Course description
FY539: Galactic dynamics and dark matter

SDU

FY539: Galactic dynamics and dark matter

Study Board of Science

STADS ID (UVA): N500031101

Teaching language: Danish or English depending on the teacher, but English if international students are enrolled
ECTS value: 5
EKA: N500031112
Censorship: Second examiner: Internal
Date of Approval:
Grading: 7-point grading scale
Offered in: Odense
Offered in: Summer school (autumn)
Duration: 1 semester
Level: Bachelor

Version: Draft

▾ Entry requirements

The course can not be followed by students who have taken FY825: Galactic dynamics and dark matter (5 ECTS).

▾ Academic preconditions

Students who follow the course, are expected to have knowledge equivalent to two years of bachelor study in physics.

▾ Aim

The aims of the course is to introduce the physics of collisionless gravitational many-body systems – stellar systems such as galaxies, dark matter halos and galaxy clusters. It covers potential theory, orbit theory, collisonless Boltzmann equation, Jeans equations, disk stability, violent relaxation, phase mixing, dynamical friction and kinetic theory.

The course builds on the knowledge acquired in the course of FY504, and provides a basis for advanced studies and graduate research in astrophysics and astroparticle physics.

In relation to the competence profile of the degree it is the explicit focus of the course to:

- Give knowledge and understanding of basic concepts in Galactic dynamics and Dark Matter
- Present advanced applications of classical mechanics to central astrophysical systems like galaxies, dark halos and clusters of galaxies.
- Give skills to do analytical and numerical calculations in central parts of astrophysics and astroparticle physics.
- Prepare the student for doing research at the masters and phd level.

▾ Statement of aims

The learning objectives of the course are that the student demonstrates the ability to:

Provide an overview of the basic ingredients in galactic dynamics

- Explain and apply central equations like collisionless Boltzmann equations and Jeans equation.
- Expound relevant timescales and physical processes in galactic dynamics like violent relaxation and dynamical friction.

▾ Content

The following main topics are contained in the course:

- Dark Matter
- Galactic formation, stability, evolution and cluster collisions.
- potential theory, orbit theory, collisonless Boltzmann equation, kinetic theory
- Jeans equations, disk stability, violent relaxation, phase mixing, dynamical friction

▾ Literature

- J. Binney and S. Tremaine: Galactic Dynamics, Princeton University Press.
- Notes on Dark Matter.

See Blackboard for syllabus lists and additional literature references.

▾ Examination regulations

▾ Exam element a)

▾ Timing

June

▾ Tests

▾ Skriftlig eksamen

▾ EKA

N500031112

▾ Censorship

Second examiner: Internal

▾ Grading

7-point grading scale

▾ Identification

Student Identification Card

▾ Language

Normally, the same as teaching language

▾ Examination aids

Not Allowed, a closer description of the exam rules will be posted under 'Course Information' on Blackboard.

▾ ECTS value

5

▾ Additional information

The examination form for re-examination may be different from the exam form at the regular exam.

▾ Indicative number of lessons

44 - hours per semester

▾ Teaching Method

At the faculty of science, teaching is organized after the three-phase model ie. intro, training and study phase.

The teaching methods consist of lectures in the intro phase and exercises in problem solving in the training phase. The students will prepare the problem solving in the study phase, prior to the training phase.

Study phase activities: In the study phase it is expected that the students work independently with the material in the course literature following the intro phase lectures including examples and prepare the problems for the tutorials in the training phase.

▾ Teacher responsible

Name	E-mail	Department
Mads Toudal Frandsen	frandsen@cp3.sdu.dk	CP³-Origins

▾ Timetable

Link to full time table

▾ Administrative Unit

Fysik, kemi og Farmaci

▾ Team at Registration & Legality

NAT

▾ Recommended course of study

Profile	Programme	Semester	Period