Grade 15 hrs Term Grad Term Grade Term Grade Grade **BIOM 3010 MECH 2320** or Soc Sci 13 ENGL 2201 or **BIOM 4730 (4)** MECH 2332 (3) Jr I 2202 (3) Term Grade Term Grade Term Term Grade Term Grade Grade 17 hrs Engr Elec 4 **BIOM 3710** Tech Elec 5 ENGL 3603 BIOM 31106 (or **BIOM 4702** (3) **CHEM3211** (3) BIOL 3730) (3) (3) Jr II Term Grade Grade Term Grade Term Grade Term Grade Term 15 hrs Human 1  $^2$ **BIOM Elec** TECH 4472<sup>4</sup> Tech Elec<sup>4</sup> **BIOM 4760** BIOM4110 (3) **CHEM 3411** (3) Sr I (3) (3) Grade Term Grade Term Grade Term Grade Term Grade Term 15 hrs

**BIOM 4784** 

**(2)** 

Term

Grade

Engr Elec <sup>4</sup>

**EECE 3203** (3)

Term

Grade

Soc Sci 23

(3)

Grade

Term

- 1. "C-" or better in all engineering, math, physics, chemistry, and biology courses used toward graduation.
- 2. 6 hours of Humanities from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212
- 3. 6 hours of Social Science from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212
- 4. Must be an upper division (3XXX/4XXX) Engineering course. TECH 4472 may also be applied as an Engineering Elective.
- 5. May be an upper division (3XXX/4XXX) Engineering, Science, Math or Technology course. (note TECH 4472 CAD is Fall term only)

**BIOM 4782** 

**(1)** 

Grade

Term

6. BIOM 3110 is Spring term only and BIOL 3730 is Fall term only

**BIOM Elec** 

**BIOM 4205** (3)

Grade

Term

Human 2<sup>2</sup>

Term

Grade

Total hours = 125

Sr II

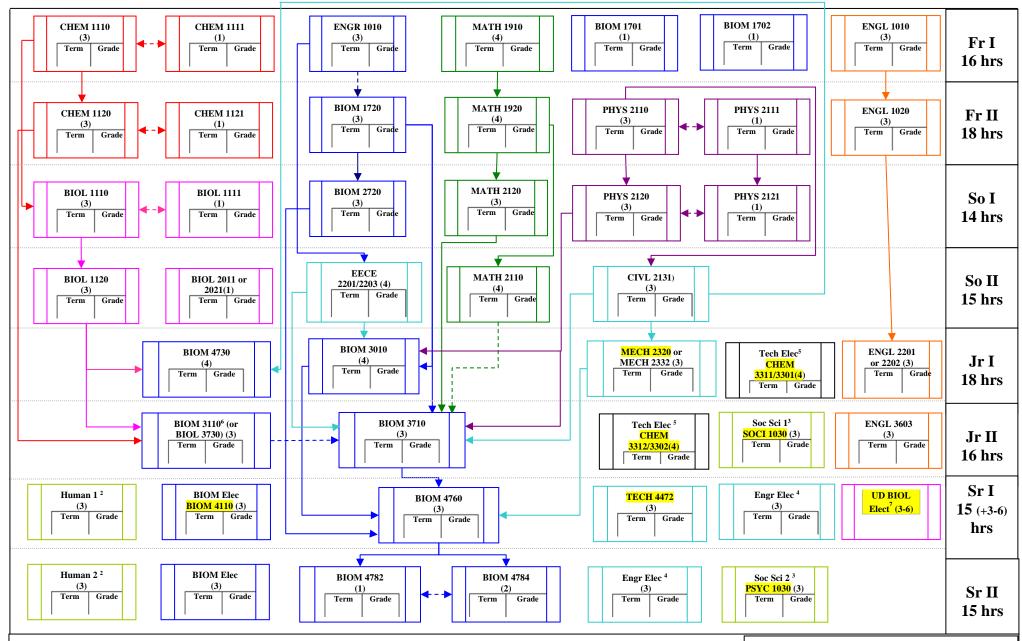
15 hrs

B.S BIOMEDICAL ENGINEERING DEGREE PROGRAM: BioImaging (Begin Fall 2023) Name: **UUID:** Advisor: Date of beginning program: **BIOM 1701 BIOM 1702 ENGL 1010 CHEM 1110** CHEM 1111 **MATH 1910 ENGR 1010 (1)** (1) (3) **(1)** Fr I Term Grade Grade Grade Term Grade Term Grad Term Grade Term Grade Term 16 hrs **BIOM 1720 MATH 1920 PHYS 2110 PHYS 2111 ENGL 1020 CHEM 1120** CHEM 1121 Fr II (3) (4) (1) (3) (3) **(1)** Term Grad Term Grade Term Grade Term Grade Term Grade 18 hrs Grade Term Grade Term MATH 2120 **BIOM 2720 BIOL 1110 BIOL 1111** PHYS 2120 PHYS 2121 So I (3) (3) (3)**(1)** Grade Term Grad Term Term Grade Grade 14 hrs Term Grade Term Grade BIOL 2011 or EECE MATH 2110 **BIOL 1120** CIVL 2131) So II 2021(1) 2201/2203 (4) (4) (3) Grade Term Term Grade Grade 15 hrs Grade Term Grade Term MECH 2320 or Engr Elec 4 **BIOM 3010** Soc Sci 3 **ENGL 2201 or** MECH 2332 (3) **EECE 3203** (3) Jr I **(4)** 2202 (3) Term Grade Term Grade Term Grade Term Grade Term Grade **16 hrs BIOM 3710 BIOM 4730** Engr Elec 4 BIOM 31106 (or ENGL 3603 **EECE 3204** (3) BIOL 3730)(3) (3) Jr II Term Grade Term Grade Grade Grade Term Grade 16 hrs Human 1<sup>2</sup> BIOM Elec Tech Elec 5 **TECH 4472 BIOM 4760** (3) BIOM 4801 (3) Sr I Grade Term Grade Term Grade Term Grade Term Grade 15 hrs Human 2<sup>2</sup> **BIOM Elec BIOM 4782 BIOM 4784** Engr Elec 7 Soc Sci 1 3 **BIOM 4150** (3) (1) (2) **EECE 4232, 4242 or 4243** (3) (3) Sr II Grade Term Term Grade Term Grade Term Grade Term Grade Term Grade 15 hrs "C-" or better in all engineering, math, physics, chemistry, and biology courses used toward graduation. 6 hours of Humanities from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212 Total hours = 1256 hours of Social Science from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212

