附件6

UCLA第一年课程介绍

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| **课程性质** | **课程编号** | **课程名称** | **教学（小时）** | **先修课程** | **课程主要内容** |
| **授课** | **讨论** | **实践** |
| 必修课5门 | 150 | 水文学概论 | 4 | 2 | 6 |  | 水文循环及有关大气过程、水分与能量平衡、辐射、降水成因、入渗、蒸发、植物蒸腾、地下水流、暴雨径流、洪水过程。 |
| 151 | 水资源工程概论 | 4 | 2 | 6 |  | 水力学原理、明渠水流与有压管流、水库与大坝、水力机械、水力发电、应用于水资源工程的系统分析与设计导论。 |
| 157A | 水文模拟 | 4 | 2 | 6 |  | 讲授内容来自于以下领域：[1]明渠水流，包括一维稳定流、不稳定流和泥沙输移；[2]管流与配水系统；[3]降雨-径流模拟；[4]地下水流模拟。以上内容侧重于**行业应用导向**和/或**标准模型研究**并考虑适用于实际应用）。 |
| 157L | 水文分析 | 2 | 4 | 6 |  | 定量化水文循环要素所需数据的收集、整编、解释，包括降水、蒸发、入渗和径流，面向水文水资源问题的模型研发、构建及应用中相关水文参数的率定和水文变量的确定。 |
| 198 | 水资源工程课程设计 | 未提供 |
| 选修课（选择7门） | 153 | 环境工程科学导论 | 4 | 1 | 7 | 机械与航空工程 | 水污染、空气污染和土壤污染（污染源、迁移规律、影响及消除过程）；水质、污水处理、固体废弃物、空气污染、全球环境问题；现场考察。 |
| 154 | 水环境化学输移转化 | 4 | 2 | 6 | 环境工程科学导论 | 地表水和地下水的化学输移转化的物理、化学和生物基本特性，主要包括不同水体中的物理输运过程、空气-水体交换、酸碱平衡、氧化降解、化学吸附、生物降解和生物积累，水环境中考虑化学输移转化过程的实际定量问题。 |
| 155 | 水与污水处理仪器及工厂设备 | 4 | 2 | 6 | 环境工程科学导论 | 水质改善的生物、化学及物理方法；污水处理系统工程设计的基本原理；现场考察。 |
|  | 163 | 大气化学与空气污染导论 | 4 | 0 | 8 | 环境工程科学导论；大学化学；高等数学；大学物理 | 大气对流层化学成分的影响变化过程，主要包括空气污染浓度及标准、城市与地区性臭氧、悬浮微粒污染、酸雨形成与沉淀、人为的/有毒的/天然有机物和无机物的输运，全球化学循环及控制对策。 |
| 164 | 污水现场观测与控制对策 | 4 | 0 | 8 | 水文学导论；环境工程科学导论 | 污水分类与来源概述，地下水与污染物输移观测及模拟技术，工程实例的控制对策与可行性研究。 |
| 156A | 环境化学实验 | 4 | 4 | 4 | 环境工程科学导论；大学化学 | 水与污水分析相关的分析化学基本实验技术，主要包括重量分析、滴定分析法、分光光度法、氧化还原分析、酸碱度和导电性。课程《环境工程仪器与工厂设备实验》中的水质样本分析概念及方法。 |
| 156B | 环境工程仪器与工厂设备实验 | 6 | 2 | 4 | 大学化学 | 典型天然水与污水中无机物和有机物的特性及分析，仪器观测实验主要包括固体成分分析、氮组成、需氧量和余氯；化学反应器的动力特性、充气、气体剥离、凝结、絮凝、薄膜分离等。 |
| 157B | 水处理场设计 | 2 | 2 | 8 | 水与污水处理仪器及工厂设备 | 水质标准与规范，水处理场概述，工厂设备设计，水处理场预设计，设备水力特性、过程控制和造价估算。 |
| 157C | 污水处理场设计 | 4 | 0 | 8 | 水与污水处理仪器及工厂设备 | 污水处理场设计过程，主要包括一级和二级处理，现有处理场的设计回顾，过程控制和经济效益。 |
| M166 | 环境微生物学 | 4 | 2 | 6 | 环境工程科学导论 | 微生物细胞及其新陈代谢特性，微生物遗传学及潜能，微生物生长及其动力学，微生物生态及多样性，污水处理微生物，微生物观测，公共安全微生物学，病原体控制。 |
| M166L | 环境微生物学与生物技术实验 | 2 | 0 | 2 | 环境微生物学 | 环境微生物学常规实验，环境样本取样，环境样本中微生物辨别的传统与现代分子技术，环境样本中微生物活动分析技术，环境生物技术的实验系统。 |
| 199 | 土木与环境工程的专题研究 | 2-8 |  |  |  | 在学校教师指导下完成个人专题研究，需要提交最终报告或项目设计。要求学生与教师单独联系，并向管理部门提出书面申请。 |

