# Reactive Transport in Porous Media
# GEO 391, Spring 2012

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## Instructors


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| Instructor: | Dr. Marc Hesse |
| Office: | EPS 3.152 |
| Office hours: | Tuesdays 17:00 to 18:00 |
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## Assessment

Grading: The class will be graded based on regular homeworks. Collaboration: Homeworks can/should be discussed amongst students, but the solutions have to be written up individually.

## Course materials

No textbook is required, but some relevant books on the topic are:

1. *Geochemistry and Fluid Flow*, Lake, Bryant, and Araque-Martinez
2. *Reactive Transport in Porous Media*, (Reviews in Mineralogy vol. 34) Lichtner, Steefel, Oelkers
3. *An Introduction to Nonlinear Partial Differential Equations*, Logan
4. *Numerical Methods for Conservation Laws*, LeVeque
5. *First-Order Partial Differential Equations* (vol 1 & 2), Rhee, Aris, and Amundson
6. *Reservoir Simulation*, Aziz and Settari
7. *Geochemistry, groundwater and pollution*, Appelo and Potsma

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## Syllabus

| week | dates | topics | homework |
|---|---|---|---|
| 1 | 18 Jan, 20 Jan | Darcy's law and porous media | HW 1: Porous media |
| 2 | 23, 25, 27 Jan | Conservation laws, Transport problem | HW 2: Conservation Laws |
| 3 | 30 Jan, 1, 3 Feb | 1D numerical solution to Transport problem | HW 3: 1D FV Transport |
| 4 | 6, 8, 10 Feb | Pressure equation, Flow problem | none |
| 5 | 13, 15, 17 Feb | Numerical solution of Flow problem | HW 4: 3D FV Flow |
| 6 | 20, 22, 24 Feb | Coupled Flow and Transport | HW 5: 3D FV Flow & Transport |
| 7 | 27, 29 Feb, 2 Mar | Speciation computations | TBD |
| 8 | 5, 7, 9 Mar | Solving nonlinear systems of algebraic equations | TBD |
| 9 | 12, 14, 16 Mar | Spring break | none |
| 10 | 19, 21, 23 Mar | Classical and surface reactions | TBD |
| 11 | 26, 28, 30 Mar | Multicomponent reactive transport | TBD |
| 12 | 2, 4, 6 Apr | Coupled Reactive Flow and Transport | TBD |
| 13 | 9, 11, 13 Apr | Hyperbolic systems of equations | TBD |
| 14 | 16, 18, 20 Apr | Chromatography - single component | TBD |
| 15 | 23, 25, 27 Apr | Chromatography - multi component | TBD |
| 16 | 30 Apr, 2, 4 May | Travelling waves - dissolution precipitation | TBD |