

Engineering Chemistry (ECM)

Interdisciplinary Major in Engineering Chemistry

Department of Chemistry, College of Arts and Sciences; Department of Materials Science and Engineering, College of Engineering and Applied Sciences

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Minors of particular interest to students majoring in Engineering Chemistry: Science and Engineering (LSE)

The interdisciplinary major in Engineering Chemistry, which leads to the Bachelor of Science degree, is designed to provide students with a basic understanding of the chemistry and materials technology underlying modern materials engineering.

This program emphasizes a strong background in physical chemistry infused with an orientation toward the solid-state sciences and materials technology. Its central theme is a chemistry core strengthened by and laboratory courses, the latter with a unique “chemistry of materials” component. The choice of suitable electives helps the student to prepare for work or advanced study in areas such as electronic materials, interfacial phenomena, solid-state science and technology, polymers, ceramics, biomaterials, etc.

Jointly sponsored by the College of Arts and Sciences and the College of Engineering and Applied Sciences, the program is a basic preparation for training chemical and materials professionals who can enter a wide range of industries or proceed to graduate work in either solid-state chemistry or materials science.

Diversified Education Curriculum Requirements

Students majoring in Engineering Chemistry must meet the D.E.C. requirements of the College of Arts and Sciences, with the following exceptions:

- A. An elementary foreign language course numbered 101 or 112, if taken to fulfill the entry skill in foreign language requirement, may also be used for one of the two courses needed to fulfill the D.E.C. category G requirement.
- B. Only one course need be taken from D.E.C. category F.

Requirements for the Major in Engineering Chemistry (ECM)

The interdisciplinary major in Engineering Chemistry leads to the Bachelor of Science degree. The following courses are required and must be taken for a letter grade; P/NC grades are not acceptable. All chemistry and engineering courses must be passed with a grade of C or higher with the exception of three courses for which the grade may be C-. No transferred course with a grade lower than C may be used to fulfill any major requirement.

Completion of the major requires approximately 66 to 68 credits.

A. Mathematics and

Basic Science Requirements

1. MAT 131, 132 Calculus I, II
(See Note, below)
2. One of the following pairs of courses: AMS 261 and 361 Engineering Mathematics I, II;
or MAT 205 and 305 Calculus III, IV;
or MAT 203 and 303 Calculus III, IV with Applications
3. MEC 111 Computer Science for Engineers
4. CHE 129, 132 *or* CHE 131, 132 General Chemistry
or CHE 141, 142 Honors Chemistry
5. CHE 133, 134 General Chemistry Laboratory
or CHE 143, 144 Honors Chemistry Laboratory
(CHE 199 General Chemistry Laboratory for Engineers acceptable with permission)

6. PHY 131/133, 132/134 Classical Physics I, II and labs
or PHY 141, 142 Classical Physics I, II: Honors
or PHY 125, 126, 127 Classical Physics A, B, C
7. PHY 251/252 Modern Physics and Laboratory
or ESG 281 An Engineering Introduction to the Solid State
Note: The following alternate calculus sequences may be substituted for MAT 131, 132: MAT 141, 142 *or* 171 *or* 125, 126, 127.

B. Core Program

1. CHE 301, 302 Physical Chemistry I, II
2. CHE 303 Solution Chemistry Laboratory
3. CHE 304 Chemical Instrumentation Laboratory
4. CHE 321 Organic Chemistry I
5. **CHE 378 Materials Chemistry**
6. ESM 325 Diffraction Techniques and Structure of Solids
7. ESG 332 Materials Science I: Structure and Properties of Materials
8. ESG 333 Materials Science II: Electronic Properties

C. Upper-Division Writing Requirement

Each student majoring in Engineering Chemistry must submit a portfolio of three to five papers from previous chemistry or materials science coursework, at least two of which should be full laboratory reports from chemistry or materials science courses. This portfolio is to be submitted by the end of the junior year. It must be found acceptable in its clarity and precision of communication before the student can be cleared for graduation.

Electives

Students make a selection of technical and open electives to total 120 credits. Students are advised to divide their electives among courses within the College of Engineering and Applied Sciences and the Department of Chemistry that strengthen their professional interests, and courses in the social sciences and humanities that help them place the problems of society and industry in perspective.

Students who wish to meet the American Chemistry Society certification requirements must take, in addition to the above, CHE 326 (organic), 346 (biological), 375 (inorganic), and the laboratories CHE 357, 383, 384.

**Bachelor of Science Degree/
Master of Science Degree
in Chemistry Program**

A student interested in this research-intensive graduate program, intended to prepare students for professional employment in the chemical or pharmaceutical industries, may apply for admission at the end of the junior year. The program leads to a Bachelor of Science degree in Engineering Chemistry at the end of the fourth year and a Master of Science in Chemistry at the end of the fifth year. During the senior year, the student is expected to take two 500-level CHE courses and begin research. In the fifth year, the student works full-time on research, earning 24 credits in CHE 599.

**Bachelor of Science Degree
in Chemistry/Master of Science
Degree in Materials Science**

Engineering Chemistry students who are interested in pursuing graduate study in materials science may wish to apply for the five-year program at the end of their junior year. For further details, contact the director of the program in engineering chemistry.

**Sample Course Sequence for the
Major in Engineering Chemistry**

Freshman Fall		Credits	
First Year Seminar 101	1		
D.E.C. A	3		
MAT 131	4		
CHE 141 or 131	4		
CHE 143 or 133	1		
D.E.C.	3		
Total	16		

Spring		Credits	
First Year Seminar 102	1		
D.E.C. A	3		
CHE 142 or 132	4		
CHE 144 or 134	1		
MAT 132	4		
MEC 111	3		
Total	16		

Sophomore Fall		Credits	
D.E.C.	3		
CHE 301	4		
CHE 303	2		
AMS 261	3		
PHY 131/133	4		
Total	16		

Spring		Credits	
CHE 302	4		
AMS 361	3		
PHY 132/134	4		
D.E.C.	4		
Total	15		

Junior Fall		Credits	
CHE 321	4		
ESG 281 or PHY 251/252	4		
ESG 332	4		
D.E.C.	3		
Total	15		

Spring		Credits	
CHE 304	2		
ESG 333	4		
D.E.C.	3		
CHE 378	3		
Elective	3		
Total	15		

Senior Fall		Credits	
ESM 325	3		
D.E.C.	3		
D.E.C.	3		
Upper-Division elective	3		
Elective	3		
Total	15		

Spring		Credits	
D.E.C.	3		
D.E.C.	3		
Electives	9		
Total	15		