

Summary of Course Requirements			* (Note: Core Courses and Electives listed are for the Engineering The Future Funding Program - Students must also satisfy their University's degree requirements regarding core courses and electives, which may differ from those listed here.)
Descriptions for Core Courses (Required)			Elective Courses (must take 3)
Univ. of Arizona	<p>CHEE 576 -- Introduction to Unit Operations for Water and Wastewater Treatment System Design Theoretical and applied principles for treatment of water and wastewater</p>	<p>CHEE 676 -- Advanced Water Treatment System Design Design and operation of water treatment plants; physio-chemical treatment processes for potable water production. Experiments to illustrate design principles in potable water production field</p>	<p>CHEE 500R Water Chemistry for Engineers CHEE 569A Air Pollution CHEE 574 Env Transport CHEE 577 Env Microbiology CHEE 581 Bioreactor Engineering HWR 531 Hydrogeology SWS 540 Biodegrad. of Pollutants in Soil and Groundwater SWS 546 Environmental Biotechnology SWS 565 Contaminant Transport in Porous Media SWS 566 Soil and Groundwater Restoration</p>
ASU	<p>CEE 561 Physical-Chemical Treatment of Water and Waste Theory and design of physical and chemical processes for the treatment of water and wastewaters.</p>	<p>CEE 562 Environmental Biochemistry and Waste Treatment Theory and design of biological waste treatment systems. Pollution and environmental assimilation of wastes.</p>	<p>CEE 540 GW Hydrology CEE 541 SW Hydrology CEE 543 Water Resources Systems CEE 546 Free Surface Hydraulics CEE 560 Soil and GW remediation CEE 563 Env Chem Lab CEE 564 Contaminant Fate & Transport CEE 565 Modeling & Assessment of Aquatic Systems CEE 566 Industrial/Haz waste treatment CEE 567 Advanced Environmental Engineering Chemistry</p>
Cal Poly SLO	<p>ENVE 535 - Advanced Wastewater Treatment Operations and processes used in tertiary treatment. Chemical coagulation, flocculation, sedimentation, filtration, adsorption. Methods for removal of phosphorous, nitrogen, solids and organics. Integration of advanced wastewater treatment processes.</p>	<p>ENVE 536 - Biological Wastewater Treatment Processes Engineering Fundamentals of reactor engineering. Biochemical and microbiological background. Modeling and design of biochemical reactors.</p>	<p>ENVE 537 Decentralized Wastewater Management ENGR 581 Biochemical Engineering I ENGR 582 Biochemical Engineering II ENGR 583 Biochemical Engr III CE 533 Advanced Water Resources Engineering CE 535 Groundwater Contamination ENVE 534 Advanced Design of Pollution Control Systems ENVE 541 Resource and Energy Recovery ENVE 551 Environmental Unit Operations</p>
Auburn University	<p>CIVL 7230 Water and Wastewater Operations and Processes II - Rigorous analysis of unit operations and processes used in modern water and wastewater treatment systems. Mixing, coagulation, sedimentation, filtration, and chemical precipitation.</p>	<p>CIVL 7250 Biological Wastewater Treatment - Development and application of the theories of biological waste treatment.</p>	<p>CIVL 6150 Groundwater Hydraulics CIVL 6210 Chemical Principles of Env. Engineering CIVL 6230 Environmental Health Engineering CIVL 6240 Air Pollution CIVL 6250 Biological Principles of Env. Engineering CIVL 6330 Landfills CIVL 7210 Methods of Pollutant Analysis in Env. Engr. CIVL 7220 Water and Wastewater Ops and Processes I CIVL 7260 Environmental Nutrient Control Processes CIVL 7280 Surface Water Quality Modeling</p>
UC Berkeley	<p>211A. Environmental Physical-Chemical Processes. Fundamental concepts of physical-chemical processes that affect water quality in natural and engineered environmental systems. Focus is on developing a qualitative understanding of mechanisms as well as quantitative tools to describe, predict, and control the behavior of physical-chemical processes. Topics include reactor hydraulics and reaction kinetics, gas transfer, adsorption, particle characteristics, flocculation, gravitational separations, filtration, membranes, and disinfection.</p>	<p>211B. Environmental Biological Processes. Fundamental concepts of biological processes that are important in natural and engineered environmental systems, especially those affecting water quality. Incorporates basic fundamentals of microbiology into a quantifiable engineering context to describe, predict, and control behavior of environmental biological systems. Topics include the stoichiometry, energetics and kinetics of microbial reactions, suspended and biofilm processes, carbon and nutrient cycling, and bioremediation applications.</p>	<p>CE 112 Environmental Engineering Design CE 173 Groundwater Seepage CE 202A Vadose Zone Hydrology CE 203N surface-water Hydrology CE 210A Control of water-related pathogens CE 211A Water Quality CE 211B Regulations CE 212 Water & Wastewater Engineering CE 214 Environmental Analytical Chem CE 215 Process Engineering Laboratory CE 216 Hazardous and Industrial Waste Treatment CE 217 Env Chemical Kinetics CE 218A Air Quality Engineering CE 219 Contaminant transport processes CE 274 Environmental Geotechnics Publ Health 162A Public Health Microbiology</p>
UC Davis	<p>CEE 243A. Water and Waste Treatment Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design.</p>	<p>CEE 243B. Water and Waste Treatment Continuation of course 243A. Aeration, thickening, biological processes, design of biological treatment systems.</p>	<p>CEE 240 Water Quality CEE 241 Air Quality Modeling CEE 242 Air Quality CEE 245A Applied Env Chem (inorganic) CEE 245B Applied Env Chem (organic) CEE 246 Unit Operations & Processes CEE 247 Aerosols CEE 248 Biofilm Processes CEE 247L Air Quality Laboratory CEE 249 Probilistic Design & Optimization CEE 264A Transport, mixing & wtr quality (Rivers/Lakes) CEE 264B Transport, mixing & wtr quality (Estuaries/wetlands) CEE 267 Water Resources mgmt. CEE 268 Infrastructure Economics CEE 270 Advanced Water Resources Mgmt CE 272A/B Advanced Hydrogeology+D5</p>
UC Irvine	<p>CEE263 Advanced Biological Treatment Processes. Water and wastewater microbiology. Engineering principles, molecular aspects, and introduction to microorganisms of importance to public health. Topics include aerobic and anaerobic wastewater treatment and disinfection of pathogens in water, wastewaters and biosolids.</p>	<p>CEE265. Analysis of natural chemical processes in the aquatic environment. Modeling of physical-chemical treatment systems. Analysis of chemical processes which affect the fate of contaminants in the natural environment. Computer modeling of several systems included.</p>	<p>CEE262 Environmental Chemistry II CEE278 Flow in Rivers and Estuaries CEE271 Flow in Unsaturated Porous Media CEE277 Transport in Rivers and Estuaries CEE273 Computer Tools for Watershed Modeling CEE274A Transport Phenomena in Saturated Porous Media CEE274B Transport Phenomena in Unsaturated Porous Media and Fractures CEE279A Computations in Environmental Hydraulics CEE276 Surface Water Hydrology CBEMS210 Reaction Engineering CBEMS216 Field Practicum in Environmental Engineering CEE275 Estimation of Groundwater</p>

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UC Los Angeles	<p>255A. Physical and Chemical Processes for Water and Wastewater Treatment. Review of momentum and mass transfer: chemical reaction engineering; coagulation and flocculation; granular filtration; sedimentation; carbon adsorption; gas transfer; disinfection; oxidation; and membrane processes.</p>	<p>C&EE 255B. Biological Processes for Water and Wastewater Treatment. Lecture, four hours, outside study, eight hours. Prerequisites: courses 254A, 255A, or consent of instructor. Fundamentals of environmental engineering microbiology; kinetics of microbial growth and biological oxidation; applications for activated sludge, gas transfer, fixed-film processes, aerobic and anaerobic digestion, sludge disposal, and biological nutrient removal.</p>	<p>C&EE 250A Surface Water Hydrology C&EE 250B Groundwater Hydrology C&EE 250C Math Modeling of Contam. Transport in Ground Water C&EE 251 Water Resources Systems Engineering C&EE 252 Engrg Econ analysis of Water & Env Planning C&EE 253 Math Mds for Wtr Quality Mgmt C&EE 254A Env Aquatic Inorg. Chem. C&EE 258A Membrane Separations in Aquat. systems C&EE 263A Physics of Env Transport C&EE 256A Mass Transfer in Env Systems C&EE 256B Contam Transp in Soils and Ground Water C&EE 266 Env Biotech</p>
Carnegie Mellon University	<p>NOTE: Core Course is in 2 parts (half-semester each)</p> <p>12-721 Environmental Biotechnology Principles This course presents the theory of microbiological processes relevant to environmental systems. Environmental microbiology, cell structure, metabolism, energetics, information storage, and microbial ecology, is followed by development of models for kinetics of suspended growth and fixed film biological systems.</p> <p>12-724 Biotechnology Applications in Engineered Systems. This course presents application of microbiology in water and wastewater treatment. Biological processes discussed include: aerobic municipal wastewater treatment, nitrification, denitrification, phosphorus removal, methanogenic treatment. Specific unit operations discussed include: activated sludge, trickling filters, fluidized beds, tertiary nutrient removal, methanogenesis, drinking water treatment, and bioremediation.</p>	<p>12-722 Wastewater Treatment: Design and Practice: Consideration of planning, process design, specifications, and costing of facilities and systems for treatment of municipal and industrial wastewaters. The subject matter is developed through references to current practice, critique of completed design, design exercises, and field trips.</p>	<p>12-720 Water Resources Chemistry 12-726 Math Modeling of Env. Qual. Syst. 12-727 Charact./Analyze Env. Samples & Syst. 12-725 Physicochemical Treatment 12-728 Remediation Engineering 12-729 Env. Microbiology for Engrs. 12-657 Water Resources Engr. 12-658 Hydraulic Structure Design 12-751 Air Quality Engr. 12-704 Probability & Est. Meth. for Engr. Syst. 12-711 Project Mgmt. for Constr. 24-424 Energy & the Environment 24-425 Combustion & Air Pol. Contr. 12-712 Intro. to Sustainability Engr. 12-713 Ind. Ecology & Sustainable Engr. Design 12-714 Env. Life Cycle Assess. & Green Design 12-715 Case Studies in Sust. Engr.</p>
