

VALIDATION COPY

Process Operations Technology Mississippi Curriculum Framework

**Program CIP: 15.0699 – Industrial Production Technologies/Technicians
January 2015**



Published by:

Mississippi Community College Board
Division of Workforce, Career, and Technical Education
3825 Ridgewood Road
Jackson, MS 39211
Phone: 601-432-6155
Email: curriculum@mccb.edu

VALIDATION COPY

FACULTY WRITING TEAM MEMBERS

Joanna Alford, East Mississippi Community College, Mayhew, MS
Tommie Broome, Mississippi Gulf Coast Community College, Gautier, MS

ADMINISTRATOR WRITING TEAM MEMBERS

Brock Clark, Dean of Career and Technical Education,
Mississippi Gulf Coast Community College, Gautier, MS
Joe Cook, Assistant Dean of Career and Technical Education,
East Mississippi Community College, Mayhew, MS

BUSINESS AND INDUSTRY WRITING TEAM MEMBERS

Brad Ladner, Technical Specialist, DAK Americas, Bay St. Louis, MS

OFFICE OF CURRICULUM AND INSTRUCTION TEAM MEMBERS

Angela Bryan, Director of Curriculum and Instruction, Mississippi Community College Board
Rachel De Vaughan, Curriculum Specialist, Office of Curriculum and Instruction,
Mississippi Community College Board
Elmira Ratliff, Curriculum Specialist, Office of Curriculum and Instruction,
Mississippi Community College Board

VALIDATION COPY

The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

Copyright © 2014 by Mississippi Community College Board
For information, please contact curriculum@mccb.edu

Contents

RESEARCH ABSTRACT	5
ADOPTION OF NATIONAL CERTIFICATION STANDARDS	6
INDUSTRY JOB PROJECTION DATA	7
ARTICULATION	10
TECHNICAL SKILLS ASSESSMENT	10
ONLINE AND BLENDED LEARNING OPPORTUNITIES	10
PROGRAM DESCRIPTION	11
SUGGESTED COURSE SEQUENCE	12
Career Certificate Required Courses	12
CAREER CERTIFICATE REQUIRED COURSES	16
PPT 1133 Introduction to Process Technology	16
PPT 1424 Process Equipment.....	20
PPT 1713 Process Instrumentation I	24
PPT 1214 Process Chemistry	25
PPT 1513 Safety, Health, and Environment	26
PPT 1413 Quality Concepts.....	28
PPT 1434 Process Systems	29
PPT 1613 Technical Communication.....	39
TECHNICAL CERTIFICATE REQUIRED COURSES	40
PPT 2443 Process Operations	40
PPT 2723 Process Instrumentation II	44
PPT 2323 Process Troubleshooting.....	45
TECHNICAL ELECTIVES	47
PPT 2733 Emerging Energy Technologies.....	47
PPT 2113 Oil and Gas Production I.....	48
PPT 2123 Oil and Gas Production II.....	49
PPT 291(1-5) Special Projects in Process Operations Technology	50
PPT 292(1-6) Supervised Work Experience in Process Operations Technology	51
Recommended Tools and Equipment	52
CURRICULUM DEFINITIONS AND TERMS	53

RESEARCH ABSTRACT

Process Operations Technology programs were established at the request of industries on the Mississippi Gulf Coast in response to a recognized critical need for process operations technicians in the petrochemical and power generation industries. The program was implemented in the fall semester of 2003 at the Perkinston Campus of Mississippi Gulf Coast Community College. Courses for the Mississippi Curriculum Framework for Process Operations Technology were reviewed and endorsed by representatives of major industries on the Gulf Coast. Chevron, BP, Shell, Mississippi Power, Entergy, and Southern Company have taken an active interest in the program by sponsoring scholarships, internships, and mentoring opportunities for students and by providing equipment and supplies. An Advisory Committee composed of industry representatives meets regularly to review the program and make comments and recommendations.

In the spring of 2015, the Office of Curriculum and Instruction (OCI) met with different industry members who made up the advisory committee. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of their field. Program faculty, administrators, and industry members were consulted regarding industry workforce needs and trends. Industry members stated an AAS degree or two years industrial experience was needed for employment. Growth is projected over the next five years, in addition, replacing the retiring population will cause a need for new additional employees.

The following changes were made to the Process Operations Technology curriculum at this revision writing meeting:

- Chemical/Refining Process Technician Skill Standards were adopted.
- PPT 1713, Process Instrumentation I, was changed from a 4 semester credit hour course to a 3 semester credit hour course.
- PPT 1443, Process Operations, was changed from a 4 semester credit hour course to a 3 semester credit hour course, PPT 2443 Process Operations, and moved to the second year.
- PPT 2723, Process Instrumentation II, was changed from a 4 semester credit hour course to a 3 semester credit hour course.
- PPT 1433, Process Systems, was changed from a 3 semester credit hour course to a 4 semester credit hour course.
- PPT 291(1-3), Special Projects in Process Operations Technology, was changed to a PPT 291(1-5) course.
- PPT 2313, Quality Concepts, was moved to the first year and changed to PPT 1413.
- PPT 2733, Emerging Energy Technology, was added as an elective.

Revision History:

2003, Original curriculum framework, Research and Curriculum Unit, Mississippi State University

2008, Revised, Research and Curriculum Unit, Mississippi State University

2015, Revised, Office of Curriculum and Instruction, Mississippi Community College Board

ADOPTION OF NATIONAL CERTIFICATION STANDARDS

The following national standards were referenced in each course of the curriculum: **Chemical/Refining Process Technician Skill Standards.**

Background

The Center for the Advancement of Process Technology (CAPT), along with its various alliance partners, including Alaska Process Industry Careers Consortium, California Chemical & Process Technology Alliance, and many others from around the nation, and working through a National Science Foundation grant, developed the Chemical/Refining Process Technician skill standards. The skill standards were submitted for recognition to the Texas Skills Standards Board (TSSB) in January, 2005, by the Gulf Coast Process Technology Alliance (GCPTA) on behalf of its industry partners in Texas. GCPTA is an industry-driven non-profit organization of community colleges and industry and an active member of CAPT. At its October 20, 2009 meeting the TSSB recognized updated Chemical/Refining Process Technician skill standards at the request of the GCPTA.

Development of Standards

CAPT recruited an Industry Technical Advisory Committee (ITAC) made up of major chemical and refining employers in Texas such as ExxonMobil, Valero Refining Company, Shell Chemical Company, BP Amoco, and Chevron Phillips to participate in the initial development of the skill standards. Developers used the DACUM (Developing a Curriculum) method to conduct a job analysis to collect, synthesize, and organize job data. The ITAC selected subject matter experts (SMEs) that would represent diversity in company size and in geographic and demographic areas of the state. During the overall DACUM process over 300 contacts with business and industry were made. The DACUM information was aggregated and work-related skill standards information was defined over the course of several focus group sessions with SMEs. Sessions were conducted using teleconference and other communication methods. Online editing and teleconferences with SMEs ensured a consensus-based output from the process.

The skill standards developed through the SME sessions underwent rigorous validation during a series of on-site focus group, telephone, and internet feedback sessions. Session participants were invited based on the need to assure that demographic distributions were fairly maintained. The companies that responded to the invitation were classified according to size and other criteria. Sixty seven (67) operators/technicians from sixteen (16) regions in the state with the heaviest concentration of chemical and refining companies participated in the validation process.

For the 2009 review, the GCPTA recruited experts from several chemical or petroleum refining companies with plants in Texas, including Sun Products, Eastman Chemical, Shell Oil, Lyondell Basell, and Lubrizol, to participate in an online survey to identify necessary skills and knowledge for each key activity. A separate group of experts reviewed the initial survey output and provided secondary response data to further clarify skill and knowledge groupings. Finally, the experts reviewed and validated the suggested revisions to the skill standards based on their years of industry experience, and recommended changes to reflect updated work practices in the field.

