



Republic of the Philippines
BATANGAS STATE UNIVERSITY

The National Engineering University

Alangilan Campus

Golden Country Homes, Alangilan, Batangas City, Philippines 4200

Tel Nos.: (+63 43) 425-0139 local 2121

E-mail Address: coe.alangilan@g.batstate-u.edu.ph | Website Address: <http://www.batstate-u.edu.ph>

College of Engineering

CURRICULUM

Bachelor of Science in Chemical Engineering (BSChE)

Academic Year 2023-2024

Reference CMOs: CMO No. 91 s. 2017, CMO No. 4 s. 2018 and CMO No. 20, s. 2013,
CMO No. 39, s. 2021, CMO No. 40, s. 2021

Curriculum Description

Chemical Engineering is a profession that involves the conceptualization, development, design, improvement and application of safe, healthy, ethical and economical way of utilizing materials and energy in unit Processes and operations for the benefit of society and the environment through the knowledge of mathematics, chemistry, biology, information technology and other natural, applied and social sciences, gained by study, research and practice.

Program Educational Objectives of Chemical Engineering

The chemical engineering alumni three to five years after graduation shall:

1. Successfully practice as defined in the law governing the scope of Chemical Engineering.
2. Achieve professional growth through the practice of chemical engineering.
3. Adhere to professional, moral and ethical standards in chemical engineering practice.

Institutional Graduate Attributes

The student should achieve at least 75% for each IGA upon graduation.

1. **Knowledge Competence.** Demonstrate a mastery of the fundamental knowledge and skills required for functioning effectively as a professional in the discipline, and an ability to integrate and apply them effectively to practice in the workplace.
2. **Creativity and Innovation.** Experiment with new approaches, challenge existing knowledge boundaries and design novel solutions to solve problems.
3. **Critical and Systems Thinking.** Identify, define, and deal with complex problems pertinent to the future professional practice or daily life through logical, analytical and critical thinking.
4. **Communication.** Communicate effectively (both orally and in writing) with a wide range of audiences, across a range of professional and personal contexts, in English and Pilipino.
5. **Lifelong Learning.** Identify own learning needs for professional or personal development; demonstrate an eagerness to take up opportunities for learning new things as well as the ability to learn effectively on their own.



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6. **Leadership, teamwork, and Interpersonal Skills.** Function effectively both as a leader and as a member of a team; motivate and lead a team to work towards goal; work collaboratively with other team members; as well as connect and interact socially and effectively with diverse culture.
7. **Global Outlook.** Demonstrate an awareness and understanding of global issues and willingness to work, interact effectively and show sensitivity to cultural diversity.
8. **Social and National Responsibility.** Demonstrate an awareness of their social and national responsibility; engage in activities that contribute to the betterment of the society; and behave ethically and responsibly in social, professional and work environments.

Student Outcomes

The following skills, knowledge and behaviors are expected to be attained by the students as they progress through the program:

1. **Discipline Knowledge.** Ability to apply mathematics, sciences and principles of engineering to solve complex chemical engineering problems;
2. **Investigation.** Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;
3. **Design/Development of Solutions.** Design solution, system, components, processes, exhibiting improvements/innovations, that meet specified needs with appropriate consideration for public health and safety, cultural, societal, economical, ethical, environmental and sustainability issues.
4. **Leadership and Teamwork.** Function effectively as a member of a leader on a diverse team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
5. **Problem Analysis.** Identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics;
6. **Ethics and Professionalism.** Apply ethical principles and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, environmental, and societal contexts;
7. **Communication.** Communicate effectively on complex engineering activities with the community, and the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;



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8. **Environment and Sustainability.** Recognize the impact of professional engineering solutions in societal, global, and environmental contexts and demonstrate knowledge of and need for sustainable development;
9. **Lifelong Learning.** Recognize the need for, and ability to engage in independent and life-long learning in the broadest context of technological change;
10. **The Engineer and Society.** Apply reasoning based on contextual knowledge to assess societal, health, safety, legal, cultural, contemporary issues, and the consequent responsibilities relevant to professional engineering practices;
11. **Modern Tool Usage.** Apply appropriate techniques, skills, and modern engineering and IT tools to complex chemical engineering activities;
12. **Project Management and Finance.** Demonstrate knowledge and understanding of engineering management and financial principles as member or a leader of a team to manage projects in multidisciplinary settings, and identify opportunities of entrepreneurship; and
13. **Social and National Responsibility.** Apply acquired chemical engineering knowledge and skills in addressing community problems that contributes to national development.



