

FysGeo 4300 - Methods in Physics of Geological Processes

Autumn 2007

This course will introduce the students to advanced methods used to study geological processes. These methods may be divided into field observation, analysis of rock samples, mathematical modelling, numerical simulation and experiments. The students will learn the principal idea of the different methods and they will apply them to phenomena related to diffusion and fracturing.

Hours	Theme	Teacher
General		
1	Introduction	Dag
5	Discrete & algorithmic simulations	Joachim/Anders
3	Continuum simulations	Galen
3	Analogue experiments, scaling, control and measurement	Dag
2	Geological maps	Torgeir
2	Graphical presentation of structure data	Torgeir
2	Introduction to Matlab	Dag
Fracturing		
Theory		
1	Fractures on different scales in nature	Bjørn
2	Elasticity, Mohr circle analysis, Griffith	Dag
Practical		
6	Field mapping of fracture system in Oslo area	Torgeir
4	Discrete (spring network) simulations of fracturing/fragmentation	Anders
4	Fracture/fragmentation experiments, image analysis, data treatm.	Dag
4	Algorithmic fragmentation model, data analysis, field comparison	Joachim
Diffusion		
Theory		
1	Geological importance of mass and heat diffusion	Bjørn
2	The diffusion equation, boundary conditions and solutions	Dag
Practical		
2	Analytical exercise/example from the research literature	Dag
4	Numerical solutions of the diffusion equation	Yuri
4	Discrete simulations of diffusion problems	Anders/Joachim
4	Experiments on heat conduction or Ostwald ripening	Dag

Week 34

20.08. morn	Theory	1h intro (+ 2h intro to 4100)	Dag, Galen
20.08. aft.	Theory	3h elasticity, Mohr circle analysis, Griffith	Dag
21.08.	Theory	3h experiments, scaling, control and measurement	Dag
21.08.	Theory	2h introduction to Matlab	Dag
22.08.	Practical	4h fracture/fragmentation experiments	Dag
23.08	Theory	1h image analysis	Torbjørn, Karthik, Espen
23.08	Theory	3h discrete & algorithmic simulations(+ 2h 4100)	Anders, Galen
24.08	Theory	2h discrete & algorithmic simulations(+ 2h 4100)	Joachim, Galen

Week 35

27.08.	Report in	fracture experiments	Dag
27.08.	Practical	4h discrete simulations of fracturing/fragmentation	Anders
28.08.	Theory	2h geological maps	Torgeir
29.08.	Theory	2h graphical presentation of structure data	Torgeir
30.08.	Report in	discrete simulations	Anders
30.08	Theory	1h quantification of field fracture patterns	Karthik
31.08.	Practical	4h algorithmic models, data analysis, scaling	Joachim

Week 36

03.09	Theory	3h continuum simulations	Galen
04.09.	Report in	algorithmic models	Joachim
04.09.	Practical	6h field mapping	Torgeir
05.09.		(2h 4100)	Galen
06.09		Fys-Geo 4200 Case study starts	Karen

Week 37

10.09.	Report in	field mapping	Torgeir
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Fys-Geo 4200 Case study**Karen****Week 44**

29.10.	Theory	1h geological importance of mass and heat diffusion	Bjørn
29.10.	Theory	2h the diffusion equation...	Dag
29.10.	Practical	2h analytical exercise	Dag
30.10.	Practical	4h numerical solution of the diffusion equation	Yuri

Week 45

05.11.	Report in	numerical solution	Yuri
06.11.	Practical	4h diffusion experiment	Dag
09.11.	Report in	diffusion experiment	Dag

Week 46

12.11.	Practical	discrete simulation: DLA	Anders/Joachim
15.11.	Report in	discrete simulation	Anders/Joachim

Week 50

07.12.	Oral examination		
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