For more information related to implementing Chemical/Refining Process Technician Skill Standards at your local campus, please visit:

<http://www.tssb.org/sites/default/files/wwwpages/repos/pdffiles/ChemRefProcessTechSSRevisedSep2009.pdf>

INDUSTRY JOB PROJECTION DATA

The field of process operations technology is growing steadily. This field provides not only opportunities in direct process operations technology and technical work but also room for multiple skill certifications. There is an 3.3%% increase in occupational demand at the national level. The mean annual income for operators is \$57,020 at the national level. A summary of occupational data from the Bureau of Labor Statistics is displayed below:

Power Plant Operators

Table 1: Education Level

Program Occupations	Education Level
Power plant Operators	Associate Degree

Table 2: Occupational Overview

Employment	Employment RSE	Mean hourly wage	Mean annual wage	Wage RSE
34,400	3.3 %	\$27.41	\$57,020	0.8 %

Table 3: Percentile wage estimates for this occupation:

	10%	25%	50% (Median)	75%	90%
Hourly Wage	\$17.81	\$22.32	\$27.23	\$32.03	\$38.04
Annual Wage	\$37,040	\$46,420	\$56,640	\$66,620	\$79,130

Table 4: Industries with the highest levels of employment in this occupation:

Industry	Employment	Hourly mean wage	Annual mean wage
<u>Electric Power Generation, Transmission and Distribution</u>	24,260	\$28.12	\$58,480
<u>Local Government (OES designation)</u>	4,390	\$24.19	\$50,320
<u>State Government (OES designation)</u>	830	\$22.86	\$47,550
<u>Colleges, Universities, and Professional Schools</u>	690	\$21.84	\$45,430
<u>Natural Gas Distribution</u>	430	\$36.45	\$75,820

VALIDATION COPY

Chemical Plant Operators

Table 1: Education Level

Program Occupations	Education Level
Chemical plant and system operators	Associate Degree

Table 2: Occupational Overview

Employment	Employment RSE	Mean hourly wage	Mean annual wage	Wage RSE
38,890	5.8%	\$26.29	\$54,690	1.2%

Table 3: Percentile wage estimates for this occupation:

	10%	25%	50% (Median)	75%	90%
Hourly Wage	\$15.79	\$20.33	\$26.31	\$32.59	\$36.95
Annual Wage (2)	\$32,840	\$42,290	\$54,730	\$67,790	\$76,850

Table 4: Industries with the highest levels of employment in this occupation:

Industry	Employment	Hourly mean wage	Annual mean wage
<u>Oil and Gas Extraction</u>	50	0.03	\$33.16
<u>Plastics Product Manufacturing</u>	60	0.01	\$32.25
<u>Petroleum and Coal Products Manufacturing</u>	1,850	1.66	\$28.14
<u>Scientific Research and Development Services</u>	210	0.03	\$27.77
<u>Pulp, Paper, and Paperboard Mills</u>	700	0.66	\$27.37

VALIDATION COPY

Gas Plant Operators

Table 1: Education Level

Program Occupations	Education Level
Gas plant operators	Associate Degree

Table 2: Occupational Overview

Employment	Employment RSE	Mean hourly wage	Mean annual wage	Wage RSE
13,890	4.0 %	\$30.18	\$62,770	1.0 %

Table 3: Percentile wage estimates for this occupation:

	10%	25%	50% (Median)	75%	90%
Hourly Wage	\$19.69	\$24.81	\$30.62	\$35.31	\$41.56
Annual Wage	\$40,950	\$51,600	\$63,680	\$73,450	\$86,440

Table 4: Industries with the highest levels of employment in this occupation:

Industry	Employment	Hourly mean wage	Annual mean wage
<u>Natural Gas Distribution</u>	5,490	5.04	\$30.36
<u>Pipeline Transportation of Natural Gas</u>	3,030	10.78	\$30.32
<u>Oil and Gas Extraction</u>	1,460	0.76	\$29.65
<u>Local Government (OES Designation)</u>	600	0.01	\$24.70
<u>Basic Chemical Manufacturing</u>	490	0.34	\$27.47

Table 5: Industries with the highest concentration of employment in this occupation:

Industry	Employment	Hourly mean wage	Annual mean wage
<u>Pipeline Transportation of Natural Gas</u>	3,030	10.78	\$30.32
<u>Natural Gas Distribution</u>	5,490	5.04	\$30.36
<u>Other Pipeline Transportation</u>	150	2.36	\$32.93
<u>Oil and Gas Extraction</u>	1,460	0.76	\$29.65
<u>Basic Chemical Manufacturing</u>	490	0.34	\$27.47

VALIDATION COPY

ARTICULATION

No articulated credit will be offered upon implementation of this curriculum. Local agreements and dual credit partnerships are encouraged.

TECHNICAL SKILLS ASSESSMENT

Students will be assessed using the *Mississippi Career Planning and Assessment Process Operations Technology* test.

The curriculum is consistent with the Gulf Coast Process Technology Alliance curriculum requirement of eight core curriculum modules for program endorsement and the program recommendations promulgated by the National Science Foundation and the Center for the Advancement of Process Technology. Graduates from the program will be eligible to take the National Certified Exit Exam for Process Operation Technicians.

Colleges should report the students who complete the program with an Associate of Applied Science Degrees for technical skills attainment.

ONLINE AND BLENDED LEARNING OPPORTUNITIES

Course content includes lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment. Training related to online and blended learning will be available to faculty members through the MS Community College Board.

PROGRAM DESCRIPTION

Process Operations Technology programs prepare technicians for employment in the diverse field of process operations in petroleum refineries, power generation facilities, pharmaceutical plants, chemical plants, waste water treatment plants, food and beverage process plants, offshore oil production facilities and a host of other industries. Individuals currently employed as process operations technicians will enhance their ability to perform their duties and increase opportunities to advance.

This curriculum offers an accelerated transition pathway at 15 hours, a career certificate at 30 hours, and a technical certificate at 45 hours, and an Associate of Applied Science degree in Process Operations Technology at 60 hours. Graduates are prepared for entry-level positions at any processing facility. They will have acquired the basic technical skills in equipment and systems and have a broadened vocabulary to make the job-specific learning less difficult. They will also possess team-building skills, safety awareness, environmental awareness, communication skills, and computer skills that are critical in the workplace. They will have a working knowledge of state and federal regulations on safety and the environment. Through an internship program, students have the opportunity to work in a position related to process technology during which they will receive work-related application of their classroom training.

VALIDATION COPY

SUGGESTED COURSE SEQUENCE

Accelerated Transition Pathway

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
PPT 1133	Introduction to Process Technology	3	3		45	45		
PHY 2244	Physical Science I	4	4		60	60		
PPT 1424	Process Equipment	4	4		60	60		
	Electives	4	4		60	60		
	Total	15	15		225	225		

Career Certificate Required Courses

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
PPT 1133	Introduction to Process Technology	3	3		45	45		
PPT 1424	Process Equipment	4	4		60	60		
PPT 1713	Process Instrumentation I	3	2	2	60	30	30	
PPT 1513	Safety, Health, and Environment	3	3		45	45		
PPT 1413	Quality Concepts	3	3		45	45		
PPT 1434	Process Systems	4	3	2	75	45	30	
PPT 1613	Technical Communication	3	3		45	45		
PPT 1214	Process Chemistry*	4	3	2	75	45	30	
	Instructor approved technical elective	3						
	TOTAL	30	24	6	495	405	90	

*PHY 2244 Physical Science I may be taken in lieu of PPT 1214 Process Chemistry

VALIDATION COPY

Technical Certificate Required Courses

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
PPT 2443	Process Operations	3	3		45	45		
PPT 2723	Process Instrumentation II	3	2	2	60	30	30	
PPT 2323	Process Troubleshooting	3	3		45	45		
	Instructor approved technical elective	3	3		45			
	Instructor approved electives	3	3		45			
	TOTAL	15	15		225	195	30	

VALIDATION COPY

General Education Core Courses

To receive the Associate of Applied Science Degree, a student must complete all of the required coursework found in the Career Certificate option, Technical Certificate option and a minimum of 15 semester hours of General Education Core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college. The Southern Association of Colleges and Schools (SACS) Commission on Colleges Standard 2.7.3 from the Principles of Accreditation: Foundations for Quality Enhancement¹ describes the general education core.

