

# Chemical Engineering (BS)

## Degree Requirements

---

---

### General Education Requirements (58 Hours)

---

#### Area I - Written Composition (2 Courses, 6 Hours)

- A. 3 hours: EH 101
- B. 3 hours: EH 102 or EH 105

#### Area II - Humanities & Fine Arts (3 Courses, 9 Hours)

- A. 3 hours from: EH 215, EH 216, EH 225, EH 226, EH 235, EH 236
- B. 3 hours from: ARH 100, ARH 103, ARH 123, ARS 101, DRA 110, MUL 101
- C. 3 hours from: AFR 101, ARH 100, ARH 103, ARH 123, ARH 203, ARS 101, CA 110, DRA 110, EH 215, EH 216, EH 225, EH 226, EH 235, EH 236, LG 111, LG 112, LG 131, LG 132, LG 151, LG 152, LG 171, LG 172, LG 211, LG 212, LG 231, LG 232, LG 251, LG 252, LG 271, LG 272, LGS 101, LGS 102, LGS 106, LGS 107, LGS 141, LGS 142, LGS 201, LGS 202, LGS 206, LGS 207, LGS 241, LGS 242, MUL 101, PHL 110, PHL 121, PHL 131, PHL 240

#### Area III – Natural Sciences & Mathematics (3 Courses & Labs, 12 Hours)

- A. 4 hours from: MA 125
- B. 8 hours from: CH 131 & CH 131L, CH 132 & CH 132L

#### Area IV – History, Social & Behavioral Sciences (3 Courses, 9 Hours)

- A. 3 or 6 hours from: HY 101, HY 102, HY 135, HY 136
- B. 3 or 6 hours from: AN 100, AN 101, CA 100, CA 211, ECO 215, ECO 216, GEO 114, GEO 115, GS 101, IS 100, IST 201, PSC 130, PSY 120, PSY 250, SY 109, SY 112

#### Area V (22 Hours)

- A. 11 hours from: MA 126, MA 227, MA 238
- B. 11 hours from: BLY 121, PH 201 & PH 201L, PH 202 & PH 202L

All undergraduates must complete two designated writing credit (W) courses, at least one of which must be in the student's major or minor.

---

### Major Requirements (68-69 Hours)

---

#### Chemical Engineering Requirements (22 Courses & Labs, 56 Hours)

- A. 2 hours: EG 101 or EG 201
- B. 8 hours: CH 201 & CH 201L, CH 202 & CH 202L
- C. 3 hours: EG 231
- D. 4 hours: CHE 203
- E. 23 hours: CHE 311, CHE 321, CHE 322, CHE 331, CHE 332, CHE 342, CHE 351, CHE 352, CHE 372
- F. 16 hours: CHE 421, CHE 441, CHE 442, CHE 452, CHE 461, CHE 462

#### Chemistry Electives (1 Course, 3 – 4 Hours)

- A. 4 hours: CH 265 & CH 265L
- B. 3 hours: CH 440\* or BMD 321

#### Technical Electives (1 Course, 3 Hours)

- A. 3 hours: Biology: BLY 122\* (only if CH 440 or BMD 321 is also taken)

- B. 3 hours: Chemistry: Any course higher than CH 202
- C. 3 hours: Computer Information Sciences: CIS 210
- D. 3 hours: Mathematic from: MA 237, MA 332, MA 354
- E. 3 hours: Statistics from: ST 315, ST 320
- F. 3 hours: Engineering from: Any 200, 300 or 400 level elective (excluding EG 270)

### Chemical Engineering Electives\*\* (2 Courses, 6 Hours)

- A. 3 hours: CHE 463, Simulation of Chemical Processes
- B. 3 or 6 hours: CHE 490, Special Topics in Chemical Engineering
- C. 3 or 6 hours: CHE 494, Directed Independent Study
- D. 3 or 6 hours: CHE 499, Senior Honors Project

### Minor Requirements (0 Hours)

A minor is not required for this degree program

### Notes:

1. C-grade or higher required in all prerequisite courses.
2. CHE 203: C-grade or higher required and only two attempts permitted.
3. \*Required course for Pre-Med track.
4. \*\*Accelerated Bachelor's to Master's (ABM) students will take up to six hours of approved graduate coursework.
5. Appropriate software tools will be utilized in almost all CHE courses.

