Potential Technical Elective Courses for CEAE Students

Updated March 2015

Courses listed below may be used to fulfill technical electives for AREN and CVEN majors. You may take up to 6.0 credits of technical electives outside AREN/CVEN by consulting with your faculty advisor for final approval. Courses outside AREN/CVEN must still be on this list, or approved by department petition, even if approved by your faculty advisor.

Any AREN/CVEN course 3000+ will count as a technical elective, even if it is not specifically listed here.

Any course outside AREN/CVEN must be specifically listed here, or it will not count as a technical elective. Other upper-division math, science, or engineering courses may be petitioned for approval – see your academic advisor for more information BEFORE enrolling in an unapproved course.

Note: Pre-requisites may apply; you may want to consider using your free elective to fulfill a pre-requisite requirement for a course in which you are very interested. Some pre-requisites are shown, but don’t assume that if none are shown that no pre-requisites apply. See the CU catalog: www.colorado.edu/catalog for current course restrictions and pre-requisites.

Do a course search to see which courses are being offered each semester.

College of Engineering and Applied Science:

Note: Only non-required courses may be used as technical electives for AREN/CVEN majors.
AREN 3010 (3) Mechanical Systems for Buildings [AREN 2120, 2050]
AREN 3140 (3) Illumination Laboratory [AREN 3540]
AREN 3540 (3) Illumination 1 [GEEN 1300, APPM 2350]
AREN 4010 HVAC System Modeling and Control [AREN 4110]
AREN 4110 (3) HVAC Design 1 [AREN 3010]
AREN 4130 (3) Optical Design for Illumination [AREN 3540]
AREN 4315 (3) Design of Masonry Structures [CVEN 3525]
AREN 4506 (3) Project Management 1 [CVEN 3246]
AREN 4530 (3) Advanced Lighting Design [AREN 3540, 4550]
AREN 4540 (3) Exterior Lighting Systems [AREN 3540; taught intermittently]
AREN 4550 (3) Illumination 2 [AREN 3540]
AREN 4560 (3) Luminous Radiative Transfer [AREN 3540]
AREN 4570 (3) Building Electrical Systems Design 1 [ECEN 3030]
AREN 4580 (3) Daylighting [AREN 3540]
AREN 4590 (3) Computer Graphics in Lighting Engineering [AREN 3540, 4560]
AREN 4606 (3) Project Management 2 [CVEN 3246, AREN 4506]
AREN 4830 (3) Special Topics
Any graduate level AREN course (5000-level and above) with approval of instructor

Note: Only non-required courses may be used as technical electives for AREN/CVEN majors.
CVEN 3022 (3) Construction Surveying [CVEN 2012; taught intermittently]
CVEN 3032 (3) Photogrammetry [instructor consent; taught intermittently]
CVEN 3111 (3) Analytical Mechanics 2 [CVEN 2121, co-req APPM 2360]
CVEN 3227 (3) Probability, Stats, and Decision [juniors and seniors]
CVEN 3256 (3) Construction Equipment and Methods [CVEN 3246]
CVEN 3323 (3) Hydraulic Engineering [CVEN 3313 or AREN 2120]
CVEN 3414 (3) Fundamentals of Environmental Engineering [CHEN 1211, APPM 1360]
CVEN 3424 (3) Water and Wastewater Treatment [CVEN 3414]
CVEN 3434 (3) Introduction to Applied Ecology [CHEM 1211, 1221; juniors and seniors]
CVEN 3602 (3) Transportation Systems
CVEN 3698 (3) Engineering Geology
CVEN 3708 (3) Geotechnical Engineering 1 [CVEN 3161]
CVEN 3718 (3) Geotechnical Engineering 2 [CVEN 3708]
CVEN 4147 (3) Civil Engineering Systems [seniors]
CVEN 4161 (3) Mechanics of Materials 2 [CVEN 3161]
CVEN 4323 (3) Water Resource Engineering Design
CVEN 4333 (3) Engineering Hydrology [CVEN 3313 or AREN 2120, co-req CVEN 3227]
CVEN 4353 (3) Groundwater Engineering [CVEN 3313]
CVEN 4383 (3) Groundwater Modeling [recommended pre-req CVEN 4353]
CVEN 4404 (3) Water Chemistry [CVEN 3414, CHEN 1211]
CVEN 4414 (1) Water Chemistry Laboratory [CHEM 1211, CVEN 3414, co-req CVEN 4404]
CVEN 4424 (3) Environmental Organic Chemistry [CHEN 1211]
CVEN 4464 (3) Environmental Engineering Processes [co-reqs CVEN 3414, 3313]
CVEN 4474 (3) Hazardous and Industrial Waste Mgmt [CVEN 3414]
CVEN 4484 (3) Introduction to Environmental Microbiology [CHEM 1211, CHEN 1221, APPM 2350]
CVEN 4511 (3) Intro to Finite Elements [CVEN 3161, 3525; APPM 2360]
CVEN 4525 (3) Matrix Structural Analysis [CVEN 3525]
CVEN 4537 (3) Numerical Methods in Civil Engineering [seniors] – counts toward CEAE Engineering Science Track
CVEN 4545 (3) Steel Design [CVEN 3525]
CVEN 4554 (3) Fundamentals of Air Quality [APPM 2360, CVEN 3313]
CVEN 4555S (3) Reinforced Concrete Design [CVEN 3525]
CVEN 4565 (3) Timber Design [CVEN 3525]
CVEN 4718 (3) Mechanics and Dynamics of Glaciers [APPM 2350, AREN 2110, GEEN 1300]
CVEN 4728 (3) Foundation Engineering [CVEN 3718]
CVEN 4838-4838 (3) Special Topics
Any graduate level CVEN course (5000-level and above) with approval of instructor