Section 2.7.3 In each undergraduate degree program, the institution requires the successful completion of a general education component at the collegiate level that (1) is substantial component of each undergraduate degree, (2) ensures breadth of knowledge, and (3) is based on a coherent rationale. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours or the equivalent. These credit hours are to be drawn from and include at least one course from the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. The courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

General Education Courses

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	
	Humanities/Fine Arts	3	3		45	45		
	Social/Behavioral Sciences	3	3		45	45		
MAT 1313	College Algebra	3	3		45	45		
	Any other instructor approved academic courses per local college requirement.	6	6		90	90		
	TOTAL	15	15		225	225		

¹

Southern Association of Colleges and Schools Commission on Colleges. (2012). *The principles of accreditation: Foundations for quality enhancement*. Retrieved from <http://www.sacscoc.org/pdf/2012PrinciplesOfAcrcditation.pdf>

VALIDATION COPY

Technical Electives

Course Number	Course Name	Semester Credit Hours	SCH Breakdown			Total Contact Hours	Contact Hour Breakdown		
			Lecture	Lab	Externship		Lecture	Lab	Externship
PPT 1214	Process Chemistry	4	3	2		75	45	30	
PPT 291(1-5)	Special Projects in Process Operations Technology	1-5		2-10		30-150		30-150	
PPT 292(1-6)	Supervised Work Experience in Process Operations Technology	1-6			3-18	45-270			45-270
WBL 191(1-3) WBL 192(1-3) WBL 193(1-3) WBL 291(1-3) WBL 292(1-3) WBL 293(1-3)	Work-Based Learning	1-6			3-18	45-270			45-270
PPT 2113	Oil and Gas Production I	3	3			45	45		
PPT 2123	Oil and Gas Production II	3	3			45	45		
PPT 2733	Emerging Energy Technology	3							
IMM 1935	Manufacturing Skills Basic	3	3						
	All other electives approved by instructor per local community college policy								
TOTAL									

CAREER CERTIFICATE REQUIRED COURSES

Course Number and Name: **PPT 1133 Introduction to Process Technology**

Classification: Career Certificate Core

Description: This course is an introduction to the types of process operations within the process industry. Topics include technician duties, responsibilities, and expectations; plant organizations; the plant processes and utility systems; and the physical and mental requirements of the process technician.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3		45

National Assessment:

Prerequisite: Instructor approved

Student Learning Outcomes:

1. Discuss the history and development of various types of process industries.
2. Identify and describe the duties, responsibilities, and expectations of a process technician.
3. Explore the concepts of health, safety, environmental, and quality concerns as related to the process industry.
4. Identify and describe the function of process equipment such as pumps, compressors, heat exchangers, cooling towers, furnaces and boilers.
5. Identify fundamental process systems such as distillation, utilities and auxiliaries.
6. Investigate the relationship of math, physics, and chemistry to process technology.

Chemical/Refining Process Technician Skill Standards

6. Control Utility Systems

6.1 Monitor and regulate instrument air system

- 6.1.1 Production rates meet desired instrument air pressure per established company/equipment specifications.
- 6.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 6.1.3 Product/process meets established process specifications
- 6.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

VALIDATION COPY

6.1.8 Process variables meet product and equipment parameters.

6.2 Monitor and regulate utility air system

- 6.2.1 Production rates meet desired utility air pressure per established company/equipment specifications.
- 6.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 6.2.3 Product/process meets established process specifications
- 6.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.2.8 Process variables meet product and equipment parameters.

6.3 Monitor and regulate process water system

- 6.3.1 Production rates meet desired level per established company specifications.
- 6.3.2 Product/process meets established process specifications.
- 6.3.3 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.3.4 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.3.5 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.3.6 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.3.7 Process variables meet product and equipment parameters.

6.4 Monitor and regulate potable water system

- 6.4.1 Production rates meet desired potable water pressure per company specifications.
- 6.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.4.3 Potable water meets company/government specifications.
- 6.4.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.4.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.4.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.4.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.4.8 Process variables meet product and equipment parameters.

6.5 Monitor and regulate fire water system

- 6.5.1 Fire water flow rates meet desired level per company specifications.
- 6.5.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.5.3 Fire water meets established process specifications.

VALIDATION COPY

- 6.5.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.5.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.5.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.5.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.5.8 Process variables meet product and equipment parameters.

6.6 Monitor and regulate service water system

- 6.6.1 Service water flow rates meet desired rates per company specifications.
- 6.6.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.6.3 Service water meets established process specifications.
- 6.6.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.6.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.6.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.6.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.6.8 Process variables meet product and equipment parameters.

6.7 Monitor and regulate boiler feed water

- 6.7.1 Production rates meet desired production level per process/equipment specifications.
- 6.7.2 Feed water meets established process specifications.
- 6.7.3 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.7.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.7.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.7.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.7.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.7.8 Process variables meet product and equipment parameters.

6.8 Monitor and regulate condensate system

- 6.8.1 Production rates meet desired production level per process/equipment specifications.
- 6.8.2 Condensate meets established process specifications.
- 6.8.3 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.8.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.8.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.8.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.8.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

VALIDATION COPY

6.8.8 Process variables meet product and equipment parameters.

6.9 Monitor and regulate natural gas system

6.9.1 Production rates meet desired level per process/equipment specifications.

6.9.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.

6.9.3 Natural gas usage meets company established cost criteria.

6.9.4 Natural gas meets established product specifications.

6.9.5 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

6.9.6 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.

6.9.7 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.

6.9.8 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

6.9.9 Process variables meet product and equipment parameters.

6.10 Monitor and regulate fuel gas system

6.10.1 Process flow meets/does not exceed company/government specifications.

6.10.2 Operation meets company established cost criteria

6.10.3 Operation meets established process specifications.

6.10.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

6.10.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.

6.10.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.

6.10.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

6.10.8 Process variables meet product and equipment parameters

6.11 Monitor and regulate nitrogen system

6.11.1 Nitrogen rates meet desired level per process/equipment specifications.

6.11.2 Nitrogen usage meets company established cost criteria

6.11.3 Nitrogen meets established product specifications.

6.11.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

6.11.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.

6.11.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.

6.11.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

6.11.8 Process variables meet product and equipment parameters

VALIDATION COPY

Course Number and Name: PPT 1424 Process Equipment

Classification: Career Certificate Core

Description: This course includes Instruction in the use of common process equipment including piping, valves, rotating equipment such as pumps, compressors, drivers, and fixed equipment such as exchangers, tanks, drums, and vessels.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	4		60

National Assessment:

Prerequisite: Instructor approved

Student Learning Outcomes:

1. Describe various types of piping equipment commonly found in process industries.
 - a. Differentiate between pipes, tubing, hoses, and fittings, and explain the use of each.
 - b. Define the role and purpose of valves in the overall operation of the plant.
2. Describe various types of rotating equipment commonly found in process industries.
 - a. Describe the importance and application of pumps and compressors
 - b. Describe the importance and application of motors and engines.
 - c. Explain the fundamental purpose and application of power transmission and lubrication.
3. Describe various types of fixed equipment commonly found in process industries.
 - a. Describe the importance and application of heat exchangers and cooling towers.
 - b. Describe the importance and application of furnaces and boilers.
 - c. Describe the importance and application of vessels.
4. Use process and piping diagrams and drawings to explain process flows and identify equipment in a unit/system.

