Pre-Approved Technical Elective (TE) Course Options for *Bioengineering: Bioinformatics (BE28)* Program

The Technical Elective (TE) requirement is satisfied by courses totaling 8 units, all of which must have "engineering" as the primary component. Courses shown below have "engineering" as the primary component; are "BENG" courses not required for the *Bioengineering: Bioinformatics* 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 110 – Foundation of Biomechanics
- BENG 112A – Tissue Biomechanics
- BENG 112B – Fluid and Cell Biomechanics
- BENG 123 – Dynamic Simulation in Bioengineering
- BENG 133 – Numerical Analysis and Computational Engineering
- BENG 134 – Measurements, Statistics and Probability
- BENG 141 – Biomedical Optics and Imaging
- BENG 160 – Chemical and Molecular Bioengineering Techniques
- BENG 161A – Bioreactor Engineering
- BENG 161B – Biochemical Engineering
- BENG 166A – Cell and Tissue Engineering
- BENG 186B – Principles of Bioinstrumentation 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 105 – Theory of Computability
- CSE 110 – Software Engineering
- 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 158 – Recommender Systems and Web Mining
- CSE 166 – Image Processing
- CSE 167 – Computer Graphics
- CSE 176A – Health Care Robotics
- CSE 180 – Biology Meets Computing
- ECE 101 – Linear Systems Fundamentals
- 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 138L – Microstructuring Processing Technology Laboratory
- ECE 140B – The Art of Product Engineering II
- ECE 143 – Programming for Data Analysis
- ECE 161B – Digital Signal Processing I
- 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 209 – Statistical Learning for Biosignal Processing
- ECE 253 – Fundamentals of Digital Image Processing
- ENG 100D and 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 145 – Introduction to Robotic Planning and Estimation
- MAE 148 – Introduction to Autonomous Vehicles ☐   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 – Modern Concepts in Nanotechnology
- 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 <u>must enroll with the same faculty member</u> 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 <u>both</u> 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 quarter 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 <u>not</u> be used to satisfy TE requirements in any majors in the Department of Bioengineering.**