

Study programmes: Astronomy and Astrophysics - PhD Studies			
Course name: Magnetohydrodynamics			
Lecturers: Dušan Onić, Vladimir Zeković			
Status: Optional			
ECTS: 9			
Attendance prerequisites: None			
Course aims: Attaining of advanced knowledge connected to theoretical studying of the magnetohydrodynamics (MHD).			
Course outcome: At the end of the course, student has skills to work on some research topics in propagation of disturbances through the neutral and ionized medium. The magnetohydrodynamics method has abroad applicability in theoretical description of stellar plasmas, interstellar and intergalactic matter.			
Course content: General properties of cosmic plasmas. Hydrodynamical models. Generalized Ohm's law. Two-component model. Ideal magnetohydrodynamics (MHD). Waves in ideal MHD. Shock waves. Dissipative MHD. Inhomogeneous plasmas. Macroscopic instabilities in MHD. Dusty plasmas in space. Relativistic MHD. Examples of MHD application to the different types of cosmic plasmas. Examples of MHD simulations.			
Literature: 1. Onić, D., 2020, Dynamics of cosmic plasma, Faculty of mathematics, manuscript 2. Goedbloed J. P., Poedts S., 2004, Principles of Magnetohydrodynamics with Applications to Laboratory and Astrophysical Plasmas, Cambridge University Press, New York 3. Goossens M., 2003, An introduction to plasma astrophysics and magnetohydrodynamics, Kluwer Academic Publications, Dordrecht 4. Bittencourt J. A., 2004, Fundamentals of Plasma Physics, Third Edition, Springer-Verlag, New York, Inc. 5. Birdsall, C. K., Langdon, A. B., 2005, Plasma Physics via Computer Simulation, Taylor & Francis Group, LLC., New York 6. Bodenheimer, P., Laughlin, G. P., Różyczka, M., Yorke, H. V., 2007, Numerical Methods in Astrophysics: An Introduction, CRC Press, Taylor & Francis Group, LLC, Boca Raton, Florida			
Number of hours: 10	Lectures: 4	Tutorials: 6	
Teaching and learning methods: Ex cathedra, group work, student research			
Assessment (maximal 100 points)			
Course assignments	points	Final exam	points
Lectures	20	Written exam	-
Exercises / Tutorials	20	Oral exam	60
Colloquia	-	Written-oral exam	-
Essay / Project	-		