

# Competencies for ChEn 477

## Level 3

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- Students will understand and practice safe laboratory and chemicals-handling principles.
- Students will be able to estimate mass transfer coefficients and use them to determine mass transfer rates for both external and internal flows and across phase boundaries.
- Students will understand fundamentals of kinetics including definitions of rate and forms of rate expressions during laboratory experiments.
- Students will demonstrate an ability to solve engineering problems.
- Students will be able to size and do performance calculations on single, isothermal plug-flow, CSTR, and batch reactors for a single homogeneous or heterogeneous reaction from experimental data.

## Level 2

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- Students will gain hands on experience with chemical processes, units, and corresponding equipment through lab experiments
- Students will demonstrate familiarity and experience with the measurement of process variables (e.g., P, T, flow rate, conc.).
- Students will demonstrate knowledge of basic laboratory techniques.
- Students will be able to use the scientific method and problem solving strategies, as well as statistical methods, to design and carry out experiments in order to solve engineering problems.
- Students will be able to integrate topics from various Chemical Engineering courses to solve realistic problems during lab experiments.
- Students will exhibit critical and creative thinking skills for analysis and evaluation of problems and cause-effect relationships.
- Students will be able to write effective, well organized technical reports, including formal engineering reports and short letter reports.
- Students will demonstrate experience working together in teams.
- Students will demonstrate an understanding of basic engineering statistics in their laboratory reports
- Students will be able to determine rate expressions by analyzing reactor data including integral and differential analysis on constant- and variable-volume systems in laboratory experiments.
- Students will be able to demonstrate familiarity and experience with the application of process control principles on an industrial control system.
- Students will be able to obtain and evaluate appropriate informational/data from databases, hand books, correlations, experiments, literature, etc.
- Students will be able to rationalize units, make order of magnitude estimates, assess reasonableness of solutions, and select appropriate levels of solution sophistication.
- Students will be able to give effective, well organized oral presentations including the handling of questions and the use of appropriate visual aids.
- Students will practice good teamwork principles.
- Students will be able to design (e.g., number of trays, tray efficiency, column height, column diameter, product specs) tray-type distillation, absorption and extraction columns.
- Students will be able to design (e.g., height of column, packing material, column diameter, flooding velocity) packed column absorbers from experimental data.

## Level 1

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- Students will demonstrate effective reading of technical material.
- Students will demonstrate effective interpretation of graphical data.