ASEN 3116 (3) Introduction to Biomedical Engineering [instructor consent]
ASEN 4090 (3) Global Positioning Systems Applications [APPM 2360, GEEN 1300; recommended for juniors/seniors only]
ASEN 4128 (3) Human Factors in Engineering and Design [juniors and seniors]
ASEN/ATOC 4215 (3) Descriptive Physical Oceanography [seniors]
ASEN 4216 (3) Neural Signals & Functional Brain Imaging [ECEN 3030, ASEN majors]
ASEN 4218 (3) Large Space Structures Design [seniors in ASEN or MCEN]
ASEN 4238 (3) Computer Aided Control System Design [APPM 2360]
ASEN 4248 (3) Computer Aided Control System Design 2 [ASEN 4238]
ASEN 4426 (3) Neural Systems and Physiological Control [ECEN 3030, ASEN majors]

CHEN 3220 (3) Separations and Mass Transfer [CHEN 3200, 3320]
CHEN 3660 (3) Energy Fundamentals [CHEN 1211, PHYS 1110, APPM 1360]
CHEN 4130 (2) Chemical Engineering Laboratory 2
CHEN-4330 (3) Chemical Engineering Reaction Kinetics
CHEN 4440 (3) Chemical Engineering Materials [CHEN 3320, CHEM 3311]
CHEN-4450 (3) Polymer Chemistry
CHEN 4460 (3) Polymer Engineering [CHEM 3311, CHEN 3320]
CHEN-4520 (3) Chemical Process Synthesis
CHEN 4521 (3) Physical Chemistry for Engineers [APPM 2350, CHEN 1211, co-req APPM 2360]
CHEN-4530 (2) Chemical Engineering Design Project
CHEN-4570 (4) Instrumentation and Process Control
CHEN 4630 (1) Intellectual Property Law and Engineering [seniors]
CHEN 4650 (3) Particle Technology [CHEN 3200 or MCEN 3021, APPM 2360]
CHEN 4670 (3) Environmental Separations [CHEN 3220, juniors and seniors]
CHEN-4801 (3) Pharmaceutical Biotechnology
CHEN 4803 (3) Metabolic Engineering [CHEM 4711 or CHEM 4611]
CHEN 4805 (3) Biomaterials [CHEN 2810]
CHEN-4810 (2) Biological Engineering Laboratory
CHEN 4820 (3) Biochemical Separations [CHEN 3220]
CHEN-4830 (3) Chemical Engineering Biokinetics
CHEN-4836 (3) Nanomaterials
CHEN 4838 (3) Sp Topics: Energy Fundamentals [juniors and seniors]
CHEN 5360 (3) Catalysis and Kinetics [CHEM 4551 or co-req CHEN 4330]
CSCI 3002 (3) HCC Foundations/User-Centered Design and Development 1 [juniors/seniors]
CSCI 3104 (4) Algorithms [APPM 1360; CSCI 2824, ECEN 2703, APPM 3170, or MATH 2001]
CSCI 3155 (4) Principles of Programming Languages [CSCI 2270; CSCI 2824 or ECEN 2703]
CSCI 3202 (3) Introduction to Artificial Intelligence [CSCI 2270; statistics (CVEN 3227, etc.)]
CSCI 3287 (3) Database and Information Systems [CSCI 3104]
CSCI-3302 (3) Introduction to Robotics
CSCI 3308 (3) Software Development Methods and Tools [CSCI 2270]
CSCI 3434 (3) Theory of Computation [CSCI 3104, 3155]
CSCI-3444 (3) Comp Sci Theory 2
CSCI 3656 (3) Numerical Computation 1 [CSCI 1300; APPM 1350, 1360; MATH 3130 or APPM 3310]
CSCI-3702 (3) Cognitive Science
CSCI 3753 (4) Operating Systems [CSCI 2270; CSCI 2400 or ECEN 3350]
CSCI-4000 (3) Entrepreneurship in Computing
CSCI 4113 (3) UNIX System Administration [CSCI 2270, 3308]
CSCI 4123 (4) Network Laboratory [CSCI 4273]
CSCI 4133 (4) Security Laboratory [CSCI 4273]
CSCI 4143 (3) Principles of Telecommunications Policy
CSCI 4202 (3) Artificial Intelligence 2 [CSCI 3202]
CSCI 4229 (3) Computer Graphics [CSCI 2270]
CSCI 4273 (3) Network Systems [CSCI 3753]
CSCI-4239 (3) Advanced Computer Graphics
CSCI-4302 (3) Advanced Robotics
CSCI 4308 (4) Software Engineering Project 1 [CSCI 3155, 3308, CSEN seniors]
CSCI-4314 (3) Algorithms for Molecular Biology
CSCI 4317 (3) Genome Databases: Mining and Management [CSCI 3104, co-req CSCI 2270]
CSCI 4318 (4) Software Engineering Project 2 [CSCI 4308]
CSCI 4446 (3) Chaotic Dynamics [CSCI 1300, APPM 2350]
CSCI 4448 (3) Object Oriented Analysis and Design [CSCI 3155]
CSCI-4502 (3) Data Mining
CSCI 4555 (3) Compiler Construction [CSCI 3155, 2400]
CSCI 4576 (4) High Performance Scientific Computing 1 [recommended pre-req CSCI 3656]
CSCI 4586 (4) High Performance Scientific Computing 2 [CSCI 4576]
CSCI 4593 (3) Computer Organization [ECEN 2350, 3350, major restrictions]
CSCI 4753 (3) Computer Performance Modeling [CSCI 3753]
CSCI 4809 (3) Computer Animation
CSCI 4810 (1) Seminar in Computational Biology [CSCI 4312 or 4317]

