INTRO GEOSCIENCE COMPUTATION

Syllabus 2011

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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.

* 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


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


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

**Seventh Homework**

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

**CHOOSE PROJECT ASSIGNEMENT**

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

**Eighth Homework**

April 5th 2011: FINAL PROJECT ASSIGNEMENT
April 7th 2011: FINAL PROJECT ASSIGNEMENT

April 12th 2011: FINAL PROJECT ASSIGNEMENT
April 14th 2011: FINAL PROJECT ASSIGNEMENT

April 19th 2011: FINAL PROJECT ASSIGNEMENT
April 21st 2011: FINAL PROJECT ASSIGNEMENT

April 28th 2011: FINAL PROJECT ASSIGNEMENT
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.

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)