PAP305 Space Applications of Plasma Physics

Go to start of metadata

• 1. Course title
  • 2. Course code
  • 3. Course status: compulsory or optional
  • 4. Course level (first-, second-, third-cycle/EQF levels 6, 7 and 8)
  • 5. Recommended time/stage of studies for completion
  • 6. Term/teaching period when the course will be offered
  • 7. Scope of the course in credits
  • 8. Teacher coordinating the course
  • 9. Course learning outcomes
  • 10. Course completion methods
  • 11. Prerequisites
  • 12. Recommended optional studies
  • 13. Course content
  • 14. Recommended and required literature
  • 15. Activities and teaching methods in support of learning
  • 16. Assessment practices and criteria, grading scale

1. Course title
Plasmaviisikan avaruussovellukset
Space Applications of Plasma Physics

2. Course code
PAP305

Aikaisemmat leikkaavat opintojaksoit 53769 Plasmaviisikan avaruussovellukset, 5 op

3. Course status: optional

- Which degree programme is responsible for the course?
Master's Programme in Particle Physics and Astrophysical Sciences

- Which module does the course belong to?
PAP300 Advanced studies in Particle Physics and Astrophysical Sciences (optional for Study Track in Astrophysical Sciences)

- Is the course available to students from other degree programmes?
Yes

4. Course level (first-, second-, third-cycle/EQF levels 6, 7 and 8)
Master's level, degree programmes in medicine, dentistry and veterinary medicine = secondcycle degree/EQF level 7
Doctoral level = third-cycle (doctoral) degree/EQF level 8

- Does the course belong to basic, intermediate or advanced studies (cf. Government Decree on University Degrees)?
Advanced studies

5. Recommended time/stage of studies for completion

- The recommended time for completion may be, e.g., after certain relevant courses have been completed.

6. Term/teaching period when the course will be offered
The course will be offered in the autumn term, in II period.

7. Scope of the course in credits
5 cr

8. Teacher coordinating the course
Minna Palmroth

9. Course learning outcomes
- You will obtain solid understanding of space physics, giving a good background in further studies and research in space plasma physics
- Knowledge of basic solar physics, e.g., the structure of the Sun, and how energy is generated and transferred
- You will obtain solid theoretical knowledge behind several key phenomena in space plasma physics, such as solar wind and interplanetary magnetic field, collisionless shocks, magnetospheric, and ionospheric physics
- You will obtain skills to analyse some key data sets related to course topics (such as magnetospheric physics behind the auroral displays)
- You will obtain solid physics-based understanding on how the solar structures affect the near-Earth dynamics, leading to space weather phenomena

10. Course completion methods
contact teaching, but can be also taken as a distance learning course

11. Prerequisites
- Basic physics courses
- Solid calculation skills (e.g., Mathematics for Physicists I-II, Mathematical Methods of Physics I-II)
- Good knowledge of electrodynamics (e.g., Electrodynamics I and II)
- Introduction to Plasma Physics

12. Recommended optional studies
- Advanced Plasma Physics
- Solar Physics
- Numerical Space Physics

13. Course content
The course contains an introduction to most important topics in space plasma physics: the Sun, solar wind, formation of the magnetosphere, ionosphere, magnetospheric dynamics, solar wind/magnetosphere-ionosphere coupling, magnetospheres of other planets, and astrophysical plasmas.

14. Recommended and required literature
- Lecture notes
- Other recommended material
- Hannu Koskinen: Johdatus plasmafysiikkaan ja sen avaruussovellutuksiin, Limes ry., 2001

15. Activities and teaching methods in support of learning
- Lectures
- Weekly exercises (include plenty of practical exercises)
- Practical exercises during the lectures
- Student seminar

16. Assessment practices and criteria, grading scale
• Final grade is based on exercises (~30%), seminar (20%), and the final exam (~50%).

17. Teaching language

English