University of Central Florida	<p>ENV 6015 Physical/Chemical Treatment Systems - Theory and Design of physical and chemical operations and processes in environmental engineering using latest technologies.</p>	<p>ENV 6016 Biological Treatment Systems - Theory and design of biological operations and processes in environmental engineering using the latest technologies.</p>	<p>CWR 5545 Water Resources Engineering CWR 6235 Open Channel Hydraulics ENV 6347 Hazardous Waste Incineration ENV 6558 Industrial Waste Treatment ENV 6106 Theory and Practice of Atm Dispersion Mod. ENV 6126 Design of Air Pollution Controls CWR 5125 Groundwater Hydrology ENV 5071 Env. Analysis of Transportation Systems ENV 5116C Air Pollution Monitoring ENV 6155 Fate & Transport of Subsurface Contam. ENV 6336 Site Remediation & Haz. Waste Trt. ENV 5335 Haz Waste Mgmt. ENV 5505 Sludge Mgmt. Ops. in Env. Engr. ENV 6504L Unit Ops & Processes Lab. ENV 6519 Aquatic Chemical Processes</p>
University of Cincinnati	<p>CEE 654 Physical/Chemical Processes for Water Quality Control Unit Process, unit operation concepts applied to design systems used for water and wastewater treatment</p>	<p>CEE 655 Biological Processes for Water Quality Control Theoretical and practical applications of biological principles to the treatment of water and wastewater. Other areas include sludge dewatering and disposal and solids separation.</p>	<p>CEE 627 Math. Principles of Env. Systems CEE 647 Chem. Principles of Env. Systems CEE 601 Env. Chemistry/Microbiology Lab CEE 653 Phys. Principles of Env. Systems CEE 676 Advanced Env. Engr. & Sci. Seminar CEE 705 Facilities & Resources CEE 614 Muni. Solid Waste Mgmt. CEE 619 Molecular Biology for Env. Engr. CEE 626 Env. /Hydrologic systems Analysis CEE 644 Environmentally Conscience Engineering CEE 649 Adv. Topics in Env. Microbiology CEE 650 Env. Biology and Microbiology Lab CEE 652 Adv. Topics in Env. Water Chem.</p>
Clarkson University	<p>CE 681 Environmental Physico-Chemical Processes This class provides fundamental understanding of the chemical and physical processes that govern the migration and fate of pollutants in environmental systems. Emphasis will be placed on the application of these concepts to water treatment processes. Topics include: Mass transfer and kinetics, coagulation, precipitation, adsorption, ion exchange, chemical oxidation, sedimentation, filtration, and related processes.</p>	<p>CE 682 Environmental Biological Processes Principles and applications of biological phenomena and processes in relation to environmental engineering practice. Emphasis is given to biokinetic analysis and design of biological treatment processes applicable to the treatment of water, municipal and industrial wastewater, and hazardous wastes. Topics include: microbial growth kinetics and bioenergetics; aerobic, anaerobic fixed-film, nitrification, denitrification and phosphorus removal biological processes; sludge treatment and disposal; advanced wastewater treatment processes.</p>	<p>CE 580 Environmental Chemistry CE 584 Chemodynamics CE 582 Environmental Systems Analysis CE 586 Intro to Industrial Ecology ES 534 Air Pollution Control CE 579 Water and Wastewater Treatment CE 581 Hazardous Waste Management Engineering CE 587 Contaminant Transport/ Groundwater CE 583 Modeling Natural Aquatic Systems ES 532 Risk Analysis ES 533 Human Exposure Analysis</p>
Clemson	<p>EE&S 803: Physicochemical Operations in Water and Wastewater Treatment Systems: Principles of physicochemical operations used in water and wastewater treatment. Including coagulation/flocculation, precipitation, sedimentation, conventional and membrane filtration, gas transfer, adsorption, ion exchange, disinfection and oxidation.</p>	<p>EE&S 804: Biochemical Operations in Wastewater Treatment Systems: Principles of biochemical operations used in wastewater treatment. Includes modeling of ideal biochemical reactors and design criteria for aerated lagoons, activated sludge, trickling filters, rotating biological contactors, nitrification, denitrification and digestion.</p>	<p>EE&S 805 Environmental Unit Operations Laboratory EE&S 806 Process & Facility Design for Env. Control Syst. EE&S 832 Air Pollution Meteorology EE&S 833 Air Pollution Control Systems EE&S 837 Biodegradation and Bioremediation EE&S 844 Environmental Engineering Chemistry Laboratory EE&S 855 Surface and Subsurface Transport EE&S 856 Pollution of the Aquatic Environment EE&S 880 Environmental Risk Assessment EE&S 630 Air Pollution Engineering EE&S 684 Municipal Solid Waste Management</p>

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Colorado School of Mines	<p>ESGN 541 Microbial Process Analysis and Modeling Microorganisms facilitate the transformation of many organic and inorganic constituents. Tools for the quantitative analysis of microbial processes in natural and engineered systems are presented. Stoichiometries, energetics, mass balances and kinetic descriptions of relevant microbial processes allow the development of models for specific microbial systems. Simple analytical models and complex models that require computational solutions will be presented. Systems analyzed include suspended growth and attached growth reactors for municipal and industrial wastewater treatment as well as in-situ bioremediation systems.</p>	<p>ESGN504 Water and Wastewater Treatment This course provides an overview of unit operations and processes used for physical, chemical, and biological treatment of water and wastewater. Coverage will include treatment objectives, process theory and introduction to practice.</p>	<p>ESGN 453 Wastewater Engineering ESGN 454 Water Supply Engineering ESGN 530 Environmental Eng Pilot Plant Lab ESGN 586 Microbiology of Engineered Env Systems ESGN 603 Adv Water Treatment Eng and Water Reuse ESGN 502 Environmental Law ESGN 498 Onsite Water Reclamation ESGN 500 Environmental Water Chemistry ESGN 501 Environmental Risk Assessment ESGN 503 Environmental Pollution: Sources, Characteristics, Trnspt and Fate ESGN 505 Experimental Design and Env Data Analysis ESGN 522 Subsurface Contaminant Transport ESGN 527 Watershed Systems Analysis ESGN 563 Pollution Prevention: Fundamentals and Practices ESGN 575 Hazardous Waste Site Remediation ESGN 591 Analysis of Environmental Impact</p>
Colorado State University	<p>CE 439 Environmental Engineering Chemical Concepts Application of chemical and physical principles to analysis of environmental engineering processes and problems, with a focus on water treatment -- mass balance, reaction rates, reactor design, gas transfer, solid/liquid phase reactions, particle processes, colloid transport.</p>	<p>CE 540 Fundamentals of Environmental Biotechnology: basic environmental microbiology and microbial ecology; detection, enumeration and characterization of microorganisms; microbial reactions--metabolism, energetics and kinetics; environmental influences on microbial activity; applications of molecular biology, bioreactor design (2 credits)</p> <p>CE 536 Wastewater Treatment: Application of environmental biotechnology to wastewater treatment engineering and design (1 credit)</p>	<p>CE 440 Nonpoint Source Pollution CH 524 Bioremediation CE 538 Aqueous Chemistry CE 539 Water and Wastewater Analysis CE 541 Treatment of Water Contaminants II CE 542 Water Quality Modeling CE 545 Management and Monitoring of Water Quality CE 547 Statistics for Environmental Monitoring CE 520 Physical Hydrology CE 522 Engineering Hydrology CE 531 Groundwater Hydrology CE 633 Groundwater Contaminant Transport Modeling CE 658 Remediation Systems-Subsurface Contamination CE 573 Urban Stormwater Management CE 578 Infrastructure Engineering and Management</p>
University of Colorado	<p>CVEN 5524- Drinking Water Treatment - Provides advanced study on theory of treatment processes, including design and operation of municipal water supplies</p>	<p>CVEN 5534 - Wastewater Treatment - Offers an advanced analysis of wastewater treatment systems: design and operation of treatment process reactors; factors affecting performance of facilities used for physical separation; and chemical and biological conversion of wastewater compounds; including nitrogen and phosphorus.</p>	<p>CVEN 5404 Environmental Engineering Chemistry CVEN 5424 Environmental Organic Chemistry CVEN 5434 Environmental Engineering Design CVEN 5474 Haz. and Industrial Waste Mgmt CVEN 5484 Intro to Env. Microbiology CVEN 5514 Bioremediation CVEN 5544 Solid Waste Mgmt. and Resource Recovery CVEN 6404 Advanced Aquatic Chemistry CVEN 5444 Env. Engr. Processes</p>
Cornell University	<p>CEE 657 Biological Processes Prerequisites: An introductory course in microbiology and CEE 656, or permission of instructor. Theoretical and engineering aspects of biological phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in the environment. Bioenergetics analysis, stoichiometry, biokinetic, and design of biological treatment process.</p>	<p>CEE 656 Physical/Chemical Processes Prerequisites: CEE 653 or permission of instructor. Theoretical and engineering aspects of chemical and physical phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in the environment. Analysis and design of treatment processes and systems.</p>	<p>CEE 653 Water Chemistry for Environmental Engineering CEE 451 Microbiology for Environmental Engineering CEE 453 Laboratory Research in Environmental Engineering CEE 658 Biodegradation & Biocatalysis CEE 601 Seminar – Water Resources and Environmental Engineering CEE 659 Seminar-Environmental Quality Engineering CEE 654 Aquatic Chemistry CEE 655 Transport, Mixing and Transformation in the Environment CEE 454 Sustainable Small Scale Water Supplies CEE 452 Water Supply Engineering</p>
