

Northern Oklahoma College
Engineering & Industrial Technology (070)
Options: Power Generation and Process Technology
June 2018 Academic Program Review

Description of the program's connection to the institutional mission and goals:

The mission of Northern Oklahoma College, the State's oldest community college, is a multi-campus, land-grant institution that provides high quality, accessible, and affordable educational opportunities and services which create life-changing experiences and develop students as effective learners and leaders within their communities in a connected, ever-changing world.

Northern Oklahoma College will be recognized as a model institution and leader in academic quality and cultural enrichment, promoting student success, collaborative learning, creative and forward thinking, and community responsiveness.

The core values of Northern Oklahoma College are that through personalized education we believe in providing individualized services leading our students to achieve their academic goals in a welcoming and safe environment, and we will provide support to students in and out of the classroom so that they receive a full college experience with diverse opportunities. Another core value is community and civic engagement, so we believe that educated citizens are necessary for a healthy, democratic society, and that free and open expression and an appreciation for diversity are cornerstones of higher education, and we believe in economic and environmental sustainability and the importance of enriching the intellectual, artistic, economic, and social resources of our communities. We at Northern Oklahoma College also believe in the inherent value of intellectual pursuit for both personal and professional growth, as well as the need to prepare students for the 21st century professions, and that a knowledge-centered institution is vital to a knowledge-based economy, and we measure our success against national models and standards of excellence.

The alignment of the Engineering and Industrial Technology Degree Program with the mission and core values is noted in the following section.

3.7.5 Process (Internal/External Review):

Previous Reviews and Actions from those reviews:

Analysis and Assessment (including quantitative and qualitative measures) noting key findings from internal or external reviews and including developments since the last review:

The last full program review occurred in 2013. The 2013 review noted the Process Technology program was one of only three such programs in the state and thus served a large region for student needs. Recommendations in the 2013 review included expanding industry participation in degree program and activities and incorporating additional lab equipment and instrumentation into multiple core courses.

Since the last formal review, the following program changes have been made:

- In 2015-2016, the advisory board made recommendations for adding classes with an environmental emphasis. An official degree option has not been added but students pursuing this career path have been directed to appropriate electives.
- In 2016-2017, PTEC 1113 and PTEC 1313 were opened to all students with PTEC 1113 offered as online course to allow students to determine if PTEC was a degree area they were interested in pursuing. A professional development class (PRVD 2321) was also added in the spring semester (now offered during both semesters), and students participated in the National Troubleshooting Competition for experiential learning.
- In 2017-2018, students again participated in the National Troubleshooting Competition, and one team participated in the National Competition. The director also reviewed the rotation of instructors, keeping adjuncts more consistent to allow for incorporation of current assignments.

Work is ongoing with an advisory board to add and modify classes as needed to meet industry needs. The division is also currently in the process of refining program assessment and collection of course assessment data. The previous collection of data on student performance on key outcomes was analyzed to identify gaps/overlaps in curriculum.

A. Centrality of the Program to the Institution’s Mission:

This program provides the access, foundation, and high-quality educational opportunities for students to pursue a career in process technology and power generation fields, which continue to be linked to the governor’s state ecosystem plan for promising areas of development. Higher rates of employability lead to life-changing experiences for students.

B. Vitality of the Program:

B.1. Program Objectives and Goals:

Students upon completion of the Engineering and Industrial Technology degree will be able to:

- Communicate technical information related to process technology
- Identify common equipment including the use of components and their characteristics
- Identify common process including function, type, and equipment
- Apply chemistry and physics concepts to identify and solve processing problems.

B.2 Quality Indicators (including Higher Learning Commission issues):

Process Technology	
Date	5/31/2018
Competency # and Description	1. Communicate technical information related to process technology
Course	PTEC 1113 – Intro to Process Technology PTEC 1124 – Process Troubleshooting PTEC 1313 – Safety, Health & Work Pract PTEC 2014- Process Tech I - Equipment PTEC 2024 – Industrial Instrumentation PTEC 2124 – Process Tech II - Systems PTEC 2243 – Principles of Quality

