# CHME-CHEMICAL & MATERIALS ENGR (CHME)

### CHME 101. Introduction to Chemical Engineering Calculations 2 Credits (2)

Introduction to the discipline of chemical engineering, including: an overview of the curriculum; career opportunities; units and conversions; process variables; basic data treatments; and computing techniques including use of spreadsheets.

## Prerequisite/Corequisite: MATH 1220G, or MATH 1250G, or MATH 1511G. Learning Outcomes

- 1. Describe career opportunities available to holders of a BSCHE degree.
- 2. Find and use learning and advising resources within CHME and Engineering.
- Create a course registration plan for future semesters that meets the degree and prerequisite requirements for the BSCHE in the timeliest manner.
- 4. Diagram a process with unit operations and material and energy flows.
- 5. Perform unit analysis and unit conversions accurately and efficiently.
- 6. Validate calculated results using estimation techniques.
- 7. Apply the concept of significant figures to numerical answers.
- 8. Identify and describe process variable measurements using engineering vocabulary.
- 9. Express and convert concentrations using mass, mole, and volume bases. 1
- 10. Convert between absolute and relative pressure and temperature scales. 1
- 11. Perform calculations in Excel using built-in and custom functions. 1
- 12. Generate 2-D plots of data and functions in Excel. 1
- 13. Perform a regression of data to a mathematical model.

#### CHME 102. Material Balances

#### 2 Credits (2)

Perform material balances in single- and multi-phase, reacting and non-reacting systems under isothermal conditions.

### Prerequisite: MATH 1220G, or MATH 1250G, or MATH 1511G. Learning Outcomes

- 1. Analyze data using trendlines. Linearize when necessary.
- 2. Use unit conversions when solving problems.
- 3. Turn a verbal or written problem statement into a diagram and a mathematical form.
- 4. Write and solve material balances on single and multi-unit processes, for both nonreactive and reactive processes.
- 5. Identify what phase a substance is in and then be able to use the correct equations to relate volume to mass and moles.
- 6. Use Raoult's and Henry's law when solving mass balances.

### CHME 201. Energy Balances & Basic Thermodynamics 3 Credits (3)

Chemical Engineering energy balances; combined energy and material balances including those with chemical reaction, purge and recycle; thermochemistry; application to unit operations. Introduction to the first and second laws of thermodynamics and their applications. May be repeated up to 3 credits.

Prerequisite: CHME 102 and MATH 1250G or MATH 1511G. Prerequisite/Corequisite: CHEM 1216 or CHEM 1215G.

#### **Learning Outcomes**

- 1. Correctly implement unit conversions (outcome (a) an ability to apply knowledge of mathematics, science, and engineering).
- Analyze and solve elementary material balances on single and multiunit process, for both nonreactive and reactive processes.
- 3. Apply the first law of thermodynamics to batch and flow processes.
- 4. Locate thermophysical property data in the literature and estimate properties when data are not available.
- 5. Conduct combined material and energy balances around continuous multi-unit processes with and without chemical reaction.
- 6. Perform process calculations using psychrometric charts, enthalpy concentration diagrams and steam tables.
- 7. Derive and solve differential equations for transient heat and material balances on dynamic systems.
- 8. Determine individual learning style and describe how learners of that style can help themselves.
- 9. Use modern engineering tools (example, Excel) to solve material and energy balance problems.