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CURRICULUM COMPONENTS

Classification/ Field / Course	Number of Hours/Week		Credit Units
	Lec	Lab	
I. TECHNICAL COURSES			
A. Mathematics			
Differential Calculus	3	0	3
Integral Calculus	3	0	3
Differential Equations	3	0	3
Engineering Data Analysis	3	0	3
Sub Total	12	0	12
B. Natural/Physical Sciences			
General Chemistry	3	3	4
Modern Biology	2	3	3
Physics 1	3	3	4
Sub Total	8	9	11
C. Basic Engineering Sciences			
Introduction to Engineering	0	3	1
Engineering Drawing	0	3	1
Computer Fundamentals and Programming	0	3	1
Computer –Aided Drafting	0	3	1
Engineering Economics	3	0	3
Engineering Management	2	0	2
Sub Total	5	12	9
D. Allied Courses			
Physics 2	3	3	4
Analytical Chemistry	4	3	5
Organic Chemistry	4	3	5
Basic Electrical & Electronics Engineering	2	3	3
Material Science and Engineering	3	0	3
Environmental Science and Engineering	3	0	3
Engineering Mechanics	3	0	3
Technopreneurship	3	0	3
Quantitative Methods in Management	3	0	3
Sub Total	28	12	32
E. Professional Courses			
Advanced Engineering Mathematics for ChE	3	0	3
Physical Chemistry for ChE	4	3	5
ChE Calculations	2	3	3
ChE Thermodynamics	2	3	3
Solution Thermodynamics	2	3	3
Momentum Transfer	2	3	3
Heat and Mass Transfer	3	3	4
Separation Processes	2	3	3



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Particle Technology	2	3	3
Chemical Engineering Laboratory 1	0	3	1
Chemical Engineering Laboratory 2	0	3	1
Chemical Process Industries	3	0	3
Chemical Process Laboratory	0	3	1
Chemical Reaction Engineering	3	3	4
Process Dynamics and Control	2	3	3
Biochemical Engineering	3	0	3
Industrial Waste Management and Control	3	0	3
Chemical Engineering Design 1	1	3	2
Chemical Engineering Design 2	0	6	2
Laws, Ethics & Process Safety for ChE	2	0	2
Field Trips and Seminars	0	3	1
Computer Applications in ChE	0	3	1
Research Methods	3	0	3
Chemical Engineering Project I	1	3	2
On the Job Training	320 hrs		4
Chemical Engineering Application with Comprehensive Exam	0	6	2
Track Specialization 1	3	0	3
Track Specialization 2	3	0	3
Track Specialization 3	3	0	3
Sub Total	52	60	77
TOTAL TECHNICAL COURSES	105	93	141
II. GENERAL EDUCATION / ELECTIVE & MANDATED COURSES			
A. General Education Courses			
Mathematics for the Modern World	3	0	3
Readings in Philippine History	3	0	3
Understanding the Self	3	0	3
Purposive Communication	3	0	3
Contemporary World	3	0	3
Science, Technology and Society	3	0	3
Art Appreciation	3	0	3
Ethics	3	0	3
Sub Total	24	0	24
B. General Education Electives			
Kontekstwalisadong Komunikasyon sa Filipino	3	0	3
Filipino sa Iba't Ibang Disiplina	3	0	3
ASEAN Literature	3	0	3
Sub Total	9	0	9
C. Mandated Courses			
Life and Works of Rizal	3	0	3
PATHFit 1 - Movement Competency Training	2	0	2