**Compulsory Courses:**

**150. Introduction to Hydrology. (4)** Lecture, four hours; discussion, two hours; outside study, six hours. Enforced requisites: course 15, Mechanical and Aerospace Engineering 103. Study of hydrologic cycle and relevant atmospheric processes, water and energy balance, radiation, precipitation formation, infiltration, evaporation, vegetation transpiration, groundwater flow, storm runoff, and flood processes. Letter grading.

**151. Introduction to Water Resources Engineering. (4)** Lecture, four hours; discussion, two hours; outside study, six hours. Enforced requisites: course 150, Mechanical and Aerospace Engineering 103. Recommended: courses 103, 110. Principles of hydraulics, flow of water in open channels and pressure conduits, reservoirs and dams, hydraulic machinery, hydroelectric power. Introduction to system analysis and design applied to water resources engineering. Letter grading.

**157A. Hydrologic Modeling. (4)**Lecture, four hours; discussion, two hours; outside study, six hours. Requisites: courses 103, 150, 151. Introduction to hydrologic modeling. Topics selected from areas of (1) open-channel flow, including one-dimensional steady flow, unsteady flow, and sediment transport, (2) pipe flow and water distribution systems, (3) rainfall-runoff modeling, and (4) groundwater flow modeling, with focus on use of industry and/or research standard models with locally relevant applications. Letter grading.

**157L. Hydrologic Analysis. (4)**Lecture, two hours; laboratory, four hours; outside study, six hours. Requisite: course 150. Collection, compilation, and interpretation of data for quantification of components of hydrologic cycle, including precipitation, evaporation, infiltration, and runoff. Use of hydrologic variables and parameters for development, construction, and application of analytical models for selected problems in hydrology and water resources. Letter grading.

198: To be updated.

**Elective Courses:**

**153. Introduction to Environmental Engineering Science. (4)** Lecture, four hours; discussion, one hour (when scheduled); outside study, seven hours. Recommended requisite: Mechanical and Aerospace Engineering 103. Water, air, and soil pollution: sources, transformations, effects, and processes for removal of contaminants. Water quality, water and wastewater treatment, waste disposal, air pollution, global environmental problems. Field trip. Letter grading.

**154. Chemical Fate and Transport in Aquatic Environments. (4)** Lecture, four hours; discussion, two hours; outside study, six hours. Recommended requisite: course 153. Fundamental physical, chemical, and biological principles governing movement and fate of chemicals in surface waters and groundwater. Topics include physical transport in various aquatic environments, air-water exchange, acid-base equilibria, oxidation-reduction chemistry, chemical sorption, biodegradation, and bioaccumulation. Practical quantitative problems solved considering both reaction and transport of chemicals in environment. Letter grading.

