University of Anbar
College of Engineering
Chemical & Petrochemical Engineering

جامعة الانبار
كلية الهندسة
قسم الهندسة الكيميائية والبتروكيميائية

تقرير التقييم الذاتي

قسم الهندسة الكيميائية والبتروكيميائية

للعام ٢٠١٩-٢٠٢٠

د. عمر مصطفى حسين

رئيس قسم الهندسة الكيميائية والبتروكيميائية

College of Engineering
Academic Accreditation Committee

UNIVERSITY OF ANBAR

Self-Assessment Report

Bachelor of Chemical & Petrochemical Engineering- University Of Anbar

2021

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Table of Contents

Chapter 1 Introduction

1.1. University of Anbar

University of Anbar was established as a state University in 1987. The University includes 19 colleges which covers wide range of knowledge such as Arts, Business Administration, Education, Engineering, Law, Medicine, Islamic Studies and Science.

University of Anbar first had started the college of engineering in 1987. Civil engineering and mechanical engineering were the first two established departments. Realizing the importance of Industrial development of the province of Anbar, the Department of Chemical &petrochemical Engineering was established in 2012.

The Department currently employs highly qualified and experienced faculty members to teach fundamental courses in a pleasant environment. Students have access to laboratories to learn and apply fundamental Chemical&petrochemical Engineering Principles. The laboratories include Heat Transfer, Chemistry Lab, and Fluid Mechanics. A Library and computer lab are also available for the students.

This report is prepared for national accredition for the first time.

1.2 Options

The Chemical & Petrochemical Engineering Department offers a
Bachelor of Science in Chemical Engineering (BSChE) degree program.

1.3 **Modes Delivery Program**

The program is conducted through face to face learning as well as electronic learning.

1.4 Program locations

All program requirements are conducted within university of Anbar, ramadi.

1.5 Public Disclosure

PEO and GO are published at the website of university of Anbar, college of engineering: https://www.uoanbar.edu.iq/EngineeringCollege/English/index.php

1.6 Previous Evaluations and Actions

This the first time to attain accredit.

Chapter 2 Program Educational Objectives (Criterion- 1)

2.1. Introduction

This section deals with the features of the Program Educational Objectives (PEOs) prepared in accordance with the Iraqi Engineering Council Accreditation 2019. The PEOs for the Chemical & Petrochemical Engineering Program describe accomplishments that graduates are expected to attain within four to five years after graduation.

The PEOs of our undergraduate education program are in alignment with the Vision and the Mission of the University of Anbar.

2.1.1. Vision and Mission of University of Anbar

Vision and Mission statements are developed to serve as foundational guidelines for instituting PEOs. The Vision and Mission of University of Anbar are published on all important forums including the University Website, Departmental notice boards, chairperson / Incharge offices, latest prospectus, conference halls.

2.1.2. Vision

The University of Anbar is searching for a pioneering position in higher education and scientific research and developing the academic programs for achieving the sustaining development.

2.1.3. Mission

The university seeks to provide a distinct quality of education, teaching and scientific research via adopting strategies of analytical and critical thinking for rehabilitation of human resources in the levels of knowledge, thinking, and skills in a creative and competitive environment.

2.1.4. Vision and Mission of Chemical &Petrochemical Engineering Department

Vision Statement

To be a pioneer in education and research in the field of chemical & Petrochemical engineering

Mission Statement:

The Department of Chemical & Petrochemical Engineering seeks to give its students an outstanding education through an academically accredited program, to serve the community, contribute to the advancement of the profession of chemical engineer, and conduct innovative research.

2.1.5. Department Mission V/S University of Anbar Vision and Mission

From statements it is clear that Departmen's Mission statements are aligned with University Mission.

2.1.6. Program Education Objectives (PEOs)

Program Educational Objectives (PEOs) are the attributes and capabilities that the graduates are expected to exhibit within few years after graduation.