2. Control Heat Exchange Systems

2.1 Monitor and regulate fired heaters/furnace system

- 2.1.1 Heat transfer rates meet desired temperature per process/equipment specifications.
- 2.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 2.1.3 Product/process meets established process specifications.
- 2.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 2.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 2.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 2.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 2.1.8 Process variables meet product and equipment parameters.

2.2 Monitor and regulate boiler system

- 2.2.1 Heat transfer rates meet desired temperature per process/equipment specifications.

VALIDATION COPY

- 2.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 2.2.3 Product/process meets established process specifications.
- 2.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 2.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 2.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 2.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 2.2.8 Process variables meet product and equipment parameters.

2.3 Monitor and regulate cooling water system

- 2.3.1 Cooling rates meet desired temperature per process/equipment specifications.
- 2.3.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 2.3.3 Product/process meets established process specifications.
- 2.3.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 2.3.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 2.3.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 2.3.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 2.3.8 Process variables meet product and equipment parameters.

2.5 Monitor and regulate heat exchanger system

- 2.5.1 Heat transfer rates meet desired temperature per process/equipment specifications.
- 2.5.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 2.5.3 Product/process meets established process specifications.
- 2.5.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 2.5.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 2.5.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 2.5.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 2.5.8 Process variables meet product and equipment parameters.

4. Control Generation Systems

4.1 Monitor and regulate steam system

- 4.1.1 Production rates meet desired production level per company specifications.
- 4.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 4.1.3 Product/process meets established process specifications.
- 4.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

VALIDATION COPY

- 4.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 4.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 4.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 4.1.8 Process variables meet product and equipment parameters.

4.2 Monitor electrical generation / distribution system

- 4.2.1 Electrical distribution meets desired level per company specifications.
- 4.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 4.2.3 Product/process meets established process specifications.
- 4.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 4.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 4.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 4.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 4.2.8 Process variables meet product and equipment parameters.

5. Control Waste Treatment/Destruction Systems

5.1 Monitor and regulate thermal oxidation system

- 5.1.1 Process variables meet/do not exceed company/government specifications.
- 5.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 5.1.3 Product/process meets established process specifications.
- 5.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 5.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 5.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 5.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 5.1.8 Process variables meet product and equipment parameters.

5.2 Monitor and regulate flare system

- 5.2.1 Process variables meet/do not exceed company/government specifications.
- 5.2.2 Emissions meet/do not exceed company/government specifications.
- 5.2.3 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 5.2.4 Product/process meets established process specifications.
- 5.2.5 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 5.2.6 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 5.2.7 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 5.2.8 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

VALIDATION COPY

5.2.9 Process variables meet product and equipment parameters.

5.3 Monitor and regulate storm water system

5.3.1 Storm water treatment meets established company/government specifications.

5.3.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.

5.3.3 Product/process meets established process specifications.

5.3.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

5.3.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.

5.3.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.

5.3.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

5.3.8 Process variables meet product and equipment parameters.

5.4 Monitor and regulate waste water system

5.4.1 Waste stream meets/does not exceed established company/government specifications.

5.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.

5.4.3 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

5.4.4 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.

5.4.5 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.

5.4.6 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

5.4.7 Process variables meet product and equipment parameters.

7. Control Chemical Materials Handling and Storage

7.1 Receive chemical materials

7.1.1 Material composition is verified according to company specifications.

7.1.2 Material quantity is verified according to company specifications.

7.1.3 Materials are unloaded according to governmental regulation, company policies, and safe work practices.

7.2 Store chemical materials

7.2.1 Material quantity and quality are maintained according to company parameters

7.2.2 Materials are labeled per governmental regulations and company policies.

7.3 Transfer chemical materials

7.3.1 Specified quantity/quality of materials are transferred to process units, storage, and/or externally per government regulations, company policies, and safe work practices.

7.3.2 Materials are transferred to the specified destination according to company distribution schedule.

7.3.3 Internal and external material transfers are coordinated according to company policies and procedures.

VALIDATION COPY

Course Number and Name: PPT 1713 Process Instrumentation I

Classification: Career Certificate Core

Description: This course is a study of the instruments and instrument systems used in chemical processing industry including terminology, primary variables, symbols, and control loops

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

National Assessment:

Prerequisite: Instructor approved

Student Learning Outcomes:

1. Describe and apply the major elements of process technology.
 - a. Define pressure, and apply related measurements and processes used in the process industry.
 - b. Define temperature, and apply related measurements and processes used in the process industry.
 - c. Define level, and apply related measurements and processes used in the process industry.
 - d. Define flow, and apply related measurements and processes used in the process industry.
 - e. Define analytical instrumentation, and apply related measurements and processes used in the process industry.
2. Describe and explain the functions and components of process control.
 - a. Identify and describe the various pieces of equipment used in instrumentation (transmitters; transducers; differential pressure cells; analog, pneumatic, and digital instruments; etc.)
 - b. Describe valves used in instrumentation (globe, three-way, butterfly, etc.).
 - c. Explain the functions and components of a control loop, and contrast the differences between open and closed controls.
 - d. Describe the relationship between measurement instruments and their role in the overall control loop process.
3. Describe and interpret the types of process industry drawings.
 - a. Compare and contrast piping and instrument diagrams (P&IDs) and process flow drawings (PFDs).
 - b. Describe the lettering and numbering standards based on ISA instrumentation symbols.
 - c. Describe how to determine the instrument type from the symbol information.
 - d. Describe the standards for line symbols.
4. Describe the role and function of advanced controls and controllers in process operations.
 - a. Identify the different advanced controls and controllers and their primary function.

VALIDATION COPY

Course Number and Name: PPT 1214 Process Chemistry

Classification: Career Certificate Core

Description: This course will provide the student with an introduction to general and organic chemistry as applied to the process industry. Includes instruction on matter, energy, atoms, chemical reactions, and chemical bonding.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	3	2	75

National Assessment:

Prerequisite: Instructor approved

Student Learning Outcomes:

1. Demonstrate knowledge of general chemistry concepts.
 - a. Identify chemical symbols, compounds, and elements.
 - b. Explore the use of concepts such as atom, proton, neutron, electron, atomic number, atomic weight, and molecules in calculations.
 - c. Interpret and apply chemical formulas and equations.
 - d. Discuss the concepts of acids, bases, and pH.
 - e. Define covalent and ionic bonds.
 - f. Describe the different types of chemical reactions (oxidation–reduction, equilibrium, combustion, sedimentation/precipitation, etc.).
2. Compare various forms of matter and their properties.
 - a. Compare and contrast the physical and chemical properties of the different forms of matter.
 - b. Demonstrate knowledge of metric and English measurement systems and conversions between these systems.
3. Explore the principles of organic chemistry.
 - a. Identify the sources and structure of organic compounds.
 - b. Identify the physical and chemical properties of hydrocarbons.

VALIDATION COPY

Course Number and Name: PPT 1513 Safety, Health, and Environment

Classification: Career Certificate Core

Description: This course is designed to provide a development of knowledge and skills to reinforce attitudes and behaviors required for safe and environmentally sound work habits. Emphasis is placed on safety, health, and environmental issues in the performance of all job tasks and regulatory compliance issues.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3		45

National Assessment:

Prerequisite: Instructor approved

Student Learning Outcomes:

1. Describe various types of physical hazards commonly found in process industries.
2. Describe the chemical hazards in process industries.
3. Describe the biological, ergonomic and plant specific hazards associated with various processes.
4. Describe the environmental hazards in process industries.
5. Identify the various Engineering controls used to make process areas safe.
6. Discuss the various Administrative controls - Programs and Practices.
7. Describe the importance and application of PPE in process industries.
8. Describe the important role OSHA plays in the process industries.
9. Describe the important role EPA (state and federal) plays in process industries.
10. Describe the other regulatory agencies that impact the Process Industry.

