

**UNIVERSITY OF HOUSTON**  
**Department of Civil and Environmental Engineering**  
**Fall 2005**

CIVE 7397 (section# 13606): Membrane Processes for Water Treatment

11:30 am – 1:00 pm on Mondays and Wednesdays in room N61-D

**Catalog data and description:** CIVE 7397: Cr. (3-0). Introduction to momentum and mass transport in pressure-driven membrane processes with special emphasis on municipal and industrial water purification.

**Course objective:** To introduce students to the fundamentals of microfiltration, ultrafiltration, nanofiltration, and reverse osmosis membrane processes including fouling and permselectivity.

**Professor:** Dr. Shankar Chellam, Associate Professor of Environmental Engineering.

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**Text materials for class:**

- Lawler, D.F. and Benjamin, M.M. (2005) Water: Physical-Chemical Treatment, McGraw Hill Publishing Company. *Textbook in Preparation*. (Membrane chapter)
- Selected journal papers

**References and suggested reading:**

- *Journal of Membrane Science*
- *Environmental Science and Technology*
- *Water Research*
- *Desalination*
- *Ultrafiltration and Microfiltration Handbook (M. Cheryan)*
- *Microfiltration and Ultrafiltration (Zeman and Zydney)*
- *Water Treatment Membrane Processes (Mallevalle, Odendall, and Wiesner Editors)*

**Prerequisites / co-requisites by topics:**

- CIVE 6378: Principles of Environmental Modeling
- CIVE 6377: Water Chemistry
- Knowledge of fluid mechanics and hydraulics
- Calculus with differential equations

**Topics:**

- Introduction to pressure-driven membrane processes, modules, and systems
- Momentum transfer in membrane systems
- Mass transfer of dissolved (charged and uncharged) components during crossflow nanofiltration
- Feed water recovery
- Particle transport and fouling
- Dead-end filtration and blocking laws
- Several laboratory demonstrations on particle sizing (Coulter counter), pore size measurement (porometry), dead-end and crossflow filtration, organics measurement, bacterial polysaccharide/protein measurement, etc.