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PATHFit 2 - Exercise-based Fitness Activities	2	0	2
PATHFit 3 - Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Traditional and Recreational Games	2	0	2
PATHFit 4 - Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Team Sports (Basketball and Volleyball)	2	0	2
National Service Training Program 1	3	0	3
National Service Training Program 2	3	0	3
Sub Total	17	0	17
TOTAL GE Education /Electives & Mandated Courses	50	0	50
GRAND TOTAL	155	93	191
SUMMARY			
Courses	Number of Units		
I. Technical Courses			
A. Mathematics	12		
B. Natural/Physical Sciences	11		
C. Basic Engineering Sciences	9		
D. Allied Courses	32		
E. Professional Courses			
1. Core Courses	77		
2. OJT			
II. Non-Technical Courses			
A. General Education Courses	24		
B. Filipino/Literature/Mandated Courses	12		
C. PATHFit 1- 4	8		
D. NSTP	6		
GRAND TOTAL	191		



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PROGRAM OF STUDY

FIRST YEAR						
First Semester						
Course Code	Course Title	No. of Hour/s		Unit/s	Pre-requisite/s	Co-requisite/s
		Lec	Lab			
ENGG 401	Introduction to Engineering	0	3	1		
GEd 101	Understanding the Self	3	0	3		
GEd 102	Mathematics for the Modern World	3	0	3		
GEd 105	Readings in Philippine History	3	0	3		
GEd 106	Purposive Communication	3	0	3		
MATH 401	Differential Calculus	3	0	3		
NSTP 111	National Service Training Program 1	3	0	3		
PATHFit 1	Movement Competency Training	2	0	2		
SCI 401	General Chemistry	3	3	4		
Total		23	6	25		

FIRST YEAR						
Second Semester						
Course Code	Course Title	No. of Hour/s		Unit/s	Pre-requisite/s	Co-requisite/s
		Lec	Lab			
CpE 401	Computer Programming 1	0	3	1		
ENGG 402	Engineering Drawing	0	3	1		
GEd 104	The Contemporary World	3	0	3		
GEd 108	Art Appreciation	3	0	3		
GEd 109	Science, Technology and Society	3	0	3		
MATH 402	Integral Calculus	3	0	3	MATH 401	
NSTP 121	National Service Training Program 2	3	0	3	NSTP 111	
PATHFit 2	Exercise-based Fitness Activities	2	0	2	PATHFit 1	
SCI 403	Physics 1	3	3	4	MATH 401	MATH 402
Total		20	9	23		

FIRST YEAR						
Midterm						
Course Code	Course Title	No. of Hour/s		Unit/s	Pre-requisite/s	Co-requisite/s
		Lec	Lab			
GEd 103	Life and Works of Rizal	3	0	3		
GEd 107	Ethics	3	0	3		
SCI 402	Modern Biology	2	3	3		
Total		8	3	9		



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SECOND YEAR						
First Semester						
Course Code	Course Title	No. of Hour/s		Unit/s	Pre-requisite/s	Co-requisite/s
		Lec	Lab			
ChE 401	Analytical Chemistry	4	3	5	SCI 401	
ChE 402	Organic Chemistry	4	3	5	SCI 401	
ChE 403	Chemical Engineering Calculations	2	3	3	SCI 401	
MATH 404	Differential Equations	3	0	3	MATH 402	
MATH 403	Engineering Data Analysis	3	0	3	MATH 402	
SCI 404	Physics 2	3	3	4	SCI 403	
PATHFit 3	Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Traditional and Recreational Games	2	0	2	PATHFit 1 and 2	
Fili 101	Kontekstwalisadong Komunikasyon sa Filipino	3	0	3		
Total		24	12	28		

SECOND YEAR						
Second Semester						
Course Code	Course Title	No. of Hour/s		Unit/s	Pre-requisite/s	Co-requisite/s
		Lec	Lab			
ChE 404	Physical Chemistry for ChE	4	3	5	MATH 401, ChE 401	
ChE 405	Advanced Engineering Mathematics for ChE	3	0	3	MATH 404	
ChE 406	Chemical Engineering Thermodynamics	2	3	3	MATH 404, ChE 403	
ChE 407	Momentum Transfer	2	3	3	MATH 404, ChE 403	
ENGG 403	Computer-Aided Design	0	3	1	ENGG 402	
ENGG 404	Engineering Economics	3	0	3	MATH 402	
ENGG 413	Environmental Science and Engineering	3	0	3	SCI 401	
PATHFit 4	Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Team Sports (Basketball and Volleyball)	2	0	2	PATHFit 1 and 2	
Fili 102	Filipino sa Iba't Ibang Disiplina	3	0	3		
Total		22	12	26		