- Must be an upper division (3XXX/4XXX) Engineering course. TECH 4472 may also be applied as an Engineering Elective.
- May be an upper division (3XXX/4XXX) Engineering, Science, Math or Technology course. (note TECH 4472 CAD is Fall term only)
- BIOM 3110 is Spring term only and BIOL 3730 is Fall term only
- Choose One from highly recommended (3hrs: BIOM 4150: Engr Tools Design Med Devices; EECE 4232: Discrete Signal Process, 4242: Electro-Optics, or 4243: Linear Optical Systems)

#### B.S BIOMEDICAL ENGINEERING DEGREE PROGRAM: Pre-Med Focus (Begin Fall 2023)

Name: UUID: Advisor: Date of beginning program:



- 1. "C-" or better in all engineering, math, physics, chemistry, and biology courses used toward graduation.
- 2. 6 hours of Humanities from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212
- 3. 6 hours of Social Science from approved list: see university catalogue (Intro to Soc and Gen Psych highly recommended for medical school)
- 4. Must be an upper division (3XXX/4XXX) Engineering course. Note TECH 4472 is required course and is used to satisfy an Engineering Elective.
- 5. May be an upper division (3XXX/4XXX) Engineering, Science, Math or Technology course. (note TECH 4472 CAD is Fall term only)
- 6. BIOM 3110 is Spring term only and BIOL 3730 is Fall term only
- One or two Unner Division Biology/Chemistry (3-6hrs) additional course work (e.g. BIOL 3130; BIOL 4445; BIOL 3500; BIOL 3072; CHEM 4511)

Total hours = 127+\*

\*w/additional course work, total hours may >130, though only 125hrs are needed for BS degree

#### B.S BIOMEDICAL ENGINEERING DEGREE PROGRAM: GENERAL (Begin Fall 2023)

Name: **Advisor:** Date of beginning program: **UUID: BIOM 1702 CHEM 1110 CHEM 1111** ENGR 1010 **MATH 1910 BIOM 1701** ENGL 1010 **(1)** Fr I Grade Term Grade Term Grade Term Grade Term Term Grade Term Grade Term 16 hrs BIOM 1720 MATH 1920 **PHYS 2110** PHYS 2111 ENGL 1020 **CHEM 1120 CHEM 1121** Fr II (3) **(1)** (3) **(1)** Term Grade Grade Term Grade Term Grade Term Grade 18 hrs Term Grade Term Grade BIOM 2720 **MATH 2120 BIOL 1110 BIOL 1111** PHYS 2120 PHYS 2121 So I (3) (3) (1) (3) **(1)** Grade Term Grade Term Grade Grade Term Term 14 hrs Term Grade Term Grade EECE CIVL 2131) **MATH 2110 BIOL 1120** BIOL 2011 or So II 2201/2203 (4) (4) (3) (3) 2021(1) Term Grade 15 hrs Term Grade Term Grade Term Grade Term Grade **BIOM 3010 MECH 2320 or** Soc Sci 13 ENGL 2201 or **BIOM 4730 (4)** Jr I MECH 2332 (3) 2202 (3) Term Grade Term Grade Grade Grade Grade Term 17 hrs Engr Elec 4 **BIOM 3710** BIOM 31106 (or Tech Elec 5 **ENGL 3603** (3) BIOL 3730) (3) (3) (3) (3) Jr II Term Grade Grade Term Grade Term Grade Term Term Grade 15 hrs Human 1<sup>2</sup> **BIOM Elec TECH 4472 BIOM 4760** Engr Elec <sup>4</sup> (3)Sr I (3) Term Grade Term Grade Term Grade Term Grade Term Grade 15 hrs Human 2<sup>2</sup> **BIOM Elec BIOM 4782 BIOM 4784** Engr Elec 4 Soc Sci 23 (3) **(1) (2)** (3) (3) Sr II Term Grade Term Grade Term Grade Term Grade Grade Grade Term **15 hrs** "C-" or better in all engineering, math, physics, chemistry, and biology courses used toward graduation. Total hours = 1256 hours of Humanities from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212 6 hours of Social Science from approved list. https://catalog.memphis.edu/preview\_program.php?catoid=26&poid=10212 Must be an upper division (3XXX/4XXX) Engineering course. TECH 4472 may also be applied as an Engineering Elective. updated March 2023 May be an upper division (3XXX/4XXX) Engineering, Science, Math or Technology course. (note TECH 4472 CAD is Fall term only) 5.

BIOM 3110 is Spring term only and BIOL 3730 is Fall term only