ECEN 3030 (3) Electrical/Electronic Circuits Non-Major [APPM 2360]
ECEN 3170 (3) Electromagnetic Energy Conversion 1 [ECEN 2260, PHYS 1120]
ECEN 3250 (5) Microelectronics [ECEN 2260]
ECEN 3300 (5) Linear Systems [ECEN 2260]
ECEN 3303 (3) Introduction to Robotics [CSCI 2270, 2824]
ECEN 3320 (3) Semiconductor Devices [ECEN 3250]
ECEN 3350 (3) Programming Digital Systems [ECEN 2350]
ECEN-3360 (3) Digital Design Laboratory
ECEN 3400 (5) Electromagnetic Fields and Waves [APPM 2350, 2360; PHYS 1110; ECEN 2250]
ECEN 3410 (3) Electromagnetic Waves and transmission [ECEN 3400]
ECEN 4106 (3) Photonics [ECEN 3400, co-req ECEN 3300]
ECEN 4116 (3) Introduction to Optical Communications [ECEN 3400]
ECEN 4120 (3) Neural Network Design [APPM 2360; ECEN 1310 or CSCI 1300]
ECEN 4138 (3) Control Systems Analysis [ECEN 3300]
ECEN 4167 (3) Electromagnetic Energy Conversion 2 [ECEN 3170]
ECEN 4224 (3) High Speed Digital Design [ECEN 3400]
ECEN 4242 (3) Communication Theory [ECEN 3300, 3810]
ECEN-4324 (3) Fundamentals of Microsystem Packaging
ECEN-4341 (3) Bioelectromagnetics
ECEN-4375 (3) Microstructures Laboratory
ECEN-4517 (3) Power Electronics and Photovoltaic Power Systems Laboratory
ECEN-4532 (3) Digital Signal Processing Laboratory
ECEN-4553 (3) Compiler Construction
ECEN 4555 (3) Principles of Energy Systems and Devices [ECEN 3810, APPM 3570 or MATH 4510; PHYS 2130 or PHYS 2170]
ECEN 4583 (3) Software System Development [CSCI 2270]
ECEN-4593 (3) Computer Organization
ECEN-4606 (3) Undergraduate Optics Laboratory
ECEN-4613 (3) Embedded System Design
ECEN-4616 (3) Optoelectronic System Design
ECEN-4623 (3) Real-Time Embedded Systems
ECEN-4633 (3) Hybrid Embedded Systems
ECEN-4634 (3) Microwave and RF Laboratory
ECEN-4638 (3) Control Systems Laboratory
ECEN-4643 (3) SW Engineering of Concurrent Systems
ECEN-4652 (3) Communication Laboratory
ECEN-4653 (3) Real-Time Digital Media
ECEN-4743 (3) SW Engineering of Distributed Systems
ECEN-4753 (3) Computer Performance Modeling
ECEN 4797 (3) Introduction to Power Electronics [ECEN 3250]
ECEN-4811 (3) Neural Signals and Functional Brain Imaging
ECEN-4827 (3) Analog IC Design
ECEN 4831 (3) Brains, Minds, Computers [ECEN 2260 or 3030]
ECEN 5107 (3) Electric Power Grid

EMEN 4100 (3) Business Methods and Engineering Economics [EMP approval; seniors]