University of Dayton	<p>CEE 560. BIOLOGICAL TREATMENT (REQUIRED) Description: Measuring the characteristics of wastewater produced from domestic and industrial sources. Principles of designing and operating microbiological processes for the treatment of wastewater. Mechanisms and kinetics of biological reactions emphasized. Units: 3 semester hours When course is normally scheduled: Fall</p>	<p>CEE 562. PHYSIOCHEMICAL TREATMENT Physical and Chemical Water and Wastewater Treatment Processes. Description: Principles and design of physical and chemical unit processes to treat water and wastewater. Industry pretreatment technologies and the basis for their development. Units: 3 semester hours When course is normally scheduled: Winter</p>	<p>CEE 564 SOLID WASTE ENGINEERING CEE 563 HAZARDOUS WASTE ENGINEERING CEE 580 HYDROLOGY AND SEEPAGE CEE 582 ADVANCED HYDRAULICS CEE 584 OPEN CHANNEL FLOW CEE /CME 574 FUNDAMENTALS OF AIR POLLUTION ENGINEERING I CEE/CME 575 FUNDAMENTALS OF AIR POLLUTION ENGINEERING II CME 521 ADVANCED TRANSPORT PHENOMENA CHM 525 PRINCIPLES OF ORGANIC CHEMISTRY</p>

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University of Delaware	CIEG 831 Theory of Water Treatment - Application of physical, chemical, and engineering techniques to water treatment processes: aeration, coagulation, sedimentation, filtration and disinfection. Advanced purification methods including adsorption and demineralization processes.	CIEG 832 Theory of Wastewater Treatment Composition of wastes, physical, chemical and biological methods of wastewater treatment; treatment and disposal of sludges produced at wastewater treatment plants.	CIEG 636 Biological Aspects of Env. Engineering CIEG 632 Chemical Aspects of Env. Engineering CIEG 634 Physical Aspects of Env. Engineering CIEG 630 Water Quality Modeling CIEG 631 Water Quality & Pollution Control CIEG 633 Hazardous Waste Mgmt. CIEG 635 Air Pollution & Its Control CIEG 637 Water and Wastewater Quality CIEG 678 Transport and Mixing Processes CIEG 833 Fate of Organic Pollutants in the Env. CHEG 622 Chemicals, Risk & the Env. PLCS 608 Env. Soil Chem. PLCS 619 Soil Microbiology MEEG 690 Intermediate Engineering Math
Duke University	CE 241 Physical and Chemical Treatment Processes in Environmental Engineering Theory and design of fundamental and alternative physical and chemical treatment processes for pollution remediation. Reactor kinetics and hydraulics, gas transfer, adsorption, sedimentation, precipitation, coagulation/flocculation, chemical oxidation, disinfection	CE 244 Biological Processes in Environmental Engineering Biological processes as they relate to environmental systems, including wastewater treatment and bioremediation. Concepts of microbiology, chemical engineering, stoichiometry, and kinetics of complex microbial metabolism, and process analyses. Specific processes discussed include carbon oxidation, nitrification/denitrification, phosphorus removal, methane production, and fermentation.	CE 200 Engineering Data Analysis CE202 Applied Mathematics for Engineers CE 207 Transport Phenomena in Biological Systems CE208 Environmental Transport Phenomena CE 241 Physical and Chemical Treatment Procs In Env Engr CE 243 Physicochemical Unit ops in Water Treatment CE 245 Pollutant Transport Systems CE 264 Physico-Bio-Chemical Transformations
University of Florida	ENV6511 Biological Wastewater Treatment Theory and current research associated with biological treatment processes	ENV6932 Stormwater Systems Design This course will develop the chemical, physical and hydrologic aspects of rainfall-runoff; and how these aspects relate to quantity/quality through unit operations and process concepts for control, treatment and/or reuse.	ENV 6932 Advanced Water Treatment Process Design EES 5415 Env. Health ENV 6441 Water Resources Planning & Mgmt. ENV 6556 Advanced Wastewater Treatment Operations ENV 6932 Global Env. Policy ENV 6932 Adv Env. Resources Management EES 6318 Principles of Ind. Ecology ENV 6932 Activated Carbon: Env. Design and Application ENV 6932 Adv. Physicochemical Processes in Soils EES 5306 Energy Analysis EES 5307 Ecological Engineering EES 6007 Adv. Energy and Environment CGN 5605 Public Works Planning AEB 6933 Nat. Resources & Env. Policy SOS 5245 Water Resource Sustainability
Georgia Institute of Technology	CEE 6330 - Physicochemical Processes - Theory and application of the physical and chemical processes of coagulation/flocculation, sedimentation, softening, filtration, and disinfection in water and wastewater treatment	CEE 6331 - Biological Processes - Microbial growth kinetics and bioenergetics, theory, modeling, and application of biological processes employed in water, wastewater, and hazardous waste treatment systems as well as subsurface bioremediation.	CEE 6271 Flow-Porous Media I CEE 6272 Flow-Porous Media II CEE 6310 Process Principles- Env E. CEE 6311 Microbial Principles CEE 6312 Chemical Principles - Env E CEE 6313 Fate of Contam. in Subsurface Env. CEE 6319 Environmental Laboratory CEE 6332 Separation Processes CEE 6333 Hazardous Waste Remediation CEE 6340 Solid-Liquid Separations CEE 6343 Membrane Processes CEE 6350 Adv. Environmental Chem. CEE 6351 Biotransformations CEE 6355 Industrial Ecology CEE 6360 Design of Water Treatment Facilities CEE 6361 Design, Model & Simulation of Bio Treat. Syst. CEE 6390 Air Pollutant Formation & Control CEE 6756 Signaling Molecules CEE 6761 Contaminated Sediment Geochemistry CEE 6790 Air Pollution: Physics & Chemistry
University of Idaho	EnvE 534 Environmental Engineering Unit Processes Aeration system design, biological oxidations, growth kinetics, process design of suspended growth and fixed film aerobic and anaerobic systems, biological nutrient removal, land treatment systems	EnvE 531 Environmental Engineering Unit Operations Analysis and design of physical and chemical operation of water and waste treatment; flow models, sedimentation, flocculation, filtration and water conditioning	EnvE 533 Bioremediation BAE 558 Fluid Mechanics of Porous Media EnvE 580 Engineering Risk Assessment for Hazardous Waste Management BAE 552 Environmental Water Quality CE 522 Hydraulic Design Hydr 563 Hydrogeology
Illinois Institute of Technology	ENVE 513 Biotechnologies Processes in Environmental Engineering Topics include biochemical reactions, stoichiometry, enzyme and microbial kinetics, detoxification of toxic chemicals, and suspended growth and attached growth treatment processes. Includes Activated Sludge process, biofilm processes, nitrogen and phosphorous removal, sludge treatment (mesophilic/thermophilic), and natural systems including wetlands and lagoons.	ENVE 542 Physical-Chemical Processes in Environmental Engineering Topics include reaction kinetics and reactors, particle characterization, coagulation and flocculation, sedimentation, filtration, membrane separation, disinfection, advanced oxidation, adsorption and absorption.	ENVE 501 Environmental Chemistry ENVE 503 Environmental Chemodynamics ENVE 561Sanitary Engineering Design ENVE 580 Hazardous Waste Engineering ENVE 573 Air Pollution Engineering ENVE 426 Statistical Tools for Engineers ENVE 545 Environmental Regulations/ Risk Assessment ENVE 585 Groundwater Contamination & Remediation ENVE 570 Air Pollution Meteorology ENVE 510 Environmental Biodynamics ENVE 528 Modeling of Env. Systems

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Univ. of Illinois	CEE 537 Water Quality Control Processes I Theory and basic design of processes used in water and wastewater treatment, including adsorption, ion exchange, chemical oxidation and reduction, disinfection, sedimentation, filtration, coagulation, flocculation, and chemical precipitation	CEE 538 Water Quality Control Processes II Theory and its application for design and operation of processes used in water and wastewater treatment; emphasis is on biological treatment processes and related processes for gas transfer, sludge dewatering, sludge disposal, and solids separation	CEE 442 Env. Eng. Principles, Physical CEE 443 Env Eng Principles, Chemical CEE 444 Env. Eng. Principles Biological CEE 440 Solid and Hazardous Waste CEE 457 Groundwater CEE 534 Surface Water Quality Modeling CEE 431 Biomonitoring CEE 598EC Special Topics- Env. Organic Chemistry MCB 450 Introductory Biochemistry CEE 453 Urban Hydrology and Hydraulics CHBE 451 Transport Phenomena CHBE 424 Chemical Reaction Engineering CEE 498SM Env. Risk Assessment & Management CEE 446 Air Quality Engineering
Iowa State University	CE 522 Water Pollution Control Processes - Fundamentals of biochemical processes, aerobic growth in a single CSTR, multiple events in complex systems, and techniques for evaluating kinetic parameters; unit processes of activated sludge systems, attached growth systems, stabilization and aerated lagoon systems, biosolids digestion and disposal, nutrient removal, and anaerobic digestion systems.	CE 523 Physical- Chemical Treatment Processes Principles and design of physical-chemical processes: including coagulation, flocculation, chemical precipitation, sedimentation, filtration, adsorption, membrane processes, ion exchange and disinfection; laboratory exercises and demonstrations. Individual and group projects required.	CE 520 Environmental Engineering Chemistry CE 521 Environmental Biotechnology CE 529 Hazardous Waste Mgmt. CE 524 Air Pollution CE 525 Industrial Wastewater & Resource Recov. CE 527 Solid Waste Mgmt. CE 570 Applied Hydraulic Design CE 571 Surface Water Hydrology CE 572 Analysis & Modeling Aquatic Envs. CE 573 Groundwater Hydrology CE 591 Seminar in Env. Engr.