Activity	Final exams / projects for each of the following courses will be used for the assessment: PTEC 1113, PTEC 1124, PTEC 1313, PTEC 2014, PTEC 2024, PTEC 2124, PTEC 2243
Measurement	PTEC 1113 – Written Projects (2) PTEC 1124 – Final Exam PTEC 1313 – Final Exam (Specific Question, Question #17) PTEC 2014 – Final Exam PTEC 2024 – Final Exam PTEC 2124 – Final Exam (Specific Questions, related to technical information) PTEC 2243 – Final Exam
Evaluation Criteria	Overall goal at this point is 70% passing for each item.
2015-2016 Results	PTEC 1113 – Data not collected PTEC 1124 – 10 out of 12 - 83% passed PTEC 1313 – 16 out of 18 - 89% passed PTEC 2014 – 15 out of 17 - 88% passed PTEC 2024 – 17 out of 21 - 81% passed PTEC 2124 – 12 out of 13 - 92% passed PTEC 2243 – Data not collected
2016-2017 Results	PTEC 1113 – 27 out of 28 – 96% passed PTEC 1124 – 18 out of 18 – 100% passed PTEC 1313 – 16 out of 18 – 89% passed PTEC 2014 – 17 out of 21 – 81% passed PTEC 2024 – 21 out of 22 – 95% passed PTEC 2124 – 13 out of 17 – 76% passed PTEC 2243 – 16 out of 16 – 100% passed
2017-2018 Results	PTEC 1113 – 13 out of 10 – 77% passed PTEC 1124 – 18 out of 18 – 100% passed PTEC 1313 – 25 out of 19 – 76% passed PTEC 2014 – 17 out of 21 – 81% passed PTEC 2024 – 16 out of 20 – 80% passed PTEC 2124 – 8 out of 19 – 42% passed PTEC 2243 – 18 out of 20 – 90% passed
Summary of changes for 2017-2018	In the systems course, added emphasis was placed on communication of information relating to drawings, process information, and conveying/explaining information at the request of the Advisory Committee. This resulted in changes to the questions and depth of knowledge to prepare students for troubleshooting skills.
Recommendation for changes for 2018-2019	To incorporate more questions and assignments where students need to describe or present technical information related to processes.
Timeline for Review	Fall/spring data will be collected and reviewed in the spring and instructors from all campuses will determine needed adjustments.
Date	5/31/2018
Competency # and Description	2. Identify common equipment including the use of components and their characteristics
Course	PTEC 1113 – Intro to Process Technology PTEC 1124 – Process Troubleshooting PTEC 1313 – Safety, Health & Work Pract PTEC 2014- Process Tech I - Equipment PTEC 2024 – Industrial Instrumentation PTEC 2124 – Process Tech II – Systems
Activity	Exams will be used to assess in the following courses: PTEC 1113, PTEC 1124, PTEC 1313, PTEC 2014, PTEC 2024, PTEC 2124

Measurement	PTEC 1113 – Exam #3 specific to equipment PTEC 1124 – Final Exam PTEC 1313 – Final Exam PTEC 2014 – Final Exam PTEC 2024 – Final Exam PTEC 2124 – Final Exam (Specific question related to equipment)
Evaluation Criteria	Overall goal at this point is 70% passing for each item.
2015-2016 Results	PTEC 1113 – data not collected PTEC 1124 – 10 out of 12 – 83% passed PTEC 1313 – 15 out of 18 – 83% passed PTEC 2014 – 14 out of 17 – 82% passed PTEC 2024 – 17 out of 21 – 81% passed PTEC 2124 – 12 out of 13 – 92% passed
2016-2017 Results	PTEC 1113 – 18 out of 18 – 100% passed PTEC 1124 – 13 out of 17 – 76% passed PTEC 1313 – 21 out of 21 – 100% passed PTEC 2014 – 21 out of 22 – 95% passed PTEC 2024 – 16 out of 21 – 76% passed PTEC 2124 – 13 out of 17 – 76% passed
2017-2018 Results	PTEC 1113 – 11 out of 13 – 84% passed PTEC 1124 – 16 out of 18 – 88% passed PTEC 1313 – 22 out of 25 – 88% passed PTEC 2014 – 17 out of 21 – 81% passed PTEC 2024 – 16 out of 20 – 80% passed PTEC 2124 – 12 out of 19 – 83% passed
Summary of changes for 2017-2018	Minor changes to tools used for evaluation.
Recommendation for changes for 2018-2019	No changes.
Timeline for Review	Fall/spring data will be collected and reviewed in the spring and instructors from all campuses will determine needed adjustments.
Date	5/31/2018
Competency # and Description	3. Identify common process including function, type, and equipment
Course	PTEC 1113 – Intro to Process Technology PTEC 1124 – Process Troubleshooting PTEC 2014- Process Tech I - Equipment PTEC 2124 – Process Tech II – Systems PTEC 2214 – Process Tech III – Operations
Activity	Final exams will be used to assess in the following courses: PTEC 1113, PTEC 1124, PTEC 2014, PTEC 2124, PTEC 2214
Measurement	Final exams will be used as the measurement in the following classes: PTEC 1113, PTEC 1124, PTEC 2014, PTEC 2124, PTEC 2214
Evaluation Criteria	Overall goal at this point is 70% passing for each item.
2015-2016 Results	PTEC 1113 – no data collected PTEC 1124 – 7 out of 12 – 58% passed PTEC 2014 – 14 out of 17 – 82% passed PTEC 2124 – 12 out of 13 – 92% passed PTEC 2214 – no data collected