The BSc (Chemical & Petrochemical Engineering Program) will yield graduates, who can:

- PEO 1: Preparing and qualifying engineers in approved engineering disciplines.
- PEO 2: Contribute to support scientific production.
- PEO 3: Establishing cultural links with local and Arab universities.

These Program Educational Objectives and mission statements are published on the website of Chemical & Petrochemical Engineering Department University of Anbar.

The educational objectives of Chemical & Petrochemical Engineering program are in line with the Mission of the University and the Department.

2.1.7. Consistency of PEOs with the Program Mission

The established PEOs are consistent with the Mission of the Chemical& Petrochemical Engineering department. Some key phrases of the PEOs and Chemical & Petrochemical Engineering Program Mission are mapped in Table 2-1.

Table ٢-١ Mapping of PEOs with the Program Mission

	PEOs	Mission of department		
		outstanding education	serve the community	innovative research
1	Preparing and qualifying engineers	√	√	
2	scientific production	√		√
3	cultural links with local and Arab		√	

	universities			

2.2. Processes to Evaluate the Attainment of PEOs

Figure 2-1 explains PEOs assessment process and review method.

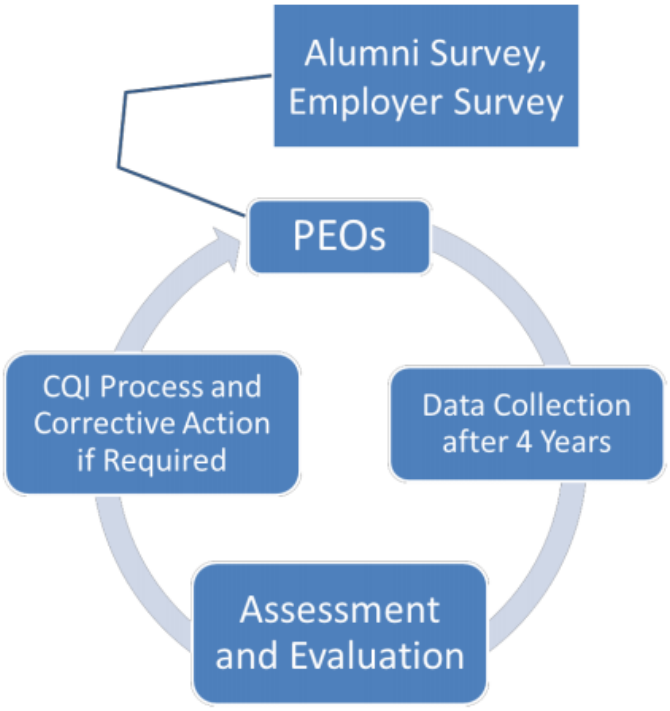

Fig. 2-1 PEO assessment

As a continuous process, the CHPE department seeks feedback from its constituencies, such as the senior exit students and faculty members, on the validity of its PEOs. Some tools were used in the assessment of the PEOs, as the following Table 2:

a. Senior exit student survey

b. Faculty survey.

Table 2 shows the achievement of BS.c Program's PEOs. Achievement of these PEOs has been estimated based on the end-of-semester program outcome achievements. An achievement of Good (***60%***) or more to be acceptable.

Table 2: BS.c Program's PEOs Level of Achievement

PEOs	Senior exit student survey		Faculty survey	
	No.	%	No.	%
Professional Presence	High	83	**High**	82
Workforce Skilled in Integrating Engineering, Design, and modern Technology	Average	59	**High**	76
Leadership in Research, Innovation and Design	High	82	**High**	77
Ethical Reasoning, Behaviour and Professionalism	Average	51	**Good**	69
Communication	High	75	**Good**	61
Personal Engagement	Good	60	**Good**	62

2.3 Program Constituencies

The CHPE program identifies its significant constituencies as its students, faculty, alumni, the engineering profession and prospective employers.

Chapter 3 Graduate outcomes (Criterion-2)

3.1. Program Learning Outcomes

The graduate attributes have been adopted as Program learning outcomes (PLOs) of Chemical & Petrochemical Engineering program and approved by department. The PLOs are publicized through college website.

