CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

AEROSPACE ENGINEERING

Dual Degree Program Course Requirements

Engineering Requirements for all majors/departments		
Course Code	**Course Title**	**Semester Credit Hours**
CHEM 105	Principles of Chemistry I	3
CHEM 106	Principles of Chemistry II	3
CHEM 113	Principles of Chemistry Lab	2
ENGR 131	Elementary Computer Programming (JAVA)	3
MATH 121	Calculus for Science and Engineering I	4
MATH 122	Calculus for Science and Engineering II	4
MATH 223	Calculus for Science and Engineering III	3
MATH 224	Elementary Differential Equations	3
PHYS 121	General Physics I	4
PHYS 122	General Physics II	4
	Humanities and Social Science (including college level writing proficiency)	22
	Physical Education (2 semesters)	0
		55

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The Aerospace Engineering 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 Aerospace Engineering			
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.
EMSE 201	Introduction to Materials Science & Engineering	3	Introductory treatment of crystallography, phase equilibria, and materials kinetics. Application of these principles to examples in metals, ceramics, semiconductors, and polymers, illustrating the control of structure through processing to obtain desired mechanical and physical properties. Design content includes examples and problems in materials selection and of design of materials for particular performance requirements. Prereq: ENGR 145 and PHYS 121 and MATH 121.
ENGR 200	Statics and Strength of Materials	3	An introduction to the analysis, behavior and design of mechanical/structural systems. Course topics include: concepts of equilibrium; geometric properties and distributed forces; stress, strain and mechanical properties of materials; and, linear elastic behavior of elements. Prereq: PHYS 121.
ENGR 210	Introduction to Circuits and Instrumentation	4	Modeling and circuit analysis of analog and digital circuits. Fundamental concepts in circuit analysis: voltage and current sources; Kirchhoff's Laws; Thevenin and Norton equivalent circuits, inductors capacitors, and transformers; modeling sensors and amplifiers and measuring DC device characteristics; characterization and measurement of time dependent waveforms; transient behavior of circuits; frequency dependent behavior of devices and amplifiers; frequency measurements; AC power and power measurements; noise in real electronic systems; electronic devices as switches; digital logic circuits; introduction to computer interfaces; and analog/digital systems for measurement and control. Prereq: MATH 122. Coreq: PHYS 122.
ENGR 225	Thermodynamics, Fluid Dynamics, Heat and Mass Transfer	4	Elementary thermodynamic concepts: first and second laws, and equilibrium. Basic fluid dynamics, heat transfer, and mass transfer: microscopic and macroscopic perspectives. Prereq: CHEM 111, ENGR 145, and PHYS 121. Coreq: MATH 223.
EMAE 250	Computer in Mechanical Engineering	3	Numerical methods including analysis and control of error and its propagation, solutions of systems of linear algebraic equations, solutions of nonlinear algebraic equations, curve fitting, interpolation, and numerical integration and differentiation. Prereq: ENGR 131 and MATH 122.

Sample Course Sequence for Aerospace Engineering

Fall Year 1

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
EMAE	172	Introduction to Mechanical Manufacturing	3	3	4
ENGR	200	Statics and Strength of Materials	3	0	3
EMAE	350	Mechanical Engineering Analysis	3	0	3
EMAE	250	Computers in Mechanical Engineering	3	0	3
ENGL	398N	Professional Communication	3	0	3
			15	3	16

Spring Year 1

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
ECIV	310	Strength of Materials	3	0	3
ENGR	225	Thermo, Fluid Dynamics, Heat and Mass Transfer	4	0	4
EMAE	285	Mechanical Engineering Lab II	3	2	4
EMAE	181	Dynamics	3	0	3
ENGR	210	Introduction to Circuits and Instrumentation	3	2	4
			16	4	18

Fall Year 2

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
EECS	246	Signals and Systems	3	2	4
EMAE	360	Engineering Design	3	0	3
EMAE	381	Flight and Orbital Mechanics	3	0	3
EMAE	325	Fluid and Thermal Engineering II	4	0	4
			13	2	14

Spring Year 2

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
EMAE	376	Aerostructures	3	0	3
EMAE	359	Aero/Gas Dynamics	3	0	3
EMAE	398	Senior Project	1	6	3
EMAE	355	Design of Fluid and Thermal Systems	3	0	3
EMAE	382	Propulsion	3	0	3
EMAE	356	Aerospace Design	3	0	3
			13	6	18

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.