



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

# Colloidal and Interfacial Processes in Aquatic Systems

## ENVENG 7220

**Credit Hours:**

3.00 - 3.00

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**Course Levels:**

Graduate

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**Course Components:**

Lecture

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**Course Description:**

Fundamental concepts of the chemistry of the solid-water interface, adsorption/desorption, coagulation, and deposition in natural and engineered systems.

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**Prerequisites and Co-requisites:**

Prereq: 2100 (610), or Grad standing, or permission of instructor.

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**Course Goals / Objectives:**

- Develop an understanding of the chemistry of environmentally relevant surfaces
  - Be able to apply mass action models to predict the surface chemistry of environmentally relevant surfaces
  - Apply understanding of the chemistry of environmental surfaces to predict the fate and transport of particles and pollutants in natural systems
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**Course Topics:**

- Overview, objectives & background The physical nature of interfaces Basics of soil mineralogy Site binding
  - Origins of surface charge at mineral surfaces Site enumeration Chemistry of hydrous oxide surfaces Surface charge and the electric double layer
  - Electrical Double Layer- Model Depictions Coordinative reactions at hydrous oxide surfaces - Protolysis and electrolyte binding
  - Coordinative reactions at hydrous oxide surfaces – Cation and anion ion adsorption Spectroscopic Detection of Surface Species
  - Surface complexation modeling
  - Chemistry of natural organic matter (NOM) Metal binding to NOM
  - NOM binding to mineral interfaces Simulating interactions with NOM
  - Colloidal Hydrodynamics and transport
  - Coagulation rate theories
  - Collision mechanisms
  - DLVO theory and particle stability
  - Steric stabilization Bridging flocculation
  - Particle deposition in porous media Colloid-facilitated transport
  - Student presentations
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**Designation:**

Elective