EMEN 4800 (3) Technology Ventures and Marketing [EMP approval; juniors]

EVEN 4100 (3) Environmental Sampling and Analysis [prereqs CVEN 4404 and 4414, fluid mechanics, or instructor consent]

GEEN 3400 (3) Invention and Innovation
GEEN 4830 (3) Solar Thermal Power

TLEN 5580 (3) Energy Communication Networks [co-reqs TLEN 5310 and 5330]

**MCEN courses are restricted to MCEN or EVEN majors only. Contact the MCEN Department to request permission to enroll if space permits.**
MCEN 3022 (3) Heat Transfer [prereqs AREN 2110 and CVEN 3313]
MCEN 3025 (3) Component Design [prereq MCEN 2063]
MCEN 3030 (3) Computational Methods [prereq GEEN 1300, APPM 2360]
MCEN 3032 (3) Thermodynamics 2 [prereq CVEN 3313 and AREN 2110; juniors/seniors]
MCEN-3166 (3) Ind Cost Analysis
MCEN-4026 (3) Manufacturing Processes and Systems
MCEN-4037 (2) Measurements Lab
MCEN-4043 (3) System Dynamics
MCEN-4057 (3) Environmental Modeling
MCEN-4115 (3) Mechatronics and Robotics I
MCEN 4117 (3) Anatomy and Physiology for Engineers [seniors]
MCEN 4123 (3) Vibration Analysis [prereq MCEN 3030]
MCEN 4124 (3) Mechanical Behavior of Materials [prereqs MCEN 2024 and 2063]
MCEN-4127 (3) Biomedical Ultrasound
MCEN 4131 (3) Air Pollution Control Engineering [prereq MCEN 3021 or equivalent]
MCEN 4133 (3) Biomechanics of Solids [prereqs MCEN 2024, 2063, and 3021 or equivalent]
MCEN 4135 (3) Wind Energy and Wind Turbine Design [prereq 2 of: MCEN 3021, 4043, or 3010; seniors]
MCEN-4137 (3) Anatomy and Physiology 2
MCEN 4141 (3) Indoor Air Pollution [prereqs MCEN 3021 and 3022; seniors]
MCEN-4145 (3) Comp Aided-Thermo Design
MCEN 4151 (3) Flow Visualization [prereq MCEN 3021 or equivalent, or significant imaging experience]
MCEN 4152 (3) Introduction to Combustion [prereq MCEN 3012]
MCEN-4154 (3) Biocolloids and Biomembranes
MCEN 4162 (3) Energy Conversion [prereq MCEN 3012]
MCEN-4173 (3) Finite Element Analysis
MCEN 4174 (3) Failure of Engineering Materials [prereqs MCEN 2024 and 2063]
MCEN 4183 (3) Mechanics of Composite Materials [prereq MCEN 2024 and 2063]
MCEN-4185 (3) Human Factors-Eng Design
MCEN 4194 (3) Electrochemical Energy Conversion and Storage [MCEN 2024 and 3032]
MCEN-4218 (3) Intro to Finite Elements
MCEN 4228 (3) Sp Tp: Renewable and Sustainable Energy

