CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

CHEMICAL 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 Chemical 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 Chemical Engineering			
Course Code	**Course Title**	**Semester Credit Hours**	**Description**
CHEM 223	Introduction to Organic Chemistry I	3	Introductory course for science majors and engineering students. Develops themes of structure and bonding along with elementary reaction mechanisms. Includes treatment of hydrocarbons, alkyl halides, alcohols, and ethers as well as an introduction to spectroscopy. Prereq: CHEM 106 or CHEM 111.
CHEM 224	Introduction to Organic Chemistry II	3	Continues and extends themes of structure and bonding from CHEM 223 and continues spectroscopy and more complex reaction mechanisms. Includes treatment of aromatic rings, carbonyl compounds, amines, and selected special topics. Prereq: CHEM 223 or CHEM 323.
CHEM 336	Physical Chemistry II	3	Continuation of CHEM 335. Reaction kinetics and catalysis. Reaction dynamics. Chemical quantum mechanics. Statistical mechanics and thermodynamics. Spectroscopy. Prereq: CHEM 335
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 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.
STAT 313	Statistics for Experimenters	3	For advanced undergraduates in engineering, physical sciences, life sciences. Comprehensive introduction to modeling data and statistical methods of analyzing data. General objective is to train students in formulating statistical models, in choosing appropriate methods for inference from experimental and observational data and to test the validity of these models. Focus on practicalities of inference from experimental data. Inference for curve and surface fitting to real data sets. Designs for experiments and simulations. Student generation of experimental data and application of statistical methods for analysis. Critique of model; use of regression diagnostics to analyze errors. Note: Credit given for only one (1) of STAT 312, 313, 333, 433. Prereq: MATH 122 or equivalent.

Dual Degree-Chemical Engineering students may choose from the following breadth areas:

Biochemical Engineering	Biomedical Engineering	Computing
Electrochemical Engineering	Environmental Engineering	Management/Entrepreneurship
Polymer Science	Research	

Sample Course Sequence for Chemical Engineering

Fall Year 1

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
ECHE	260	Introduction to Chemical Systems	3	0	3
ENGR	225	Thermo, Fluid Dynamics, Heat and Mass Transfer	4	0	4
ECHE	360	Transport Phenomenon Chemical Systems	0	3	3
ECHE	151	Chemical Engineering at Case	3	0	3
			10	3	13

Spring Year 1

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
ECHE	363	Chemical Engineering	3	0	3
ECHE	361	Separation Process	3	0	3
ECHE	365	Measurements Laboratory	0	3	3
ENGL	398N	Professional Communication	3	0	3
ECHE	364	Chemical Reaction Processes	3	0	3
			12	3	15

Fall Year 2

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
ECHE	398	Process Analysis and Design	3	0	3
ECHE	362	Chemical Engineering Lab	0	4	4
ENGR	210	Introduction to Circuits and Instruments	4	0	4
ECHE	367	Process Control	4	0	4
		Technical Elective in related breadth area	3	0	3
			14	4	18

Spring Year 2

Subject Code	Course Number	Course Title	Hours per Week		Semester Credit Hours
			Class	Lab	
ECHE	399	Chemical Engineering Design Project	3	0	3
STAT	313	Statistics for Experimenters	3	0	3
		Technical Elective in related breadth area	3	0	3
		Technical Elective in related breadth area	3	0	3
			12	0	12

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.