**155. Unit Operations and Processes for Water and Wastewater Treatment. (4)**Lecture, four hours; discussion, two hours; outside study, six hours. Requisite: course 153. Biological, chemical, and physical methods used to modify water quality. Fundamentals of phenomena governing design of engineered systems for water and wastewater treatment systems. Field trip. Letter grading.

**163. Introduction to Atmospheric Chemistry and Air Pollution. (4)** Lecture, four hours; outside study, eight hours. Requisites: course 153, Chemistry 20A, 20B, Mathematics 31A, 31B, Physics 1A, 1B. Description of processes affecting chemical composition of troposphere: air pollutant concentrations/standards, urban and regional ozone, aerosol pollution, formation/deposition of acid precipitation, fate of anthropogenic/toxic/natural organic and inorganic compounds, selected global chemical cycle(s). Control technologies. Letter grading.

**164. Hazardous Waste Site Investigation and Remediation. (4)** Lecture, four hours; outside study, eight hours. Requisites: courses 150, 153, Mechanical and Aerospace Engineering 103. Overview of hazardous waste types and potential sources. Techniques in measuring and modeling subsurface flow and contaminant transport in subsurface. Design project illustrating remedial investigation and feasibility study. Letter grading.

**156A. Environmental Chemistry Laboratory. (4)** Lecture, four hours; laboratory, four hours; outside study, four hours. Requisites: course 153 (may be taken concurrently), Chemistry 20A, 20B. Basic laboratory techniques in analytical chemistry related to water and wastewater analysis. Selected experiments include gravimetric analysis, titrimetry spectrophotometry, redox systems, pH and electrical conductivity. Concepts to be applied to analysis of “real” water samples in course 156B. Letter grading.

**156B. Environmental Engineering Unit Operations and Processes Laboratory. (4)** Laboratory, six hours; discussion, two hours; outside study, four hours. Requisites: Chemistry 20A, 20B. Characterization and analysis of typical natural waters and wastewaters for inorganic and organic constituents. Selected experiments include analysis of solids, nitrogen species, oxygen demand, and chlorine residual, that are used in unit operation experiments that include reactor dynamics, aeration, gas stripping, coagulation/flocculation, and membrane separation. Letter grading.

**157B. Design of Water Treatment Plants. (4)** Lecture, two hours; discussion, two hours; laboratory, four hours; outside study, four hours. Requisite: course 155. Water quality standards and regulations, overview of water treatment plants, design of unit operations, predesign of water treatment plants, hydraulics of plants, process control, and cost estimation. Letter grading.

**157C. Design of Wastewater Treatment Plants. (4)** Lecture, four hours; outside study, eight hours. Requisite: course 155. Process design of wastewater treatment plants, including primary and secondary treatment, detailed design review of existing plants, process control, and economics. Letter grading.

**M166. Environmental Microbiology. (4)** (Same as Environmental Health Sciences M166.) Lecture, four hours; discussion, two hours; outside study, six hours. Recommended requisite: course 153. Microbial cell and its metabolic capabilities, microbial genetics and its potentials, growth of microbes and kinetics of growth, microbial ecology and diversity, microbiology of wastewater treatment, probing of microbes, public health microbiology, pathogen control. Letter grading.

**M166L. Environmental Microbiology and Biotechnology Laboratory. (1)** (Same as Environmental Health Sciences M166L.) Laboratory, two hours; outside study, two hours. Corequisite: course M166. General laboratory practice within environmental microbiology, sampling of environmental samples, classical and modern molecular techniques for enumeration of microbes from environmental samples, techniques for determination of microbial activity in environmental samples, laboratory setups for studying environmental biotechnology. Letter grading.

**199. Directed Research in Civil and Environmental Engineering**. (2 to 8) Tutorial, to be arranged. Limited to juniors/seniors. Supervised individual research or investigation under guidance of faculty mentor. Culminating paper or project required. May be repeated for credit with school approval. Individual contract required; enrollment petitions available in Office of Academic and Student Affairs. Letter grading.