Chemical/Refining Process Technician Skill Standards

9. Maintain Safe and Healthful Work Environment

9.1 Conduct Preventative SHE Inspections

- 9.1.1 Area inspections are conducted according to established procedures.
- 9.1.2 Area inspection documentation is complete per company standards.
- 9.1.3 Inspection and audit findings are posted appropriately so that they are accessible to all relevant parties.
- 9.1.4 Inspection findings are remedied according to company policies and procedures

9.2 Conduct SHE incident and hazard investigations

- 9.2.1 Investigations of incidents and hazards are conducted according to established procedures.
- 9.2.2 Incident and investigation documentation is complete per company standards.
- 9.2.3 Incident and investigation reports and findings are disseminated to designated recipients according to company procedures.

VALIDATION COPY

9.2.4 Corrective action is taken as specified by company policies and procedures.

9.3 Instruct individuals entering operating area in SHE policies and procedures

9.3.1 Area specific safety orientation is provided for employees and contractors entering process unit.

9.3.2 All employees have current and continuing training on the SHE policies and procedures.

9.4 Comply with company policies and procedures

9.4.1 Employees comply with company safety and environmental policies and procedures.

9.4.2 Safety and environmental compliance documentation is complete per company standards.

9.4.3 Safety and environmental improvements are submitted per company policies and procedures.

9.5 Comply with local, state and federal policies and procedures

9.5.1 Employees comply with local, state and federal policies and procedures.

9.5.2 Safety and environmental compliance documentation is complete per local, state and federal standards

VALIDATION COPY

Course Number and Name: PPT 1413 Quality Concepts

Classification: Career Certificate Core

Description: A course to provide an introduction to the field of quality in the process industry. Students are introduced to industry-related process concepts including operating consistency, continuous improvement, plant economics, team skills, and statistical process control (SPS).

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3		45

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss the history of the quality movement in the United States and the state of the movement in the process industry today.
2. Describe the impact of quality on the organization's economic performance.
3. Understand and use effective system communication techniques to ensure operating consistency and reduce variability in the process.
4. Understand and use effective system communication techniques to ensure operating consistency and reduce variability in the process.
5. Discuss the principles associated with process orientation and systems thinking and theory.
6. Demonstrate how to follow procedures and policies in order to ensure operating consistency, reduce variability in the process, reduce waste and prevent safety incidents.
7. Use continuous improvement methodology to optimize processes.
8. Take preventive or corrective action to ensure operating consistency, reduce variability in the process, reduce waste and prevent safety incidents.
9. Use statistical thinking in one's work as necessary.
10. Use Quality Tools and team problem solving to resolve a real-world dilemma.

VALIDATION COPY

Course Number and Name: PPT 1434 Process Systems

Classification: Career Certificate Core

Description: This course involves the study of the interrelation of process equipment and process systems including related scientific principles.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	3	2	75

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Describe how process industry facilities are divided into systems.
2. Identify the types of systems used in the process industry:
 - a. Water Systems.
 - b. Relief And Flare Systems
 - c. Electrical Power Generation And Distribution Systems
 - d. Material Storage and Blending Systems
 - e. Refrigeration System
 - f. Steam Generation And Distribution Systems
 - g. Reaction Systems
 - h. Separation Systems
3. Describe typical process technician responsibilities for the following:
 - a. operating systems
 - b. monitoring systems
 - c. troubleshooting systems
 - d. completing rounds
 - e. communication between inside and outside operator
 - f. communication between process technician and other departments
4. List factors that can affect plant economics.

Chemical/Refining Process Technician Skill Standards

1. Control Separation Systems

1.1 Monitor and regulate distillation system

- 1.1.1 Production rates meet desired production level per company specifications.
- 1.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 1.1.3 Product/process meets established process specifications.
- 1.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.

VALIDATION COPY

- 1.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.1.8 Process variables meet product and equipment parameters

1.2 Monitor and regulate stripping system

- 1.2.1 Production rates meet desired production level per company specifications.
- 1.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 1.2.3 Product/process meets established process specifications.
- 1.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.2.8 Process variables meet product and equipment parameters

1.3 Monitor and regulate filtration system

- 1.3.1 Production rates meet desired production level per company specifications.
- 1.3.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 1.3.3 Product/process meets established process specifications.
- 1.3.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.3.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.3.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.3.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.3.8 Process variables meet product and equipment parameters

1.4 Monitor and regulate absorption system

- 1.4.1 Production rates meet desired production level per company specifications.
- 1.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 1.4.3 Product/process meets established process specifications.
- 1.4.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.4.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.4.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.4.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.4.8 Process variables meet product and equipment parameters

1.5 Monitor and regulate adsorption system

- 1.5.1 Production rates meet desired production level per company specifications.
- 1.5.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.

VALIDATION COPY

- 1.5.3 Product/process meets established process specifications.
- 1.5.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.5.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.5.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.5.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.5.8 Process variables meet product and equipment parameters

1.6 Monitor and regulate extraction system

- 1.6.1 Production rates meet desired production level per company specifications.
- 1.6.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 1.6.3 Product/process meets established process specifications.
- 1.6.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.6.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.6.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.6.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.6.8 Process variables meet product and equipment parameters

2. Control Heat Exchange Systems

2.1 Monitor and regulate fired heaters/furnace system

- 2.1.1 Heat transfer rates meet desired temperature per process/equipment specifications.
- 2.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 2.1.3 Product/process meets established process specifications.
- 2.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 2.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 2.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 2.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 2.1.8 Process variables meet product and equipment parameters.

2.2 Monitor and regulate boiler system

- 2.2.1 Heat transfer rates meet desired temperature per process/equipment specifications.
- 2.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 2.2.3 Product/process meets established process specifications.
- 2.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 2.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 2.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.

VALIDATION COPY

- 2.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 2.2.8 Process variables meet product and equipment parameters.

2.3 Monitor and regulate cooling water system

- 2.3.1 Cooling rates meet desired temperature per process/equipment specifications.
- 2.3.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 2.3.3 Product/process meets established process specifications.
- 2.3.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 2.3.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 2.3.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 2.3.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 2.3.8 Process variables meet product and equipment parameters.

2.4 Monitor and regulate refrigeration system

- 2.4.1 Production rates meet desired production level per company specifications.
- 2.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 2.4.3 Product/process meets established process specifications.
- 2.4.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 2.4.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 2.4.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 2.4.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 2.4.8 Process variables meet product and equipment parameters.

2.5 Monitor and regulate heat exchanger system

- 2.5.1 Heat transfer rates meet desired temperature per process/equipment specifications.
- 2.5.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 2.5.3 Product/process meets established process specifications.
- 2.5.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 2.5.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 2.5.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 2.5.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 2.5.8 Process variables meet product and equipment parameters.

3. Control Reaction Systems

3.1 Monitor and regulate continuous reaction system

- 3.1.1 Chemical reaction rates meet desired production level per company specifications.

VALIDATION COPY

- 3.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 3.1.3 Product/process meets established process specifications.
- 3.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 3.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 3.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 3.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 3.1.8 Process variables meet product and equipment parameters.

3.2 Monitor and regulate batch reaction system

- 3.2.1 Chemical reaction rates meet desired production level per company specifications.
- 3.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 3.2.3 Product/process meets established process specifications.
- 3.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 3.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 3.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 3.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 3.2.8 Process variables meet product and equipment parameters.

4. Control Generation Systems

4.1 Monitor and regulate steam system

- 4.1.1 Production rates meet desired production level per company specifications.
- 4.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 4.1.3 Product/process meets established process specifications.
- 4.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 4.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 4.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 4.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 4.1.8 Process variables meet product and equipment parameters.

