

课程大纲 COURSE SYLLABUS

| | | |
|----|--|--|
| 1. | 课程代码/名称 Course Code/Title | ESE5093—反应性运移 Reactive Transport in Environment |
| 2. | 课程性质 Compulsory/Elective | 专业选修课 |
| 3. | 课程学分/学时 Course Credit/Hours | 3/48 |
| 4. | 授课语言 Teaching Language | 中/英文 |
| 5. | 授课教师 Instructor(s) | 刘崇炫 |
| 6. | 先修要求 Pre-requisites | 无 |
| 7. | 教学目标 Course Objectives | |
| | <p>a. To understand physical, chemical, biological processes, and their interactions in governing the reactive transport of environmental substances in natural and engineering systems;</p> <p>b. To establish quantitative models to describe reactive transport processes in environment;</p> <p>c. To apply the quantitative models for calculating and predicting the reactive transport of environmental substances.</p> <p>a. 理解控制环境物质反应性运移的物理、化学、生物和它们的耦合过程、机制和定量表述;</p> <p>b. 建立定量模型描述环境中的反应性运移过程;</p> <p>c. 运用定量模型计算和预测环境物质的反应性运移。</p> | |
| 8. | 教学方法 Teaching Methods | |
| | Lecture and Group Discussion 课堂讲授和课堂讨论 | |
| 9. | 教学内容 Course Contents | |
| | Section 1 | Geochemical Reactions and Rate Laws in Reactive Transport (6 hours) 反应性运移中的地球化学反应和反应动力学 (6 学时) |
| | Section 2 | Biogeochemical Reactions and Rate Laws in Reactive Transport (6 hours) 反应性运移中的生物地球化学反应和反应动力学 (6 学时) |
| | Section 3 | Biogeochemical cycles of elements and Global Kinetics (4 hours) 元素生物地球化学循环和系统动力学 (4 学时) |
| | Section 4 | Mass Transfer and Transport Processes in Reactive Transport (6 hours) 反应性运移中的传质过程 (6 学时) |
| | Section 5 | Review and Mid-exam (2 hours) 练习和期中考试 (2 学时) |
| | Section 6 | Generalized Equations of Reactive Transport and Numerical Treatments (4 hours) 反应性运移方程和数值处理 (4 学时) |

| | | |
|------------|--|--|
| | Section 7 | Reactive Transport in Complex Systems and Apparent Reaction Rates (4 hours) 复杂系统中的反应性运移和表观反应速率 (4 学时) |
| | Section 8 | Reactive Transport in Unsaturated Porous Media (2 hours) 非饱和介质中的反应性运移 (2 学时) |
| | Section 9 | Reactive Transport of Particles and Microorganisms in Environment (4 hours) 颗粒物和微生物的反应性运移 (4 学时) |
| | Section 10 | Reactive Transport Cases (10) 反应性运移实例 (10 学时) |
| 10. | 课程考核 Course Assessment | |
| | Attendance: 10% Homework: 20% Mid-exam: 30% Final presentation & report: 40% 出席率和课堂讨论: 10% 作业: 20% 期中考试: 30% 反应性运移实例报告 40% | |
| 11. | 教材及其它参考资料 Textbook and Supplementary Readings | |
| | 1、Text Books: Environmental Transport Processes, Bruce Logan, 2 nd Edition, 2012 2、Supplementary Readings: Chemical Kinetics and Reaction Dynamics, Santosh Upadhyay, 2006 Reactive Transport in Porous Media, Reviews in Mineralogy, Vol 34, ed. by P.C. Lichtner, C.I Steefel, and E.H. Oelkers, 1996 | |