

EECS 498 Introduction to Quantum Electromagnetics

This course is designed for upper level engineering students and students from the physical sciences who have had the usual first two semesters of introductory physics (e.g., 140/240) and the usual calculus classes up through differential equations. Some general knowledge of matrices and determinants is helpful. The course assumes no prior training in quantum mechanics. The course begins with a short introduction to the usual quantum mechanics and then a presentation of the postulates of quantum mechanics and an introduction to Dirac notation. After reviewing the basic ideas and results of classical electromagnetics, we then use the postulates to convert the classical picture of electromagnetics to the quantum picture. The rest of the semester is then used to explore how to create and detect the quantum field and the creation of new states of the quantum field for quantum communications, quantum sensing (lidar/radar), quantum encryption and quantum information. The impact of the quantum vacuum on devices is discussed as well as the interaction of quantized light with various kinds of quantum devices.

The performance metric in the class is focused on learning rather than assessment.