4.2 Monitor electrical generation / distribution system

- 4.2.1 Electrical distribution meets desired level per company specifications.
- 4.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 4.2.3 Product/process meets established process specifications.
- 4.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 4.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.

VALIDATION COPY

- 4.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 4.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 4.2.8 Process variables meet product and equipment parameters.

5. Control Waste Treatment/Destruction Systems

5.1 Monitor and regulate thermal oxidation system

- 5.1.1 Process variables meet/do not exceed company/government specifications.
- 5.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 5.1.3 Product/process meets established process specifications.
- 5.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 5.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 5.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 5.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 5.1.8 Process variables meet product and equipment parameters.

5.2 Monitor and regulate flare system

- 5.2.1 Process variables meet/do not exceed company/government specifications.
- 5.2.2 Emissions meet/do not exceed company/government specifications.
- 5.2.3 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 5.2.4 Product/process meets established process specifications.
- 5.2.5 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 5.2.6 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 5.2.7 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 5.2.8 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 5.2.9 Process variables meet product and equipment parameters.

5.3 Monitor and regulate storm water system

- 5.3.1 Storm water treatment meets established company/government specifications.
- 5.3.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 5.3.3 Product/process meets established process specifications.
- 5.3.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 5.3.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 5.3.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 5.3.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 5.3.8 Process variables meet product and equipment parameters.

VALIDATION COPY

5.4 Monitor and regulate waste water system

- 5.4.1 Waste stream meets/does not exceed established company/government specifications.
- 5.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 5.4.3 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 5.4.4 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 5.4.5 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 5.4.6 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 5.4.7 Process variables meet product and equipment parameters.

6. Control Utility Systems

6.1 Monitor and regulate instrument air system

- 6.1.1 Production rates meet desired instrument air pressure per established company/equipment specifications.
- 6.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 6.1.3 Product/process meets established process specifications
- 6.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.1.8 Process variables meet product and equipment parameters.

6.2 Monitor and regulate utility air system

- 6.2.1 Production rates meet desired utility air pressure per established company/equipment specifications.
- 6.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 6.2.3 Product/process meets established process specifications
- 6.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.2.8 Process variables meet product and equipment parameters.

6.3 Monitor and regulate process water system

- 6.3.1 Production rates meet desired level per established company specifications.
- 6.3.2 Product/process meets established process specifications.
- 6.3.3 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

VALIDATION COPY

- 6.3.4 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.3.5 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.3.6 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.3.7 Process variables meet product and equipment parameters.

6.4 Monitor and regulate potable water system

- 6.4.1 Production rates meet desired potable water pressure per company specifications.
- 6.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.4.3 Potable water meets company/government specifications.
- 6.4.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.4.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.4.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.4.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.4.8 Process variables meet product and equipment parameters.

6.5 Monitor and regulate fire water system

- 6.5.1 Fire water flow rates meet desired level per company specifications.
- 6.5.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.5.3 Fire water meets established process specifications.
- 6.5.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.5.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.5.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.5.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.5.8 Process variables meet product and equipment parameters.

6.6 Monitor and regulate service water system

- 6.6.1 Service water flow rates meet desired rates per company specifications.
- 6.6.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.6.3 Service water meets established process specifications.
- 6.6.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.6.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.6.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.6.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.6.8 Process variables meet product and equipment parameters.

VALIDATION COPY

6.7 Monitor and regulate boiler feed water

- 6.7.1 Production rates meet desired production level per process/equipment specifications.
- 6.7.2 Feed water meets established process specifications.
- 6.7.3 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.7.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.7.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.7.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.7.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.7.8 Process variables meet product and equipment parameters.

6.8 Monitor and regulate condensate system

- 6.8.1 Production rates meet desired production level per process/equipment specifications.
- 6.8.2 Condensate meets established process specifications.
- 6.8.3 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.8.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.8.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.8.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.8.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.8.8 Process variables meet product and equipment parameters.

6.9 Monitor and regulate natural gas system

- 6.9.1 Production rates meet desired level per process/equipment specifications.
- 6.9.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources.
- 6.9.3 Natural gas usage meets company established cost criteria.
- 6.9.4 Natural gas meets established product specifications.
- 6.9.5 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.9.6 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.9.7 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.9.8 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.9.9 Process variables meet product and equipment parameters.

6.10 Monitor and regulate fuel gas system

- 6.10.1 Process flow meets/does not exceed company/government specifications.
- 6.10.2 Operation meets company established cost criteria
- 6.10.3 Operation meets established process specifications.
- 6.10.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

VALIDATION COPY

- 6.10.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.10.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.10.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.10.8 Process variables meet product and equipment parameters

6.11 Monitor and regulate nitrogen system

- 6.11.1 Nitrogen rates meet desired level per process/equipment specifications.
- 6.11.2 Nitrogen usage meets company established cost criteria
- 6.11.3 Nitrogen meets established product specifications.
- 6.11.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 6.11.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 6.11.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 6.11.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 6.11.8 Process variables meet product and equipment parameters

VALIDATION COPY

Course Number and Name: PPT 1613 Technical Communication

Classification: Career Certificate Core

Description: This course includes an application of written, oral, and other forms of communication to the process technology industry. It includes instruction and practice in written communications (reports and presentations, procedures, resumes, documentation, training materials, etc.) and oral communications (presentations, directions/instructions, feedback, etc.).

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3		45

National Assessment:

Prerequisite: Instructor approved

Student Learning Outcomes:

1. Organize and compose effective written communications.
 - a. Identify direct, indirect, and persuasive approaches to writing.
 - b. Develop skills to produce clear, concise, complete, accurate, and courteous messages.
 - c. Compose effective correspondence (e-mail, memos, and letters).
 - d. Compose a technical report illustrating proper organization and effective use of data tables, charts, and graphs.
 - e. Compose written procedures and documentation for process technology operations.
2. Organize and compose effective oral communications.
 - a. Compose and deliver oral instructions and reports.
 - b. Receive and interpret oral instructions and directions.
 - c. Develop and present an oral demonstration using graphics, tables, and equipment.
 - d. Give and receive positive feedback from other individuals.
 - e. Apply skills for oral interviews.
3. Prepare written communications involved in the job application process.
 - a. Complete an application form.
 - b. Complete a resume.
 - c. Update a resume.
 - d. Compose letters of application, follow-up, acceptance, and resignation.

VALIDATION COPY

TECHNICAL CERTIFICATE REQUIRED COURSES

Course Number and Name: **PPT 2443** **Process Operations**

Classification: Technical Certificate Core

Description: This course is a course that combines equipment systems into operational units with an emphasis on instruction for start-up, normal operation, abnormal/emergency operations, and shutdown of an entire process.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3		45

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss the importance of this course and how the material learned here will prepare the student for work "on-the-job", including the role and responsibilities of a Process Technician.
2. Recall the key concepts from PT I and II, Equipment and Systems and understand how they build into an Operating Unit.
3. Discuss the importance of Equipment maintenance.
4. Use drawings and operating manual to learn about the basic elements of a specific operating unit.
5. Describe the conditions and activities related to the initial start-up or commissioning of the unit.
6. Describe the conditions and activities related to the Normal Operation of the unit.
7. Describe the conditions and activities related to the Abnormal Operation or Emergencies in the unit.
8. Describe the conditions and activities related to the Normal shutdowns of the unit.

Chemical/Refining Process Technician Skill Standards

1. Control Separation Systems

1.1 Monitor and regulate distillation system

- 1.1.1 Production rates meet desired production level per company specifications.
- 1.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 1.1.3 Product/process meets established process specifications.
- 1.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

VALIDATION COPY

1.1.8 Process variables meet product and equipment parameters

1.2 Monitor and regulate stripping system

1.2.1 Production rates meet desired production level per company specifications.

1.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.

