**College of Engineering, Design, and Computing: MS Bioengineering Program Sheet**

The Master of Science requires 30 credit hours of coursework, including 3 to 6 credit hours of a master’s project or thesis. Note graduate credits must receive a B- or better. Note most courses only taught in the fall (F) or spring (S)

Fall Semester 1:

* Meet with your academic advisor (Note: You must meet with your advisor every Fall semester in order to register for your spring classes, it is recommended meet once a semester to make sure you are on track)
* Attend Pitch Night, contact faculty whose research interests you
* Complete Mentor Selection Form and submit to the Director of Student Services (DSS) (Note: This form is required to enroll in BIOE 5040 (Research Methods) for the Spring)

Spring Semester 1:

* Take BIOE 5040 (Research Methods) and BIOE 5041 (Clinical Experiences)
* Form defense committee (3 faculty total – 2 must be core faculty per list on website)

Final Semester – See email from DSS each semester for deadlines

* Apply to graduate through UCD Access Portal
* Complete and Submit the Application for Candidacy to DSS
* Schedule defense date and reserve room (typically 2 hours duration)
* Complete and sign the Declaration of Original Work
* Complete and Submit the Request for Examination to DSS
* Send copy of thesis/project to all committee members at least 2 weeks before the defense
* Send copy of thesis/project to [thesisdissertationsupport@ucdenver.edu](mailto:thesisdissertationsupport@ucdenver.edu) for format review
* Defend thesis or project (45 min presentation, 15 min questions, 45 min closed exam)
* Get approvals on Thesis Approval Form and submit to Committee Chair
* Thesis only – Submit final thesis to ProQuest
* Complete Exit Survey

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| **Bioengineering Core (5 to 6 credits)** | | | |
| Course ID and Title | Semester | Grade | Credits |
| BIOE 5040 - Research Methods for Bioengineers (S) 2 credits |  |  |  |
| BIOE 5041 - Clinical Experiences for Bioengineers (S) 1 credit |  |  |  |
| BIOE 5000 - Department Seminar (F, S) min 2 credits, max 3 credits |  |  |  |
| Bioengineering Core Earned Credit Subtotal: | | |  |

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| **Quantitative Methods Core (3 credits)** | | | |
| Course ID and Title | Semester | Grade | Credits |
| BIOE 5020 - Analytic Methods for Engineering Analysis (F) |  |  |  |
| Quantitative Methods Core Earned Credit Subtotal: | | |  |

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| **Quantitative Methods Electives (optional): Choose from among the following** | | | |
| Course ID and Title | Semester | Grade | Credits |
| BIOE 5021 - Numerical Methods for Engineering Analysis (S) |  |  |  |
| BIOE 5064 - Advanced MatLab for Bioengineers (F) |  |  |  |
| BIOE 5420 - Image Processing for Bioengineers (S) |  |  |  |
| BIOE 5420 - Data Science Methods (F) |  |  |  |
| BIOL 6764 - Biological Data Analysis (S) |  |  |  |
| BIOS 6601 - Applied Biostatistics |  |  |  |
| MECH 5175 - Finite Element Analysis (F) |  |  |  |
| MECH 5143 - Theory of Elasticity (S) |  |  |  |
| MCEN 5023 - Solid Mechanics I (Boulder) (F) |  |  |  |
| CSCI 5625 - Computer Vision (F) |  |  |  |
| CSCI 5931 - Deep Learning (S) |  |  |  |
| Quantitative Methods Electives Earned Credit Subtotal: | | |  |

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| **Technology Electives (6 credits required, 3 must be BIOE): Choose from among the following** | | | |
| Course ID and Title | Semester | Grade | Credits |
| BIOE 5039 - Mechatronics and Embedded Systems (F) |  |  |  |
| BIOE 5053 - Optics and Microscopy in Biomed Research (F) |  |  |  |
| BIOE 5054 - Regulatory Affairs (F) |  |  |  |
| BIOE 5057 - Rehabilitation and Assistive Technology (F) |  |  |  |
| BIOE 5063 - 3D Modeling for Bioengineers (F) |  |  |  |
| BIOE 5067 - Human Factors and Usability Testing for Bioengineers (SP) |  |  |  |
| BIOE 5073 - Neural Interfaces & Bionic Limbs (S) |  |  |  |
| BIOE 5068 - Introduction to Medical Imaging (F) |  |  |  |
| BIOE 5069 - Advanced Biomechanics (S) |  |  |  |
| BIOE 5083 - Polymers in Biomedical Applications (SP) |  |  |  |
| BIOE 5300 - Medical Device Design and Entrepreneurship (F) |  |  |  |
| BIOE 5420 - Special Topics in Bioengineering (for the following topics):  Introduction to Design, Disability, and Aging (S),  Engineering the ECM (F), MedTech Commercialization (F),  Image Processing for Bioengineers (S) |  |  |  |
| CSCI 5211 - Mobile Computing and Programming |  |  |  |
| MECH5030 – Exp and Comp Methods in Human Movement (S) |  |  |  |
| MECH 5020 - Biomechanics (F) |  |  |  |
| MCEN 5115 - Mechatronics & Robotics I (Boulder) (F) |  |  |  |
| Technology Earned Credit Subtotal: | | |  |

