**APPENDIX A:**

**List of possible graduate electives by research domain area**

Note: Courses with an \*asteriskdo not count as Engineering electives

*Hi-lited yellow = used as recently as 2016*

Advanced Mathematics

|  |  |
| --- | --- |
| Semester | Course Title |
| \*MATH 5001 and above | All math course 5001 and above may be used to satisfy the math requirement pending approval of the student’s PhD research advisor. |

Some popular Math Choices

|  |  |  |
| --- | --- | --- |
| \*Finite Linear Mathematics | Mathematics | 5101 |
| \*Applied Differential Equations I | Mathematics | 5401 |
| \*Mathematics of Infectious Disease Dynamics | Mathematics | 5421 |
| \*Mathematical Modeling of Biological Processes | Mathematics | 5651 |
| \*Applied Regression Analysis | Statistics | 5461 |

 BioImaging:

|  |  |  |
| --- | --- | --- |
| Semester | Quarter | Course Title |
| BME 5110 | BME 611 | Biomedical Microscopic Imaging |
| BME 5120 | BME 612 | Biomedical Optics |
| BME 5177 |  | Biomedical Atomic Force Microscopy |
| BME 5186 | BME 716 | Biomedical Ultrasound |
| BME 6113 | BME 813 | Magnetic Res Spectro & Imaging I  |
| BME 7114 | BME 814 | Magnetic Res Spectro & Imaging II |
| CSE 5542 | CSE 781  | 3D Image Generation |
| CSE 5545 | CSE 782  | Advanced 3D Image Generation  |
| ECE 5200 | ECE 600 | Intro to Digital Signal Processing  |
| ECE 6200 | ECE 700  | Digital Signal Processing |
| ECE 5206 | ECE 706 | Medical Imaging |
| ECE 5460 | ECE 707 | Digital Image Processing |
| ECE 5012 | ECE 717  | Integrated Optics |

BioMaterials:

|  |  |  |
| --- | --- | --- |
| Semester | Quarter | Course Title |
| BME 5310 | BME 631  | Advanced Biomaterials  |
| BME 5421 | BME 641  | Tissue Mechanics  |
| BME 5353 | BME 733  | Hard-Tissue Biomaterials |
| CHBE 5774 | CHBE 774  | Polymer Membranes |
| CHBE 5775 | CHBE 775 | Rheology of Fluids |
| ME 7040 | ME 740 | Elasticity |
| ME 5144 | ME 744 | Eng Fracture Mechanics |
| ME 7163 | ME 763  | Adv Strength of Mat for Design |
| ME 7506 | ME 806  | Viscous Flow of Fluids |
| MSE 6605 | MSE 605  | Principles of Materials Science |
| MSE 5641 | MSE 642 & 643 | Structure-Property Relationships of Polymers |
| MSE 5711 | MSE 644  | Structure-Properties of Composite Matls |
| MSE 5611 | MSE 645 & 646 | Materials in Medicine |
| MSE 5571 | MSE 673 | Electroceramics |
| MSE 5532 | MSE 679 | Electronic Materials Lab |
| MSE 6715 | MSE 715  | Principles of Characterization of Matls |
| MSE 6756 | MSE 756  | Computational Materials Modeling |
| MSE 6765 | MSE 765  | Mech Behavior of Materials |
| PHYS 8301 | PHYS 822 | Elasticity and Fluid Materials |

BioMechanics

& BioTransport:

|  |  |  |
| --- | --- | --- |
| Semester | Quarter | Course Title |
| BME 5210 | BME 621  | Advanced Biological Transport |
| BME 5420 | BME 642  | Mechanobiology |
| BME 5421 | BME 641  | Tissue Mechanics |
| BME 5430 | BME 643  | Finite Element Applications in BME  |
| BME 5470 | BME 740  | Cellular Mechanics |
| BME 5663 | BME 763  | Intro to Microfluidics and Nanofluidics |
| CHBE 5733 | CHBE 733  | Novel Separation Processes  |
| CHBE 5765 | CHBE 765 | Principles of Biochemical Eng  |
| CHBE 5775 | CHBE 775  | Rheology of Fluids |
| ISE 7610 | ISE 868.01  | Adv Topics: Spine Biomechanics |
| ISE 7620 | ISE 868.02  | Adv Topics: Upper Extremity Biomech  |
| ISE 7630 | ISE 868.03 | Adv Topics: Biomech, Musculoskeletal  |
| ME 7701 | ME 628  | Experimental Methods in Movement Biomechanics  |
| ME 5139 | ME 639 | Applied Finite Element Method |
| ME 6700 | ME 687  | Intro to Musculoskeletal Biomechanics |
| ME 6505 | ME 705  | Fund Concepts in Fluid Mechanics |
| ME 7230 | ME 733  | Adv Engineering Dynamics |
| ME 7040 | ME 740  | Elasticity |
| ME 7100 | ME 743 | Intro to Continuum Mech |
| ME 5144 | ME 744  | Eng Fracture Mechanics |
| ME 7163 | ME 763 | Adv Strength of Materials for Design |
| ME 5068 | ME 768  | Intro to Finite Element Methods |
| ME8702 | ME 787  | Neuromuscular Biomechanics |
| ME 7506 | ME 806 | Viscous Flow of Fluids |
| ME 8038 | ME 838  | Adv Topics in Finite Element Methods |
| MSE 5611 | MSE 645 & 646 | Materials in Medicine |
| MSE 6756 | MSE 765  | Mech Behavior of Materials  |
| \*PHARM 6210 | \*PHARM 621  | Drug Delivery I |
| \*PHARM 6220 | \*PHARM 622 | Drug Delivery II  |
| \*PHARM 8040 | \*PHARM 804 | Drug Transport |
| PHYS 8301 | PHYS 822 | Elasticity and Fluid Mechanics  |

