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Iowa Central Community College
Science Department



Course Syllabus

Course Name: Distillation and Evaporation Theory

Course Number: BPT-129

Class Location and Time:

Room: BHS-116

Day: TW

Time: 4:30 – 6:35 pm

Room:

Day:

Time:

Course Start Date: 1/12/2011

Course End Date: 5/6/2011

Instructor: Carl Gross

Office Location: SC-301A

E-mail Address:

Gross_c@iowacentral.edu

(preferred contact method)

Office Hours:

Days: MW

Times: 10:20-11:30 am

Days:

Times:

Phone: (515) 574-1227, or

800 362-2793, x 1227

Days:

Times:

Final Exam: Day: Tuesday Date: 5/3/2011 Time: 4:30 – 6:30pm

Departmental Assistance: For help with course selection, class registration, transfer information, and other academic assistance, please contact the department associate, Jolene Messerly, in Science 110H, at (515) 574-1257 or 1-800-362-2793, ext. 1257, or by e-mail: messerly@iowacentral.edu

1. Total Semester Hour Credit: 3

2. Total Contact Hours per Semester: Lecture: 18 Lab: 72 Clinical:

3. Catalog Description:

This is an introduction to the fundamentals of distillation. Topics will include the basic principles behind the distillation of mixed composition solutions, the relationships between pressure, temperature, boiling point and vapor composition, and the construction and function of a basic distillation column. The laboratory portion of the course will provide hands-on experiences with the distillation of solutions under various conditions.

4. Prerequisites and/or Co-requisites:

5. Textbook Required:

- *Fundamentals of Distillation*. Job Training Systems, Inc., Unionville, Pennsylvania. 2003.
- *Practical Distillation*. Job Training Systems, Inc., Unionville, Pennsylvania. 2003.

6. Supplemental Materials Required:

- Lab notebook: spiral or equivalent is fine.

- USB flash drive

7. College Procedures:

- **Children in the Classroom:**
 - Students are not allowed to bring children into the classrooms, labs, shops, or hallways during class times.
- **Electronic Devices in the Classroom:**
 - Cell phones, pagers, timers and similar devices are not to be operational during classroom, lab, and clinical times.
- **Inclement Weather Statement:**
 - The final decision to attend college classes can only be made by the individual based on their specific extenuating circumstances that may make it hazardous for them to travel.
- **Academic Accommodations:**
 - Any student who feels they may need academic accommodations should contact the Special Populations Coordinator early on in the semester. The Coordinator will verify documentation and coordinate appropriate and reasonable accommodations. Students must obtain a new accommodation notification each semester.
 - For information contact:
 - Heather Lundberg
 - Special Populations Coordinator
 - Student Resource Center/Library
 - 515-574-1045

8. Additional Course Information:

- Attendance
 - Attendance is required for success. Please be sure to attend class regularly. Refer to your student handbook for college attendance policy.
- Late Work
 - A regular homework assignment is **NOT** accepted late for **any reason**.
 - A project assignment that takes a number of days to complete will be accepted late with penalty. Penalty: 10% per day deduction in total score.
- Make-up Work
 - Arrangements must be made with the instructor **prior to due date** if possible.
 - At minimum a phone call, e-mail, or Facebook message must be received by the end of the day to be eligible for make-up work.
 - When available, make-up work will likely be different from in-class versions.
 - Make-up work will be evaluated on a case-by-case basis.

8. Grading Policy:

Letter Grade Minimum Percent	
A	>90
B	>80
C	>70
D	>60
F	<60

Grade Weighting	
Homework	30
Quiz	20
Lab Work	20
Midterm	15
Final	15

9. Course (Student) Outcomes:

Upon successful completion of this course, the student will be expected to understand the relationships among solution composition, boiling point, pressure, and vapor composition. The student will be able to describe how a distillation column is constructed and how it functions, especially related to batch and continuous distillation procedures. Through the laboratory exercises, the student will be able to apply their knowledge with hands-on distillation exercises.

10. Unit (Competencies) Outcomes:

A. The student will understand the basic principles behind distillation.

Task 1: Distinguish between chemical and physical separation.

Task 2: Explain heat of vaporization.

Task 3: Describe the effect of pressure on boiling point.

Task 4: Understand that a fraction of a solution can be expressed by its weight, volume, or molar concentration.

Task 5: Define high boiler and low boiler.

Task 6: Describe an azeotrope.

Task 7: Describe how solutions of 3 or more components differ from ideal solutions of 2 components.

B. The student will be able to explain the distillation process.

Task 1: Describe the concept of a distillation column.

Task 2: Describe the role of heat exchangers in distillation.

Task 3: Explain the difference between batch and continuous distillation.

Task 4: Explain how distillate is formed.

Task 5: Explain how and why the level of liquid is controlled in a distillation column.

C. The student will understand mass balance and steady-state operation.

Task 1: Explain how the mass of substance flowing into and out of a column remain balanced during steady-state operation.

Task 2: Describe how changes in the rate of vaporization, feed rate and bottoms draw affect mass balance.

Task 3: Explain why it is difficult to calculate distillate composition for a batch distillation.

D. The student will understand the importance of temperature, pressure and composition to the distillation process.

Task 1: Explain why it is important to know the bottoms temperature.

Task 2: Describe how pressure is controlled in a column and what happens when pressure changes.

Task 3: Identify changes in composition and boiling point using temperature and pressure readings from a column.

E. The student will demonstrate knowledge sufficient enough to safely and effectively start up and shut down a distillation column through laboratory exercises.

Task 1: Demonstrate proficiency in all aspects concerning safe operation of a distillation apparatus.

Task 2: Demonstrate proper start-up procedures for a distillation apparatus.

Task 3: Demonstrate the ability to monitor the distillation process including the detection and correction of any deviations from normal operation.

Task 4: Demonstrate proper shut-down procedures including proper handling and maintenance of a distillation apparatus when not in use.