Syllabus

GEO 391 - INTRO GEOSCIENCE COMPUTATION

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PHYSICS OF THE EARTH PROJECTS:

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

January 19th 2010: **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 21nd 2009: MATLAB INTRODUCTION

January 26th 2009: Gutenberg-Richter laws (STATISTICS IN MATLAB, IF).

First Homework (Calculating Gutenberg-Richter laws).

January 28th 2009: Ground acceleration (FOR, DO LOOPS).

February 2rd 2009: 1D diffusion (Energy conservation lecture).

February 4th 2009: Heat flow example.

Second Homework (Cook steak).

February 9th 2009: CHECK STEAKS.

February 11th 2009: COOK OTHER THINGS.

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

February 16th 2009: Erosion with diffusion.

February 18th 2009: Erosion with diffusion.

Fourth Homework (Diffusion in 2D).

February 23rd 2009: 1D transport-advection lecture.

February 25th 2009: 1D transport of fluids.

Fifth Homework

March 2nd 2009: Example of transport (heat advection)

March 4th 2009: Example of transport (fluid advection)

Sixth Homework

March 9th 2009: Discuss homework and prepare exam.

March 11th 2009: Midterm exam

SPRING BREAK

March 23rd 2009: FORTRAN INTRO (OPEN AND WRITE A FILE)

March 25th 2009: FORTRAN 1D diffusion

Seventh Homework

March 30th 2009: 1D wave equation lecture.

April 1st 2009: FORTRAN (1D wave equation).

Eigth Homework

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April 6th 2009: FORTRAN TO MATLAB for output.

CHOOSE PROJECT ASSIGNEMENT

April 8th 2009: 1D and 2D wave reflection (lecture).

Ninth Homework

April 13th 2009: MATLAB/FORTRAN 1D and 2D wave reflection.

April 15th 2009: MATLAB/FORTRAN 1D and 2D wave reflection.

April 20th 2009: FINAL PROJECT ASSIGNEMENT
April 22nd 2009: FINAL PROJECT ASSIGNEMENT

April 27th 2009: FINAL PROJECT ASSIGNEMENT
April 29th 2009: FINAL PROJECT ASSIGNEMENT
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May 4th 2009: FINAL PROJECT PRESENTATION (15 min each)
May 6th 2009: FINAL PROJECT PRESENTATION (15 min each)

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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)