University of Montana

ScholarWorks at University of Montana

Syllabi   Course Syllabi

1-2015

GEO 585.01: Topics - Hydrologic Modeling

Marco P. Maneta
University of Montana - Missoula, marco.maneta@umontana.edu

Follow this and additional works at: https://scholarworks.umt.edu/syllabi

Let us know how access to this document benefits you.

Recommended Citation

Maneta, Marco P., "GEO 585.01: Topics - Hydrologic Modeling" (2015). *Syllabi*. 2850.
https://scholarworks.umt.edu/syllabi/2850

GEO585: Hydrologic Modeling
Spring 2015
University of Montana
Instructor: Marco Maneta
Email: marco.maneta@umontana.edu
Office: CHCB 348
Phone: 406-243-2454
Class meetings: Monday-Wednesday 10:10pm-11:30pm

Overarching goals:

- Inverse modeling, calibration, and sensitivity analysis using advanced research tools

- Advanced topics in forward computer modeling and model analysis.

Ancillary goals: Along with the overarching goals, in this course we will revisit some linear algebra, probability, and optimization concepts necessary to understand the contents of the course and to understand the scientific literature. We will also run computer models and get familiar with data pre- and post-processing tools.

Prerequisites: Interest in quantitative modeling of environmental processes and comfort with computers, calculus, physics and algebra.

Office hours: Office hours will be the next hour after class.

Grades: 60% Individual project; 40% class activities

Text books:

- Optimization:

  - Arora, J. Introduction to Optimum Design. 3rd edition. 2012.
    * The 2nd edition of this book is available online at the UM Mansfield library (free of charge)
    * There is an number of errata in the 2nd edition. Make sure you also get the document with the list of corrections in the publisher's webpage

Recommended books:

- Linear Algebra:

  - Noble and Daniel. Applied linear algebra. 2nd edition

- Inverse modeling

  - Aster, RC, Brochers, B, Thurber, CH. Parameter estimation and inverse problems. Elsevier, 2nd ed, 2012

Date	Topic	Activity
01/26/15	Overview and Intro to Modeling	
01/28/15	Intro to PCRASTER	PCR problem set
02/02/15	Intro to Python	Python Practice
02/04/15	Plotting with Python	Python Practice
02/09/15	Physics in Ech2o	Ech2o case study
02/11/15	Review of linear algebra and calculus	
02/16/15	President day	
02/18/15	Review of probability concepts	Problem set
02/23/15	Intro to optimization	Problem set
02/25/15	Least squares	

03/02/15	Statistical aspects of LS	
03/04/15	Steepest descent	
03/09/15	Newton's method	Problem set
03/11/15	Levenberg Marquardt	
03/16/15	Intro to PEST	PEST demo
03/18/15	Connecting Pest and Ech2o	Invert Ech2o
03/23/15	Connecting Pest and Ech2o	Invert Ech2o
03/25/15	Interpreting PEST outputs	
03/30/15	Spring break	
04/01/15	Spring break	
04/06/15	Error propagation 1 variable	
04/08/15	Error propagation 1 variable	Problem set
04/13/15	Error propagation multivariable	
04/15/15	Static optimal estimation	
04/20/15	Static optimal estimation	Problem set
04/22/15	Dynamic optimal estimation	
04/27/15	Dynamic optimal estimation	
04/29/15	Student project presentation	
05/04/15	Student project presentation	
05/06/15	Student project presentation	