Johns Hopkins University	570.446 Biological Processes for Water and Wastewater Treatment Fundamentals and application of aerobic and anaerobic biological unit processes for the treatment of municipal and industrial wastewater	570.448 Physical and Chemical Processes in Environmental Engineering II Fundamental and applications of physical and chemical processes used in water and wastewater treatment. Emphasis on coagulation, sedimentation, filtration, membrane systems, and advanced oxidation processes	570.411 Engineering Microbiology 570.445 Physical and Chemical Procs in Env. Engr I 570.443 Aquatic Chemistry 570.452 Experimental Methods in Env. Engr & Chem 570.442 Environmental Organic Chemistry 570.465 Water Resource Development History & Principles 570.444 Colloid Chemistry 570.491 Hazardous Waste Management 570.423 Principles of Geomorphology 570.450 Molecular Biology for Engineering Application 570.395 Principles of Estuarine Environment 570.424 Air Pollution 570.493 Econ Foundations for Public Decision Making 570.490 Solid Waste Management
Loyola Marymount Univ.	CIVL 611 Wastewater Treatment Systems Design Integration of Unit Processes and Unit Operations and functional engineering design of municipal wastewater treatment and water reclamation systems.	CIVL 643 Unit Operations and Processes for Water & Wastewater Treatment - Theory of the physical, chemical, and biological unit operations and processes for water and wastewater treatment; industrial water and wastewater problems, and advanced wastewater treatment processes. The integration of individual processes into practical treatment trains is discussed.	CIVL 610 Water Treatment Systems Design ENVS 610 Chemistry for Environmental Engineers ENVS 631 Principles of Water Quality Management ENVS 633 Aquatic Chemistry ENVS 644 Applied Microbiology CIVL 605 Engineering Communications ENVS 645 Environmental Engineering Laboratory ENVS 650 Watershed Management CIVL 656 Water Resources Systems Modeling CIVL 510 Open Channel Hydraulics CIVL 504 Applied Fluid Mechanics CIVL 612 Air Pollution Analysis CIVL 614 Industrial Waste Management CIVL 620 Computers & Environmental Analysis CIVL 635 Contaminant Transport in Groundwater CIVL 515 Groundwater Hydrology CIVL 511 Hydraulic Analysis and Design CIVL 643 Groundwater Management CIVL 615 Theory and Design of Waste Outfall Systems CIVL 648 Hazardous Substances Management CIVL 649 Contaminated Site Remediation Civl 670 Contracts and Specifications ENVS 500 Geology ENVS 613 Solid Wastes Engineering ENVS 615 Environmental Impact Reports ENVS 618 Applied Oceanography ENVS 625 Inland Waters CIVL 665 Economics of Water Resources CIVL 650 Fundamentals of Environmental Health Risk
Manhattan College	ENVG 506 Water and Wastewater Treatment Processes Study of the fundamental principles used to treat both drinking water and wastewater. Drinking water treatment principles include Stokes law for particle settling, theory of coagulation and flocculation, porous media filtration, and disinfection. Principles for wastewater treatment include reactor analyses, growth of complex organics, and hindered and compression settling.	ENVG 718 Biological Treatment of Wastewater Application of microbiology to treatment of organic wastes including toxic chemicals. Treatment models, aerobic, facultative, and anaerobic processes, cell synthesis and respiration, oxygen and nutrient requirements. Biological nutrient removal, attached growth systems, bioremediation and process design.	ENVG 704 Advanced Water Quality Modeling ENVG 706 Aquatic and Sediment Chemistry ENVG 702 Air Quality Models ENVG 736 Advanced Unit Operations ENVG 505 Surface Water Quality Modeling ENVG 535 Surface Water Quality Lab ENVG 517 Env. Law ENVG 507 Geohydrology ENVG 739 Experimental Analysis in Env. Engr. ENVG 709 Geochemistry ENVG 708 Env. Biotech. ENVG 712 Advanced Geohydrology ENVG 721 Reg. & Engr aspects of Water/Residual Reuse ENVG 703 Env Fate & Effects of Toxic Contam. ENVG 705 Env. Chem

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University of Maryland	<p>ENCE 752 Theory of Aqueous Waste Treatment Theory and Practical design of treating wastewater, hydraulics of plant, cost analysis. Biological oxidation of organics and biological nutrient removal are emphasized. Stabilization and disposal of biosolids.</p>	<p>ENCE 753 Unit Operations of Environmental Engineering - The fundamental theory of unitoperations in the physical, chemical, and biological treatment of water. Coagulation and flocculation, sedimentation, filtration, disinfection, ion exchange, adsorption, gas transfer, membrane processes. Pollution prevention and waste minimization will be integrated into the course.</p>	<p>ENCE 651 Chemistry of Natural Waters ENCE 637 Biological Principles of Environmental Engineering ENCE 650 *Processes Dynamics in Environmental Systems * (Optional core course if ENCE 753 is not offered) ENCE 655 Environmental Behavior of Organic Pollutants ENCE 755 Transformations of Organic Compounds in the Env. ENCE 756 Bioremediation ENCE 757 Environmental Engineering Laboratory</p>
Mass. Institute Of Tech. (MIT)	<p>1.89 Env. Microbiology A general introduction to the diverse roles of microorganisms in natural & artificial environments. Topics include: cellular architecture, energetics, and growth; evolution and gene flow; population and community dynamics; water and soil microbiology; biogeochemical cycling; and microorganisms in biodeterioration and bioremediation</p>	<p>1.85 Water and Wastewater Treatment Engineering: Overview of engineering approaches to protect water quality with an emphasis on fundamental principals. Theory and conceptual design of systems for treating municipal wastewater and drinking water. Reactor theory, process kinetics, and models. Physical, chemical, and biological processes, including sedimentation, filtration, biological treatment, disinfection, and sludge processing. Engineered and natural processes for wastewater treatment.</p>	<p>1.34 Waste Containment & Remediation Tech. 1.72 Groundwater Hydrology 1.725J Chemicals in the Environment: Fate & Transport 1.76 Aquatic Chemistry 1.77 Water Quality Control 1.83 Environmental Organic Chemistry 1.64 Physical Limnology 1.714 Surface Hydrology 1.715 Env. Data Analysis 1.731 water Resource Systems 1.75 Limnology and Wetland Ecology 1.782 Env. Engineering MEng Project 1.811 Env. Law, Policy, and Economics 1.814J Industrial Ecology 11.479J Water & Sanit. Infrastruct. in Developing Countries</p>
Univ. of Mass at Amherst	<p>CEE 671 Biological Phenomena in Environmental Engineering Lecture and Lab. The major biological phenomena and processes used in environmental control. Fundamentals of microbiology and biochemistry as applied to wastewater treatment, drinking water treatment, and hazardous waste remediation</p>	<p>CEE 672 Physical and Chemical Treatment Processes Lecture and Lab. Fundamentals of physical and chemical processes used in environmental engineering. Applications include processes used in the treatment of drinking waters, industrial waters and wastewaters, municipal wastewaters, and hazardous waste remediation.</p>	<p>CEE 770 Environmental Engineering Design CEE 680 Water Chemistry CEE 577 Surface Water Quality Modeling CEE 579 Air Quality CEE 660 Subsurface Hydraulics CEE 661 Subsurface Pollution CEE 662 Water Resource Systems Analysis CEE 772 Instrumental Methods in Env. Analysis CEE 774 Processes at the particle-water interface CEE 776 Bioremediation of contam soils & ground water CEE 790M Pathogen and Indicator Organisms CEE 560 Hydrology CEE 561 Open Channel Flow CEE 572 Environmental Engineering Analysis CEE 573 Environmental Engineering Microbiology</p>