2016-2017 Results	PTEC 1113 – 18 out of 18 – 100% passed PTEC 1124 – 14 out of 18 – 83% passed PTEC 2014 – 13 out of 17 – 76% passed PTEC 2124 – 13 out of 17 – 76% passed PTEC 2214 – 17 out of 18 – 94% passed
2017-2018 Results	PTEC 1113 – 12 out of 13 – 92% passed PTEC 1124 – 16 out of 18 – 89% passed PTEC 2014 – 17 out of 21 – 81% passed PTEC 2124 – 10 out of 19 – 52% passed PTEC 2214 – 18 out of 18 – 100% passed
Summary of changes for 2017-2018	In the systems course added emphasis was placed on linking equipment to systems. This resulted in changes to the questions and depth of knowledge to prepare students for troubleshooting skills.
Recommendation for changes for 2018-2019	Provide more field opportunities to allow for field identification of equipment.
Timeline for Review	Fall/spring data will be collected and reviewed in the spring and instructors from all campuses will determine needed adjustments.
Date	5/31/2018
Competency # and Description	4. Apply chemistry and physics concepts to identify and solve processing problems
Course	PTEC 1113 – Intro to Process Technology PTEC 1124 – Process Troubleshooting PTEC 2014- Process Tech I - Equipment PTEC 2124 – Process Tech II – Systems CHEM 2014 – Process Organic Chem
Activity	Final exams will be the activity in each of the following: PTEC 1113, PTEC 1124, PTEC 2014, PTEC 2124, CHEM 2014 – Final Exam
Measurement	Questions embedded in final exams will measure the competencies in the following: PTEC 1113, PTEC 1124, PTEC 2014, PTEC 2124, CHEM 2014
Evaluation Criteria	Overall goal at this point is 70% passing for each item.
2015-2016 Results	PTEC 1113 – no data collected PTEC 1124 – 9 out of 12 – 75% passed PTEC 2014 – 15 out of 17 – 88% passed PTEC 2124 – 12 out of 13 – 92% passed CHEM 2014 – no data collected
2016-2017 Results	PTEC 1113 – 18 out of 18 – 100% passed PTEC 1124 – 15 out of 18 – 88% passed PTEC 2014 – 21 out of 21 – 100% passed PTEC 2124 – 10 out of 19 – 52% passed CHEM 2014 – 12 out of 17 – 71% passed
2017-2018 Results	PTEC 1113 – 12 out of 13 – 92% passed PTEC 1124 – 16 out of 18 – 88% passed PTEC 2014 – 17 out of 21 – 81% passed PTEC 2124 – 13 out of 17 – 76% passed CHEM 2014 – 12 out of 17 – 71% passed
Summary of changes for 2017-2018	No changes.
Recommendation for changes for 2018-2019	Incorporate information to allow the integration of these concepts for troubleshooting and electrical applications.

