# ENCH 215: Chemical Engineering Analysis

*This detailed course description provides information about course topics & content. It is not a course syllabus. Summer 2013 course syllabi are updated in the spring, and may not be available until summer classes begin.*

## Instructor Information

| Instructor | Email | Course Format | Number of Credits |
|---|---|---|---|
| Joshua Enszer | enszer@umbc.edu | Lecture, Discussion | 3 |

## General Information

### Course Format Other
5.25 hours of lecture and 2.5 hours of discussion per week. Discussion is not optional.

### Delivery Format
In-Person

### Prerequisite /Co-requisite:
ENES 101 and CHEM 102

## Course Materials

### Currently Used Materials
• Felder and Rousseau, Elementary Principles of Chemical Processes, 3rd edition (2005 with integrated media and study tools)

## Course Objectives/Learning Outcomes:

By the end of the course, you should be able to work with the following:

- Basic engineering calculations. Convert quantities from one set of units to another quickly and accurately; define, calculate, and estimate properties of process materials including fluid density, flow rate, chemical composition variables (mass and mole fractions, concentrations), fluid pressure, and temperature.
- Material and energy balance calculations. Draw and label process flowcharts from verbal process descriptions; carry out degree-of-freedom analyses (process bookkeeping); write and solve material and energy balance equations for single-unit and multiple-unit processes, processes with recycle, bypass, and reactive processes.
- Applied physical chemistry. Perform pressure-volume-temperature calculations for ideal and non-ideal gases. Perform vapor-liquid equilibrium calculations for systems containing one condensable component and for ideal multi-component solutions. Calculate internal energy and enthalpy changes for process fluids undergoing specified changes in temperature, pressure, phase, and chemical composition. Incorporate the results of these calculations into process material and energy calculations.

## Potential Topics Covered:

- Material in F&R
- unit conversions and process properties
- process variables
- balance equations, flowcharts, degrees of freedom
- multi-unit processes, recycle and bypass
- chemical reactions
- debrief of course to date
- single phase systems, equations of state
- multi-phase systems
- energy balances
- thermodynamic tables
- programming with Excel and MATLAB
- enthalpy
- enthalpy and enthalpy of reaction
- energy balances on reactive processes
- debrief of entire course

## Instructions for Visiting Students

Departmental consent is required for all courses in chemical engineering at UMBC. Advisors in chemical engineering or general engineering can grant this consent. Please contact Dr. Bayles (tbayles@umbc.edu), Dr. Enszer (enszer@umbc.edu), or the College of Engineering advisors (http://www.coeit.umbc.edu/programs/undergraduate-student-services) to obtain permission. If you have not taken second-semester general chemistry or a first-year engineering course, it may not be in your best interest to take ENCH 215 over the summer - please check with Dr. Bayles or Dr. Enszer to make sure you have the background experience necessary for success in this course.

## Additional Information and Resources

Summer ENCH 215 is primarily intended for transfer students, and it is also suitable for advanced rising sophomores and students who require a second attempt in the course.

If you are a current UMBC student or transfer student who will have completed organic chemistry I, multivariable calculus, and differential equations by the fall, taking ENCH 215 over the summer is ideal for you. Successful completion of this course will allow you to start junior-level chemical engineering courses in the fall, potentially reducing your time to graduation by one year.

If you are a current UMBC rising sophomore or incoming transfer student who has not yet taken organic chemistry 1, calculus 3, or differential equations, there is likely no advantage to taking ENCH 215 in the summer; you should plan to take ENCH 215 in the fall.