# Sample schedule for MechE/BME Additional Majors in the BMEC Track

Updated 7/19/19

***Mechanical Engineering***

***First Year***

| | **Fall** | **Units** |
|---|---|---|
| 21-120 | Differential & Integral Calculus | 10 |
| 24-101 | Fundamentals of Mechanical Eng. | 12 |
| 33-141 | Physics for Engineering Students I | 12 |
| 99-101 | Computing@Carnegie Mellon | 3 |
| 76-101 | Interpretation and Argument | 9 |
| | **Total:** | **46** |

| | **Spring** | **Units** |
|---|---|---|
| 21-122 | Integration & Approximation | 10 |
| xx-xxx | Second Introductory Engineering Course | 12 |
| xx-xxx | Physics II/Chemistry/Computer Science | 10-12 |
| xx-xxx | General Education Course | 9 |
| | **Total:** | **41-43** |

***Second Year***

| | **Fall** | **Units** |
|---|---|---|
| 21-259 | Calculus in Three Dimensions | 9 |
| 24-221 | Thermodynamics I | 10 |
| 24-261 | Statics | 10 |
| xx-xxx | Physics II/Chemistry/Computer Science | 10-12 |
| xx-xxx | General Education Course | 9 |
| 24-xxx | Machine shop/Intro to CAD/ISC | 1-2 |
| 39-210 | Experiential Learning I | 0 |
| | **Total:** | **49-52** |

| | **Spring** | **Units** |
|---|---|---|
| 21-260 | Differential Equations | 9 |
| 24-231 | Fluid Mechanics | 10 |
| 24-262 | Stress Analysis | 12 |
| xx-xxx | Physics II/Chemistry/Computer Science | 10-12 |
| xx-xxx | General Education Course | 9 |
| 24-xxx | Machine shop/Intro to CAD/ISC | 1-2 |
| xx-xxx | Lab Requirement | |
| 39-220 | Experiential Learning II | 0 |
| | **Total:** | **51-54** |

***Third Year***

| | **Fall** | **Units** |
|---|---|---|
| 24-302 | Mechanical Engineering Seminar (Fall or Spring) | 2 |
| 24-322 | Heat Transfer | 10 |
| 24-370 | Engineering Design I: Methods and Skills | 12 |
| 24-351 | Dynamics | 10 |
| 36-220 | Engineering Statistics and Quality Control | 9 |
| xx-xxx | General Education Course | 9 |
| 39-310 | Experiential Learning III | 0 |
| | **Total:** | **52** |

| | **Spring** | **Units** |
|---|---|---|
| 24-321 | Thermal-Fluids Experimentation | 12 |
| 24-311 | Numerical Methods | 12 |
| 24-352 | Dynamic Systems and Controls | 12 |
| xx-xxx | General Education Course | 9 |
| | **Total:** | **45** |

***Mechanical Engineering and BME***

***First Year***

| | **Fall** | **Units** |
|---|---|---|
| 21-120 | Differential & Integral Calculus | 10 |
| 24-101 | Fundamentals of Mechanical Eng. | 12 |
| 33-141 | Physics for Engineering Students I | 12 |
| 99-101 | Computing@Carnegie Mellon | 3 |
| 76-101 | Interpretation and Argument | 9 |
| | **Total:** | **46** |

| | **Spring** | **Units** |
|---|---|---|
| 21-122 | Integration & Approximation | 10 |
| **42-101** | **Introduction to BME** | **12** |
| 15-110 | Principles of Programming | 10 |
| **03-121** | **Modern Biology** | **9** |
| xx-xxx | General Education Course | 9 |
| | **Total:** | **50** |

***Second Year***

| | **Fall** | **Units** |
|---|---|---|
| 21-259 | Calculus in Three Dimensions | 9 |
| 24-221 | Thermodynamics I | 10 |
| 24-261 | Statics | 10 |
| 24-xxx | Machine shop/Intro to CAD/ISC | 1-2 |
| 33-107 | Physics for Engineering Students II | 12 |
| **42-201** | **Professional Issues in BME** | **3** |
| **42-202** | **Physiology** | **9** |
| **-or-** | | |
| **42-203** | **BME Laboratory** | |
| 39-210 | Experiential Learning I | 0 |
| | **Total:** | **54-55** |

| | **Spring** | **Units** |
|---|---|---|
| 21-260 | Differential Equations | 9 |
| 24-231 | Fluid Mechanics | 10 |
| 24-262 | Stress Analysis | 12 |
| 09-105 | Modern Chemistry I | 10 |
| **42-202** | **Physiology** | **9** |
| **-or-** | | |
| **42-203** | **BME Laboratory** | |
| 24-xxx | Machine shop/Intro to CAD/ISC | 1-2 |
| 39-220 | Experiential Learning II | 0 |
| | **Total:** | **51-52** |