### Additional Information

It is important that students make adequate progress in the Chemical Engineering program. Satisfactory completion of a set of fundamental courses is required before a student is allowed to take advanced courses. Professional Component Standing (PCS) is awarded by the chair of the department when the student completes the College of Engineering PCS requirements and the ChBE departmental PCS requirements.

### College Of Engineering PSC Courses

Course Number	Course Title	Credit Hours	Minimum Grade
EH 101	English Composition I	3	C
EH 102	English Composition II	3	C
CH 131	General Chemistry I + Lab	4	C
MA 125	Calculus I	4	C
MA 126	Calculus II	4	C
PH 201	Calculus-Based Physics I + Lab	4	C

### Chemical And Biomolecular Engineering PCS Courses

Course Number	Course Title	Credit Hours	Minimum Grade
CH 132	General Chemistry II + Lab	4	C
CH 201	Organic Chemistry I + Lab	4	C
MA 227	Calculus II	4	C

MA 238	Differential Equations I	3	C
BLY 121	General Biology I	3	C
CHE 203	Material and Energy Balances	4	C

Students who fail to maintain at least a 2.00 GPA overall at the University of South Alabama will lose PCS and may be required to take or repeat appropriate courses as specified by the department chair to correct their deficiencies and may not be permitted to continue in 300- and 400-level engineering courses. CHE 203 may only be taken twice. Failure to achieve a C-grade or higher in the second attempt of CHE 203 will result in dismissal from the Chemical Engineering program.

## Graduation Plan

### Chemical Engineering (BS) - General Track (126 Total Hours)

#### First Year - Fall Semester

Course ID	Course Description	Hours
MA 125	Calculus I	4
CH 131/CH 131L	General Chemistry I + Lab	4
EH 101	English Composition I	3
BLY 121	General Biology - lecture only	3
EG 101	Intro to Engineering & Design	2
Total Hours		16

#### First Year - Spring Semester

Course ID	Course Description	Hours
MA 126	Calculus II	4
CH 132/CH 132L	General Chemistry II + Lab	4
EH 102	English Composition II	3
PH 201/PH 201L	Calculus Based Physics I + Lab	4
Total Hours		15

#### Second Year - Fall Semester

Course ID	Course Description	Hours
MA 227	Calculus III	4

CH 201/CH 201L	Organic Chemistry I + Lab	4
CHE 203	Material & Energy Balances	4
PH 202/PH 202L	Calculus Based Physics II + Lab	4
Total Hours		16

**Second Year - Spring Semester**

Course ID	Course Description	Hours
MA 238	Differential Equations I	3
CH 202/CH 202L	Organic Chemistry II + Lab	4
EG 231	Intro to Ethics and Economics	3
Tech Elective	**Technical Electives	3
General Education	**Area II or IV	3
Total Hours		16

**Third Year - Fall Semester**

Course ID	Course Description	Hours
CHE 311	CHE Separations I	3
CHE 321	Transport Phenomena I	3
CHE 331	CHE Thermodynamics I	3
CHE 351	Modeling Lab	1
General Education	**Area II or IV	3
Chemistry Elective	**Chemistry Electives	3-4
Total Hours		16-17

**Third Year - Spring Semester**

Course ID	Course Description	Hours
CHE 322	Transport Phenomena II	3
CHE 332	CHE Thermodynamics II	3
CHE 342	Engineering Communication (W)	3
CHE 352	Measurement Lab	1
CHE 372	Chemical Reactor Design	3
General Education	**Area II or IV	3
Total Hours		16

**Fourth Year - Fall Semester**

Course ID	Course Description	Hours
CHE 421	CHE Separations II	3
CHE 441	Chemical Engineering Operations Lab I (W)	2
CHE 452	Process Dynamics and Control	3
CHE 461	Process Design I	3
CHE Elective I	**Chemical Engineering Electives	3
General Education	**Area II or IV	3
Total Hours		17

**Fourth Year - Spring Semester**

Course ID	Course Description	Hours
CHE 442	Chemical Engineering Operations Lab II (W)	2
CHE 462	Process Design II	3
CHE Elective II	**Chemical Engineering Electives	3
General Education	**Area II or IV	3
General Education	**Area II or IV	3
Total Hours		14

**Notes**

\*\*See Degree Requirements

**BOLD** courses required for Professional Component Standing (PCS)

CHE 300-level and CHE 400-level courses are offered only in the semesters they listed (i.e. Fall, Spring)

