

# PHYS 722

<http://userpages.umbc.edu/~martins/PHYS722/>

## Remote Sensing of Earth's Atmosphere

<p><b>Instructor:</b> Dr. Jose Vanderlei Martins <b>Office Hours:</b> Wed 10:00–12:00    <b>Physics</b> <b>Building – room</b> 429                      <b>Phone:</b> <b>410-455 2764</b>                      <a href="mailto:martins@umbc.edu">martins@umbc.edu</a></p>	<p>Lectures Time/Place: <b>Tue/Thu: 11:00-12:15</b> <b>Physics building</b></p>
<p><b>Grading Method:</b> Final Exam (25%), Mid-Term Exam (25%), Project (25%), Homework (25%)</p>	<p><b>Suggested Textbook: (not required)</b> - John R. Schott, 2009; Fundamentals of Polarimetric Remote Sensing, SPIE Tutorial Text Vol. TT81</p> <p><b>Reference Books:</b> - G. L. Stephens, Remote Sensing of the Lower Atmosphere, 1994, Oxford University Press. - W. G. Rees, Physical Principles of Remote Sensing, 2001, 2nd. Edition, Cambridge University Press.</p>

Obs: A number of www-based aides, summary notes, etc. will be available but the students are always encouraged to take their own notes.

# Course Syllabus

## **PHYS 722** *Remote Sensing of the Earth's Atmosphere* [3 credits]

(from Catalog) Techniques for the passive and active remote sensing of the state and composition of the Earth's atmosphere. Fundamentals of radiative transfer as applied to remote sensing. Introduction to measuring radiation and designing passive and active instruments; theoretical background and algorithmic considerations for the passive and active sensing of aerosol and cloud properties; atmospheric profiles of temperature, humidity and trace gas concentration; and the state and composition of the Earth's surface.

### **Prerequisite:**

*PHYS721.*

### **Course Description and Objectives:**

The course will explore passive and active remote sensing techniques that are commonly used to explore Earth's atmospheric and surface properties from ground, aircraft, and space platforms. Students will apply their radiative transfer background from previous courses to simulate the remote sensing measurements and to develop sensors and algorithms to measure physical parameters of the atmosphere and surface. Particular emphasis will be given to the remote sensing of aerosol and cloud particles.

At the end of the course, students are expected to be able to:

- a) Distinguish and describe the designs of passive and active remote sensing instruments
- b) Identify and explain theoretical principles of ground- and satellite-based radiation measurements
- c) Develop and evaluate retrieval methods for sensing aerosols, clouds, precipitation, and atmospheric profiles of temperature, humidity and/or trace gas concentration

*Note: The emphasis on a given topic or the course content may vary according to specific interests of the class and links with special events on Atmospheric Remote Sensing.*

### **Course Work:**

- *Homework* assignments will be given periodically covering subjects discussed or related to topics discussed in class or related to the class project.
- A *Project* topic will be selected at the beginning of the course and the students will develop it along the whole semester. Individual students will make oral presentations on their results and turn in a final report with no more than 10 pages. The report must be well organized, well written, and present references following an AGU publication-

like standard.

- The *mid-term* and *final exams* will be cumulative, covering the entire subject discussed up to their dates. At the instructor's discretion, these exams could be given as take home exams.

## Policies & Expectations

### Policy on Attendance

Attendance at most lectures is **optional** - the only **exceptions** being for **Quizzes, Exams and Project Presentations** (*see below*). Despite being optional, it should be stressed that you are **strongly encouraged to attend** the lectures. They are an integral part of the course.

A note on **Classroom Etiquette**: You are expected to show the professor and your fellow students respect. You are expected to arrive prior to the start of the lecture, and not to leave until after the end of the lecture. You are expected to pay attention to the lecture, and usually to take notes. Behavior such as reading non-course related material, wearing headphones, disrupting fellow students *etc* are unacceptable. *If* you need to clarify a point with your neighbor, please do so in a "hushed manner". You are encouraged to ask questions, but to do so you are expected to raise your hand & wait to be called upon.

**Please turn cell-phones OFF prior to entering the lecture hall.**

**Laptops are allowed and even encouraged in this class as they can be used for real time calculations, simulations**

### Policy on Exams & Quizzes:

Make sure you **read & understand the "rules" and consequences of academic misconduct** (see below).

### Policy on Grading *etc*

Dr Martins will determine all final grades. Your final grade is based on your actual total score. Grade Distribution: Final Exam (25%), Mid-Terms (25%), Project (25%), Homework (25%)

**You have one week from receiving a grade to appeal.**

### Academic (Mis)Conduct

**Cheating will not be tolerated.** We all know what that means, so I am not going to list all the possible "dos & donts". However here are a few pointers:

**Quizzes & Exams** are to be completed **alone** (*not with the help of your neighbors and classmates*)

***A note on academic integrity:***

By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal.

**The consequences of misconduct will be severe, and may be reported to the Academic Conduct Committee.** See also the UMBC [Graduate School website](#).

**If you are uncertain as to whether something is allowed: ASK FIRST!!**

*Students are expected to be familiar with the [Policies & Expectations](#) of this course, and all UMBC regulations.*