**College of Engineering and Applied Science: PhD Bioengineering Program Sheet**

**Pre 2018 Matriculation**

The PhD in bioengineering requires 36 credit hours of coursework and at least 30 credit hours of dissertation work.

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| **Life Sciences Core (6 credits)** | | | |
| Course ID and Title | Semester Taken | Grade | Credits Earned |
| **Core I** | | | |
| BIOE 5010 - Cell and Molecular Biology for Bioengineers (Fall Only, REQUIRED) |  |  |  |
| **Core II -** (Choose one the following)  *Please refer to the current class schedule for fall/spring course offerings.* | | | |
| BIOE 5011 - Systems Physiology for Bioengineers (Spring Only) |  |  |  |
| BIOE 5073 - Neural Interfaces & Bionic Limbs |  |  |  |
| CANB 7600 - Cancer Biology |  |  |  |
| NRSC 7600 - Cellular and Molecular Biology |  |  |  |
| NRSC 7610 - Fundamentals of Neuroscience |  |  |  |
| Life Sciences Core Earned Credit Subtotal: | | |  |

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| **Quantitative Methods Core (6 credits)** | | | |
| Course ID and Title | Semester Taken | Grade | Credits Earned |
| **Core I** | | | |
| BIOE 5020 - Analytic Methods for Engineering Analysis (Fall Only) |  |  |  |
| **Core II** | | | |
| BIOE 5021 - Numerical Methods for Engineering Analysis (Spring Only) |  |  |  |
| Quantitative Methods Core Earned Credit Subtotal: | | |  |

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| **Technology Core (6 credits) -** Choose a minimum of 6 credits (usually two courses) from the following list. Please refer to the current class schedule for fall/spring course offerings. | | | |
| Course ID and Title | Semester Taken | Grade | Credits Earned |
| BIOE 5053 - Optics and Microscopy in Biomedical Research |  |  |  |
| BIOE 5054 - Regulatory Affairs |  |  |  |
| BIOE 5063 - 3D Modeling for Bioengineers |  |  |  |
| BIOE 5064 - Advanced MatLab for Bioengineers and Life Scientists |  |  |  |
| BIOE 5068 - Introduction to Medical Imaging |  |  |  |
| BIOE 5069 - Advanced Biomechanics |  |  |  |
| BIOE 5073 - Neural Interfaces & Bionic Limbs |  |  |  |
| BIOE 5074 - Introduction to Laboratory Animal Research |  |  |  |
| BIOE 5083 - Polymers in Biomedical Applications |  |  |  |
| BIOE 5420 - Special Topics in Bioengineering (for the following topics only):   * Rehabilitation and Assistive Technology * Introduction to Design, Disability, and Aging * BioDesign * Mechatronics * Stem Cell and Regenerative Medicine * Applying Systems Engineering to Bioengineering * Biomedical Device Design and Entrepreneurship * Data Science Methods |  |  |  |
| BIOL 6764 - Biological Data Analysis |  |  |  |
| CSCI 5211 - Mobile Computing and Programming |  |  |  |
| ELEC 5638 - Digital Imaging Processing |  |  |  |
| ELEC 5667 - Wavelet Theory and Application |  |  |  |
| MECH 5020 - Biomechanics |  |  |  |
| MECH 5025 - Advanced Biomechanics |  |  |  |
| MECH 5175 - Finite Element Stress Analysis |  |  |  |
| MECH 5143 - Theory of Elasticity |  |  |  |
| **Students may also apply the following courses from the University of Colorado Boulder toward the Technology Core Requirement.**  See ‘concurrent registration’ in this document for more information. | | | |
| Course ID and Title | Semester Taken | Grade | Credits Earned |
| MCEN 5115 - Mechatronics & Robotics I (Boulder) |  |  |  |
| MCEN 5023 - Solid Mechanics I (Boulder) |  |  |  |
| Technology Core Earned Credit Subtotal: | | |  |

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| **Research & Clinical Core (3 credits)** | | | |
| Course ID and Title | Semester Taken | Grade | Credits Earned |
| BIOE 5041 - Clinical Experiences for Bioengineers (Spring Only, 1 credit) |  |  |  |
| BIOE 5040 - Research Methods for Bioengineers (Spring Only, 2 credits) |  |  |  |
| Research & Clinical Core Earned Credit Subtotal: | | |  |

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| **Electives (15 credits) – Should be approved by committee** | | | |
| Course ID and Title | Semester Taken | Grade | Credits Earned |
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| Research & Clinical Core Earned Credit Subtotal: | | |  |

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| **Research (30 credits)** | | | |
| Course ID and Title | Semester Taken | Grade | Credits Earned |
| BIOE 8990 – Doctoral Dissertation |  |  |  |
| Research Earned Credit Subtotal: | | |  |

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