The Engineering Physics Department recommends that the following courses be taken prior to beginning the Dual Degree Program at Case Western Reserve University. If the courses cannot be fulfilled, they will be integrated into the curriculum, which may possibly extend the program timeline.

Recommended Engineering Courses for Engineering Physics

Course Code	Course Title	Semester Credit Hours	Description
PHYS 221	Introduction to Modern Physics	3	Concepts in special relativity, statistical mechanics and quantum mechanics. Applications to atomic structure, and selected topics in nuclear, condensed matter physics, particle physics, and cosmology. Prereq: PHYS 116 or PHYS 122 or PHYS 124.
PHYS 310	Classical Mechanics	3	Lagrangian formulation of mechanics and its application to central force motion, scattering theory, rigid body motion, and systems of many degrees of freedom. Recommended preparation: PHYS 221and either MATH 223 or MATH 227.
PHYS 313	Thermodynamics and Statistical Mechanics	3	Thermodynamic laws, entropy, and phase transitions from the quantum mechanical viewpoint. Gibbs and Boltzmann factors. Ideal, degenerate fermion, degenerate boson, photon, and phonon gases. Correlation functions and transport phenomena. Applications ranging from solid state physics to astrophysics. Prereq: PHYS 221.
PHYS 317	Engineering Physics Laboratory I	3	Laboratory course for engineering physics majors. Emphasis is on experimental techniques, data and error analysis, and written and oral presentation of work. Four experiments drawn from classical and modern physics are carried out. These emphasize condensed matter, material and optical physics. Experiments include electric fields, resistivity of materials, optical interference, chaotic systems, and spectroscopy. Design of data analysis systems and software is required. Prereq: PHYS 208. Coreq: PHYS 303.
PHYS 324	Electricity and Magnetism I	3	First half of a sequence that constitutes a detailed study of the basics of electromagnetic theory and many of its applications. Electrostatics and magnetostatics of free space, conductors, dielectric and magnetic materials; basic theory illustrated with applications drawn from condensed matter physics, optics, plasma physics, and physical electronics. Prereq: PHYS 116 or PHYS 122 or PHYS 124.
PHYS 325	Electricity and Magnetism II	3	(Continuation of PHYS 324.) Electrodynamics, Maxwell's equations, electromagnetic waves, electromagnetic radiation and its interaction with matter, potential formulation of electromagnetism, and relativity. Prereq: PHYS 324.
PHYS 331	Quantum Mechanics I	3	Quantum nature of energy and angular momentum, wave nature of matter, Schroedinger equation in one and three dimensions; matrix methods; Dirac notation; quantum mechanical scattering. Two particle wave functions. Prereq: PHYS 221.

Sample Course Sequence for Engineering Physics

Fall Year 1

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
ENGR	210	Introduction to Circuits and Instrumentation	3	2	4
ENGR	145	Chemistry of Materials	4	0	4
CONC		Engineering Concentration Course	3	0	3
CONC		Engineering Concentration Course	3	0	3
			13	2	14

Spring Year 1

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
PHYS	208	Instrumentation and Signal Analysis Lab	4	0	4
PHYS	250	Mathematics, Physics and Computing	3	0	3
QMII*		Applied Quantum Mechanics	3	0	3
ENGR	200	Statics and Strength of Materials	3	0	3
			13	0	13

* Choice among: PHYS 322, PHYS 327, EEAP 321, EEAP420, EMSE 314, EMSE 405

Fall Year 2

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
PHYS	315	Introduction to Solid State Physics	3	0	3
PHYS	352	Senior Physics Seminar	1	0	1
PHYS	353	Senior Engineering Physics Project	2	0	2
ENGR	225	Thermo, Fluid Dynamics, Heat & Mass Transfer	4	0	4
CONC		Engineering Concentration Course	3	0	3
			13	0	13

Spring Year 2

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
PHYS	318	Engineering Physics Lab II	3	2	4
PHYS	352	Senior Physics Seminar	1	0	1
PHYS	353	Senior Engineering Physics Project	2	0	2
ENGR	398	Professional Communications	1	0	1
ENGL	398	Professional Communications	2	0	2
CONC		Engineering Concentration Course	3	0	3
			12	2	13

*Add Electives to meet minimum credit hour requirements for degree program

Please Note: The course sequence serves as an example of the classes necessary to complete the Dual Degree Program. Courses and the semesters taken will be based on the student's transfer credit and discussion with the Case Western Reserve University faculty advisor.