Course Number and Title: CPO 135 Chemical Process Technology-Equipment

Campus Location:
Stanton

Effective Date:
2019-51

Prerequisite:
MAT 010, SSC 100 or concurrent

Co-Requisites:
none

Course Credits and Hours:
3.00 credits
2.00 lecture hours/week
2.00 lab hours/week

Course Description:
In this course, students are introduced to the types of equipment used in the chemical process industry. Topics include piping, valves, pumps, compressors, heat exchangers, and other chemical process equipment. The course concludes with a discussion of preventative/predictive maintenance.

Required Text(s):
Obtain current textbook information by viewing the campus bookstore - https://www.dtcc.edu/bookstores online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:
None

Schedule Type:
Classroom Course

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Describe the roles and responsibilities of a process technician, and list the fundamental skills required to be a successful technician. (CCC 1, 4; PGC 1)
2. Explain the basic principles of pressure, temperature and heat, heat transfer, and fluid flow. (CCC 2, 6; PGC 3)
3. Describe the construction, function, and operation of various fluid control valves. (CCC 2, 5, 6; PGC 2)
4. Describe the construction, function, and operation of various fluid pumps. (CCC 2, 5, 6; PGC 6)
5. Explain the construction, function, and operation of various fluid compressors. (CCC 2, 5, 6; PGC 6)
6. Describe the construction, function, and operation of various steam turbines. (CCC 2, 5, 6; PGC 6)
7. Identify basic instrumentation symbols, and explain temperature, pressure, and flow measurement. (CCC 2, 5, 6; PGC 3)
8. Describe the construction, function, and operation of various heat exchangers. (CCC 2, 5, 6; PGC 6)
9. Describe the construction, function, and operation of various fired heaters. (CCC 2, 5, 6; PGC 6)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):
Upon completion of this course, the student will:

1. Describe the roles and responsibilities of a process technician, and list the fundamental skills required to be a successful technician.
    1. Describe the roles and responsibilities of a process technician.
    2. List and explain the available college training programs that prepare students for entry-level process technology jobs.
    3. Identify the fundamental skills required to become a process technician.
2. Explain the basic principles of pressure, temperature/heat, heat transfer, and fluid flow.
    1. Differentiate the principles of temperature, heat, and heat transfer.
    2. Differentiate the principles of fluid flow processes.
    3. Solve basic mathematical problems encountered in industry.
3. Describe the construction, function, and operation of various fluid control valves.
    1. Describe the construction, function, and operation of gate, globe, ball, check, butterfly, diaphragm, relief, and safety valves.
    2. Explain the purpose of valves in industry.
4. Describe the construction, function, and operation of various fluid pumps.
    1. Describe the construction, function, and operation of centrifugal, rotary, screw, gear, piston, axial, diaphragm, and reciprocating pumps.
    2. Identify and discuss pump problems.
5. Explain the construction, function, and operation of various fluid compressors.
    1. Describe the construction, function, and operation of centrifugal, rotary, screw, gear, piston, axial, and reciprocating compressors.
    2. Identify and discuss compressor problems.
6. Describe the construction, function, and operation of various steam turbines.
    1. Describe the construction, function, and operation of a steam turbine.
    2. Identify and discuss steam turbine problems.
7. Identify basic instrumentation symbols, and explain temperature, pressure, and flow measurement.
    1. Identify and describe basic instrumentation symbols.
    2. Explain temperature, pressure, and flow measurement.
8. Describe the construction, function, and operation of various heat exchangers.
    1. Explain and differentiate laminar and turbulent flow.
    2. Identify and summarize the three methods of heat transfer: conduction, convection, and radiation.
    3. Describe the construction, function, and operation of single-pass and multi-pass heat exchangers, reboilers, condensers, and distillation towers.
9. Describe the construction, function, and operation of various fired heaters.
    1. Describe the construction, function, and operation of direct-fired heaters, fire tube heaters, and furnaces.
    2. Identify common furnace problems.

Evaluation Criteria/Policies:
Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	**–**	**100**	**=**	**A**
83	**–**	**91**	**=**	**B**
75	**–**	**82**	**=**	**C**
0	**–**	**74**	**=**	**F**

Students should refer to the Student Handbook - https://www.dtcc.edu/handbook for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Final Course Grade:
Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
Tests (summative) (equally weighted)	60%
Class Project (summative)	10%
Homework (formative)	5%
Laboratory Reports (summative)	25%
TOTAL	100%

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

1. Maintain safety, health, and environmental standards during simulation exercises or in a chemical plant.
2. Handle, store, and transport chemical materials according to all applicable federal, state, and local regulations.
3. Apply chemical process and quality systems in a simulated chemical process environment or a chemical plant.
4. Operate, monitor, control, and troubleshoot batch and continuous chemical processes.
5. Analyze samples of raw materials, intermediates, and finished products in a simulated chemical process environment or a chemical plant.
6. Perform routine, predictive, and preventive maintenance and service to process equipment and instrumentation.
7. Use computers and computerized equipment for communications and chemical process control.

Disabilities Support Statement:
The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the disabilities services - https://www.dtcc.edu/disabilitysupport web page or visit the campus Advising Center.