Basic/Essential Course Information	
Course title	Kinetic theory of transport phenomena
Degree Course title	Physics
ECTS	6
Compulsory attendance	Yes
Course teaching language	English

Teacher	Savino Longo	savino.longo@uniba.it

ECTS Details	Disciplinary area/broad field:	SSD	ECTS
	Characterizing	CHIM/03	6

Time management and teaching activity type	Period	Year	lesson type
	2st semester	1rd	Lessons (40h) Laboratory (15h)

Time management,	Total hours	in-class/in-lab study hours	out-of-class study hours
	150	55	95

Course calendar	Starting date	Ending date
	1.04.2019	10.06.2019

Syllabus	
Prerequisites	Basic chemistry. Differential equations. Basic computer programming.
Expected learning outcomes (according to Dublin Descriptors)	**Knowledge and understanding:** The use of the concepts of transport theory to the understanding of physical and chemical systems. **Knowledge and understanding skills applied:** The student has the basics for a correct numerical elaboration that leads to results that have concrete and appropriate meaning for the proposed cases **Judging autonomy:** Students are encouraged to choose personal solutions to the problems they are facing, and sufficiently elaborate solutions can be the essential part of the exam interview. **Communicative Skills:** Know how to expose the particularities of case studies and propose solution techniques, discussion in the classroom is encouraged

	Learning Skills: Know how to extract operational information for case studies from formal texts
Course contents summary	To grasp chemical, physical and numerical aspects of particle transport theory. The course provides basic notions for more advanced courses of kinetic theory, space chemistry and physics, particle transport, plasma physics. Several analytical and numerical techniques are displayed. Numerical codes are developed by the class during lessons. The techniques are tested by reproducing literature results.
detailed syllabus	Introduction to transport phenomena with examples. The transport equation in integral-differential form. Isotropic and anisotropic scattering. The one-dimensional case. Derivation of the Milne equation. The discrete ordinate method. Use of special functions (e.g. H). Monte Carlo solution. Models for charged particles. Code development and numerical solution of transport equations. Applications: photon transport in gases, electron and ion transport in plasma devices and discharges, neutron transport and others.
books	Chandrasekhar, Radiative Transfer. Kourganoff, Introduction to the General Theory of Transport Phenomena.
notes	Some chapters of each. Scientific papers are used for special methods and applications.
Teaching methods	Lessons with proposal and discussion of cases of study. Development of computational codes.
Assessment % of final mark	Results and methodology of the final presentation (50%) presentation and discussion (50%)
Evaluation criteria	the student • **knows** the principles of transport theory and its application to real problems • **knows** how to develop method to solve transport equations • **knows** how to use sound simplification and hypothesis for concrete cases. • **knows how to realize** a presentation. • **knows how to present** the results of a structural analysis in written and oral forms;
other	