Pre-Approved Technical Elective (TE) Course Options for Bioengineering: BioSystems (BE29) Major

The Technical Elective (TE) requirement is satisfied by courses totaling 8 units, of which all units must have “engineering” as the primary component. Courses shown below have “engineering” as the primary component; are “BENG” courses not required for the Bioengineering: BioSystems major; or other 4 unit, upper-division (100 series) courses taught in one of the departments in the Jacobs School of Engineering. Courses must be taken for a letter grade. Note: any prerequisite courses must also be completed. Not all courses are offered each year/quarter. This list is subject to change. Please verify your Technical Electives prior to enrollment with Student Affairs.

- BENG 112A – Tissue Biomechanics
- BENG 112B – Fluid and Cell Biomechanics
- BENG 123 – Dynamic Simulation in Bioengineering
- BENG 160 – Chemical and Molecular Bioengineering Techniques
- BENG 161A – Bioreactor Engineering
- BENG 161B – Biochemical Engineering
- BENG 166A – Cell and Tissue Engineering
- BENG 168 – Biomolecular Engineering
- BENG 186A – Principles of Biomaterials Design
- BENG 193 – Clinical Bioengineering
- BENG 196 – Bioengineering Industrial Internship
- BENG 199 (2 quarters with same faculty)
- CENG 100 – Material and Energy Balances
- CENG/MAE 101A – Introductory Fluid Mechanics
- CENG/NANO 134 – Polymeric Materials
- CENG 199 (2 quarters with same faculty)
- CSE 100 – Advanced Data Structures
- CSE 101 – Design and Analysis of Algorithms
- CSE 112 – Advanced Software Engineering
- CSE 140/140L – Components and Designs Techniques for Digital Systems/Laboratory
- CSE 150A – Intro to Artificial Intelligence: Probabilistic Reasoning and Decision Making
- CSE 150B – Intro to Artificial Intelligence: Search and Reasoning
- CSE 151A – Intro to Machine Learning
- CSE 151B – Deep Learning
- CSE 166 – Image Processing
- CSE 176A – Health Care Robotics
- CSE 180 – Biology Meets Computing
- ECE 102 – Introduction to Active Circuit Design
- ECE 103 – Fundamentals of Devices and Materials
- ECE 107 – Electromagnetism
- ECE 118 – Computer Interfacing
• ECE 120 – Solar System Physics
• ECE 128B – Power Grid Modernization
• ECE 138L – Microstructuring Processing Technology Laboratory
• ECE 140B – The Art of Product Engineering II
• ECE 143 – Programming for Data Analysis
• ECE 144 – LabVIEW Programming: Design and Applications
• ECE 161B – Digital Signal Processing
• ECE 174 – Introduction to Linear and Nonlinear Optimization with Applications
• ECE 175A – Elements of Machine Intelligence: Pattern Recognition and Machine Learning
• ECE 199 – (2 quarters with same faculty)
• ECE 253 – Fundamentals of Digital Image Processing
• ENG 100D and 2 quarters of ENG 100L (must take all for a total of 8 units)
• MAE/CENG 101A – Introductory Fluid Mechanics
• MAE 101B – Advanced Fluid Mechanics
• MAE 105 – Intro to Mathematical Physics
• MAE 107 – Computational Methods in Engineering
• MAE 108 – Probability and Statistical Methods for Mechanical Engineering
• MAE 118 – Intro to Energy Systems
• MAE 119 – Introduction to Renewable Energy: Solar and Wind
• MAE 120 – Introduction to Nuclear Energy
• MAE 125 – Building Energy Efficiency
• MAE 130 – Advanced Vibrations
• MAE 131A/SE 110A– Solid Mechanics I
• MAE 143A – Signals and Systems
• MAE 143B – Linear Control
• MAE 144 – Embedded Control and Robotics
• MAE 145 – Introduction to Robotic Planning and Estimation
• MAE 148 – Introduction to Autonomous Vehicles
• MAE 149 – Sensor Networks
• MAE 150 – Computer-Aided Design
• MAE 154 – Product Design and Entrepreneurship
• MAE 170 – Experimental Techniques
• MAE 180A – Spacecraft Guidance I
• MAE 199 – (2 quarters with same faculty)
• NANO 102 – Foundations in Nanoengineering: Chemical Principles
• NANO 103 – Foundations in Nanoengineering: Biochemical Principles
• NANO 106 – Crystallography of Materials
• NANO 108 – Materials Science and Engineering
• NANO/CENG 134 – Polymeric Materials
• NANO 156 – Nanomaterials
• NANO 175 – Nanoengineering in Medicine
• NANO 199 – (2 quarters with same faculty)
• SE 101A – Mechanics I: Statics
• SE 110A/MAE 131A – Solid Mechanics I
• SE 115 – Fluid Mechanics for Structural Engineering

**BENG 199, Independent Study Research Courses.** BENG students interested in doing research via BENG 199 courses must enroll with the same faculty member in two quarters of BENG 199. *It is preferred (though not required) that the two quarters be taken sequentially.* Completion of two quarters of BENG 199 will satisfy both TE requirements—(a.) completion of a total of 8 units and (b.) the total 4 units required must be “engineering-related.”

**“Teams in Engineering Sciences” (TIES) Courses.** ENG 100D and 100L courses are considered “engineering-related” courses. Students will receive 8 units of TE credit after passing 1 quarter of ENG 100D (4 units) taken concurrently with ENG 100L (2 units), and passing 1 additional quarters of ENG 100L.

**BENG 196, Bioengineering Industrial Internship course.** BENG students who obtain a bioengineering related internship and obtain approval and verification of technical content from the Bioengineering Departmental Industrial Relations board may enroll to use 4 units towards satisfying 1 Technical Elective.

**BENG 197, Engineering Internship or BENG 198, Directed Group Project courses may not be used to satisfy TE requirements in any majors in the Department of Bioengineering.**