



Students must take the equivalent of the following courses at their liberal arts college before entering CWRU

General Requirements for Dual Degree Program		
Course	Course Title	Semester Credit Hours
MATH		
MATH 121	Calculus for Science & Engineering I	4
MATH 122	Calculus for Science & Engineering II	4
MATH 223	Calculus for Science & Engineering III	3
MATH 224	Elementary Differential Equations	3
CHEMISTRY		
CHEM 105	Principles of Chemistry I	3
CHEM 106	Principles of Chemistry II	3
CHEM 113	Principles of Chemistry Laboratory	2
PHYSICS		
PHYS 121	General Physics I-Mechanics	4
PHYS 122	General Physics II-Electricity and Magnetism	4
COMPUTER PROGRAMMING		
Students must take one of the following: EECS 132 should be taken by Computer Engineering majors and computer tracks of BME (Biomedical Computing and Analysis) All other majors should take ENGR 131		
ENGR 131	Elementary Computer Programming (MATLAB)	3
EECS 132	Introduction to Programming in Java	3

Sample Course Sequence for Materials Science and Engineering

Year 1 Fall

Course	Course Title	Semester Credit Hours
EMSE 110	Transitioning Ideas to Reality I-Materials in Service of Industry and Society	1
EMSE 276	Materials Properties and Design	3
EMSE 320	Materials Laboratory II	1
EMSE 372	Structural Materials by Design	4
ENGR 145	Chemistry of Materials	4
ENGR 200	Statics and Strength of Materials	3
ENGR 210	Intro to Circuits and Instrumentation	4
		20

Year 1 Spring

Course	Course Title	Semester Credit Hours
EMAC 270	Intro to Polymer Science and Engineering	3
EMSE 120*	Transitioning Ideas to Reality II-Manufacturing Laboratory	2
EMSE 220	Materials Laboratory I	2
EMSE 228	Mathematical and Computational Methods for Materials Science and Engineering	3
EMSE 319	Processing and Manufacturing of Materials	3
ENGR 225	Thermodynamics, Fluid Dynamics, Heat and Mass Transfer	4
		17

Year 2 Fall

Course	Course Title	Semester Credit Hours
EMSE 328	Mesoscale Structural Control of Functional Materials	3
EMSE 345	Materials for Biological and Medical Technology	3
EMSE 349	Materials for Energy and Sustainability	3
EMSE 343	Processing of Electronic Materials	3
EMSE 398	Senior Project in Materials I	1
ENGL 398	Professional Communication for Engineers	2
ENGR 398	Professional Communication for Engineers	1
		16

Year 2 Spring

Course	Course Title	Semester Credit Hours
EMAC 276	Polymer Properties and Design	3
EMSE 327	Thermodynamic Stability and Rate Processes	3
EMSE 330	Materials Laboratory III	2
EMSE 379	Design for Lifetime Performance	3
EMSE 399	Senior Project in Materials II	2
	Approved Concentration at CWRU**	3
		16

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.

**The EMSE 120 course can be completed by signing up for EMSE 325 undergraduate research or EMAE 160 (3 credits).*

***The concentration is for courses outside EMSE; courses taken at the student's liberal arts university may count for credit.*

Sample Course Sequence for Materials Science and Engineering II

Year 1 Fall

Course	Course Title	Semester Credit Hours
EMSE 110	Transitioning Ideas to Reality I-Materials in Service of Industry and Society	1
EMSE 276	Materials Properties and Design	3
ENGL 398	Professional Communication for Engineers	2
ENGR 398	Professional Communication for Engineers	1
ENGR 145	Chemistry of Materials	4
ENGR 200	Statics and Strength of Materials	3
ENGR 210	Intro to Circuits and Instrumentation	4
		18

Year 1 Spring

Course	Course Title	Semester Credit Hours
EMAC 270	Intro to Polymer Science and Engineering	3
EMSE 120*	Transitioning Ideas to Reality II-Manufacturing Laboratory	2
EMSE 220	Materials Laboratory I	2
EMSE 228	Mathematical and Computational Methods for Materials Science and Engineering	3
EMSE 319	Processing and Manufacturing of Materials	3
ENGR 225	Thermodynamics, Fluid Dynamics, Heat and Mass Transfer	4
		17

Year 2 Fall

Course	Course Title	Semester Credit Hours
EMSE 320	Materials Laboratory II	1
EMSE 328	Mesoscale Structural Control of Functional Materials	3
EMSE 345	Materials for Biological and Medical Technology	3
EMSE 349	Materials for Energy and Sustainability	3
EMSE 343	Processing of Electronic Materials	3
EMSE 372	Structural Materials by Design	4
EMSE 398	Senior Project in Materials I	1
		18

Year 2 Spring

Course	Course Title	Semester Credit Hours
EMAC 276	Polymer Properties and Design	3
EMSE 327	Thermodynamic Stability and Rate Processes	3
EMSE 330	Materials Laboratory III	2
EMSE 379	Design for Lifetime Performance	3
EMSE 399	Senior Project in Materials II	2
	Approved Concentration at CWRU**	3
		16

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