**College of Arts & Sciences:**
Suggested technical courses outside engineering

AIRR 3010 (3) Air Force Leadership Studies I

APPM 3010 (3) An Introduction to Nonlinear Systems: Chaos [pre-reqs APPM 1360 and 2360]
APPM 3050 (3) Scientific Computing in Matlab [prereqs APPM 1360 and 2360]
APPM 3170 (3) Discrete Applied Mathematics [Prereq or coreq APPM 3310]
APPM 3310 (3) Matrix Methods and Applications [prereq APPM 2350]
APPM-3350 (3) Advanced Engineering Calculus
APPM 4120 (3) Introduction to Operations Research [Prreq APPM 3310 or MATH 3130] – **counts toward CEAE Engineering Science Track**

**Engineering Science Track**

APPM 4350 (3) Methods in Appl Math: Fourier Series/Boundary Value Prob [prereqs APPM 2350 and 2360; coreq APPM 3310] – **counts toward CEAE**

APPM 4360 (3) Methods in Appl Math: Complex Variables & Applications [prereqs APPM 2350 and 2360, or 3310
APPM 4380 (3) Modeling in Applied Mathematics [prereqs APPM 2350 and 2360; rec prereqs APPM 3310, 4350, and 4650]
APPM-4390 (3) Modeling in Mathematical Biology
APPM-4440 (3) Undergraduate Applied Analysis 1
APPM-4450 (3) Undergraduate Applied Analysis 2
APPM 4520/5520 Introduction to Mathematical Statistics
APPM-4540 (3) Introduction to Time Series
APPM-4560 (3) Markov Processes, Queues, and Monte Carlo Simulations
APPM 4580 Statistical Applications: Software and Methods [pre-req APPM 4570; may be able to petition CVEN 3227 as a substitute pre-req].
APPM 4650 (3) Intermediate Numerical Analysis 1 [Prereqs APPM 3310 or MATH 3130 and knowledge of a programming language]
APPM 4660 (3) Intermediate Numerical Analysis 2 [prereq APPM 4560]
APPM 4720 (3) Open Topics in Applied Mathematics
[for AREN students who do not take CVEN 3227, APPM 3570 Applied Probability or APPM 4570 Statistical Methods [pre-req Calc 2] can be taken as a technical elective.]

ASTR/ATOC 3720 (3) Planets and Their Atmospheres [prereq PHYS 1110 and 1120 and either MATH 1300 and 2300 or APPPM 1350 and 1360]
ASTR-3730 (3) Astrophysics 1 - Stellar and Interstellar
ASTR-3740 (3) Cosmology and Relativity
ASTR-3750 (3) Planets, Moons, and Rings
ASTR-3760 (3) Solar and Space Physics
ASTR-3830 (3) Astrophysics 2 - Galactic and Extragalactic
ASTR-4330 (3) Cosmochemistry

