Course Information
Title: GGS756-001 Physical Principles of Remote Sensing
CRN: 78545
Time: Monday 7:20 - 10:00 PM
Classroom: Exploratory Hall 2103
Instructor: Dr. John Qu
Telephone: (703) 993-3958
Office: Exploratory Hall, Room 3411
Office Hour: Stop by Monday or make appointment

Course Description
This course is designed to give students with limited Earth science satellite remote sensing background a thorough introduction to gather the basic concepts and fundamentals of physical principles of remote sensing. The main emphasis of this course is on the basic physical and mathematical principles underlying the satellite remote sensing techniques, including radiometric and geometric information, satellite orbit and geo-location simulation, science algorithm designing, atmosphere corrections, and in situ measurements in support of remote sensing. In addition, this class will provide a focus on the NASA current and future Earth Observing System (EOS) instruments, such as the Moderate Resolution Imaging Spectroradiometer (MODIS), future National Polar-orbiting Operational Environmental Satellite System (NPOESS, now JPSS) and NPOESS Preparatory Project (NPP, now Suomi National Polar-orbiting Partnership) missions. These students will understand not only what remote sensing systems do, but how they work.

Schedule
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<tr>
<th>Week one (08/30)</th>
<th>Introduction to Earth science satellite remote sensing</th>
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<tr>
<td>Week two (09/06)</td>
<td>Physical fundamentals of remote sensing</td>
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<td>Week three (09/13)</td>
<td>Top atmospheric solar radiation</td>
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<td>Week four (09/20)</td>
<td>Atmospheric absorption and scattering</td>
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<td>Week five (09/27)</td>
<td>Radiation transfer in the atmosphere</td>
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<td>Week six (10/04)</td>
<td>Applications radiation transfer principles to remote sensing I</td>
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<td>Week seven (10/11)</td>
<td>Applications radiation transfer principles to remote sensing II</td>
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<td>Week eight (10/18)</td>
<td>Platform for remote sensing and Electro-optical systems</td>
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<td>Week nine (10/25)</td>
<td>Satellite orbit and geo-location simulation</td>
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<td>Week ten (11/01)</td>
<td>Sensor Data Record (SDR): data products</td>
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<td>Week eleven (11/08)</td>
<td>SDR algorithms and calibrations</td>
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<td>Week twelve (11/15)</td>
<td>Atmospheric correction and vegetation indices</td>
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<td>Week thirteen (11/22)</td>
<td>Selected scientific Environmental Data Record (EDR) algorithms</td>
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Week fourteen (11/29) | Student presentations

Week fifteen (12/06) | Final Term Paper Due

Final project
EOS, JPSS or NPP related topics and focusing on physical principles of satellite remote sensing.

Grading

- Midterm 30%
- Homework 20%
- Final Project 50%

(A=90-100, B=80-89, C=70-79, D=60-69, F=<60)

Prerequisite
Permission of the instructor

Required Textbook: None

Reference Books and Documents

6. Some EOS, JPSS, and NPP Algorithm Theoretical Basis Documents (ATBDs) will be used during this class.

Useful Links

7. NASA Earth Observing System
8. Selected EOS instrument ATBDs
9. NASA Visible Earth
10. NASA/GSFC MODIS Direct readout
11. NASA Remote Sensing Tutorial
12. NPP Web Page
13. JPSS Web Page
14. NASA AERONET (AErosol RObotic NETwork) program
15. MODIS Rapid Response System