

SE 598 Syllabus – Spring 2019

Course Name: SE 598 – Multiscale Simulation

Lecture: 2:00 pm to 3:20 pm on Tuesday and Thursday.

Location: 204 Transportation building

Instructor Information:

Dr. Yumeng Li (yumengl@illinois.edu)

Office: 212 Transportation Building

Office hours: 10:00 am to 12:00 am on Tu./Th. or by appointment

Course Overview (Tentative): In this course, students will learn important multiscale simulation concepts and methods as well as uncertainty quantification and propagation to solve various engineering problems. The topics under consideration in this course include:

- *Micromechanics Model*
- *Atomistic Simulations*
- *Mathematical Homogenization Theory*
 - *Homogenization with multiple scales*
 - *One dimensional problems*
 - *Multidimensional problems*
 - *Finite element formulation*
- *Heterogeneous Multiscale Method*
- *Multiscale Finite Element Method*
- *Uncertainty quantification and propagation*

Required Text: None. Recommended reference books are listed below. Additional reference materials will be provided throughout the semester.

Recommended Reading Material:

- G.A. Pavliotis and A. M. Stuart, “Multiscale Methods: Averaging and Homogenization,” Springer, 2008.
- J. Fish, “Multiscale Methods: Bridging the Scales in Science and Engineering,” Oxford University Press, 2010.
- Y. Efendiev and T. H. Hou, “Multiscale Finite Element Methods: Theory and Applications,” Springer, 2000.
- W. E, “Principles of Multiscale Modeling,” Cambridge University Press, 2011.

Course Website: Compass2g will be used to post important announcements, documents, and homework assignments. It can be accessed at <https://compass2g.illinois.edu> using your NetID and password. Grades will also be posted on Compass. Please check it regularly. Class sessions include a mix of lecture and discussion.

Homework:

- Homework will be assigned throughout the semester in weekly or bi-weekly fashion. Late submissions will be graded based on half credit if returned until noon of the next day. Assignments returned later will be graded but no credit will be given
- Deadline extension will be permitted with proof of medical or personal emergency only.

Projects:

- Project topic should be relevant to the course material. A proposal and a final report is required. There will be individual meetings with the instructor to discuss possible project topics.
- A one-page long project proposal is required. Your proposal should include a reasonably thought-out plan of what to be done to complete the project and key milestones. Project proposal constitutes 5% of the project score.
- Final reports must follow the general rules of journal paper writing. It must include a brief literature review of the subject in addition to the detailed description of research work, case studies and others. Computer codes must be provided with the project report.
- Important tentative dates for the project:
 - Project discussion: February 28, 2018
 - Project proposal due: March 23, 2018
 - Project presentation and final report: May 3, 2018

Grading: The overall grade of the course will be assembled based on

30%: Homework

70%: Project

A+: 97 – 100%	A: 93 – 96%	A-: 90 – 92%
B+: 87 – 89%	B: 83 – 86%	B-: 80 – 82%
C+: 77 – 79%	C: 73 – 76%	C-: 70 – 72%
D+: 67 – 69%	D: 63 – 66%	D-: 60 – 62%

Academic Integrity: We will follow university regulations for academic integrity: (<http://admin.illinois.edu/policy/code/>). Students who violate academic integrity will receive a “0” on that exam or assignment and may receive an “F” grade in the course. Discussing a homework assignment in a group is encouraged as long as each student writes the answer in his/her own words. Plagiarism is considered a serious violation of academic integrity and will be dealt with utmost severity.