Michigan State University	<p>ENE 802 Physicochemical Processes in Environmental Engineering Physical and chemical principles of air and water pollution control and environmental contaminants in water, air, and soils.</p>	<p>ENE 804 Biological Processes in Environmental Engineering Engineering of microbial processes used in wastewater treatment, in-situ bioreclamation, and solid waste stabilization.</p>	<p>ENE 801 Dynamics of Environmental Systems ENE 806 Laboratory Feasibility Studies for Environmental Remediation ENE 807 Environmental Analytical Chemistry ENE 808 Environmental Analytical Chemistry Laboratory CE 821 Groundwater Hydraulics CE 891 Groundwater Modeling CE 891 Stochastic Groundwater Modeling CE891 Mixing and Transport in Surface Waters</p>
Michigan Techno-logical University	<p>CE 5502 Biological Treatment Application of kinetics, reactor theory, and microbiology to modeling and design of aerobic and anaerobic wastewater treatment systems. Topics include activated sludge process models and application of these models to process design and operation.</p>	<p>CE 5503 Physical - Chemical Treatment Processes Advanced theory, fundamentals, and application to physical and chemical processes employed in design and operation of drinking water systems.</p>	<p>CE 5501 Environmental Process Engineering CE 5504 Surface Water Quality Modeling CE 5511 Air Quality and the Built Environment CE 5610 Civil and Environmental Engr. Syst. Analysis CE 5665 Sediment Transport CE 5243 Probabilistic Analysis & Reliability in Cvl. Engr. CE 5999 Masters Research CE 4506 Appl. of Env. Regs. & Pol. Prev. to Engr. Practice CE 4507 Intro to GIS for Nat. Resource Mgmt CE 4509 Envr. Process. & Simulation CE 5661 GIS Applications CE 5510 Practical Appl. & Anal. Techniques for Env. Meas. CE 4338 Computer Based Proj. Mgmt. CE 4508 Water & WW Treatment</p>

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Descriptions for Core Courses (Required)		Elective Courses (must take 3)	
University of Michigan	CEE 580 Physicochemical Processes in Environmental Engineering Physicochemical separated and transformation processes in natural and engineered environmental systems: process modeling; design of operations involving state and phase transformation; chemical oxidation, reduction, sorption, stripping and exchange processes, membrane separations, particle aggregation, and coagulation, sedimentation and filtration.	CEE 592 Biological Processes in Environmental Engineering Theoretical Principles, qualitative and quantitative description of suspended growth and biofilm processes, as applicable to wastewater treatment and the bioremediation of soils, sediments, and groundwater. Bioremediation processes discussed include bioventing and biosparging, in situ intrinsic and enhanced bioremediation of chlorinated and nonchlorinated compounds.	CEE 580 Physicochemical Processes in Env. Engineering CEE 526 Design of Hydraulic Systems CEE 570 Introduction to Geostatistics CEE 581 Aquatic Chemistry CEE 582 Environmental Microbiology CEE 583 Surfaces and Interfaces in Aquatic Systems CEE 586 Industrial Ecology CEE 587 Water Resource Policy CEE 589 Risk and Benefit Analysis in Env. Engineering CEE 590 Stream, Lake and Estuary Analysis CEE 686 Case Studies in Environmental Sustainability CEE 692 Biological and Chemical Degradation of Pollutants CEE 693 Environmental Molecular Biology
University of Minnesota	CE 8504 Theory of Unit Operations The goal is to understand the behavior and design principles for the physical and chemical processes that are commonly used in water and wastewater treatment. Specific objectives of the course are to develop a strong theoretical basis for understanding process behavior, to determine how operating conditions influence process behavior, to determine and understand the basis for design practice, to design processes for specific application, and to predict the performance and behavior of designed systems. Processes covered include adsorption, ion exchange, sedimentation, thickening, filtration, gas transfer, coagulation, flocculation, membrane processes, and disinfection.	CE 8505 Biological Processes This class focuses on the biological treatment of wastewater. The following topics are covered: modeling suspended and attached growth systems, the fundamentals of nutrient removal, the fundamentals of floc formation and filamentous organism growth, and areas of future interest in wastewater effluent. The course is publication based, using a mixture of older seminal papers and newer papers as teaching aids. All of the students read the papers, and each week a different student presents a paper augmenting their presentation with traditional literature and leading the class discussion. The relevance of the topics covered in the class to industrial waste treatment, hazardous waste treatment, biological drinking water treatment is also discussed.	CE 5541 Environmental Water Chemistry CE 5542 Experimental Methods in Environmental Engineering CEE 5551 Environmental Microbiology Lab CE 8551 Env. Microbiology: Molecular Theory and Methods CE 4561 Solid and Hazardous Wastes CE 4562 Remediation Technologies CE 8542 Chemistry of Organic Pollutants in Env. Systems CE 8561 Analysis and Modeling of Aquatic Env. I CE 8562 Analysis and Modeling of Aquatic Env. II CE 8501 Environmental Fluid Mechanics I CE 8503 Environmental Mass Transport CE8490 Research & Prof. Ethics in Water Resources & Env. Sci.
University of Nebraska-Lincoln	CIVE 829 Biological Waste Treatment Principles of biological processes and their application in the design of waste treatment systems.	CIVE 823 Physical and Chemical Treatment Processes in Environmental Engineering Evaluation and analysis of physical and chemical unit operations and processes applied to the treatment of water, wastewater, and hazardous wastes.	CIVE 828 Quantitative Methods in Env. Engr. CIVE 821 Hazardous Waste Mgmt. CIVE 824 Solid Waste Mgmt. Engr. CIVE 826 Design of Water Treatment Facilities CIVE 827 Design of Wastewater Trt. & Disp. Fac. CIVE 830 Fundamentals of Water Quality Modeling CIVE 858 Groundwater Engineering CIVE 854 Hydraulic Engineering CIVE 819 Flow Systems Design BSEN 855 Nonpoint Source Pol. Contr. Engr. AGEN 841 Animal Waste Mgmt. CHME 892 Air Pollution, Assessment, and Control CIVE 822 Pollution Prevention: Princ. & Practice
University of New Hampshire	CIE 946 Advanced Bioenvironmental Engineering Design Theoretical and experimental examination of the fundamental parameters used in selection, design, and operation of biological treatment processes for waters, wastewaters, and hazardous wastes. Topics include design and evaluation of aerobic and anaerobic processes, suspended and fixed-film processes, and advanced biological water and wastewater treatment processes.	CIE 944 Advanced Physicochemical Treatment Design Selection, design, and evaluation of advanced unit processes employed in physicochemical treatment of waters, wastewaters, and hazardous wastes. Discussion on preparation of alternative designs and economic analysis. Emphasis on treatment schemes based on experimental laboratory or pilot studies.	CIE 849 Water Chemistry CIE 856 Environmental Engineering Microbiology CIE 840 Public Health Engg CIE 848 Solid and Hazardous Waste Design CIE 850 Ecohydrology CIE 945 Advanced Groundwater Topics CIE 847 Intro to Marine Pollution and Control CIE 851 Sustainable Engineering CIE 855 Design of Water Trans System CIE 940 Hydrologic Monitoring
New Mexico State	ENVE 552 Unit Processes/Operations in Wastewater Treatment Theory and applications with unit processes in environmental engineering. Biological treatment methods emphasized.	ENVE 551 Unit Processes/ Operation of Water Treatment Theory and applications with unit processes in Env. Engineering. Physical/ Chemical treatment methods emphasized.	ENVE 553 Chem. Theories of Env. Engineering ENVE 554 Microbiological Theories of Env. Engineering ENVE 557 Water Quality Modeling ENVE 558 Adv. Waste Mgmt. ENVE 456 Env. Engineering ENVE 462 Sampling and Analysis of Env. Contaminants ENVE 455 Solid and Haz. Waste Systems IE 460 Evaluation of Engineering Data
