

Physics 522: The Interstellar Medium (ISM)

Fall 2009

Tuesday and Thursday 2:20-3:40 pm

Earth & Space Sciences Building (ESS) Room 450

Instructor:

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Office hours:

Official: Thursday and Thursday, 9-11 AM

Unofficial: Stop by my office or send me an e-mail anytime.

Course Descriptions

The interstellar medium (ISM) is the gas and dust anywhere (almost everywhere) in space from the early Universe to the present. PHY522 is a survey of the physical processes that determine the properties and behavior of the ISM, and the processes that makes the ISM observable. The goals of this course are to understand the basic physical principles necessary to pursue research in the ISM, and more broadly in astrophysics. The course is divided into four parts: radiative processes, dynamical processes, evolutionary processes, and interstellar chemistry.

Textbooks:

Primary:

“The Interstellar Medium”, by Lequeux

Secondary:

“Radiative Processes in Astrophysics”, by Rybicki & Lightman

“The Physics of Astrophysics II: Gas Dynamics”, by Shu

“Astrophysics of Gaseous Nebulae and Active Galactic Nuclei”, by Osterbrook & Ferland

“The Formation of Stars”, by Stahler & Palla

Course Grading:

Homework (30%), Midterm examination (30%), and oral presentations or final examination (40%). Students are encouraged to discuss homework problems and questions with other students, but everyone must work out his or her own solutions or answers, and turn in a personal write-up.

Tentative Class Schedule:

Radiative Processes

Week 1	Aug 31-Sep 4	Overview and Radiation Field
Week 2	Sep 7-11	Radiative Transfer and Black Body Radiation
Week 3	Sep 14-18	Spectral Line Formation and Absorption
Week 4	Sep 21-25	Atomic and Molecular Spectral Lines

Week 5	Sep 28-Oct 2	Continuum Radiation
<u>Dynamical Processes</u>		
Week 6	Oct 5-9	Introduction to Gas Dynamics
Week 7	Oct 12-16	Shock Waves
Week 8	Oct 19-23	Turbulence
Week 9	Oct 26-30	Midterm exam on Oct 27 ; Interstellar Magnetic Field
<u>Evolutionary Processes</u>		
Week 10	Nov 2-6	Heating and Cooling of the ISM
Week 11	Nov 9-13	Instability of the ISM
Week 12	Nov 16-20	Stellar Evolution and the ISM
<u>Interstellar Chemistry</u>		
Week 13	Nov 23-27	Chemical reactions in interstellar space
Week 14	Nov 30-Dec 4	Oral presentations + discussion

Stony Brook policies:

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Disability Support Services (631) 632-6748 or <http://studentaffairs.stonybrook.edu/dss>. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website <http://www.stonybrook.edu/ehs/fire/disabilities.shtml>.

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instance of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary>.

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, and/or inhibits students' ability to learn.