Timeline for Review	Fall/spring data will be collected and reviewed in the spring and instructors from all campuses will determine needed adjustments.
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B.3 Minimum Productivity Indicators:

Time Frame (e.g.: 5 year span)	Head Count/Graduates				
	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Process Technology	96/15	90/31	80/15	60/13	58/20

B.4 Other Quantitative Measures:

a. Number of courses taught exclusively for the major program for each of the last five years and the size of classes:

Course Number	Course Name	Sections/Average Size of Class				
		2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
CHEM 2014	Process Organic Chemistry	1/22	1/23	1/11	1/19	1/17
PTEC 1113	Intro to Process Technology	1/32	1/22	1/25	2/17	2/16.5
PTEC 1313	Safety, Health & Work Pract	1/29	1/30	1/18	1/21	1/25
PTEC 2014	Process Tech I-Equipment	1/28	1/17	1/17	1/21	1/21
PTEC 2024	Industrial Instrumentation	1/30	1/22	1/22	1/22	1/21
PTEC 2124	Process Tech II-Systems	1/14	1/31	1/16	1/18	1/20
PTEC 2214	Process Tech III-Operations	1/14	1/26	1/12	1/19	1/18
PTEC 1124	Process Troubleshooting	1/12	1/26	1/12	1/19	1/18
PTEC 2243	Principles of Quality	1/17	1/26	1/13	1/17	1/20
PRDV 2321	Prof Dev	2/7.3	1/25	1/19	2/13	2/14

b. Student credit hours by level generated in all major courses that make up the degree program for five years:

Course Number	Course Name	Hours generated				
		2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
CHEM 2014	Process Organic Chemistry	88	92	44	76	68
PTEC 1113	Intro to Process Technology	96	66	75	102	99
PTEC 1313	Safety, Health & Work Practice	87	90	54	63	75

PTEC 2014	Process Tech I-Equipment	84	68	68	84	84
PTEC 2024	Industrial Instrumentation	120	88	88	88	84
PTEC 2124	Process Tech II-Systems	56	124	64	72	80
PTEC 2214	Process Tech III-Operations	59	104	48	76	72
PTEC 1124	Process Troubleshooting	48	104	48	76	72
PTEC 2243	Principles of Quality	54	78	39	51	60
PRDV 2321	Professional Dev	20	25	19	26	28
TOTAL		712	839	547	714	722

c. Direct instructional costs for the program for the review period:

The average program cost for the degree for a 3-credit hour program course (including salary and fringe benefits) is \$6546. Courses taught by adjuncts are paid at a slightly higher rate than other programs with support from an industry grant. 3-credit courses are paid at \$3,000. The Program Director has release time to run the program, so 18 credit hours per year are covered with a full-time instructor; the other courses are covered by adjunct faculty. The computer course required for the program is taught by full-time business faculty.

8 courses in 5-year period were 1-credit hours—8 credit hours

17 courses in 5-year period were 3-credit hours—51 credit hours

30 courses in 5-year period were 4-credit hours—150 credit hours

Total credit hours—209

90 credit hours taught by fte at a cost of **\$196,380**

119 credit hours taught by adjuncts at a cost of **\$119,000**

Total instructional cost: **\$315,380**

d. The number of credits and credit hours generated in the program that support the general education component and other major programs including certificates:

Course Number	Course Name	Hours generated				
		2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
CS 1113	Computer Concepts	3636	3021	2559	1914	1518
BSAD 1113	Digital/Financial Literacy	0	441	963	1203	1548
TOTAL		3636	3462	3522	3117	3066

e. A roster of faculty members, faculty credentials and faculty credential institution(s). Also include the number of full time equivalent faculty in the specialized courses within the curriculum:

Faculty	Credential	Institution that granted degree
Full-time Faculty:		
Churchill, Richard (computer courses)	M.S. in Computer Science	Oklahoma State University
Cnossen, Jack (Chemistry)	Ph.D. in Chemical Engineering	Worcester Polytechnic Institute
Harmon, Jill (CS 1113)	M.Ed. In Adult Ed + Business hrs.	