Univ. of New Mexico	CE 531 Physical-Chemical Water and Wastewater Treatment - Theory and design of common physical-chemical treatment processes including sedimentation, coagulation, flocculation, water softening, oxidation, disinfection, sludge handling and disposal, filtration and centrifugation.	CE 536 Biological Wastewater Treatment - Principles and design of wastewater treatment systems which are dependent on biological organisms. Processes covered include suspended culture and fixed culture systems, nutrient removal, hybrid systems, land application and on-site treatment systems. Emphasis will be placed on fundamental interaction between the organisms, wastes, and receiving body of water.	CE 532 Advanced Physical-Chemical Water and Wastewater CE 534 Environmental Engineering Chemistry CE 537L Aqueous Env. Chemistry and Analysis CE 539 Radioactive Waste Mgmt CE 540 Design of Hydraulic Systems CE 541 Groundwater engineering CE 442 Hydraulic Engr. and Hydrology CE 542 Intermediate Hydrology CE 543 Intro to Groundwater Contam. Transport Modeling CE 544 Water Resources engineering CE 545 Open Channel Hydraulics CE 546 Hydraulic Structures

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Univ. of North Carolina	<p>ENVR 253 Physical/ Chemical Treatment Processes Fundamental descriptions of disinfection, oxidation, coagulation, precipitation, sedimentation, filtration, adsorption, ion exchange, and membrane processes; applications to water and wastewater treatment.</p>	<p>ENVR 254 Environmental Process biotechnology Theory and Practice of biological processes used to remove contaminants from environmental media, including water, wastewater, soil, and air.</p>	<p>ENVR 116 Aerosol Technology ENVR 116L Aerosol Technology Lab ENVR 151 Process Dynamics in Env. Systems ENVR 153 Groundwater Hydrology ENVR 161 Geostatistics for Spatial/Temporal Env. Phenomena ENVR 162 Random Field Modeling of Physical Proc. ENVR 167 Temporal GIS ENVR 250 Principles of Industrial Ventilation ENVR 250D Ventilation Design Problem ENVR 251 Air Pollution Control ENVR 252 Analysis of Water Resource Systems ENVR 255 Water and Wastewater Plant Design ENVR 256 Environmental Engineering Project ENVR 260 Appl. of Comp. Fluid Dynamics ENVR 265 Multiphase Transport Phenomena ENVR 285 Surface Water Qual.: Modeling and Policy ENVR 291 Water Resources Planning and Policy ENVR 119 Chemical Equilibria in Natural Waters ENVR 134 Environmental Health Microbiology ENVR 113 Limnology ENVR 114 Ecology of Wetlands ENVR 116 Lab Techniques and Field Measure. ENVR 130 Health Effects of Env. Agents</p>
North Carolina State University	<p>CE 771 Physical-Chemical Water Treatment Processes</p>	<p>CE 774 Environmental Bioprocess Technology</p>	<p>CE 574 Chemical Principles of Env. Engineering CE 573 Computer Methods & Applications in Civil Engrg. CE 774 Environmental Bioprocess Technology CE 584 Hydraulics of Groundwater CE 588 Water Resources Engineering CE 596B/C Environmental Engineering Laboratory CE 771 Physical-Chemical Water Treatment Processes CE 577 Engineering Principles of Solid Waste Mgmt. CE 775 Modeling and Analysis of Environmental Systems CHE 546 Design and Analysis of Chemical Reactors CHE 715 Transport Phenomena ST 511 Experimental Statistics for Biological Sciences ST 512 Experimental Statistics for Biological Sci. II MEA 759 Organic Geochemistry MAE 560 Computational Fluid Mechanics/Heat Transfer SSC 521 Soil Chemistry</p>
Northeastern University	<p>CIV G251 Environmental Biological Processes Examines microbiology with emphasis on biological processes in environmental engineering applications. Topics include cell structure, morphology, cell nutrition and growth, energy transfer and utilization, aerobic and anaerobic microbial metabolism, biological wastewater process theory and modeling, biological nutrients removal, and disinfection of relevant microorganisms. Includes relevant laboratory exercises of treatment parameters used to monitor the biological processes, such as BOD, TOC, COD, gravimetric methods, and dissolved oxygen. Also covers enzyme kinetics and evaluation of kinetic coefficients for biotreatment. Offering:</p>	<p>CIV G252 Water and Wastewater Treatment Processes Covers design principles and theory of removal of impurities from water. Treatment unit operations and processes typically include aeration, screening, coagulation and flocculation, sedimentation, filtration, ion exchange, activated carbon adsorption, and disinfection. Covers wastewater treatment with emphasis on secondary municipal treatment processes including preliminary treatment, primary clarification, activated sludge systems, aerated lagoons, aeration and mixing theory, fixed film biological treatment systems, anaerobic treatment systems, residue utilization, and disposal.</p>	<p>CIV G250 Environmental Chemistry CIV G253 Advanced Municipal and Industrial Wastewater Treatment Processes CIV G261 Surface Water Hydraulics and Quality Modeling CIV G262 Watershed Management. CIV G263 Groundwater Hydraulics and Quality Modeling CIV G270 Environmental Protection and Management CIV G271 Solid and Hazardous Waste Management CIV G272 Air Quality Management CIV G321 Geoenvironmental Engineering CIV G322 Engineering Geology IEM G200 Engineering Probability and Statistics CIV G260 Hydrology</p>
Northwestern University	<p>CIV ENG 442 Processes in Environmental Biotechnology Theory and practice of microbiological processes used in pollution control: kinetics of suspended growth and fixed-film processes, activated sludge, biofilm processes, nitrogen and phosphorus removal, methanogenesis.</p>	<p>CIV ENG 444 Physical/Chemical Processes in Environmental Control - Theory and practice of separations and conversions in water quality and residuals management. Water quality, coagulation, adsorption, ion exchange, membranes, oxidation, sedimentation, flocculation, filtration.</p>	<p>CIV ENG 467 Advanced Env Chemistry CIV ENG 440 Env. Transport Processes CIV ENG 361 Evaluation of Disease CIV ENG 448-0 Biophysicochemical Proc. in Env. Systems CIV ENG 468 Chemical Speciation in Aquatic Syst. CIV ENG 441-0 Methods in Microbial Complexity CIV ENG 446-0 Env. Analytical Chemistry CIV ENG 395 Env. Law and Policy CIV ENG 395 Industrial Ecology of Mats & Prod. CIV ENG 355-0 Eng. Aspects of Groundwater Flow CIV ENG 356-0 Trans. Processes in Porous Media IEMS 395-0 Sustainability Issues & Actions CIV ENG 516 Seminar in Env. Engr. and Sci.</p>

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Old Dominion University	CEE 752 Biological Treatment - Evaluates microorganism interactions, metabolism, nutrient requirements, substrate requirements, environmental conditions controlling growth, and other factors that are important to understanding microbial activity in biological wastewater treatment. The course will introduce various kinetic expressions of biological growth and combine them with fluid transport formulations through reactors that will allow prediction of reductions in organic and nutrient concentrations (i.e., percent removal) and requirements of oxygen or other electron receptors.	CEE 751 Physiochemical treatment Examines the mechanisms that are responsible for contaminant removal and the quantitative representation (theoretical and empirical formulations) of these processes that have been developed to predict treatment performance and are used in process design. The treatment processes that will be evaluated include all of the major processes used in domestic and industrial water and wastewater treatment.	CEE 762 Aquatic Chemistry CEE 765 Water Quality Mgmt. CEE 756 Water Quality Modeling CEE 754 Env. Engr. Microbiology CEE 790 Civil & Env. Engr. Experim. Design CEE 650 Pollution Prevention CEE 546 Urban Stormwater Hydrology CEE 552 Air Quality CEE 550 Water Distrib & WW Collection System Design CEE 558 Sustainable Development CEE 554 Hazardous wastes CEE 753 Advanced Water & WW treatment CEE 789 Computational Env. Fluid Dyn.
