TEACHING GUIDE ON

Approximation methods in Physics

MASTER MODULE	SEMESTER	CREDITS	COURSE TYPE
Common Module	2	6	Optative

PROFESSOR(S)	CONTACT DETAILS
• Manuel Masip	Dpto. Física Teórica y del Cosmos, Edificio Mecenas, Office 03, UGR. E-mail: masip@ugr.es
	TUTORIALS TIMETABLE
	Monday, Wednesday and Friday from 15:00 to 17:00

MASTER DEGREE

University Master in Physics: Radiations, Nanotechnology, Particles and Astrophysics, University of Granada

TEACHING DATES AND TIMES

PRE-REQUISITES FOR REGISTRATION

Degree in Physics (or other Science degree)

BRIEF CONTENTS DESCRIPTION

We will discuss the postulates, approximations, the limits and the interpretations of the main physical theories. The course may be useful to graduates in Physics and, in general, to science students interested in outreach.

PROGRAM

- Lecture 1. **Approximate methods in classical physics.** Units, natural units and scales. Newton and minimum action. Electromagnetic field.
- Lecture 2. **Speed of light and special relativity.** Finite c and $c \to \infty$. $E=mc^2$.
- Lecture 3. **Approximations in general relativity.** Gravitation. Space-time. Approximate solutions: black holes and Big Bang.
- Lecture 4. **Planck constant and quantum mechanics.** Finite h and $h \to 0$. Formulations. Measurement and determinism. Interpretations. Perturbations.
- Lecture 5. **Fields, particles and effective theories.** Quantum field theory. The Standard Model.

- Lecture 6. **Approximations beyond the standard model.** Unification. Extra dimensions. Strings. Multiverse

BIBLIOGRAPHY

- Feynman, "Physics Lectures" (3 Vols), 1964
- Landau & Liftshitz (Mechanics, Electrodynamics), 1972
- French, "Special relativity", 1969
- Ballentine, "Quantum Mechanics: A Modern Development", 2000.
- Aharonov, Rohrlich, "Quantum Paradoxes", 2004
- Weinberg, "The Quantum Theory of Fields", 1996
- Kolb & Turner, "The Early Universe", 1990