Earth Observation & Modeling
HGEC-610

Syllabus

Instructor	Prof. Seon Ki Park (spark.chapman@gmail.com; park@chapman.edu) Room 204, Hashinger Science Center
Room/Time	Room 207, Hashinger Science Center Mon.-Thu. 09:00~12:00, 14:00~17:00
Office Hours	By appointment only. E-mail correspondence is strongly encouraged.
Course Description	Main goals of this course are to explore various observation systems for monitoring the Earth and quantitative measurement of its components, and to introduce fundamental knowledge on numerical modeling and data assimilation of atmosphere. Basics on the global earth system/climate modeling will be also covered. Especially numerical techniques to solve the partial differential equations will be discussed in depth for practical assessment to numerical modeling and prediction.
Course Topics	Topics to be covered include but not limited to: 1) observation systems; 2) global/regional field campaigns; 3) in situ vs. remote sensing observations; 4) overview of numerical weather prediction (NWP) 5) partial differential equations (PDEs); 6) Navier-Stokes' equation; 7) governing equation of atmosphere; 8) numerical techniques for solving PDEs; 9) initial conditions (ICs) and boundary conditions (BCs); 10) sub-grid scale physical processes and parameterization; 11) basics of data assimilation
Course Structure	Oral Lecture; Oral Presentations by Students
Course Requirements	Prerequisites: PHYS-520
Assignments	• Problems • Paper reading: oral presentation and summary report • Term project: oral presentation and term paper
Assessment and Grades	• Quiz (40%) • Homework (30%) - Problems, Computer problems, Paper reading • Term Project (30%)

Texts and References	1. Kalnay, 2003: *Atmospheric Modeling, Data Assimilation and Predictability*. Cambridge University Press, 341 pp. 2. NRC, 2008: *Observing Weather and Climate from the Ground Up: A Nationwide Network of Networks* The National Academies Press, 250 pp. 3. Trenberth, K.E., 2010: *Climate System Modeling*. Cambridge University Press, 880 pp. 4. McGuffie, K., and A. Henderson-Sellers, 2005: *A Climate Modeling Primer*. John Wiley & Sons, 280 pp. 5. Washington, W. M., and C. L. Parkinson, 2005: *An Introduction to Three-Dimensional Climate Modeling*. University Science Books, 353 pp.
Important Notes	1. Homework is due by 8 pm on the date announced through online submission. Students will be assessed a 40% penalty per day for late work, and work will not be accepted more than 1 day beyond the announced due date. 2. Submitting homeworks in time is very important! If you do not submit your homework once, you cannot get A. If you do not submit your homework twice, you are guaranteed to get no better than C. I will strictly apply this rule no matter how good your records are in the exams.

Lectures for **Interterm 2011**
Hazards, Global and Environmental Change (HGEC) Program
School of Earth and Environmental Sciences
Schmid College of Science
Chapman University