

SYLLABUS: ASTRONOMY 8120 – Spring 2025
Plasma Physics & Magneto-Hydrodynamics (MHD)
Dr. Petrus (Piet) Martens
Updated 1/10/2025

Office Hours: Mo and We: After class, or by appointment at other times.
You can also email or drop by my office.
Email: martens@astro.gsu.edu
Class Location: 25 PP, Rm 628 (conference room)
Class Times: Mo, We: 9:30-10:45 AM
Class Web Site: [Plasma-8120_Spring2025](#)
Prerequisites: Electricity and Magnetism I, Physics 7700

Required Textbook: ["The Physics of Fluids and Plasmas"](#), by Arnab R. Choudhuri.
Hardcopies are available at Amazon. Other textbooks will be consulted in class; copies of the relevant chapters will be provided.

Description: This is a course in the basic theory of plasma physics and magnetohydrodynamics (MHD) with applications and examples from solar and stellar physics, neutron stars, accretion disks, galaxies, magnetospheric physics, magnetically controlled fusion, and plasma experiments.

Class Subsections: A detailed class schedule will be presented on the class website. Subsections are: Gas Dynamics; MHD; Helicity; Current, and Energy; Waves and Stability; Current Sheets; Plasma Transport Coefficients; Eruptions and Flares.

Objectives: The principal objective of this course is to prepare the students for actual Plasma Physics & MHD research in any of the fields listed above.

Grading: You will write an ApJL type paper on a course subject of your choice, following instructions and a timetable on the class web site. There will be assignments following each class, due by the next class, and graded. **These can be handwritten and scanned. Lecture notes will be posted on the class web site. The final grade will be a combination of the final paper (60%), and assignments, class presence, and notes (40%).**

Workload: This is a three credit hour course. The typical student load per semester hour is 48 hours, so 144 total -- just under 10 hours per week over the 15 weeks duration of the class. Lectures take up 2.5 hours per week, so roughly seven hours should go into going over the lecture notes, homework assignments, and working on the final paper.

Additional Info: The website and this syllabus provide a general plan for the course; deviations may be necessary. Test dates are targets and subject to change. Active attendance in the lectures is required and contributes to the final grade

Withdrawal: Last day to withdraw (W) is March 4th.

Academic Honesty: Students are expected to do their own work and to abide by the [Policy on Academic Honesty](#). Cheating or plagiarism on any assignment will yield a zero on that work and possible referral.

Assessment: Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take the time to fill out the online course evaluation.

Accommodation: Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to their instructors. All audiovisual presentations in this class will have the option for close-captioning.

Non-Discrimination Policy: GSU does not tolerate sexual harassment and discrimination on the basis of race, gender, sexual orientation, age, disability, national origin, military status, or religion. Every student and employee in the university community has the responsibility not to engage in any unlawful harassment or discrimination. For the detailed GSU policies see the [GSU Student Code of Conduct](#) Non Discrimination Policy, and the [Sexual Misconduct Policy](#) documents.

Incompletes: Receiving a grade of “incomplete” – in order to receive an incomplete, a student must inform the instructor, either in person or in writing, of his/her inability (non-academic reasons) to complete the requirements of the course. Incompletes will be assigned at the instructor’s discretion and the terms for removal of the “I” are dictated by the instructor. A grade of incomplete will only be considered for students who are a) passing the course with a C or better, b) present a legitimate, non-academic reason to the instructor, and c) have only one major assignment left to finish.