**Major Milestones**

## CHEMICAL ENGINEERING SAMPLE 4-YEAR PLAN WITH MILESTONES (2020-2021 USA Bulletin)

Term 1	Course Description	Pre-req	Cr Hrs	Milestone Notes
<b>EH 101*</b>	English Composition I		3	Must complete at least 12 hours with a 2.0 or higher GPA
MA 125	Calculus I	ACT Math 27	4	**C-grade or higher required in all prerequisite courses
CH 131/CH 131L	General Chemistry I	ACT Math 24	4	
BLY 121	General Biology I	ACT Math 22	3	

EG 101	Freshman Seminar	ACT Math 22	2	
			<b>16</b>	

Term 2	Course Description	Pre-req	Cr Hrs	Milestone Notes
EH 102	English Composition II	EH 101 or test score	3	MA 125
MA 126	Calculus II	MA 125	4	CH 131/CH 131L
CH 132/CH 132L	General Chemistry II	CH 131	4	BLY 121
PH 201/PH 201L	Physics I	MA 125 and EH 101	4	EH 101 or EH 105*  **C-grade or higher required in all prerequisite courses
			<b>15</b>	

Term 3	Course Description	Pre-req	Cr Hrs	Milestone Notes
MA 227	Calculus III	MA 126	4	MA 126
CH 201/CH 201L	Organic Chemistry I	CH 132	4	PH 201/PH 201L
CHE 203	Material and Energy Balances	CH 132/CH 132L and MA 126 and EH 101	4	CH 132/CH 132L
PH 202/PH 202L	Physics II	PH 201	4	EH 102  **C-grade or higher required in all prerequisite courses
			<b>16</b>	*CHE 203; only 2 attempts permitted to complete the course with a C-grade or higher

Term 4	Course Description	Pre-req	Cr Hrs	Milestone Notes
MA 238	Differential Equations	MA 227	3	CHE 203 *Summer not guaranteed
CH 202/CH 202L	Organic Chemistry II	CH 201/CH 201L	4	MA 238
EG 231	Engineering Economics and Ethics	MA 126	3	CH 201/CH 201L
Technical Elective	See advisor for approved course list		3	MA 227
English Literature			3	**C-grade or higher required in all prerequisite courses
			<b>16</b>	

Term 5	Course Description	Pre-req	Cr Hrs	Milestone Notes
CHE 311	Separations I	CHE 203 and CHE 331 (cc)	3	**C-grade or higher required in all prerequisite courses
CHE 321	Transport Phenomenal	PH 201, MA 238, and CHE 203	3	CHE courses only available in Fall semester
CHE 331	Thermodynamics I	CH 201/CH 201L, PH 201, CHE 203, MA 238, CHE 351 (cc)	3	
<b>History (US or Western Civ.)</b>			3	
CHE 351	Modeling Lab	CHE 311 (cc) and CHE 331 (cc)	1	
Chemistry Elective	CH 265 OR CH 440		3	
			<b>16</b>	

Term 6	Course Description	Pre-req	Cr Hrs	Milestone Notes
CHE 342	Engineering Communications	EH 102 and CHE 352 (cc)	3	**C-grade or higher required in all prerequisite courses

CHE 322	Transport Phenomena II	CHE 321	3	CHE courses only available in Spring semester
CHE 332	Thermodynamics II	CHE 331 and CHE 352 (cc)	3	
CHE 372	Reactor Design	CHE 322 and CHE 332	3	
CHE 352	Measurement Lab	CHE 351, CHE 332 (cc), CHE 372 (cc)	1	
<b>Social/ Behavioral Elective</b>			3	
			<b>16</b>	

Term 7	Course Description	Pre-req	Cr Hrs	Milestone Notes
CHE 421	Separations II	CHE 311 and CHE 322	3	
CHE 441	Unit Operations Lab I	CHE 322, CHE 342, CHE 351, CHE 352	2	Apply for graduation
CHE 452	Process Controls	CHE 372	3	
CHE 461	Design I	EG 231, CHE 332, CHE 342, and CHE 372	3	**C-grade or higher required in all prerequisite courses
ChE Elective I	See advisor for approved course list		3	CHE courses only available in Fall semester
<b>Humanities Elective</b>			3	
			<b>17</b>	

Term 8	Course Description	Pre-req	Cr Hrs	Milestone Notes
CHE 442	Unit Operations Lab II	CHE 311, CHE 421, CHE 441	2	**C-grade or higher required in all prerequisite courses
CHE 462	Design II	CHE 461	3	CHE courses only available in Spring semester



ChE Elective II	See advisor for approved course list	3
<b>Fine Arts Elective</b>		3
<b>Social/ Behavioral Elective</b>		3
		<b>14</b>
<b>**TOTAL</b>		126

All bolded courses meet general education requirements.

