

**Course Outline**  
**JEE 664 Air Pollution Modeling**  
**Semester 1, 2009**  
**Main Instructor: Asst. Prof. Dr. Kasemsan Manomaiphiboon**

**Course Description:**

This is a graduate course devoted to the introduction of air quality modeling (AQM). Following the key ideas of the course description said in the JGSEE Student Handbook, the objectives of the course designed for this semester are i) to provide students the overview of the AQM and its fundamentals and components, ii) to concisely introduce the concepts of various different AQM subjects of the AQM, and iii) to allow students to develop basic understanding and skills. The course contents are outlined in the table below (subject to change). Since the nature of the AQM is broad-ranged, the subjects chosen and included do not present its entire spectrum. The course is primarily designed for those who are interested and/or begin their work in the modeling area. Evaluation of course performance will be based solely on assignments (i.e., no examinations). Assignments will be regularly given with specific due times.

**Required Background:**

The only prerequisite of this course is Atmospheric Science (or equivalent). Nevertheless, students are expected to possess or quickly develop computer skill in both FORTRAN language and UNIX/LINUX, at least at a basic level within a couple weeks after the first lecture begins. Some background in the following subjects, though not required, are helpful: Mathematical Techniques, Numerical Methods, Fluid Mechanics, Computational Fluid Dynamics, Meteorology, Meteorological Modeling, Atmospheric Dynamics, Atmospheric Boundary Layer, Environmental Modeling, Modeling in Environmental Engineering, Turbulence, Turbulence Modeling, Statistics, Statistical Modeling, Probability, Probabilistic Modeling, and Simulation.

**Contents (subject to adjustment):**

Overview of air quality models, computer issues, computational routines, emission estimation, spatial allocation, temporal allocation, chemical speciation, turbulence, meteorology, Gaussian plume, plume rise, stochastic process, photochemical/ozone, and biogenic emissions (teaching may not be arranged in this order)

**Grading Policy:**

Group Project = 30%  
Midterm Exam = 30%  
Final Exam = 40%

**Textbooks:**

Suggested textbooks:

- 1) Jacobson, M. Z. (1998, 2005) Fundamentals of Atmospheric Modeling. Cambridge University Press.
- 2) Seinfeld, J. H. and Pandis, S. N. (1997) Atmospheric Chemistry and Physics: From Air Pollution to Climate Change. Wiley.
- 3) Arya, S. P. (1999) Air Pollution Meteorology and Dispersion. Oxford University Press.
- 4) Beychok, M. R. (2005) Fundamentals of Stack Gas Dispersion. M. R. Beychok
- 5) Chapra, S. C. and Canale, R. P. (1998) Numerical Methods for Engineers: With Programming and Software Applications. McGraw-Hill.
- 6) Jacobson, M. Z. (2002) Atmospheric Pollution: History, Science and Regulation. Cambridge University Press
- 7) Power, H. and Baldasano, J. M. (1998) Air Pollution Emissions Inventory. WIT Press.
- 8) Schnelle, K. B. and Dey, P. R. (2000) Atmospheric Dispersion Modeling Compliance Guide. McGraw-Hill
- 9) Stull, R. B. (1998) An Introduction to Boundary Layer Meteorology. Kluwer.

The above titles can be found in the JGSEE and/or KMUTT libraries.

**Remark:**

- 1) Sit-in students are welcome but should write an email to the instructor to request official permission).
- 2) Some classes may be taught at a classroom on Floor 4, SBT Building , KMUTT (BKT campus) (to be notified later).