ATOC/GEOL 3070 (3) Introduction to Oceanography [pre-req any 2 course sequence of natural science courses]
ATOC 3180 (3) Aviation Meteorology [prereq ATOC 1050 Weather and the Atmosphere or equivalent]
ATOC 3300 (3) Analysis of Climate and Weather Observation [pre-reqs ATOC 1050 and 1060; or ATOC 3600; or GEOG 1001 and 1 semester calculus]
ATOC 3500 (3) Air Chemistry and Pollution [pre-req 2 semester of chemistry]
ATOC 3600 (3) Principles of Climate [prereqs ATOC 1050 and 1060; or ATOC 3600; or GEOG 1001 and 1 semester calculus]
CHEM 3311 (4) Organic Chemistry 1  [prereq CHEN 1211; coreq CHEM 3321]
CHEM 3321 (1) Lab in Organic Chemistry 1  [prereq CHEN 1211; coreq CHEM 3311]
CHEM 3331 (4) Organic Chemistry 2  [prereq CHEM 3311; coreq CHEM 3341]
CHEM 3341 (1) Lab in Organic Chemistry 2  [prereq CHEM 3311; coreq CHEM 3331]
CHEM 4011 (3) Modern Inorganic Chemistry
CHEM 4021 (3) Inorganic Laboratory
CHEM-4131 (3) Chemistry of Global Health
CHEM-4141 (3) Environmental Water and Soil Chemistry
CHEM 4171 (3) Instrumental Analysis
CHEM 4181 (4) Instrumental Analysis Lab with Environ Emphasis
CHEM-4251 (3) Materials Chemistry and Properties
CHEM-4261 (3) Organic Materials: Structures and Functions
CHEM-4271 (3) Chemistry of Solar Energy
CHEM-4431 (3) Physical Chemistry w Biochemistry Applications 2
CHEM 4531 (3) Physical Chemistry 2
CHEM 4541 (2) Physical Chemistry Laboratory for Engineers
CHEM 4581 (1) Physical Chemistry Lab 1
CHEM 4591 (2) Physical Chemistry Lab 2
CHEM 4611 (3) Survey of Biochemistry
CHEM 4621 (3) Genome Databases: Mining and Management
CHEM 4711 (3) General Biochemistry 1
CHEM 4731 (3) General Biochemistry 2
CHEM 4751 (3) Current Topics in Biochemical Research
CHEM 4761 (4) Biochemistry Laboratory
CHEM 4791 (3) Bioorganic Chemistry in Biotechnology

EBIO 3040 (4) Conservation Biology
EBIO 3080 (4) Evolutionary Biology
EBIO 3110 (3) Population and Community Ecology
EBIO 3170 (3) Mountain Ecology and Conservation
EBIO 3175 (1) Arctic and Alpine Ecology Lab
EBIO 3180 (3) Global Ecology
EBIO 3190 (3) Tropical Marine Ecology
EBIO 3240 (4) Animal Behavior
EBIO 3270 (3) Ecosystem Ecology
EBIO-3400 (4) Microbiology
EBIO 3630 (4) Parasitology
EBIO 3770 (4) Animal Diversity: Vertebrates
EBIO 3850 (4) Animal Diversity: Invertebrates
EBIO 4020 (3) Stream Biology
EBIO 4030 (3) Limnology
EBIO 4060 (3) Landscape Ecology
EBIO-4080 (4) Freshwater Phycology
EBIO 4090 (2) Coral Reef Ecology
EBIO 4100 (3) Advanced Ecology
EBIO 4120 (2-4) Advanced Ecology
EBIO 4140 (3) Plant Ecology
EBIO 4150 (1-2) Techniques in Ecology
EBIO 4160 (3) Introduction to Biogeochemistry
EBIO 4175 (3) Scientific Basis for Ecosystem Management Public Lands
EBIO 4290 (3) Molecular Systematics and Evolution
EBIO 4350 (1-4) Biological Field Studies
EBIO 4410 (4) Biometry
EBIO-4440 (4) Animal Developmental Diversity
EBIO 4500 (4) Plant Biodiversity and Evolution
EBIO 4510 (4) Plant Anatomy and Development
EBIO-4520 (4) Plant Systematics
EBIO-4530 (4) Functional Plant Biology
EBIO-4550 (4) Plant Eco-Evo-Devo
EBIO 4640 (2-4) Plant Field Studies
EBIO 4660 (4) Insect Biology
EBIO 4740 (3) Biology of Amphibians and Reptiles
EBIO 4750 (4) Ornithology
EBIO 4760 (4) Mammalogy
EBIO-4795 (3) Field Methods in Zoology and Botany