Courses listed as Milestones are required to obtain the Professional Component Standing (PCS) and require a C-grade or higher.

Prerequisite courses denoted (cc) may be taken concurrently.

\*Students who earn an English ACT score of 27, or a written SAT score of 610, can opt out of EH 101.

**\*\*Students not Term 1 - Calculus I ready will exceed the 126 hours required for this degree. Students with ACT Math scores 21 and below will not complete the degree in 4 years. Students beginning in MA 112 must utilize summer before Term 3 by taking MA 125 and CH 132/CH 132L and utilize the summer before Term 5 to complete the degree in 4 years. Students with ACT Math scores 23 and below should begin math courses in the summer before Fall - Year 1.**

Two designated writing (W) courses are required with at least one course chosen from offerings in the student's major or minor. Courses carrying this required credit are identified in the University Bulletin by a (W) after the course title.

The Sample 4-year plan is designed as a guide for students preparing for their course selections. This information provides only a suggested schedule. Actual course selections should be made in consultation with an advisor.

## Department Information

Department of Chemical and Biomolecular Engineering Staff		(251) 460-6160
Chair		F. Carl Knopf
Professors		Knopf, Leavesley, Sylvester, West
Associate Professors		Glover, Wheeler
Assistant Professors		Rabideau, Walker

[Department of Chemical and Biomolecular Engineering website](https://www.southalabama.edu/colleges/engineering/chbe/index.html)  
<https://www.southalabama.edu/colleges/engineering/chbe/index.html>

Chemical Engineering is a profession in which knowledge of mathematics, chemistry, biology and other natural sciences gained by study, experience, and practice is applied with judgment to develop economical ways of using material and energy for the benefit of mankind. The program required for the degree of Bachelor of Science in Chemical Engineering provides fundamental instruction in mathematics, chemistry, biology, physics, and engineering. This education prepares the graduate to seek employment in petrochemical, pharmaceutical, healthcare, microelectronics, polymers, energy and environmental industries. In addition, the graduate is well-prepared to pursue graduate school.

All electives must be approved by the student's advisor. Degree requirements include a minimum of 18 semester hours of approved electives in the Humanities and Social Sciences.

Satisfactory completion of the 126 hour program outlined below leads to a Bachelor of Science in Chemical Engineering. Students must also comply with the College of Engineering Requirements for a Degree, which are covered in the Bulletin under the College of Engineering.

### **BSCHE Program Educational Objectives**

---

The educational objectives of the Department of Chemical & Biomolecular Engineering's undergraduate program are that, within a few years of program completion, graduates will have used the knowledge and skills gained through academic preparation and post-graduation experience so they have:

1. Advanced in the chemical engineering profession and applied engineering knowledge and problem-solving skills to multi-disciplinary projects.
2. Incorporated economic environmental, social, regulatory, constructability, safety, and sustainability considerations into the practice of chemical engineering.
3. Exhibited effective communication skills, teamwork, leadership, initiative, project management, and professional and ethical behavior.
4. Continued their technical and professional development, which may include graduate level education, continuing education, and participation in professional organizations.

### **BSCHE Student Outcomes**

---

By the time of graduation from the BSCHE program, a student will have demonstrated attainment of the following outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The BSCHE curriculum is designed to ensure the attainment of the student outcomes.

The Bachelor of Science in Chemical Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>

### **BSCHE Accelerated Bachelor's – Master's (ABM) Degree Option**

---

The Department of Chemical and Biomolecular Engineering allows well-qualified undergraduates in the program to follow an "Accelerated Bachelor's to Master's" study plan. This plan permits up to six credit hours of graduate coursework to count towards both the bachelor's (as Technical Electives) and the master's degrees, so that the master's degree is earned faster than usual. (The coursework concerned must individually satisfy the requirements of both degrees.) See a departmental advisor for specific details.