SCHOOL OF COMPUTER SCIENCE

CS 5753 SCIENTIFIC COMPUTING II
SPRING 2014

Topic: **MULTISCALE METHODS**

Instructor: S. Lakshmivarahan

Class Time: T-Th 1.30 – 2.45 PM , **Class Room**: Felgar Hall Room 320

Office Hours: T-TH from 9.00 to 10.00am and from 3.00 to 3.30pm

Course outline: Study of many problems in Science and Engineering such as fluid flow, coupled weather and climate analysis, analysis of nano-devices, to mention a few, involve phenomena that has information on a wide ranging (multi) time and spatial scales. The aim of this course is to provide a broad based introduction to the tools and techniques for analyzing these challenging problems. The topics to be include:
1) Perturbation methods,
2) Averaging methods,
3) Analysis of two scale and multi-scale processes,
4) Examples from different application domain.
Note: It is encouraged to use MATLAB for all the programming exercises

Reference books:

1) J. A. Sanders and F. Verhulst (1985) **Averaging Methods in Nonlinear Dynamical Systems,** Springer Verlag
2) A. Lasota and M. C. Mackey(1994) **Chaos, Fractals and Noise: stochastic aspects of dynamics,** Springer Verlag
3) G. A. Pavliotis and A. M. Stuart (2008) **Multiscale Methods: averaging and homogenization**, Springer Verlag
4) J. Lewis, S. Lakshmivarahan and S. K. Dhall (2006) **Dynamic Data Assimilation,** Cambridge University Press.

Final Exam: Thursday, May 08, 2014 from 1.30 to 3.30 pm

Grading: Assignments 8-10, one midterm, and a final. Assignments – 40%, Mid-term-30%, Final Exam 30%. Grading scale: A is 90 or above; B is 80 to 89; C is 70 to 79 and D is 60 to 69. Below 60 is F.

Date for the mid-term exam will be announced later. For more information contact the instructor: **varahan@ou.edu**