

INTRO GEOSCIENCE COMPUTATION

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PHYSICS OF THE EARTH PROJECTS:

- Calculating Gutenberg-Richter laws for earthquakes.
- Earthquakes ground motion.
- 1D-2D diffusion equation.
- 1D-2D transport equation.
- 1D-2D advection-diffusion equation.
- Wave propagation in 1D.
- Shallow water wave equation.

January 18th 2011: **Introduction.**

*Description of the class (Format of class, 55 min lecture/ 55 min exercise)

* Login for computers

* Check matlab

*Questionnaires

*Examples of problems addressed via computation in Geosciences (CIG)

January 20th: 2011: MATLAB INTRODUCTION Gutenberg-Richter laws

January 25th 2011: Gutenberg-Richter laws- Ground acceleration (STATISTICS IN MATLAB, IF).

First Homework (Calculating Gutenberg-Richter laws for each plate boundaries).

January 27th 2011: Ground acceleration-Slope failure (FOR, DO LOOPS).

February 1st 2011: 1D diffusion (Energy conservation lecture).

February 3rd 2011: 1D non-steady state Heat flow example (Mars, Moon)

Second Homework (Cook steak).

February 8th 2011: 2D Heat diffusion CHECK STEAKS.

February 10th 2011: COOK (variable boundary conditions and conductivity).

Third Homework (Heat flow with source and varying boundary conditions).

February 15th 2011: Erosion with diffusion.

February 17th 2011: Erosion with diffusion.

Fourth Homework (Diffusion in 2D).

February 23rd 2011: 1D transport-advection lecture (shallow water wave eq).

February 25th 2011: 1D transport (AGAIN).

Fifth Homework

March 1st 2011: Example of transport (heat advection)

March 3rd 2011: Example of transport (fluid advection)

Sixth Homework

March 8th 2011: Midterm exam (Take home starting in class).

March 10th 2011: Midterm exam (Take home starting in class). Must be in by Friday 5:00. pm.

SPRING BREAK

March 22nd 2011: 1D advection-diffusion.

March 24th 2011: 1D advection-diffusion (example).

Seventh Homework

March 29th 2011: 2D advection-diffusion (example).

CHOOSE PROJECT ASSIGNMENT

March 31st 2011: 2D advection-diffusion (example).

Eighth Homework

April 5th 2011: FINAL PROJECT ASSIGNMENT

April 7th 2011: FINAL PROJECT ASSIGNMENT

April 12th 2011: FINAL PROJECT ASSIGNMENT

April 14th 2011: FINAL PROJECT ASSIGNMENT

April 19th 2011: FINAL PROJECT ASSIGNMENT

April 21st 2011: FINAL PROJECT ASSIGNMENT

April 28th 2011: FINAL PROJECT ASSIGNMENT

April 30th 2011: FINAL PROJECT PRESENTATION (15 min each)

May 3rd 2011: FINAL PROJECT PRESENTATION (15 min each)

May 5th 2011: FINAL PROJECT PRESENTATION (15 min each), project paper due.

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Midterm: 2 hours programming exam. Open manual.

Final project: 5 pages summary

I INTRO: problem statement with equations

II METHODS

III RESULTS AND UNCERTAINTIES

IV DISCUSSION

V APPENDIX WITH CODE AND PLOTTED RESULTS

15 min presentation with Powerpoint or Pdf includes 12 slides no more (AGU format)