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| **Life Sciences Electives (6 credits required, 3 must be BIOE): Choose from among the following** | | | |
| Course ID and Title | Semester | Grade | Credits |
| BIOE 5010 - Cell and Molecular Biology for Bioengineers (F) |  |  |  |
| BIOE 5011 - Systems Physiology for Bioengineers (S) |  |  |  |
| BIOE 5200 - Stem Cells and Regenerative Medicine (F) |  |  |  |
| BIOE 5420 - Special Topics in Bioengineering: Engineering the ECM (F) |  |  |  |
| BIOE 5420 - Special Topics in Bioengineering: Anatomy, Physiology and Medical Terminology for Bioengineers (S) |  |  |  |
| BIOE 5073 - Neural Interfaces & Bionic Limbs (S) |  |  |  |
| BIOE 5074 - Introduction to Laboratory Animal Research (S) |  |  |  |
| CANB 7600 - Cancer Biology (S) |  |  |  |
| NRSC 7600 - Cellular and Molecular Biology (S) |  |  |  |
| NRSC 7610 - Fundamentals of Neuroscience (S) |  |  |  |
| NRSC 7615 - Developmental Neurobiology (F) |  |  |  |
| Life Sciences Earned Credit Subtotal: | | |  |

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| **General Electives (Remainder of credits) – In sciences, engineering, business related to the thesis or project.** | | | |
| Course ID and Title | Semester | Grade | Credits |
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| Electives Earned Credit Subtotal: | | |  |

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| **Research Core (3-6 credits either Thesis or Project)** | | | |
| Course ID and Title | Semester | Grade | Credits |
| BIOE 6950 - MS Thesis – Public defense of hypothesis-driven research with thesis submitted to ProQuest |  |  |  |
| BIOE 6960 - MS Project – Private defense that can include design projects w/o published report |  |  |  |
| Research Core Earned Credit Subtotal: | | |  |

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| **Total Credits Earned (30 minimum):** |  |

Suggested Courses for Specializations (\*Required courses for certificate are in red)

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|  | Neural Engineering\* | Biomaterials, Tissue Engineering, and Regenerative Medicine | Assistive and Inclusive Technologies\* | Medical Device Design, Entrepreneurship, and Regulatory Affairs\* | Orthopedics and Prosthetics | Computational Biomechanics and Bioinformatics |
| BIOE Core  (5-6 credits) | BIOE5040 Res Methods (2)  BIOE5041 Clin Exp (1)  BIOE5000 Seminar (2-3) | BIOE5040 Res Methods (2)  BIOE5041 Clin Exp (1)  BIOE5000 Seminar (2-3) | BIOE5040 Res Methods (2)  BIOE5041 Clin Exp (1)  BIOE5000 Seminar (2-3) | BIOE5040 Res Methods (2)  BIOE5041 Clin Exp (1)  BIOE5000 Seminar (2-3) | BIOE5040 Res Methods (2)  BIOE5041 Clin Exp (1)  BIOE5000 Seminar (2-3) | BIOE5040 Res Methods (2)  BIOE5041 Clin Exp (1)  BIOE5000 Seminar (2-3) |
| Quantitative Methods Core (3 credits) | BIOE5020 Analytic Methods | BIOE5020 Analytic Methods | BIOE5020 Analytic Methods | BIOE5020 Analytic Methods | BIOE5020 Analytic Methods | BIOE5020 Analytic Methods |
| Suggested Quantitative Elective (3 credits) | **Choose 1 from among**:  BIOE5021 Num Methods  BIOE5420 Special Topics (Image Processing)  BIOE5420 Data Science Methods  BIOE5064 Adv. Matlab  CSCI5931 Deep Learning  CSCI5625 Computer Vision | BIOS6601 Appl Biostat | BIOS6601 Appl Biostat |  | BIOE5021 Num Methods | BIOE5021 Num Methods |
| Suggested Technology Electives (6 credits) | **Choose 2 from among**:  BIOE5073 Bionic Limbs  BIOE5053 Optics & Microscopy  BIOE 5039 Mechatronics  BIOE 5063 3D Modeling | BIOE5083 Polymers  BIOE5420 Eng ECM | BIOE5057 Rehab / Ass Tech  BIOE5420 Design Dis Age | BIOE5054 Reg Affairs  BIOE5300 BioMed Device Design | BIOE 5039 Mechatronics  MECH5030 Exp and Comp Methods in Human Move | BIOE5063 3D Biodesign  BIOE5069 Adv Biomech |
| Suggested Life Sci Electives (6 credits) | BIOE5010 Cell Bio  NRSC7610 Fundamentals of Neurobiology | BIOE5010 Cell Bio  BIOE5011 Sys Phys | BIOE5420 Anat Med Term  BIOE5011 Sys Phys | BIOE5010 Cell Bio  BIOE5011 Sys Phys | BIOE5010 Cell Bio  BIOE5073 Bionic Limbs | BIOE5010 Cell Bio  BIOE5011 Sys Phys |
| Other Possible Electives | NRSC7600 Cell and Molec Neurobiology | BIOE5420 Stem Cells  CSDV7670 Organoids | BIOE5067 Human Fact  BIOE 5420 - Rehabilitation Engineering Fieldwork  BIOE5063 3D Biodesign | BIOE5420 MedTech Comm  ENTP6020 Bus Model Dev | NRSC7610 Fundamentals of Neurobiology  BIOE5420 Stem Cells  BIOE5420 Eng ECM  BIOE5063 3D Biodesign | BIOE5064 MATLAB  BIOE5063 3D Biodesign |
| Research  (3-6 credits) | BIOE6950 Thesis | BIOE6950 Thesis | BIOE6960 Project | BIOE6960 Project | BIOE6950 Thesis | BIOE6950 Thesis |