M,C, & T Eng:

|  |  |  |
| --- | --- | --- |
| Semester | Quarter | Course Title |
| BME 5310 | BME 631 | Advanced Biomaterials |
| BME 5510 | BME 651  | Tissue Engineering |
| BME 5520 | BME 652  | Cellular Engineering |
| BME 5580 |  | Excitable Cell Engineering |
| BME 5001 | BME 701 | Cardiovascular Bioengineering |
| BME 5470 | BME 740 | Cellular Mechanics |
| CHBE 5765 | CHBE 765 | Principles of Biochemical Eng |
| \*IBGP 7016 | \*IBGP 702.03 | Extracell Matrix & Cytoskel Human Disease |
| \*IBGP 7602 | \*IBGP 762.02 | Independent Studies in Human Histology |
| MSE 5611 | MSE 645 & 646 | Materials in Medicine |
| \*PHARM 6210 | \*PHARM 621 | Drug Delivery I |
| \*PHARM 6220 | \*PHARM 622 | Drug Delivery II |
| \*PHARM 8040 | \*PHARM 804 | Drug Transport |

Micro / Nano:

|  |  |  |
| --- | --- | --- |
| Semester | Quarter | Course Title |
| BME 5610 | BME 661 | Biomedical Microdevices |
| BME 5663 | BME 763 | Intro to Microfluidics and Nanofluidics |
| BME 5662 | BME 764 | Advanced Biomed Nanotechnology II |
| BME 5635 | BME 765 | Cellular Nanotechnology  |
| BME 5667 | BME 767  | BioMEMS Microfabrication  |
| BME 5668 | BME 768  | Biomedical Microtransducers |
| \*BIOCHEM 8900.01 & .02 | \*BIOCHEM 905 | Advanced Biochemistry: Biomolecular NMR  |
| \*BUSMHR 7530 | \*BUS MHR 890 | Tech Entrepreneurship & Commercialization |
| \*BUSMHR 7531 | \*BUS MHR 891 | Technology Ventures |
| CHBE 5777 | CHBE 777 | Intro to Polymer Micro/Nanoengineering |
| \*CHEM 5520 | \*CHEM 611 | Nanochemistry |
| \*CHEM 7160 | \*CHEM 824 | NMR Spectroscopy |
| \*EARTHSCI 5675 | \*EARTHSCI 675 | Scanning Electron Microscopy |
| ECE 5025 | ECE 624  | Power Electronic Devices & Circuits |
| ECE 5037 | ECE 637 | Solid-state Micro-electronics lab |
| ECE 6200 | ECE 700  | Digital Signal Processing |
| ECE 5460 | ECE 707 | Digital Image Processing |
| ECE 6010 | ECE 719 | Electromagnetic Field Theory I |
| ECE 5530 | ECE 730 | Fund of Semicond for Micro- & Opto-elect |
| ECE 5131 | ECE 732 | Quantum Electron Devices: Lasers |
| ECE 6001 | ECE 804  | Random Signal Analysis  |
| ECE 7832 | ECE 835.01 | Special Topics In Nano Devices: Adv Voltaics |
| ECE 7833 | ECE 835.02 | Special Topics In Nano Devices: Organic Conducting Dev |
| ECE 5532 | ECE 835.03 | Special Topics In Nano Devices: Nanoscale Structures & Dev  |
| ECE 7868 | ECE 874 | Pattern Recognition |
| ME 5068 | ME 768 | Intro to Finite Element Methods |
| ME 5374 | ME 774 | Smart Materials & Intelligent Systems  |
| MSE 5761 | MSE 564 | Mechanical Behavior of Crystalline Solids |
| MSE 5641 | MSE 642 & 643 | Structure-Property Relationships of Polymers |
| MSE 5571 | MSE 673  | Electroceramics |
| MSE 5532 | MSE 679 | Electronic Materials Lab |
| MSE 6756 | MSE 756 | Computational Materials Modeling |
| PHYS 8301 | PHYS 822 | Elasticity and Fluid Mechanics |
| PHYS 7501 | PHYS 827 | Quantum Mechanics I |
| PHYS 7502 | PHYS 828 | Quantum Mechanics II |
| PHYS 8805.01 | PHYS 880.05 | Magnetic Resonance Force Microscopy |
| PHYS 8803.02 | PHYS 880.20 | Scanned Probe Microscopy |

