GHENT UNIVERSITY

Course Specifications

From the academic year 2020-2021 up to and including the academic year

Theory of Relativity (C002462)

Due to Covid 19, the education and assessment methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0 **Study time 180 h** **Contact hrs** 52.5h

Course offerings and teaching methods in academic year 2021-2022

A (semester 1)	Dutch	Gent	lecture	30.0h
			online seminar: coached exercises	0.0h
			online lecture	0.0h
			seminar: coached exercises	15.0h

Lecturers in academic year 2021-2022

Van Acoleyen, Karel	WE05	lecturer-in-charge
Verschelde, Henri	WE05	co-lecturer

Offered in the following programmes in 2021-2022	**crdts**	**offering**
Bachelor of Science in Physics and Astronomy	6	A
Master of Science in Teaching in Science and Technology(main subject Mathematics)	6	A
Master of Science in Mathematics	6	A

Teaching languages

Dutch

Keywords

Relativity theory, general relativity, classical fields

Position of the course

The aim of this course is to give a theoretical and physical insight in theory of special and general relativity

Contents

1 Theory of special relativity : basic principles, Lorenz transformation; relativistic kinematics and dynamics in Minkowski space (four vector formalism);Lorentz-group, representations of the Lorentz-group.
2 Relativistic fields: Maxwell field, Klein-Gordon field, Proca field, Weyl field, Dirac field.
3 General relativity : equivalence principle, tensor algebra and analysis in Riemann spaces, Geodesic motion,Einstein field equations.
4 The Schwarzschild solution: perihelionprecession Mercurius, Gravitational lenzing, black holes; Gravitational waves, the Friedmann-Lemaitre equations (cosmology).

Initial competences

Basic knowledge of mathematical analysis and linear algebra is sufficient.
Knowledge of electromagnetism is preferable.

Final competences

This course is a good preparation for an advanced study of theoretical physics (elementary particle physics and relativistic quantum field theory) and certain aspects (phenomenology of elementary particle physics) of experimental physics.
This course is neccesary for advanced research in theoretical physics.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Online lecture, Lecture, Online seminar: coached exercises, Seminar: coached exercises

Learning materials and price

A syllabus is available at 10,00€

References

C. Misner, K. Thorne en J. Wheeler : Gravitation, Freeman (1973).
S. Weinberg : Gravitation and Cosmology, J. Wiley (1972).
S. Carroll, Spacetime and Geometry, Addison Wesley (2004)

Course content-related study coaching

There is possibility for consulting the teacher and assisting personel. Electronic means of consultation are being planned for the future but personal contact will remain the main form of study coaching.

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Written examination with open questions

Examination methods in case of periodic assessment during the second examination period

Written examination with open questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

Theory : mixed written and oral. Special attention will be paid to the way in which the student is able to communicate certain insights in a well structured manner. Also his (her) attitude will be examined with respect to being critical and scientific. Exercises: written. The problem solving capacity will be more important than the final results obtained.

Calculation of the examination mark

Theory: 2/3, Exercises: 1/3