Oregon State University	ENVE 522 Environmental Engineering Design: Design of water and wastewater treatment facilities including physical, chemical, and biological processes	ENVE 534 Physiochemical Treatment: Physical and chemical processes for water quality control. Principles and design of unit operations and processes for water and wastewater treatment.	ENVE 541 Biological Treatment ENVE 521 Water & Wastewater Characterization ENVE 525 Air Pollution Control ENVE 531 Fate & Transport of Chem. In Env. Syst. ENVE 532 Aqueous Env. Chemistry ENVE 535 Physical & Chem Proc. for Haz. Waste Treatment ENVE 546 Aqueous Env. Chem Lab. ENVE 542 Microb. Proc. Design for Mun. & Haz. Waste ENVE 554 Groundwater Remed. ENVE 556 Sust. Water Resources Dev. CE 512 Hydrology
Penn State University	CE 571 Physicochemical Treatment: the theory of physical-chemical processes used in the treatment of potable water and municipal and industrial wastewaters.	CE 572 Biological Treatment Processes: The theory and application of biological processes to treat organic wastes, including wastewater, solid residuals, and toxic priority pollutants.	CE 576 Environmental Transport Processes CE 570 Environmental Aquatic Chemistry CE 479 Environmental Microbiology Lab CE 497A Environmental Microbiology CE 573 Environmental Organic Chemistry CE 472W Environmental Engineering Capstone Design CE 475 Water Quality Chemistry CE 575 Industrial Waste Management CE 578 Groundwater Remediation CE 555 Groundwater Hydrology: Analysis and Modeling CE556 Tracer and Contam. Transport in Groundwater Systems CE 561 Surface Hydrology
Purdue University	CE 456 Wastewater Treatment -Fundamental Concepts and Design Procedures for the treatment of municipal and industrial wastewaters. Course topics include waste characterization, impacts of pollutants, and principles of sedimentation, biochemical treatment processes (suspended and attached-growth systems), nutrient removal, disinfection, and sludge management.	CE 550 Physico-chemical Processes in Environmental Engineering covers basic physico-chemical processes of environmental engineering. Topics include: reactor theory, mixing, gravity separation, centrifugation, adsorption, ion exchange, ultraviolet disinfection and chemical disinfection	CE 554 Aquatic Chemistry in Environmental Engineering CE 597 B Environmental Engineering Microbiology CE 697 A. Advanced Physico Chemical Processes of Environmental Engineering CE 559 Water Quality Modeling CE 544 Subsurface Hydrology AGRY 544 Environmental Organic Chemistry CE 597A Groundwater and Soil Remediation CE 593 Environmental Geotechnology CE 575 Air Quality Management CE 555 Microbial Degradation of Pollutants CE 558 Sampling and Analysis of Source and Atmospheric Air Contaminants CE 542 Hydrology CE 540 Open Channel Hydraulics CE 547 Transport Processes In Surface Waters
Rice University	CEVE 533 Physical-Chemical Processes in Environmental Engineering- Introduction to colloid and surface chemistry, precipitation, settling, packed bed filtration, membrane separations, and other operations used in environmental pollution control and potable water treatment	CEVE 536 Environmental Biotechnology - Theory and application of biochemical processes in environmental engineering	CEVE 401 Introduction to Environmental Chemistry CEVE 412 Hydrology & Watershed Analysis CEVE 511 Atmospheric Chemistry/Physics CEVE 512 Hydrologic Design Lab CEVE 518 Groundwater Hydrology and Contamination CEVE 550 Environmental Organic Chemistry CEVE 406 - Introduction to Environmental Law CEVE 411 Air Resource Management CEVE 424 Chemical Transport & Fate in the Env. CEVE 443 Atmospheric Science CEVE 508 Remediation Technologies CEVE 534 Transport Phenomena & Env. Modeling CEVE 630 Membr.Proc./Spec.Topics-Colloid/Nanochem. CEVE 631 Env. Systems Analysis
San Diego State Univ.	ENV E 648 Biological Processes and Bioremediation Engineering - Engineering Principles and design of biological processes used in wastewater and bioremediation treatment technologies	ENV E 647 Physical and Chemical Processes of Water pollution Control Engineering principles and design of physical and chemical processes used in water and wastewater treatment	ENV E 645 Aquatic Chemistry ENV E 646 Micro. Princ. Of Env. Engr. ENV E 554 Proc. Fund. Of Env. Systems ENV E 637 Proc. Design of Ind & Haz Waste Treat. ENV E 553 Env. Engr. Lab ENV E 556 Air Pollution Engr. ENV E 558 Solid & Haz Waste Engr. ENV E 596 Advanced Env. Engr.
University of Southern California	CEE 523 Physical Processes of Environmental Engineering Environmental reactor design, coagulation, flocculation, sedimentation, filtration, adsorption, solid waste management (drying, centrifugation, incineration), membrane processes, advanced water treatment; mathematical modeling of physical processes.	CEE 553 Chemical and Biological Processes in Environmental Engineering Chemistry of softening, coagulation, disinfection, oxidation, corrosion control, dry and wet combustion and ion exchange, aerobic and anaerobic processes and the ecology of liquid and solid waste treatment	CE 503 Microbiology for Environmental Engineers CE 510 Groundwater Management CE 514ab Advanced Sanitary Engineering Design CE 516 Geohydrology CE 522 GW Hydrological Modeling CE 563 Chemistry and Biology of Natural Waters ENE 526 Env Pollutants: Monitoring & Risk Assessment ENE 580 Appl Env Biotechnology

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Univ. of South Florida	<p>ENV 6519 Physiochemical Treatment Processes - Theory and design of physico chemical operations and processes in engineered and natural systems. Analysis of unit operations and processes used in water and wastewater treatment including chlorination, activated carbon adsorption, gas/liquid mass transfer, filtration, coagulation, flocculation, and settling.</p>	<p>ENV 6667 Biological Processes in Environmental Engineering - Theory and applications of environmental biotechnology pertaining primarily to biological wastewater treatment processes (e.g. activated sludge, biological nutrient removal, membrane bioreactors, trickling filters and rotating biological contactors, fluidized bed reactors, anaerobic digestion, and natural treatment systems), and bioremediation. Theoretical concepts emphasized include: basics of microbiology and biogeochemical cycling, electron and oxygen equivalents, stoichiometry, energetics and kinetics of microbial growth, substrate degradation kinetics, suspended and attached growth systems, analysis of completely-mixed and plug flow bioreactor systems.</p>	<p>CGN 6933-002 Biological Principles of Env Engr ENV 4002 Physical and Chem. Princ.Of Env. Engr. ENV 6666 Aquatic Chemistry ENV 4417 Water Quality and Treatment PHC 6303 Community Air Pollution PHC 6301 Analysis of Water & Wastewater CGN 4933-002 Molecular Biology for Engineers ENV 5345 Solid Wastes Control PHC 7934 Environmental Modeling CGN 6933-003 Membrane Technology in Env. Engr. CGN 6933-004 Transport in Porous Media CGN 6933-005 Groundwater Engineering CGN 6933-006 Vadose Zone Hydrology CWR 6305 Urban Hydrology CWR 6534 Coastal and Estuary Modeling CWR 6533 Water Quality Modeling CGN 6933-001 Env Research Interd.Colloquium</p>
Stanford	<p>CEE 271A. Physical and Chemical Treatment Processes— Physical and chemical unit operations for water treatment, emphasizing combinations for drinking water supply. Application of the principles of process chemistry, rate processes, fluid dynamics, and process engineering to define and solve water treatment problems by flocculation, sedimentation, filtration, disinfection, oxidation, aeration, and adsorption. Investigative paper on water supply and treatment.</p>	<p>271B. Environmental Biotechnology— Stoichiometry, kinetics, and thermodynamics of microbial processes for the transformation of environmental contaminants. Design of dispersed growth and biofilm-based processes. Applications include treatment of municipal and industrial waste waters, detoxification of hazardous chemicals, and groundwater remediation.</p>	<p>CEE 260C Contaminant Hydrogeology CEE 266C Watershed and wetlands hydrogeology CEE 270 Movement & Fate of Org Contam in GW & SW CEE 272 Coastal Contaminants CE 273 Aquatic Chemistry CEE 273A Water chemistry Laboratory CEE 274A Env Microbiology I - Fundamentals CEE 274B Env Microbiology II - organic Degradation CEE 274C Env Microbiology Lab CEE 274D Pathogens in disinfection CEE 274E Pathogens in Environment CEE 278A Air pollution - physics & Chem CEE 278B Atmospheric Aerosols</p>
Univ. Texas at Austin	<p>CE 385L.1 Water and Wastewater Treatment: Physical and Chemical Treatment Principles of treatment of drinking water, industrial process water, and wastewater. Chemical reaction engineering and the science and engineering of processes for removing soluble and particulate pollutants</p>	<p>CE 385L.2 Water and Wastewater Treatment: Biological Wastewater Treatment and Sludge Processing Principles of treatment of domestic and industrial water, wastewater, and sludges with biological treatment methods</p>	<p>CE 385N Industrial Wastewater Treatment CE 386M Design of Water and Wastewater Systems CE 390J Engineering Microbiology CE 390L Environmental Analysis CE 390N Water Pollution Chemistry CE 385K.1 Water Qual: Stream, Impound.& Estuary Anal. CE 394K.1 EngrHydrology: Groundwater Pol./Transport CE 385W Drinking Water: Treatment & Pub.Health Issues CE 397 Water Supply/Waste Disp in Developing Countries CE389N Engr and Mgmt. of Municipal & Indust. Residuals CE 385J Hazardous Waste Management CE 385D Water Resources Planning and Management CE 394K.2 Engineering Hydrology Surface Water CE 394K.1 Geographic Info Syst in Water Resources CE 385M Unit Operations in Water and Wastewater Trtmt.</p>
