

# Chemical Engineering

M.Eng. in Chemical Engineering (<https://catalog.und.edu/graduateacademicinformation/departmentalcoursesprograms/engineering/chemicalengineering/chemeng-meng/>)

M.S. in Chemical Engineering (<https://catalog.und.edu/graduateacademicinformation/departmentalcoursesprograms/engineering/chemicalengineering/chemeng-ms/>)

Ph.D. in Chemical Engineering (<https://catalog.und.edu/graduateacademicinformation/departmentalcoursesprograms/engineering/chemicalengineering/chemeng-phd/>)

## CHE 501. Advanced Transport Phenomena. 3 Credits.

This course is designed to give an advanced treatment of momentum, heat, and mass transfer suitable for graduate students in chemical engineering, mechanical engineering, and environmental engineering. This course will involve using advanced mathematics to model transport systems of importance in engineering science and design. Prerequisite: CHE 301 and MATH 266. S, even years.

## CHE 503. Fuels Technology. 3-4 Credits.

Processing and utilization of low rank fuels.

## CHE 504. Air Pollution Control. 3 Credits.

Identification of major air pollutants from stationary and mobile sources and methods of controlling their emissions; dispersion of air pollutants in the atmosphere; photochemical air pollution; federal and state regulations. Prerequisite: Background equivalent to CHEM 122, MATH 265, and PHYS 252 is expected.

## CHE 505. Biochemical and Biomaterial Engineering. 3 Credits.

Principles of biochemical and biomaterial engineering and methods for the analysis, design, operation, and monitoring of biochemical engineering processes and bioreactors. Application to biochemical engineering research and application of materials science to problems in tissue engineering. Prerequisite: Background/knowledge of chemical reactor design and consent of instructor. F.

## CHE 507. Advanced Unit Operations. 3-6 Credits.

One or more of the following: fluid flow, heat flow, evaporation, humidification and dehumidification, drying, gas absorption, distillation, and extraction. Prerequisite: Background equivalent to CHE 405 is expected.

## CHE 508. Advanced Unit Operations. 3-6 Credits.

Continuation of the first semester's work in advanced unit operations.

## CHE 509. Advanced Chemical Engineering Thermodynamics. 3 Credits.

Chemical Engineering processes from the standpoint of quantitative thermodynamics. Special emphasis on thermodynamics of chemical reactions. Prerequisite: Background equivalent to CHE 303 is expected. F, even years.

## CHE 510. Advanced Chemical Process Control. 3 Credits.

Analysis and design of advanced chemical process control systems including: dead time compensation, feed forward and adaptive control, multivariable control, digital computer control and the use of Z-transforms to get the discrete-time dynamic response of chemical process systems. Prerequisite: MATH 266 and CHE 408 or equivalents approved by the department.

## CHE 511. Advanced Chemical Engineering Kinetics. 3 Credits.

Theory and practice of industrial chemical reactor design. Advanced topics in kinetics of industrial chemical reactors. Prerequisite: Background equivalent to CHE 421 is expected.

## CHE 512. Transport Of Mass. 3 Credits.

Prerequisite: Background equivalent to CHE 305, CHE 321, and MATH 265 is expected.

## CHE 515. Design of Engineering Experiments. 3 Credits.

Design and analysis of experimental data including block and factorial arrangements, significance of data, and mathematical modeling. Prerequisite: MATH 265.

## CHE 520. Impurities in Combustion and Gasification Systems. 3 Credits.

This course is on the fate and behavior of fuel derived impurities in energy conversion systems and how impurities influence system design, operation and reliability. Prerequisite: CHEM 122.

## CHE 525. Polymer Engineering. 3 Credits.

Basic polymer structures and characterization. Polymerization reactions and kinetics of condensation and chain growth polymerizations. Polymerization processes including bulk, suspension, solution, and emulsion polymerizations. Polymer processing technologies including extrusion, and injection molding. Prerequisite: CHE 321 and CHE 301.

## CHE 530. Combustion Theory and Modeling. 3 Credits.

A theoretical and mathematical study of premixed and diffusion flames, laminar and turbulent combustion, solid fuel combustion and pollutant formation. Corequisite: CHE 301 and CHE 303. S.

## CHE 531. Rocket Propulsion. 3 Credits.

A theoretical and mathematical study of space flight, the thermodynamics of rocket propulsion, classification and formulation of propellants and their combustion characteristics, and rocket motors. Prerequisite or Corequisite: CHE 303. F.

## CHE 532. Explosives: Theory and Modeling. 3 Credits.

A theoretical and mathematical study of: the thermodynamics of deflagrations and detonations, classification and formulation of explosives and their combustion characteristics. Prerequisite or Corequisite: CHE 303. F.

## CHE 535. Metallic Corrosion and Polymer Degradation. 3 Credits.

Reviews the forms of metal corrosion and of polymer degradation; discussion of control and mitigation techniques. F.

## CHE 562. Seminar in Chemical Engineering. 1 Credit.

Conferences and reports on current developments in Chemical Engineering. Repeatable to 3.00 credits. S/U grading.

## CHE 591. Research. 1-15 Credits.

Analysis, planning, and detailed study of definite problems; individual laboratory work on some selected problems to develop the power of independent investigation. Repeatable.

## CHE 593A. Special Topics. 1-3 Credits.

Topics of current interest to be considered each semester. Regular grading. Repeatable to 9.00 credits.

## CHE 593B. Special Topics. 1-3 Credits.

Topics of current interest to be considered each semester. S/U grading. Repeatable to 3.00 credits. S/U grading.

## CHE 595. Design Project. 3-6 Credits.

A three to six credit course of engineering design experience involving individual effort and formal written report. Prerequisite: Restricted to the Master of Engineering students and subject to approval by the student's advisor.

## CHE 597. Graduate Cooperative Education. 1-2 Credits.

A practical work experience with an employer closely associated with the student's academic area. Arranged by mutual agreement among student, department, and employer. Prerequisite: Approval of ChE graduate director. Repeatable to 4.00 credits. S/U grading. On demand.

## CHE 996. Continuing Enrollment. 1-12 Credits.

Repeatable. S/U grading.

## CHE 997. Independent Study. 2 Credits.

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## CHE 998. Thesis. 1-9 Credits.

Development and documentation of scholarly activity demonstrating proficiency in Chemical Engineering at the master's level. Repeatable to 9.00 credits. F,S,SS.

## CHE 999. Dissertation. 1-12 Credits.

Repeatable to 12.00 credits. F,S,SS.