

UNIVERSITY OF SANTO TOMAS FACULTY OF ENGINEERING Department of Chemical Engineering



Program Specifications

Program Description

The Chemical Engineering (ChemE) curriculum provides the student with the knowledge and skills needed for future leadership and global competitiveness in the practice of the Chemical Engineering profession. It provides a rich environment for research, and for imbibing Christian values distinct to Thomasian engineers.

Within four years after graduation, Bachelor of Science in Chemical Engineering alumni from the University of Santo Tomas shall be engaged either locally or abroad in design, operation, or management of an industrial plant; pursue teaching, research, technical sales, or entrepreneurship after having completed advanced studies or special training. Furthermore, they shall be expected to imbibe the Thomasian traits of contemplative, creative and critical thinking; exemplary work ethic; and a commitment to the improvement of society and lifelong learning.

Career Options

- Equipment and/or Process Design Engineer
- Waste Management Expert
- Technical Marketing Engineer
- Product Development Engineer (research and development)
- Quality Assurance and/or Quality Control Engineer
- Process Engineer (production/manufacturing)
- Safety, Health and Environment Officer

Program Intended Learning Outcomes (PILOs)

Student Outcomes (SOs) or PILOs refer to skills, knowledge and behavior attributes that the students are expected to know and be able to do by the time of graduation. Below are the student outcomes of the UST Bachelor of Science in Chemical Engineering Program:

- 1. An ability to identify, formulate, and solve complex chemical 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 and morally sound judgments, 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 judgment to draw conclusions;



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- 7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies; and
- 8. The specialized knowledge in at least one field of chemical engineering practice, and the ability to apply such knowledge to provide solutions to actual problems

Comparative Matrix of Program Intended Learning Outcomes (PILOs) in CHED Memorandum Order versus those of UST

| CMO 91 s. 2017 Program Outcomes | | UST BS Chemical Engineering Student Outcomes (PILO) | |
|---------------------------------|---|--|---|
| a | Apply knowledge of mathematics and science to colve complex chemical engineering problems | 1 | An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics |
| b | Design and conduct experiments, as well as to analyze and interpret data | 6 | An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions |
| с | Design a system, component, or process to meet desired needs within realistic constraints, in accordance with the standards | 2 | An ability to apply chemical 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 |
| d | Function in multidisciplinary and multi-cultural teams | 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 |
| e | Identify, formulate, and solve complex chemical engineering problems | 1 | An ability to identify, formulate, and solve complex chemical engineering problems by applying principles of engineering, science, and mathematics |
| f | Understand professional and ethical responsibility | 4 | An ability to recognize ethical and professional responsibilities in chemical engineering situations and make informed and morally sound judgments, which must consider the impact of chemical engineering solutions in global, economic, environmental, and societal contexts |
| g | Communicate effectively complex chemical engineering activities with the engineering community and with society at large | 3 | An ability to communicate effectively with a range of audiences |



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| CMO 91 s. 2017 Program Outcomes | | UST BS Chemical Engineering Student Outcomes (PILO) | |
|---------------------------------|--|--|---|
| h | Understand the impact of chemical engineering solutions in a global, economic, environmental, and societal context | 4 | An ability to recognize ethical and professional responsibilities in chemical engineering situations and make informed and morally sound judgments, which must consider the impact of chemical engineering solutions in global, economic, environmental, and societal contexts |
| i | Recognize the need for, and engage in lifelong learning | 7 | An ability to acquire and apply new knowledge as needed, using appropriate learning strategies |
| j | Know contemporary issues | 4 | An ability to recognize ethical and professional responsibilities in chemical engineering situations and make informed and morally sound judgments, which must consider the impact of chemical engineering solutions in global, economic, environmental, and societal contexts |
| k | Use techniques, skills, and modern engineering tools necessary for the chemical engineering practice | | Implied in 1, 2 and 6 |
| 1 | Know and understand engineering and management principles as a member and a leader of a team, and to manage projects in an multidisciplinary environment | | Implied in 5 |
| m | Understand at least one specialized field of chemical engineering practice | 8 | The specialized knowledge in at least one field of chemical engineering practice, and the ability to apply such knowledge to provide solutions to actual problems |