ENVS 3001 (3) Sustainable Solutions Consulting
ENVS/EBIO 3040 Conservation Biology
ENVS/PHYS 3070 (3) Energy and the Environment
ENVS/CVEN 3434 Introduction to Applied Ecology
ENVS/GEOL 3520 Energy and Climate Change: An Interdisciplinary Approach
ENVS/ATOC 3600/GEOG 3601 Principles of Climate
ENVS 4050 (3) Field Studies in Environmental Sciences
ENVS/GEOL/EBIO 4160 Intro to Biogeochemistry

GEOG 3053 (3) Cartography: Visualization and Information Design
GEOG 3251 (3) Mountain Geography
GEOG 3301 (3) Analysis of Climate and Weather Observation
GEOG 3351 (3) Biogeography
GEOG 3412 (3) Conservation Practice and Resource Management
GEOG 3511 (4) Introduction to Hydrology
GEOG 3601 (3) Principles of Climate
GEOG 4023 (3) Introduction to Quantitative Methods in Human Geography
GEOG 4043 (3) Cartography 2: Interactive & Multimedia Mapping
GEOG 4093 (4) Remote Sensing of the Environment
GEOG 4103 (4) Introduction to Geographic Information Science
GEOG/ENVS 4201 (3) Biometeorology
GEOG 4203 (4) Geographic Information Science: Modeling Applic
GEOG 4231 (4) Physical Climatology/Field Methods
GEOG 4241 (4) Principles of Geomorphology
GEOG 4251 (4) Fluvial Geomorphology
GEOG 4291 (3-4) Mountain Geomorphology
GEOG 4303 (4) GIS Programming for Spatial Analysis
GEOG 4311 (3) Watershed Biogeochemistry
GEOG 4321 (3-4) Snow Hydrology
GEOG 4331 (3-4) Mountain Climatology
GEOG 4371 (3) Forest Geography: Principles and Dynamics
GEOG 4401 (3) Soils Geography
GEOG 4411 (3) Methods of Soil Analysis
GEOG 4501 (3) Water Resources & Water Management of Western US
GEOG 4983 (1-3). Field Problems

GEOL 3010 (3) Introduction to Mineralogy
GEOL 3020 (3) Petrology
GEOL 3030 (3) Introduction to Hydrogeology
GEOL 3040 (3) Global Change: The Recent Geological Record
GEOL 3050 (2) GIS for Geologists
GEOL/ATOC 3070 (3) Introduction to Oceanography
GEOL 3120 (4) Structural Geology
GEOL 3300 (3) Extraterrestrial Life
GEOL 3320 (3) Introduction to Geochemistry
GEOL 3410 (3) Paleobiology
GEOL 3430 (4) Sedimentology and Stratigraphy
GEOL 3500 (3) Earth Resources and the Environment
GEOL 3520 (3) Energy and Climate Change: An Interdisciplinary Approach
GEOL 3540 (3) Introduction to Petroleum Geology
GEOL 3720 (3) Evolution of Life: The Geological Record
GEOL 3950 (3) Natural Disasters & Geologic Hazards
GEOL 4060 (4) Oceanography
GEOL 4093 (4) Remote Sensing of the Environment
GEOL 4130 (3) Principles of Geophysics
GEOL 4160 (3) Introduction to Biogeochemistry
GEOL 4241 (4) Principles of Geomorphology
GEOL 4270 (3) Marine Chemistry and Geochemistry
GEOL 4474 (4) Vertebrate Paleontology
GEOL 4550 (3) Petroleum Reservoir Characterization & Modeling
GEOL 4670 (3) Isotope Geology
GEOL 4711 (2) Igneous and Metamorphic Field Geology
GEOL 4712 (2) Structural Field Geology
GEOL 4714 (2) Field Geophysics
GEOL 4715 (2) Field Techniques in Hydrogeology
GEOL 4716 (2) Environmental Field Geochemistry
GEOL 4717 (2) Field Seminar in Geology and Tectonics

