

## CIVE 3331 Environmental Engineering

CIVE 3331 - ENVIRONMENTAL ENGINEERING  
Spring 2003

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Purpose: Review topics for final examination

Final Exam: **May 7, 2003; 2:00pm – 5:00 pm (3 hours)**

Questions: Ten problems. Main coverage as below, but earlier topics are necessary (i.e. mass balance is fair game!)

Water Quality – Groundwater (Lecture\_009)

1. Apply Darcy's law in simple aquifer flow cases.
2. Three- well triangulation to determine direction and magnitude of hydraulic gradient.
3. Use drawdown at two wells to infer hydraulic conductivity.
4. Design well array to capture a contaminant plume.

Water/Wastewater Treatment (Lecture\_010 – Lecture\_011)

1. Calculate alkalinity, hardness, etc.
2. Determine equivalent weights and draw/interpret ion bar graphs.
3. Conceptual design of clarifiers, ion-exchange beds, etc.

Air Quality (Lecture\_012 – Lecture\_016)

1. Infer atmospheric stability from discharge plumes.
2. Determine mixing depth from elevation temperature profile
3. Estimate location and magnitude of peak downwind concentration from a single source using Gaussian dispersion model.
4. Use box models to infer air phase concentrations of contaminants under different pollutant loading conditions.

Population Modeling (Lecture\_017)

1. Use exponential and age-distributed growth concepts to estimate population numbers in past or future.
2. Determine half-lives and doubling times from population growth information.
3. Determine harvest rates for sustained yield of a natural resource.

Risk Assessment (Lecture\_018)

1. Estimate loss probabilities from exposure to selected compounds (EPA lifetime models).
2. Be able to explain in simple terms what is required for risk (environmental) to be meaningful.

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