Haywood, Scott (PRDV)	M.A. in Communication Arts	Northeastern State University
Marshall, Laura (CS 1113)	M.Ed. In Adult Ed + Business hrs.	University of Central Oklahoma
Wood-Black, Frankie (PTEC, pre-Engineering)	Ph.D. in Physics	Oklahoma State University
Adjunct Faculty:	PTEC Program	
Connelly, Blake	B.S. in Fire Protection/Safety Tech	Oklahoma State University
Goddard, Mark	A.A.S. in Process Technology	Northern Oklahoma College
Land, David	B.S. in Physics	Oklahoma Baptist University
Smith, Josh	A.A.S. in Engineering Technology	Northern Oklahoma College

f. If available, information about employment or advanced studies of graduates of the program over the past five years:

Based upon information from students, 100% of students have interviewed for permanent positions. Since the adoption of the application program, approximately 85% have found work within the applicable field prior to or upon graduation.

g. If available, information about the success of students from this program who have transferred to another institution:

Not applicable—terminal degree

B.5 Duplication and Demand:

In cases where program titles imply duplication, programs should be carefully compared to determine the extent of the duplication and the extent to which that duplication is unnecessary. An assessment of the demand for a program takes into account the aspirations and expectations of students, faculty, administration, and the various publics served by the program. Demand reflects the desire of people for what the program has to offer and the needs of individuals and society to be served by the program.

B.5. Duplication and Demand Issues:

Address Duplication:

NA

Address Demand:

NA

B.5.a. Detail demand from students, taking into account the profiles of applicants, enrollment, completion data, and occupational data:

A new selective application for the program was added in 2015-2016. The program currently takes about 2/3 of the applicants and advisors are directing other students without the necessary background for likely success into different majors.

17 applicants for 24 slots in the 2015-2016 year (Note this year also had students grandfathered into the program.)
 43 applicants for 24 slots in the 2016-2017 year
 37 applicants for 24 slots in the 2017-2018 year
 35 applicants for 24 slots in the 2018-2019 year (Current pool)

B.5.b. Detail demand for students produced by the program, taking into account employer demands, demands for skills of graduates, and job placement data:

2016-2025 OK labor market projections for this field:
Petroleum Pump Systems Operators, Refinery Operators – Experience or Associates
 Median Salary - \$32.77/hr.
 Growth of Transportation and Distribution Ecosystem – 20.2%; 10 Year change in jobs - +205

B.5.c. Detail demand for services or intellectual property of the program, including demands in the form of grants, contracts, or consulting:

Not applicable

B.5.d. Detail indirect demands in the form of faculty and student contributions to the cultural life and well-being of the community:

Students are placed primarily in local industries.

B.5.e. The process of program review should address meeting demands for the program through alternative forms of delivery. Detail how the program has met these demands:

Due to the hands-on nature of the coursework, online delivery is not available. During the 2016-2017 year, an online Intro. to PTEC course was added to help students identify whether or not this program suited their needs. While there has been a slight drop in applications since this offering, applicants are more in line with the program. The Intro. to PTEC and the Health, Safety and Environment courses are now open to all students to help identify career goals.

B.6 Effective Use of Resources:

Northern’s Information Technology department has provided needed resources for the successful maintenance of the Engineering and Industrial Technology program through ITV studios maintained for general education and other program courses as well. In addition, Quality Matters and Blackboard Training has been provided for distance education courses but also for all faculty who use the internet for web-enhanced courses; therefore, the costs have not been exclusive to any one program.

*Low Producing Program Reviews follow a different format and template.

Institutional Program Recommendations:

Recommendations	Implementation Plan	Target Date
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<ul style="list-style-type: none"> • Schedule PTEC advisory meetings more frequently for recognition as a National PTEC program. • Include representatives from Wind Energy companies on PTEC advisory board. • Explore the possibilities of offering pipeline and electrical courses. 	Annual Review	2018
<ul style="list-style-type: none"> • Provide more field opportunities for students in the Introduction to PTEC and System courses. • Work with advisory group to realign some program questions to address turbines, electrical energy and pipeline considerations. • Provide more opportunities to develop trouble shooting skills and hands-on applications. 	Annual Review	2019

Summary of Recommendations:

	Department	School/College	Institutional
Possible Recommendations:			
Maintain program at current level	An admission application was added to ensure higher quality of applicants. Currently, the recommendation is to maintain program size.		