Devices:

|  |  |  |
| --- | --- | --- |
| Semester | Quarter | Course Title |
| BME 5639 | BME 679  | Medical Device Design  |
| BME 5668 | BME 768  | Biomedical Microtransducers  |
| BME 5771 | BME 771  | Biomedical Instrumentation |
| \*STAT 6615 | \*BIOSTAT 615 | Des & Analysis of Clinical Trials |
| \*BUSMHR 7530 | \*BUS MHR 890 | Tech Entrepreneurship & Commercialization |
| \*BUSMHR 7531 | \*BUS MHR 891 | Technology Ventures |
| ISE 5610 | ISE 769 | Ergonomics in the Product Design Process |
| ME 5682 | ME 682 | Product Design Fundamentals |
| ME 5665 | ME 776.01 | Reliability Engineering I |
| ME 5666 | ME 776.02 | Reliability Engineering II |

Life Sciences Elective Ideas

Note: None of these courses count as Engineering Sciences:

|  |  |  |
| --- | --- | --- |
| Semester | Quarter | Course Title |
| BMI 7820 | BMI 820 | Biol & Medical Image Analysis |
| DENT 8840 | DENT 884 | Current Issues in Oral Biology |
| ANAT 6900 | ANAT 712  | Human Anatomy |
| MOLBIOCH 6733 | MOLBIOCH 733 | Human Genetics |
| MOLGEN 5607 | MOLGEN 607 | Cell Biology |
| BIOCHEM 8900.01 & .02 | BIOCHEM 905 | Advanced Biochemistry: Biomolecular NMR |
| IBGP 7016 | IBGP 702.03 | Extracell Matrix & Cytoskel Human Disease |
| IBGP 7602 | IBGP 762.02 | Independent Studies in Human Histology |
| IBGP 7605 | IBGP 762.05 | Independent Studies in the Human Cardiovascular System |
| NEUROSC 7001 | NEUROSC 723, 724  | Foundations of Neuroscience I |
| NEUROSC 7002 | NEUROSC 725 | Foundations of Neuroscience II |
| NEUROSC 7900 | NEUROGSP 790 | Developmental Neurobiology |
| PHARMACY 8050 | PHARMACY 805 | Pharmaceutical Biotechnology |
| PHARMCOL 5600 | PHARMCOL 600 | Introduction to General Pharmacology  |
| PHARMCOL 7050 | PHARMCOL 705 | Neurobiology of Disease |
| PHARMCOL 5852 | PHARMCOL 852 | Biology of Aging |
| PHYS THER 8610 | PHYS THER 720 | Advanced Orthopedic Physical Therapy |
| PHYS THER 8650 | PHYS THER 730 | Advanced Neurologic Rehabilitation |
| PHYSIO 6101 | PHYSIOCB 601 | Organ System Physiology I |
| PHYSIO 6102 | PHYSIOCB 602 | Organ System Physiology 2 |
| PHYSIO 8101  | PHYSIOCB 911.27 | Advanced Cardiac Physiology |
| PSYCH 6806 | PSYCH 806, 807 | Survey of Behavioral Neuroscience I |
| PSYCH 6807 | PSYCH 807, 808 | Survey of Behavioral Neuroscience II |
| RADIOLG 5680 | RADIOLOGY 680 | Radiation Biology |
| VETBIOS 7721 | VETBIOS 721, 722 | Laboratory Animal Medicine  |
| VETBIOS 7730 | VETBIOS 730 | Endocrinology |
| VETBIOS 7790 | VETBIOS 790 | Electrocardiography |
| VETBIOS 7792 | VETBIOS 792 | Prototypical Cardiovascular Diseases |
| VETBIOS 7793 | VETBIOS 797 | Advanced Comparative Electrocardiography |
| VISSCI 8100 | VISSCI 780, 813, 814 | Advanced Topics in Vision Sci |
| VISSCI 8010 | VISSCI 801 | Optics of the Eye & Specification of Visual Stimulus |
| VISSCI 8020 | VISSCI 802 | Ocular Motility & Binocular Vision |
| VISSCI 8040 | VISSCI 804 | Anatomy & Physiol of the Eye |