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THIRD YEAR						
First Semester						
Course Code	Course Title	No. of Hour/s		Unit/s	Pre-requisite/s	Co-requisite/s
		Lec	Lab			
ChE 408	Solution Thermodynamics	2	3	3	ChE 406	
ChE 409	Heat and Mass Transfer	3	3	4	ChE 407	
ChE 410	Chemical Process Laboratory	0	3	1	ChE 401, ChE 402	
ChE 411	Chemical Engineering Laboratory 1	0	3	1	ChE 407	ChE 409
ChE 412	Computer Applications in Chemical Engineering	0	3	1	ENGG 403, MATH 403	
ChE 413	Process Dynamics and Control	2	3	3	ChE 405	
ENGG 412	Materials Science and Engineering	3	0	3	SCI 401	
ENGG 416	Research Methods	3	0	3	MATH 403	
	Total	13	18	19		

THIRD YEAR						
Second Semester						
Course Code	Course Title	No. of Hour/s		Unit/s	Pre-requisite/s	Co-requisite/s
		Lec	Lab			
ChE 414	Separation Processes	2	3	3	ChE 409	
ChE 415	Particle Technology	2	3	3	ChE 409	ChE 414
ChE 416	Chemical Engineering Laboratory 2	0	3	1	ChE 411	ChE 414
ENGG 409	Engineering Mechanics	3	0	3	SCI 403	
ChE 417	Chemical Reaction and Engineering	3	3	4	ChE 404, ChE 408	
ChE 418	Industrial Waste Management and Control	3	0	3	ENGG 413	
EE 420	Basic Electrical and Electronics Engineering	2	3	3	SCI 404	
ENGG 406	Engineering Management	2	0	2		
	Total	17	15	22		

THIRD YEAR						
Midterm						
Course Code	Course Title	No. of Hour/s		Unit/s	Pre-requisite/s	Co-requisite/s
		Lec	Lab			
ChE 419	Chemical Process Industries	3	0	3		
ChE 420	Field Trips and Seminars	0	3	1		
Lit 102	ASEAN Literature	3	0	3		
	Total	6	3	7		



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FOURTH YEAR						
First Semester						
Course Code	Course Title	No. of Hour/s		Unit/s	Pre-requisite/s	Co-requisite/s
		Lec	Lab			
ENGG 417	On-the-Job Training	320		4	Fourth Year Standing	
ChE 421	Chemical Engineering Design 1	1	3	2	ChE 412, ChE 414, ChE 417	
ChE 422	Chemical Engineering Project I	1	3	2	ENGG 416, MATH 403	
ENGG 405	Technopreneurship	3	0	3	Fourth Year Standing	
Total		5	6	11		

FOURTH YEAR						
Second Semester						
Course Code	Course Title	No. of Hour/s		Unit/s	Pre-requisite/s	Co-requisite/s
		Lec	Lab			
IE 426	Quantitative Methods in Management	3	0	3	ENGG 404, ENGG 405	
ChE 423	Biochemical Engineering	3	0	3	SCI 402, ChE 417, ChE 402	
ChE 424	Laws, Ethics and Process Safety for Chemical Engineering	2	0	2	GEEd 107, ENGG 405	
ChE 425	Chemical Engineering Design 2	0	6	2	ChE 421	
ChE 426	Chemical Engineering Application with Comprehensive Examination	0	6	2	Graduating	
ChE 427	Track Specialization 1	3	0	3		
ChE 428	Track Specialization 2	3	0	3		
ChE 429	Track Specialization 3	3	0	3		
Total		17	12	21		
GRAND TOTAL UNITS		155	96	191		