IPHY 3060 (4) Cell Physiology [prereqs EBIO 1210, 1220, 1230, 1240]
IPHY 3410 (3) Introduction to Human Anatomy [prereqs EBIO 1210, 1220, 1230, 1240]
IPHY 3415 (2) Human Anatomy Laboratory
IPHY 3430 (3) Introduction to Human Physiology
IPHY 3435 (2) Human Physiology Laboratory
IPHY 3450 (5) Comparative Animal Physiology
IPHY 3460 (5) Comparative Vertebrate Anatomy
IPHY 3470 (3) Human Physiology 1
IPHY 3480 (3) Human Physiology 2
IPHY 3500 (2) Applied Clinical Research
IPHY 3660 (3) Dynamics of Motor Learning
IPHY 3800 (3) Forensic Biology
IPHY 3810 (1) Forensic Biology Laboratory
IPHY 4200 (3) Physiological Genetics and Genomics
IPHY 4440 (3) Endocrinology
IPHY 4470 (3) Biology of Human Reproduction [prereqs EBIO 1210, 1220, 1230, 1240]
IPHY 4480 (3) Comparative Reproduction
IPHY 4740 (3) Theory of Motor Skills Learning

MATH 3110 (3) Introduction to Theory of Numbers
MATH 3140 (3) Abstract Algebra 1
MATH 3170 (3) Combinatorics 1
MATH 3210 (3) Euclidean and Non-Euclidean Geometries
MATH 4000 (3) Foundations of Mathematics
MATH 4120 (3) Introduction to Operations Research
MATH 4140 (3) Abstract Algebra 2
MATH 4230 (3) Geometry of Curves and Surfaces
MATH 4330 (3) Fourier Analysis
MATH 4440 (3) Mathematics of Coding and Cryptography
MATH 4450 (3) Introduction to Complex Variables
MATH 4470 (3) Partial Differential Equations 1
MATH 4510 (3) Introduction to Probability Theory
MATH 4520 (3) Introduction to Mathematical Statistics
MATH 4540 (3) Introduction to Time Series
MATH 4650 (3) Intermediate Numerical Analysis 1
MATH 4660 (3) Intermediate Numerical Analysis 2
MATH 4730 (3) Set Theory

NAVR 4010 (3) Leadership and Management I

PHYS/ENVS 3070 (3) Energy and the Environment
PHYS 3210 (3) Classical Mechanics and Mathematical Methods 2 [prereqs PHYS 2210, APPM 2360, or equivalent]
PHYS 3220 (3) Quantum Mechanics and Atomic Physics 1 [prereqs PHYS 2130, 2210, and 3210; coreq PHYS 3310]
PHYS 3310 (3) Principles of Electricity and Magnetism 1 [prereqs PHYS 2210 and 2130]
PHYS 3320 (3) Principles of Electricity and Magnetism 2 [prereq PHYS 3310]
PHYS 3330 (2) Electronics for the Physical Sciences [prereq PHYS 2150 and 2130 or 2170]
PHYS 3340 (3) Introductory Research in Optical Physics [prereq PHYS 3330]
PHYS 4130 (2) Biological Electron Microscopy [prereq EBIO 1220 or MCDB 1150 or PHYS 1120 or instructor consent]
PHYS 4150 (3) Plasma Physics [prereq PHYS 1110-1120, PHYS 3310, and APPM 2350]
PHYS 4410 (3) Quantum Mechanics and Atomic Physics 2 [prereqs PJHYS 3220, 3320]
PHYS 4420 (3) Nuclear and Particle Physics [prereq PHYS 4410]
PHYS 4510 (3) Optics [prereq PHYS 3320]

PSYC 4165 (4) Psychology of Perception [PSYC 1001 and 3101]

THTR 3055 (3) Stage Lighting Design 1 [THTR 1105 or inst. Consent] – approved for Lighting Concentration students only

**Leeds School of Business:**
Business Minor courses approved as technical electives

BUSM 3001 (3) Managing Innovation in Organizations [prereqs BUSM 2001 and 2002]
BUSM 3002 (3) Business and Financial Analytics [prereqs BUSM 2001 and 2002]

**Program in Environmental Design:**

ENVD 3009 (6) Urban Site Analysis & Design in Rome (global seminar) – approved for 3 credits of technical electives
ENVD 3152 (3) Introduction to Computer Graphics Applications: GIS and Geodesign for Planners (3)