Texas A&M	<p>CVEN 601 Environmental Engineering Processes III Biological Processes that describe behavior of materials in natural and engineered environmental systems including fundamental theory of kinetics, bioenergetics, genetics, and cellular functions.</p>	<p>CVEN 619 - Environmental Engineering Processes I Physical processes that describe behavior of materials in natural and engineered environmental systems including transport phenomenon, sorption, desorption, flocculation, and sedimentation.</p>	<p>CVEN 603 Environmental Engineering Management CVEN 620 Environmental Engineering Processes II CVEN 604 Engineering Analysis of Treatment Systems CVEN 605 Environmental Measurement CVEN 606 Environmental Engineering Design I CVEN 609 Env. Control of Oil and Hazardous Materials CVEN 610 Environmental Risk Assessment CVEN 673 Transport Phenomena in Porous Media CVEN 674 Groundwater Engineering CVEN 627 Engineering Surface Water Hydrology CVEN 628 Advanced Hydraulic Engineering CVEN 6654 Water Resources Engr Planning and Mgmt. CVEN 6 Linear and Non-Linear Optimization Models CVEN 675 Stochastic Hydrology BAEN 670 Air Pollution Engineering</p>
Tufts University	<p>CEE 139 Bioremediation: Natural and Enhanced Biodegradation of organic contaminants is evaluated in natural settings and in treatment processes. Aerobic and anaerobic pathways, their prediction and control are examined. Water, soil and vapor phase transformations are evaluated. Subject areas included kinetics, equilibria, sorption, gas transfer, and transformation products. Process design for treatment plants and in-situ applications applied to case studies.</p>	<p>CEE 239 Physicochemical Processes in Water and Wastewater Treatment A study of the physical and chemical principles underlying the methods used in treatment systems. Subject areas include adsorption filtration aeration, sedimentation, and solids handling</p>	<p>CEE132 Environmental Engineering Processes CEE 133 Water and Wastewater Plant Design CEE 134 Water and Wastewater Chemistry CEE 172 Fate and Transport of Env. Contaminants CEE 112 Hydrology and Water Resource Engineering CEE 131 River Hydraulics and Restoration CEE 113 Groundwater Hydrology CEE 136 Air Pollution CEE 138 Hazardous Waste Treatment Technology CEE 103 Water Quality Modeling CEE 114 Water Resources Systems Engineering CEE 202 Environmental Statistics CEE 143 Site Remediation CEE 154 Principles of Epidemiology CEE 173 Health Effects and Risk Assessment</p>

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Utah State University	<p>CEE 6640 Physical and Chemical Environmental Process Engineering - Principles of physical and chemical environmental engineering processes, including sedimentation, filtration, gas transfer, aeration, absorption, ion exchange, membrane processes, coagulation, flocculation, precipitation, oxidation, reduction, and disinfection. Process modeling and analysis applications in treatment of water, wastewater, industrial wastes, vapor treatment, and soil remediation.</p>	<p>CEE 6650 Biological Processes in Environmental Engineering- Theory and design of biological processes used in environmental engineering. Stoichiometric, energetic, and kinetic analysis of biological treatment processes; modeling and design of suspended growth and fixed film processes for treatment of municipal, industrial, and hazardous wastes; nutrient removal; and bioremediation.</p>	<p>CEE 6670 Environmental Process Laboratory CEE 6610 Environmental Quality Analysis CEE 6660 Environmental Data Anal. And Experimentation CEE 6630 Process Dynamics in Env. Engr. Systems CEE 6600 Environmental Chemistry of Inorganic Contam. CEE 6680 Soil-based Waste Mgmt. CEE 6690 Natural Systems Engineering CEE 6719 Environmental Engineering Microbial Ecology CEE 6730 Analysis & Fate of Env. Contaminants CEE 6740 Environmental Quality Modeling CEE 6830 Mgmt. and Utilization of Biological Solids CEE 6850 Atmospheric and Air Pollution Chemistry CEE 5880 Remediation Engineering CEE 5670 Hazardous Chemicals Handling and Safety CEE 5620 Aquatic Chemistry CEE 5750 Air Quality Measurements CEE 5810 Biochemical Engineering CEE 5860 Air Quality Mgmt. CEE 5870 Hazardous Waste Incineration CEE 5790 Accident and Emergency Management CEE 6480 Groundwater Contam. Model, Monit., Mgmt. CEE 7520 Math. Methods for Civil & Env. Engr.</p>
University of Utah	<p>CV EEN 6650 Biological Treatment Principles of enzyme and biochemical kinetics, aerobic and anaerobic treatment, sludge disposal, stream analysis, process design and operation.</p>	<p>CVEEN 7620 Physical and Chemical Treatment Processes for Water Quality Control Theory and application of physical and chemical methods for treatment of water, wastewater, hazardous waste, and contaminated soil.</p>	<p>CVEEN 6610 Water Chemistry and Lab Analysis CVEEN 7680 Design of Muni. Water and WW Treat. Syst. CVEEN 6605 Environmental II CVEEN 6640 Env. Lab. CVEEN 6603 Biochemical Engineering CVEEN 7690 Design of Ind. Water & WW Systems CVEEN 6620 Equilibrium Proc. in Aq. Syst. CVEEN 6660 Syst. Dynamics and Env. Policy CVEEN 6730 Health Physics & Radiation Prot. w/Lab CVEEN 6260 Applied Probability & Statistics CVEEN 7650 Modeling Env. Systems CVEEN 7610 Adv. Bioprocess Syst.</p>
Virginia Tech	<p>CEE 5125 Environmental Design I (Wastewater Treatment) Design of wastewater treatment facilities for the reduction and elimination of organic and inorganic pollutants.</p>	<p>CEE 5144 Unit Operations and Process Laboratory Applied science aspects of water and waste treatment; advanced research techniques in analysis and treatment of water and wastes</p>	<p>CEE 5134 Engineering Aspects of Water Quality CEE 5104 Environmental Chemistry CEE 5704 1 credit Env Chem lab CEE 5304 Env. Fluid Mechanics CEE 5794 Env. Engr. Principles CEE 4104 Water & Wastewater Treatment Design CEE 4144 Air Resources Engr. CEE 4174 Solid & Haz. Waste Mgmt. CEE 4594 Soil and Groundwater Pollution CEE 5126 Env. Engr. Design II/ Water CEE 5134 Engr. Aspects of Water Quality CEE 5154 Air Poll. Control Engr. CEE 5164 Air Qual. Modeling/Measurement CEE 5194 Env. Engr. Micro CEE 5204 GIS Appl. In Civil Engr. BSE 5354 Nonpoint Source Pollution Modeling CEE 5374 Dynamics of Groundwater CEE 5574 Env. Geotechnics CEE 58714 Surface Water Quality Modeling CEE 5774 Haz. Waste Mgmt.</p>
Washington State University	<p>BIOLOGICAL TREATMENT (REQUIRED) CE542 Environmental Engineering Unit Processes 3 Prereq C E 541. Biochemical energetics and kinetics; biological waste treatment processes; nutrient removal; advanced wastewater treatment design.</p>	<p>PHYSIOCHEMICAL TREATMENT (REQUIRED) CE541 Environmental Engineering Unit Operations 3 Prereq C E 442: Math 315. Theory and design of physical and chemical unit operations of water and wastewater treatment systems.</p>	<p>CE518 Hazardous Waste Engineering 3 or 4 Prereq graduate standing. CE584 Environmental Microbiology V 2 (1-3) or 3 (1-6) Prereq C E 583 CE583 Engineering Aspects of Environmental Chemistry V 2-4 Prereq C E 442 CE515 Environmental Measurements 3 (1-6) Graduate-level counterpart of C E 415 CE519 Hazardous Waste Treatment 3 Prereq C E 518 CE548 Advanced Topics in Water Quality Engineering Systems V 2-4 CE508 Air Pollution Control Engineering 3 CE576 Dynamics of Groundwater Contamination 3 CE577 Advanced Groundwater Hydraulics 3 CE579 Groundwater Geochemistry V 2-4 CE585 Aquatic System Restoration 3 (2-3)</p>
University of Washington	<p>CEE 541 Biological Treatment Systems Basic reactions, design principles, current design models, and operational considerations for biological treatment systems used in environmental engineering. Applications include activated sludge design and optimization, fixed film reactors, nitrification, nitrogen removal, phosphorus removal, anaerobic treatment, and toxic organics removal.</p>	<p>CEE 544 Physical-Chemical Treatment Processes Principles and design of major physical-chemical unit processes used in water, wastewater, and hazardous waste treatment. Processes include chemical and reactor kinetics, filtration, chemical coagulation, ion exchange, adsorption, and gas transfer. Development of mathematical models, laboratory demonstrations, and evaluation of current design practice.</p>	<p>CEE 540 Microbiological Process Fundamentals CEE 543 Aquatic Chemistry CEE 462 Applied Limnology & Poll. Effects of Freshwater CEE 486 Environmental Analysis Lab CEE 481 Hydraulic Design for Env. Engineering CEE 484 On Site Wastewater Disposal CEE 542 Bioremediation of Env. Pollutants CEE 547 Lake and Watershed Mgmt. CEE 555 Topics in Env. Health CEE 577 Water-Quality Management CEE 576 Water Resources Planning</p>

Summary of Course Requirements		* (Note: Core Courses and Electives listed are for the Engineering The Future Funding Program - Students must also satisfy their University's degree requirements regarding core courses and electives, which may differ from those listed here.)
Descriptions for Core Courses (Required)		Elective Courses (must take 3)
Univ. of Wisconsin	<p>CEE 821 Biological Treatment Processes Advanced theory and application of biological systems for the treatment of wastes. Includes a wet lab to introduce techniques to assess treatability and to provide design parameters. Topics covered include the fundamental concepts of stoichiometry, energetics, and kinetics of microbial growth and biological oxidations, suspended and biofilm processes, and bioremediation</p>	<p>CEE 822 Physical/Chemical Treatment Processes Advanced theory and applications of chemical and physical-chemical treatment of water and wastewater. Includes a wet lab to introduce techniques to assess treatability and design requirements. Topics covered include the fundamental concepts of sorption, coagulation/flocculation, filtration, disinfection, reactor hydraulics, and sedimentation.</p> <p>CEE 500 Water Chemistry CEE 824 Environmental Field Evaluations CEE 423 Air Pollution - Effects, Meas. & Control CEE 629 Environmental Microbial Biotechnology CEE 609 Sol-Gel Chemistry CEE 929 Environmental Engineering Seminar CEE 700 Chemistry of Natural Waters CEE 502 Env. Organic Chemistry CEE 609 Chemistry of Air Pollution CEE 629 Aerosol and Air Pollution lab</p>