

Approximate Schedule for CEE 6430 (FALL 2008)
(Please Check Frequently for Updates)
Last Updated: 07/07/08

Probabilistic Methods in Hydroscience

1st Week (Aug 27) (VIA EMAIL)

- i. Introduction. Course Description, Objectives and format via email
- ii. Refreshing the basic concepts of probability.random processes and random variables from books. Ideas for CLASS PROJECT –via email
- iii. Housekeeping practice and reading assignments from books

2nd Week (Sept. 3)

- i. Random Processes. Real-world examples. Probability Distributions – Tests for Distributions. (Lectures 1-2)

3rd Week (Sept. 10)

- i. Bayesian Statistics. Bayesian Vs Non-Bayesian. Utility of Bayesian Theory in hydrosciences. CLASS PROJECT ideas update. Lectures 3-4
- ii. Notification of due dates for handing in project proposal (end of 4th week – due Sept. 24). Hand in Homework Assignment#1.
- iii. Error Propagation – Uncertainty analysis – the concept of input-output modeling, derived distribution theory. Analytical concepts with examples.

4th Week –(Sept 17)

- i. Introduction to Monte Carlo Methods. Importance, concept, relevance to analytical error propagation. Lectures 5-6
- ii. Quiz – (15-20 min) Monte Carlo Method Continued. Collect Class Project Proposal (one-page).
- iii. Distribute HW#1 and Mini Project#1 (Deriving parameters of distribution from data by chi-squared and likelihood method; discrete and cont. distribution and prob problems; error propagation problem Manning's equation)

5th Week – (Sept 24)

- i. Complete error propagation. Lectures 7-8
- ii. Optimization Theory. All details – hand out papers on GA, nature (for review)

6th Week – (Oct. 1)

- iii. Complete Optimization Theory – Importance for WR systems management. Examples. Introduction to major algorithms. Discuss paper reviews
- iv. Lectures 9-10 – ANNs, Fuzzy Logic, Turning's test of intelligence.
- v. Assign HW#2 (On optimization, AIs). Collection of HW#1.
- vi. Mini Project#2 (On optimization)

7th Week – (Oct. 8)

- i. HW#1 solutions and discussion.
- ii. Complete Artificial Intelligence: Neural Networks – Status Update on Class Project. Lectures 11-12
- iii. Quiz (10-15 min) on Optimization.

8th Week. (Oct 15)

- i. Introduction to Geostatistics. Lectures 13-14
- ii. Assign HW#3.

9th Week. (Oct. 22)

- i. Complete Geostatistics
Status update on CLASS Project.
- ii. Assign Mini Project#3 (on Kriging – semi-variograms, correlation lengths)
- iii. Begin Time series analysis (Box Jenkins, detrending, stationary processes). Lectures 15-16.

10th Week. (Oct. 29)

- i. Complete time series analysis. Lectures 17-18.
- ii. HW#4 (on time series analysis)
- iii. Begin - Chaos Theory as a paradigm for analyzing non-linearity in hydrosystems. Open Discourse on Chaos Theory
– Marriage of Uncertainty with Certainty.
- iv. Random Numbers (pseudo) generators. Monte Carlo Discussion of CLASS Project presentation- setting up dates. The Do's and Don'ts of presentation.

11th Week (Nov 5)

- i. Complete random number, chaos theory, fractals. Begin Filtering (Kalman filtering). Lectures 19-20
- ii. Mini Project# 4 (On time series analysis, stress random number generation, chaos, monte carlo techniques; filtering).
- iii. Start STEVE 2.0 trial. – Introduce SREM2D

11th Week (Nov. 12)

- i. Complete Filtering. Lectures 19-20 – Do examples
- ii. Hydrologic remote sensing. Presentations on GPM, TRMM, HYDROS.
- iii. Hydrologic remote sensing – error propagation concepts. Exploring Optimality and assimilation concepts. Quiz – 15-20 min.
- iv. HW#5 (On filtering work)
- v. STEVE 2.0 Trial – complete SREM2D.

12th Week (Nov. 19)

- i. Continue STEVE 2.0 Trial
- ii. Solidify concepts on SREM2D and then visualization

13th Week (Nov. 26)

- i. STEVE 2.0 trial

- ii. Collect all mini project reports. Homeworks
- iii. Discussion of Project reports.
- iv. Assign hypothesis testing, and assessment of STEVE 2.0

14th Week (Dec 3)

- i. Final class presentation (each 20mins)
- ii. Final class project report due.