

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري لمادة : انظمة كواشف ليزر

	Material Covered
١ + ٢	Review of semiconductor physics Schrodinger equation, Bloch wavefunction, energy bands, bandgap, direct and indirect semiconductors, compound semiconductors and alloys, electrons and holes, effective mass, density of states, Fermi-Dirac distribution, Fermi and quasi Fermi levels, semiconductor doping, conductivity, generation and recombination, band diagram in the presence of electric fields, phonons, pn junctions, forward and reverse biased junctions, pin diode, heterojunctions.
Week 3	Interaction of light with atoms Photon, spontaneous and stimulated emission, population inversion and optical gain, EDFA.
Week 4	Responsivity and electric bandwidth , Quantum efficiency and responsivity , Speed of photodetection response , Electrical characteristics of a photodiode .
Week 5	Photodetector noise and SNR , Sources of photodetection noise , SNR of an optical receiver , Noise-equivalent power
Week 6	Avalanche photodiodes , APD used as a linear detector , APD used as a single-photon detector
Week 7+8	Other types of photodetectors , Photovoltaic , Charge-coupled devices
Week 9	Light emitting diodes Spontaneous emission in semiconductors, homojunction and heterojunction LED, LED spectrum, quantum-well LED, efficiency and brightness, LED characteristics, modulation bandwidth, LED lighting, coherence length, coupling LEDs to waveguides.
Week 10	LASER diode , Semiconductor amplifiers and lasers Gain in semiconductors, semiconductor optical amplifier, lasing condition, quantum-well lasers, laser characteristics, Fabry-Perot, DBR, DFB, VCSELs , Optoelectronics applications
11+12	Solar cell , The working principle of a solar solar , Charge Carrier Recombination , Shunt and Series Resistances
Week 13+14	Photoconductive detectors , Thermoelectric detectors , Pyroelectric detectors
Week 15	PIN photodiodes
Week 16	Preparatory week before the final Exam