Biomedical Engineering Graduate Concentration – Fall 2015

Medical Product Development
Advisor: Tim Bruns, Ph.D. (Fall 2015 term)
Advisor: Jan Stegemann, Ph.D. (Winter 2016 term)

MEDICAL PRODUCT DESIGN AND DEVELOPMENT (both courses are required):
BIOMEDE 599.002 Graduate BME Innovative Design Team (3) (I)
BIOMEDE 599.004 Graduate BME Innovative Design Team (4) (II)

GENERAL (both courses are required):
BIOMEDE 500 Biomedical Engineering Seminar (1) (I, II)
BIOMEDE 550 Ethics and Enterprise (1) (I)

MATHEMATICS (select one course):
MATH 450 Advanced Mathematics for Engineers I (4) (I, II, IIIb)
MATH 454 Boundary Value Problems for Partial Differential Equations (3) (I,II,IIa)
MATH 462 Mathematical Models (3) (II)
MATH 463 Mathematical Modeling in Biology (3) (I)
MATH 471 Introduction to Numerical Methods (3) (I,II,IIb)
MATH 550 Introduction to Adaptive Systems (3) (I)
MATH 555 Introduction to Functions of a Complex Variable with Applications (3) (I,II)
MATH 556 Applied Functional Analysis (3) (I)
MATH 557 Applied Asymptotic Analysis (3) (II)
MATH 558 Applied Nonlinear Dynamics (3) (I)
MATH 559 Topics in Applied Mathematics (3)
MATH 561 Linear Programming I (3) (I,II)
MATH 562 Continuous Optimization Methods (3) (II)
MATH 563 Advanced Mathematical Methods for the Biological Sciences (3) (II)
MATH 564 Topics Math Biology (3)
MATH 571 Numerical Linear Algebra (3) (I,II)
MATH 572 Numerical Methods for Differential Equations (3) (II)
MATH 651 Topics in Applied Mathematics I (3) (I,II)
MATH 656 Introduction to Partial and Differential Equations (3) (I)
MATH 657 Nonlinear Partial Differential Equations (3) (II)
MATH 756 Advanced Topics in Partial Differential Equations (3)
MECHENG 501 Math Methods in Mechanics (3) (II)
MECHENG 564 Linear Systems Theory (4) (I)

BIOINSTRUMENTATION (select one course):
BIOLCHEM 516 Intro Biochemistry Lab (3) (I)
BIOMEDE 458 Biomedical Instrumentation and Design (4) (I, II)
BIOMEDE 510 Medical Imaging Laboratory (3) (II)
IOE 432 Industrial Engineering Instrumentation Methods (3) (I)
MCDB 429 Cellular & Molecular Biology Lab (3) (II)

STATISTICS (select one course):
BIOMEDE 503 Statistical Methods for Biomedical Engineering (3) (II)
BIOSTAT 602 Biostatistical Inference (4) (II)
BIOSTAT 650 Applied Statistics I: Linear Regression (4) (I)
BIOSTAT 651 Applied Statistics II: Extensions for Linear Regression (3) (II)
EECS 501 Probability and Random Processes (4) (I,II)
IOE 461 Quality Engineering Principles and Analysis (3) (I)
STATS 470 Introduction to the Design of Experiments (4) (I)
STATS 500 Applied Statistics I (3) (I)
STATS 525 Probability Theory (3) (I)

NOTE: BME graduate students can only take EECS 501 in the winter term.
LIFE SCIENCE (two courses are required – at least one course must be outside of the College of Engineering):

**Required:**
- BIOMEDE 519  Quantitative Physiology (4) (I)

**Select one course:**
- ANAT 403  Human Anatomy (5) (I, II)
- ANAT 541  Mammal Reprod (4) (II)
- BIOLCHEM 451  Introductory Biochemistry I (4) (I)
- BIOLCHEM 515  Introductory Biochemistry (3) (I, II)
- BIOLCHEM 550  Macromol Struc & Func (3) (I)
- BIOPHYS 520  Biophys Chem I (3) (I)
- CANCBIO 553  Cancer Biol (2) (I)
- CDB 530  Cell Biology (3) (I)
- CDB 550  Histology (4) (II)
- CDB 581  Developmental Genetics (3) (I)
- CDB 583  Stem Cells Regen Bio (3) (II)
- KINESLGY 522  Clin Neurophys Image (3) (II)
- KINESLGY 545  Metab Respon to Exer (3) (II)
- MCDB 422  Cellular and Molecular Neurobiology (3) (I)
- MCDB 423  Neurology Lab (3) (I)
- MCDB 427  Molecular Biology (4) (I)
- MCDB 428  Cell Biology (4) (II)
- MCDB 429  Laboratory in Cell and Molecular Biology (3) (II)
- MCDB 435  Intracellular Trafficking (3) (I)
- MCDB 530  Cell Biology (3) (I)
- MICROBIOL 440  Immunology (3) (II)
- NEUROSCI 570  Human Neuroanatomy (3) (I)
- NEUROSCI 601  Principles Neuro I (4) (I)
- NEUROSCI 602  Principles Neuro II (4) (II)
- PATH 581  Tissue, Cellular and Molecular Basis of Disease (4) (II)
- PHYSIOL 592  Integrative Neuroscience (3) (II)
- PHYSIOL 600  Pathophysiology (3) (II)

**TECHNICAL ELECTIVES:** (two courses required, and total credits for concentration must be at least 30)
- BIOMEDE 499.002  Clinical Observation and Needs Finding (2) (II)
- BIOMEDE 504  Cellular Biotechnology (3) (II)
- BIOMEDE 523  The Business of Biology (3) (I)
- BIOMEDE 587  Technology, Innovation, Law, and Regulation (2) (I)
- BIOMEDE 588  Global Quality Systems and Regulatory Innovation (2) (II)
- BIOMEDE 599.007  Regulatory Issues in Medical Device Design (3) (II)
- CHE 517  Biochemical Eng (3) (I)
- ENTR 599.011  Technology Inspired Models (3) (I, II)
- ENTR 599.014  Introduction to Innovation Careers (2) (II)
- ENTR 599.015  Introduction to Innovation (2) (I)
- ENTR 599.019  Business Math (1.5) (I)
- ES 512  Business Basics for Graduate Engineers (3) (II)
- ES 720  Commercialization of Biomedicine (1.5) (II)
- FIN 629 / ES 629  Financing Research Commercialization (3) (I)
- LAW 489 / ENTR 599.008  IP Strategy (3) (I)

**KEY AND ADDITIONAL NOTES:**

Course Department and Number       Course Name (# of credits) (term offered)

Terms:  I- fall, II - winter, III - spring-summer, IIIa - spring half, IIIb summer half

Every effort is made to make sure that the course offering is correct, but students should refer to the Schedule of Classes or the department’s website for the current offering.