1.2.3 Product/process meets established process specifications.

1.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

1.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.

1.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.

1.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

1.2.8 Process variables meet product and equipment parameters

1.3 Monitor and regulate filtration system

1.3.1 Production rates meet desired production level per company specifications.

1.3.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.

1.3.3 Product/process meets established process specifications.

1.3.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

1.3.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.

1.3.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.

1.3.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

1.3.8 Process variables meet product and equipment parameters

1.4 Monitor and regulate absorption system

1.4.1 Production rates meet desired production level per company specifications.

1.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.

1.4.3 Product/process meets established process specifications.

1.4.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.

1.4.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.

1.4.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.

1.4.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.

1.4.8 Process variables meet product and equipment parameters

1.5 Monitor and regulate adsorption system

1.5.1 Production rates meet desired production level per company specifications.

1.5.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.

1.5.3 Product/process meets established process specifications.

VALIDATION COPY

- 1.5.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.5.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.5.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.5.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.5.8 Process variables meet product and equipment parameters

1.6 Monitor and regulate extraction system

- 1.6.1 Production rates meet desired production level per company specifications.
- 1.6.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 1.6.3 Product/process meets established process specifications.
- 1.6.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.6.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.6.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.6.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.6.8 Process variables meet product and equipment parameters

1.7 Monitor and regulate dehydration system

- 1.7.1 Production rates meet desired production level per company specifications.
- 1.7.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 1.7.3 Product/process meets established process specifications.
- 1.7.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.7.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.7.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.7.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.7.8 Process variables meet product and equipment parameters

7. Control Chemical Materials Handling and Storage

7.1 Receive chemical materials

- 7.1.1 Material composition is verified according to company specifications.
- 7.1.2 Material quantity is verified according to company specifications.
- 7.1.3 Materials are unloaded according to governmental regulation, company policies, and safe work practices.

VALIDATION COPY

7.2 Store chemical materials

- 7.2.1 Material quantity and quality are maintained according to company parameters
- 7.2.2 Materials are labeled per governmental regulations and company policies.

7.3 Transfer chemical materials

- 7.3.1 Specified quantity/quality of materials are transferred to process units, storage, and/or externally per government regulations, company policies, and safe work practices.
- 7.3.2 Materials are transferred to the specified destination according to company distribution schedule.
- 7.3.3 Internal and external material transfers are coordinated according to company policies and procedures.

VALIDATION COPY

Course Number and Name: PPT 2723 Process Instrumentation II

Classification: Technical Certificate Core

Description: This course is a clinical practice and instruction in a clinical affiliate. Areas included are patient care and management, radiation protection, operation of equipment, and radiologic procedures.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Recall the types of instrumentation used in the petrochemical and refining industry to monitor and control the process.
2. Given a drawing, picture or actual device, identify and describe pressure regulators.
3. Define the function of a switch.
4. Explain how relays are used in the process industry.
5. Explain the purpose of annunciator systems.
6. Review the purpose and operation of transmitters.
7. Identify and describe types of control schemes.
8. Explain the purpose of digital control.
9. Define terms associated with Programmable Logic Control (PLC):
10. Explain the purpose of a DCS
11. Define terms associated with instrumentation power supply:
12. Define the terms associated with emergency shutdown systems, interlocks and alarms.
13. Describe the failure modes.
14. Explain how a control loop will respond to typical malfunctions

VALIDATION COPY

Course Number and Name: PPT 2323 Process Troubleshooting

Classification: Technical Certificate Core

Description: A course to apply knowledge of process variables, indicators and controllers, troubleshooting tools, and troubleshooting steps to solve problems in a simple process system

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3		45

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify and describe the methods and tools of troubleshooting process systems.
 - a. Identify and define the process variables to include naming an example of each variable, identifying the relationships between variables, and explain the meaning of the measured value of each variable.
 - b. Identify and describe the function of instruments in operating and controlling a chemical process including indicators and controllers.
 - c. Identify and define the troubleshooting tools and explain their use.
 - d. Identify and define the troubleshooting steps and explain their use.
 - e. Identify, verify, and analyze data on a process to draw conclusions and answer questions about the status of the process and the cause or causes.
2. Apply the troubleshooting steps and tools to solve simulated problems.
 - a. Troubleshoot simple separation systems.
 - b. Troubleshoot reaction systems.
 - c. Troubleshoot steam generation systems.
 - d. Troubleshoot distillation systems.
 - e. Troubleshoot absorption and stripping systems.

Chemical/Refining Process Technician Skill Standards

1. Control Separation Systems

1.8 Monitor and regulate decanting system

- 1.8.1 Production rates meet desired production level per company specifications.
- 1.8.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 1.8.3 Product/process meets established process specifications.
- 1.8.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.8.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.8.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.8.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.8.8 Process variables meet product and equipment parameters

VALIDATION COPY

Control Reaction Systems

3.1 Monitor and regulate continuous reaction system

- 3.1.1 Chemical reaction rates meet desired production level per company specifications.
- 3.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 3.1.3 Product/process meets established process specifications.
- 3.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 3.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 3.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 3.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 3.1.8 Process variables meet product and equipment parameters.

3.2 Monitor and regulate batch reaction system

- 3.2.1 Chemical reaction rates meet desired production level per company specifications.
- 3.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 3.2.3 Product/process meets established process specifications.
- 3.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 3.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 3.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 3.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 3.2.8 Process variables meet product and equipment parameters.

8. Troubleshoot Process Abnormalities and Equipment Malfunctions

8.1 Diagnose abnormality or malfunction

- 8.1.1 Abnormal condition is recognized
- 8.1.2 Process is stabilized as specified by company policies and procedures
- 8.1.3 Relevant data is collected according to data points used to determine the condition of the process or equipment under normal operators.
- 8.1.4 Relevant data is analyzed according to data point comparison that determines deviation from normal operating conditions.
- 8.1.5 Cause of malfunction or abnormality is identified.

8.2 Remedy equipment/process malfunction

- 8.2.1 Plan of action to remedy equipment malfunction or process abnormality is determined according to company procedures.
- 8.2.2 Plan of action to remedy equipment malfunction or process abnormality is implemented as per company procedures.
- 8.2.3 Equipment or process is verified to be within acceptable operational parameters according to company procedures.

TECHNICAL ELECTIVES

Course Number and Name: **PPT 2733** **Emerging Energy Technologies**

Classification: Technical Elective

Description: The purpose of this course is to introduce students to the latest technologies and possibilities in the world of energy. This is a fast paced, ever-changing industry and it will be helpful to them to know of the opportunities available to them in alternative energy as well as, the technologies that are keeping fossil fuels as viable choices.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3		45

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss the history of the United States energy industry.
2. Explain the conventional electric power generation systems and process (coal, gas, hydroelectric, and nuclear).
3. Identify various fuel sources and the cost/efficiency/environmental issues associated with each:
 - a. Oil
 - b. Coal
 - c. Natural gas
 - d. Uranium
4. Discuss emerging and alternative technologies, advantages and disadvantages for each of the following:
 - a. Solar energy
 - b. Wind energy
 - c. Geothermal
 - d. Ocean wave energy
 - e. Biomass energy
5. Explain the fundamental concepts of natural gas.
6. Explain the fundamental concepts of SmartGrid and Time of Use technologies.
7. Discuss key energy regulatory topics such as cap and trade, efficiency, cost, etc.

