



## INTRODUCTION TO QUANTUM MECHANICS AND QUANTUM TECHNOLOGIES

<b>Anno immatricolazione</b>	2020/2021
<b>Anno offerta</b>	2020/2021
<b>Normativa</b>	DM270
<b>SSD</b>	FIS/03 (FISICA DELLA MATERIA)
<b>Dipartimento</b>	DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE
<b>Corso di studio</b>	ELECTRONIC ENGINEERING
<b>Curriculum</b>	Space Communication and Sensing
<b>Anno di corso</b>	1°
<b>Periodo didattico</b>	Primo Semestre (28/09/2020 - 22/01/2021)
<b>Crediti</b>	6
<b>Ore</b>	45 ore di attività frontale
<b>Lingua insegnamento</b>	English
<b>Tipo esame</b>	ORALE
<b>Docente</b>	BAJONI DANIELE (titolare) - 6 CFU
<b>Prerequisiti</b>	<ul style="list-style-type: none"><li>- Classical Mechanics</li><li>- Classical Electromagnetism</li><li>- Calculus</li></ul>
<b>Obiettivi formativi</b>	Basic understanding of quantum mechanics and quantum technologies
<b>Programma e contenuti</b>	<p>Introduction to Quantum Mechanics:</p> <p>The crisis of classical physics. Shroedinger equation. The wavefunction, statistical distributions. Simple systems in 1D: quantum well, tunneling, harmonic oscillator. 3D Shroedinger equation, the hydrogen atom. Dirac formalism, Hermitian operators, time evolution. Heisenberg uncertainty principle.</p>

Crystals, Bloch theorem.  
Tight binding model, band and band gaps.

Introduction to Quantum Technologies:

Brief Introduction to statistical mechanics  
The Qubit  
Entanglement  
Quantum Key Distribution  
Quantum Teleportation  
Quantum Computing

**Metodi didattici**

oral lectures

**Testi di riferimento**

Griffiths, "Introduction to Quantum mechanics"

**Modalità verifica  
apprendimento**

Oral examination, with questions aiming at understanding which are the concepts acquired by the student and his/her ability to explain the topics discussed in the course. The minimum score to pass the exam is 18/30, the maximum score is 30/30 cum laude.

**Altre informazioni**

**Obiettivi Agenda 2030 per lo  
sviluppo sostenibile**

[Sbl legenda sviluppo sostenibile](#)