***Third Year***

| | **Fall** | **Units** |
|---|---|---|
| 24-322 | Heat Transfer | 10 |
| 24-370 | Engineering Design I: Methods and Skills | 12 |
| 24-351 | Dynamics | 10 |
| 36-220 | Engineering Statistics and Quality Control | 9 |
| **42-XXX** | **BMEC Elective or 42-302 Biomedical Engineering Systems Modeling and Analysis** | **9-12** |
| xx-xxx | General Education Course | 9 |
| 39-310 | Experiential Learning III | 0 |
| | **Total:** | **59-62** |

| | **Spring** | **Units** |
|---|---|---|
| 24-302 | Mechanical Engineering Seminar (Fall or Spring) | 2 |
| 24-321 | Thermal-Fluids Experimentation | 12 |
| 24-311 | Numerical Methods | 12 |
| 24-352 | Dynamic Systems and Controls | 12 |
| **42-XXX** | **BMEC Elective or 42-302 Biomedical Engineering Systems Modeling and Analysis** | **9-12** |
| | **Total:** | **47-50** |

***Fourth Year***

| | **Fall** | **Units** |
|---|---|---|
| 24-441 | Engineering Design II: Conceptualization and Realization OR xx-xxx Elective | 12 |
| 24-452 | Mechanical Systems Experimentation | 9 |
| xx-xxx | Elective | 9 |
| xx-xxx | Elective | 9 |
| xx-xxx | General Education Course | 9 |
| | **Total:** | **48** |

| | **Spring** | **Units** |
|---|---|---|
| 24-441 | Engineering Design II: Conceptualization and Realization OR xx-xxx Elective | 12 |
| xx-xxx | Mechanical Engineering Technical Elective | 9-12 |
| xx-xxx | Elective | 9 |
| xx-xxx | Elective | 9 |
| xx-xxx | General Education Course | 9 |
| | **Total:** | **48-51** |

***Fourth Year***

| | **Fall** | **Units** |
|---|---|---|
| 24-452 | Mechanical Systems Experimentation | 9 |
| **42-401** | **Foundations of BME Design** | **6** |
| **42-xxx** | **BMEC Track Elective*** | **9-12** |
| xx-xxx | General Education Course | 9 |
| xx-xxx | General Education Course | 9 |
| xx-xxx | Elective | 9 |
| | **Total:** | **51-54** |

| | **Spring** | **Units** |
|---|---|---|
| **42-402** | **BME Design Project** | **9** |
| **42-xxx** | **BMEC Track Elective*** | **9-12** |
| xx-xxx | General Education Course | 9 |
| xx-xxx | General Education Course | 9 |
| xx-xxx | Elective | 9 |
| | **Total:** | **45-48** |

**Minimum no. of units to graduate: 382 (MechE), 403 (BME/MechE)**

**Core courses (All Required)**
42-101 Introduction to Biomedical Engineering - Fall and Spring
42-201 Professional Issues in Biomedical Engineering - Fall and Spring
42-202 Physiology - Fall and Spring
42-203 Biomedical Engineering Laboratory# - Fall and Spring
42-302 Biomedical Engineering Systems Modeling and Analysis
03-121 Modern Biology - Fall and Spring
42-401 Foundations of BME Design* - Fall
42-402 BME Design Project– Spring

# Also known as 03-206 for pre-med students.
*42-401 serves as the precursor/pre-requisite for 42-402 BME Design.

For the Biomechanics track, you must take the following combination of courses:

- One (1) BMEC **Required** Elective
- Two (2) BMEC Electives (either **Required** or **Additional**)

**Required BMEC Electives (must take at least one of the following)**
42-341 Introduction to Biomechanics
42-441 Cardiovascular Biomechanics
42-645/24-655 Cellular Biomechanics
42-646/06-646/24-657 Molecular Biomechanics

**Other BMEC Additional Electives**
33-441/03-439 Introduction to BioPhysics
42-444 Medical Devices
42-447 Rehabilitation Engineering
42-640/24-658 Image-Based Computational Modeling and Analysis
42-641/24-676 Bio-Inspired Robotics
42-643/24-615/06-623 Microfluidics
42-X00 BME Research* OR 39-500 CIT Honors Thesis* OR 42-6XX Clinical Course (Surgery for Engineers/ Precision Medicine/ICU Medicine)

* The 42-X00 research project (42-200/300/400 Sophomore/Junior/Senior Biomedical Engineering Research Project OR 39-500 Honors Research Project) must be on a BME topic that is aligned to the track, supervised or co-supervised by a BME faculty member, and conducted for 9 or more units of credit.**
Some Special Topics and newly offered or intermittently offered courses may be acceptable as BMEC track electives. Students should consult with their BME advisors and petition the BME Undergraduate Affairs Committee for permission to include such courses as BMEC track electives.