Mapping of Institutional Intended Learning Outcomes (IILOs) with Program Intended Learning Outcomes (PILOs)

| | Thomasian Graduate Attributes (THOGA) | | UST BS Chemical Engineering Student Outcomes (PILO) | |
|----------------|---|---|---|--|
| SERVANT LEADER | | | | |
| | Show leadership abilities to promote advocacies for life, freedom, justice, and solidarity in the service of the family, the local and global communities, the Church and the environment. | 4 | An ability to recognize ethical and professional responsibilities in chemical engineering situations and make informed and morally sound judgments, which must consider the impact of chemical engineering solutions in global, economic, environmental, and societal contexts | |



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| | Implement relevant projects and activities that speak of Christian compassion to the poor and the marginalized in order to raise their quality of life | 2 | An ability to apply chemical 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 |
|----------|--|---|---|
| | Show respect for the human person, regardless of race, religion, age, and gender | 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 |
| EF CC | FECTIVE COMMUNICATOR AND DLLABORATOR | | |
| | Express myself clearly, correctly, and confidently in various environments, contexts, and technologies of human interaction | 3 | An ability to communicate effectively with a range of audiences |
| | Work productively with individuals or groups from diverse cultures and demographics | 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 |
| | Show profound respect for individual differences and/or uniqueness as members of God's creation | 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 |
| A٢ | NALYTICAL AND CREATIVE THINKER | | |
| | Show judiciousness and resourcefulness in making personal and professional decisions | 6 | An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions |
| | Engage in research undertakings that respond to societal issues | 7 | An ability to acquire and apply new knowledge as needed, using appropriate learning strategies |
| | Express personal and professional insights through an ethical and evidence-based approach | 4 | An ability to recognize ethical and professional responsibilities in chemical engineering situations and make informed and morally sound judgments, which must consider the impact of chemical engineering solutions in global, economic, environmental, and societal contexts |
| LI | FELONG LEARNER | | |
| | Engage in reflective practice to ensure disciplinal relevance and professional development | 7 | An ability to acquire and apply new knowledge as needed, using appropriate learning strategies |
| | Exhibit preparedness and interest for continuous upgrading of competencies required by the profession or area of specialization | 7 | An ability to acquire and apply new knowledge as needed, using appropriate learning strategies |



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Performance Indicators (PI)

| UST BS Chemical Engineering Student Outcomes (PILO) | | Performance Indicators | |
|--|---|--|--|
| 1 | An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics | Identifies completely the variables or parameters in complex chemical engineering problems by applying the correct principles, laws or theories of engineering and sciences | |
| | | Sets up correctly the needed formulas or equations and constraints to solve complex chemical engineering problems | |
| | | Applies the appropriate mathematical methods, tools or techniques to obtain the correct solution to chemical engineering problems | |
| 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 | Designs a process, system or component using engineering principles | |
| | | Designs a process, system or component using modern tools, in accordance to technical and safety standards to meet the identified needs of stakeholders | |
| | | Designs a process, system or component that meets the identified needs of stakeholders | |
| | | Integrates realistic constraints such as public health and welfare as well as global, cultural, social, and environmental factors in the engineering design | |
| 3 | An ability to communicate effectively with a range of audiences | Writes using appropriate style and format, correct grammar, and organized manner | |
| | | Uses appropriate and modern visual aids to communicate more effectively | |
| | | Delivers oral presentations with professionalism, confidence, clarity of speech, and good audience rapport | |



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| 4 | An ability to recognize ethical and professional responsibilities in engineering situations and make informed and morally sound judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts | Explains the code of ethics and relevant laws in the practice of chemical engineering |
|---|--|--|
| | | Deduces the impact of engineering solutions or research and innovation in a global, economic, environmental, and societal context |
| 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 | Formulates goals or objectives based on the integrated inputs from the team and on their knowledge of engineering and project management |
| | | Implements the action plan formulated by the team to its fullest detail to meet target goals and objectives |
| | | Performs assigned task or specific role as agreed upon by the team |
| 6 | An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions | Designs appropriate laboratory procedures |
| | | Performs laboratory procedure correctly and safely |
| | | Capable of analyzing and interpreting experimental data |
| | | Draws conclusions from pertinent experimental results by applying appropriate engineering principles |
| 7 | An ability to acquire and apply new knowledge as needed, using appropriate learning strategies | Engages in activities promoting further learning |
| | | Able to find information relevant to problem solution, assignment, or research project independently |
| | | Demonstrates comprehensive knowledge in a specific field of chemical engineering |
| | | Identifies problems and provides solutions specific to a field of chemical engineering |
| | | Provides solutions to problems specific to a field of chemical engineering |