VALIDATION COPY

Course Number and Name: PPT 2113 Oil and Gas Production I

Classification: Technical Elective

Description: This course includes an overview of the petroleum industry including exploration and geology, well drilling, wellhead operations, and product distribution. Emphasis is placed on oil and gas production.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3		45

National Assessment:

Prerequisite: Instructor approved

Student Learning Outcomes:

1. Describe the process of oil exploration and associated geological principles.
 - a. Discuss the basic concepts of geology related to oil and gas exploration and production (reservoirs, fluid flow, and pressure).
 - b. Discuss the basic concepts of oil and gas exploration including geographic and geophysical surveys, data sources, reservoir development tools, resource ownership, and so forth.
2. Describe the oil and gas drilling process and wellhead development procedures, such as well construction, well completion, and well work-over and servicing.
3. Describe wellhead operations and production.
 - a. Identify and describe the functions of the major components of a wellhead.
 - b. Compare and contrast the differences in wellhead construction for onshore and offshore facilities.
 - c. Identify and discuss safety, health, and environmental factors associated with wellhead production.
 - d. Describe the activities associated with monitoring and regulating the wellhead, including typical malfunctions, and maintenance activities.
4. Describe the separation and treatment of emulsions.
 - a. Describe the process and equipment used to separate and treat the emulsion and the products obtained from the separation.
 - b. Compare and contrast emulsion separation and treatment processes in onshore and offshore facilities.

VALIDATION COPY

Course Number and Name: PPT 2123 Oil and Gas Production II

Classification: Technical Elective

Description: This course includes a continuation of Oil and Gas Production I with emphasis on oil and natural gas production and processing.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3		45

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Provide an overview of the role and importance of gas in the oil and gas industry.
2. Explain the importance of Gas Dehydration
3. Explain the formation of hydrates and how hydrates affect natural gas.
4. Discuss the importance of Gas Compression
5. Discuss the purpose of produced water treatment systems.
6. Discuss the Auxiliary Systems associated with production.
7. Explain the purpose of artificial lift and enhanced recovery techniques.
8. Identify the early methods used to transport crude oil, natural gas and petroleum products.
9. Discuss the Federal, state and regional environmental regulations that govern oil and gas production operations.
10. Discuss the safety regulations dealing with oil and gas production.

Chemical/Refining Process Technician Skill Standards

1. Control Separation Systems

1.7 Monitor and regulate dehydration system

- 1.7.1 Production rates meet desired production level per company specifications.
- 1.7.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.
- 1.7.3 Product/process meets established process specifications.
- 1.7.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.
- 1.7.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.
- 1.7.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.
- 1.7.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.
- 1.7.8 Process variables meet product and equipment parameters

VALIDATION COPY

Course Number and Name: PPT 291(1-5) Special Projects in Process Operations Technology

Classification: Technical Elective

Description: A course designed to provide the student with practical application of skills and knowledge gained in other vocational–technical courses. The instructor works closely with the student to ensure that the selection of a project will enhance the student’s learning experience.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1		2	30
2		4	60
3		6	90
4		8	120
5		10	150

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply technical skills needed to be a viable member of the workforce.
 - a. Prepare a description of technical skills to be developed in the supervised work experience.
 - b. Develop technical skills needed to be a viable member of the workforce.
2. Apply skills developed in other program area courses.
 - a. Perform skills developed in other program area courses.
3. Apply human relationship skills.
 - a. Use proactive human relationship skills in the supervised work experience.
4. Apply and practice positive work habits and responsibilities.
 - a. Perform assignments to develop work habits and responsibilities.
5. Work with the instructor and employer to develop written occupational objectives to be accomplished.
 - a. Perform written occupational objectives in the supervised work experience.
6. Assess accomplishment of objectives.
 - a. Prepare daily written assessment of accomplishment of objectives.
 - b. Present weekly written reports of activities performed and objectives accomplished to the instructor.
7. Utilize a set of written guidelines for the supervised work experience.
 - a. Develop and follow a set of written guidelines for the supervised work experience.

VALIDATION COPY

Course Number and Name: PPT 292(1-6) Supervised Work Experience in Process Operations Technology

Classification: Technical Elective

Description: A course that is a cooperative program between industry and education designed to integrate the student's technical studies with industrial experience. Variable credit is awarded on the basis of one semester hour per 45 industrial contact hours.

Hour Breakdown:

Semester Credit Hours	Lecture	Externship	Contact Hours
1		3	45
2		6	90
3		9	135
4		12	180
5		15	225
6		18	270

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Prepare a written agreement.
 - a. Compile a written training agreement in cooperation with the instructor and student that details a work schedule and specific tasks/skills to be mastered in the program.

2. Prepare a written report of activities.
 - a. Compile a daily log of activities and tasks.
 - b. Submit weekly reports to the instructor summarizing activities and tasks completed.
 - c. Submit a final report of activities and experiences.

3. Follow written guidelines for work experience programs.
 - a. Complete all required activities in the training agreement.
 - b. Adhere to all written and oral instructions for the supervised experience.

Recommended Tools and Equipment

CAPITALIZED ITEMS

1. Acrylic cooling tower—Actual working model (1 per program)
2. Distillation training tower (1 per program)
3. Pump demonstrator—working model (1 per program)
4. Distillation Training Unit (table size) (1 per program)
5. Chiller unit for distillation training unit (table size) (1 per program)
6. Static kettle reboiler and shell and tube reboiler (1 per program)
7. Static Vertical Thermosiphon Reboiler (1 per program)
8. Acrylic boiler—Actual working model (1 per program)
9. Crude oil desalter (1 per program)
10. FCCU (fluid catalytic cracker unit)—Working model (1 per program)
11. DTU-1 Working glass distillation training unit (1 per program)
12. Educational process trainer pressure, level, flow, temperature (1 per program)
13. pH skid for EPT (1 per program)
14. PVC valves, ball, check, gate, globe, safety (1 each per program)
15. Simulator software and site licenses (1 software per program with licenses for all lab computers)
16. Tool and toolbox (for process operation technicians)
17. Windows-compatible computers with standard accessories and Internet access (1 per student)
18. Integrated office software (word processing, spreadsheet, presentations, and database) (1 license per computer)
19. Laser printer
20. Color printer (inkjet or laser)

NON-CAPITALIZED ITEMS

1. Molecular model kits
2. Basic chemistry lab kit (beakers, flasks, tubing, hydrometers, thermometers, etc.)
3. pH meter
4. Hot plates
5. Bunsen burner

It is recommended that instructors have access to the following items:

1. 32-in. LCD monitor/television
2. VCR/DVD player
3. Smart board
4. Windows notebook computer
5. LCD projector
6. Digital camera
7. Optical scanner
8. Copy machine

CURRICULUM DEFINITIONS AND TERMS

Course Name – A common name that will be used by all community colleges in reporting students

Course Abbreviation – A common abbreviation that will be used by all community and junior colleges in reporting students

Classification – Courses may be classified as the following:

- a. Career Certificate Required Course – A required course for all students completing a career certificate.
- b. Technical Certificate Required Course – A required course for all students completing a technical certificate.
- c. Technical Elective – Elective courses that are available for colleges to offer to students.

Description – A short narrative that includes the major purpose(s) of the

Prerequisites – A listing of any courses that must be taken prior to or on enrollment in the course

Corequisites – A listing of courses that may be taken while enrolled in the course

Student Learning Outcomes – A listing of the student outcomes (major concepts and performances) that will enable students to demonstrate mastery of these competencies

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:

Additional competencies and objectives within the course related to topics not found in the state framework, including activities related to specific needs of industries in the community college district

Activities that develop a higher level of mastery on the existing competencies and suggested objectives

Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed or revised

Activities that include integration of academic and career–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary career–technical programs

Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas

Sequencing of the course within a program is left to the discretion of the local college. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors.

Programs that offer an Associate of Applied Science Degree must include all of the required Career Certificate courses, Technical Certificate courses **AND** a minimum of 15 semester hours of General Education Core Courses.

The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each community college specifies the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.

In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:

VALIDATION COPY

Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework.

Revising or extending the student learning outcomes

Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)