Università degli Studi della Basilicata

DIPARTIMENTO DI MATEMATICA, INFORMATICA ED ECONOMIA

COURSE: Modern Physics – Relativistic and Quantum Physics			
ACADEMIC YEAR: 2018 / 2019			
TYPE OF EDUCATIONAL ACTIVITY: Characterizing			
TEACHER: D. Cocolicchio			
e-mail:		website:	
phone:		mobile (optional):	
Language of Instruction: Italian			
ECTS: 6	n. of hours: 48	Campus: Potenza DIPARTIMENTO DI MATEMATICA, INFORMATICA ED ECONOMIA Corso di Laurea Triennale in Matematica	Semester: II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

Course Outline and Contents: This 6 credits theory physics-based course provides a broad introduction of the most recent discoveries in relativistic and quantum physics.

Learning Outcomes: This decennial course aims to crown the educational formation with the fundamental concepts of modern physics, focusing primarily on mathematical models and methods. All these tools are useful for students to expound the main issues of the most recent discoveries in physics.

PRE-REQUIREMENTS

General Physics

SYLLABUS

Classical Electro-Dynamics: Relativistic covariant formulation
Fundamentals of Quantum Theories
Mathematical Formulations of Quantum Mechanics
Semi-classical Theory of the Radiation-Matter Interactions
Atomic. Nuclear and Subnuclear Physics
Astrophysics and Cosmology

TEACHING METHODS

Teaching Methods and Tools: Class lessons consist primarily of presenting relativistic and quantum physics concepts, and discussing modern discoveries. Key points are highlighted by means of a computer assisted approach, with solutions of examples in MatLab, MATHEMATICA and JAVA applets.

EVALUATION METHODS

Assessment Methods: Oral examination is usually supplemented with a discussion of a homework report.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Although, this course is largely based on lecture notes, nevertheless, the following textbooks may be a useful completion.

- *E. Merzbacher, Quantum Mechanics, (Wiley, 1997 ^{3Ed})*
- *R. Eisberg, R. Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei, Particles (Wiley, 1985 ^{2Ed})*
- *J. J. Sakurai, Advanced Quantum Mechanics, (Addison-Wesley)*
- *R. Shankar, Principle of Quantum Mechanics, Plenum Press, New York, 1994*
- *D. J. Griffiths, Introduction to Quantum Mechanics (2nd Edition , 2004)*
- *D. J. Griffiths, Introduction to Electrodynamics (Prentice Hall Inc., 2nd Edition 1999)*

- *M. Alonso, E. Finn, Physics – Revised edition (Addison-Wesley, 1992)*
- *R. Eisberg, R. Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei, Particles (Wiley, 1985 [2Ed])*
- *K. Krane, Modern Physics, (Wiley, 1996 [2Ed])*
- *J. Bernstein, P. Fishbane, S. Gasiorowicz, Modern Physics, (Prentice Hall, 2000)*
- *R. Harris, Nonclassical Physics, (Addison Wesley, 1998)*
- *F.J. Blatt, Modern Physics, (McGraw Hill, 1992)*
- *S.T. Thornton, A. Rex, Modern Physics for scientists and engineers, (Saunders, 2000)*
- *P. Tipler, R. Llewellyn, Modern Physics (3rd Ed.) Freeman*

P. A. Tipler, Corso di Fisica vol. 3, (Zanichelli, 1995)

- *Visual Quantum Mechanics at Kansas State University.*
- *Computational Physics at Oregon State University.*

INTERACTION WITH STUDENTS

EXAMINATION SESSIONS (FORECAST)[1]

Month	Year	Day
March	2019	13
June	2019	19
July	2019	17
September	2019	18
October	2019	23
November	2019	27
December	2019	11

SEMINARS BY EXTERNAL EXPERTS YES ☐ NO ☒

FURTHER INFORMATION

[1] Subject to possible changes: check the web site for updates.