Following is the list of Program Learning Outcomes (PLO) which graduates of Chemical& Petrochemical Engineering Program will attain during their stay in University of Anbar.

1. **Engineering Knowledge** :an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. **Design/Development of Solutions** : an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

3. **Communication** :an ability to communicate effectively with a range of audiences.

4. **Ethics**; an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

5**. Individual and Teamwork** :an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

6. **Investigation**: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7. **Modern Tool Usage**: an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The most benefit of defining PLOs is to ensure the achievement of PEOs.

3.2. Mapping of PLOs to PEOs

For the achievement of Program Educational Objectives, PLOs must be designed in a way that a relationship can be developed between PLOs and PEOs.

The PLOs of Chemical& Petrochemical Engineering Program are well-mapped with the PEOs as illustrated in Table3-1.

Table ٣-١ PLOs and PEOs Mapping

No.	**PLOs**	**PEO 1**	**PEO 2**	**PEO 3**
1.	Engineering Knowledge	√	√	
2.	Design/Development of Solutions	√		
3.	Communication			√
4.	Ethics		√	√
5.	Individual and Teamwork		√	
6.	Investigation	√		
7.	Modern Tool Usage	√		

3.3. Mapping of courses with PLOs

The courses are systematically designed to be mapped to the relevant PLOs, so that all PLOs are covered properly through the courses in the curriculum. The mappings of the courses with the PLOs are shown in Table 3-2.

Table 3-2 mappings of the courses with the PLOs

Semester	Course No.	Course Title	Engineering Knowledge	Design/Development of Solutions	Communication	Ethics	Individual and Teamwork	Investigation	Modern Tool Usage
1.	CHE1111	English Language (I)	√		√	√			
	CHE1112	Human Rights				√			
		Calculus (I)	√	√					
		Chemistry	√	√					
		Physics (I)	√	√					
		Computer Science	√	√					√

		Principles Of Chemical Engineering (I)	√	√				√	
2.	CHE1111	English Language (II)	√		√	√			
	CHE1112	Engineering workshops		√					
		Calculus (II)	√	√					
		Organic Chemistry	√	√					
		Physics (II)	√	√					
		Engineering drawing	√	√					
		Principles Of Chemical Engineering (II)	√	√				√	
3.	CHE1111	Democracy			√	√			
	CHE1112	Arabic language				√			
		Calculus (III)	√	√					
		Physical Chemistry	√	√					
		Mechanics	√	√					
		Fluid mechanics I	√	√					
4.	CHE1111	Engineering materials	√		√				
	CHE1112	thermodynamics	√	√					
		Calculus (IV)	√	√					
		Analytical Chemistry	√	√					
		Fluid (II)	√	√					
		Computer Science	√	√					√
		Industrial Chemical technology (I)	√	√				√	
	CHE1111	Mass transfer	√		√				
5.	CHE1111	Heat transfer I	√		√				
	CHE1112	Composite materials	√						
		Unit operation I	√	√					
		Reactor design I	√	√					
		Petrochemical industries I	√	√					

		Engineering statistic	√	√					
		Properties of petro-gas products	√	√				√	
6.	CHE1111	Heat transfer II	√		√				
	CHE1112	Water treatment	√						
		Petrochemical industries II	√	√					
		Unit operation II	√	√					
		Reactor design II	√	√					
		Engineering economics	√	√					
		Natural gas technology	√	√					
7.	CHE1111	Petrol engineering I	√		√				
	CHE1112	Process control	√	√					
		Equipments design	√	√					
		Transport phenomena	√	√					
		Pollution engineering	√	√					
		Project design I	√	√			√	√	
8.	CHE1111	Petrol engineering II	√		√				
	CHE1112	Industrial Safety				√			
		Corrosion engineering	√	√					
		Catalyst engineering	√	√					
		Modeling	√	√					
		Ethics	√	√					
		Project design II	√	√			√	√	
	Total		50	43	9	11	2	6	2

Chapter 4 Curriculum (Criterion-3)

4.1 Program structure and content

The B.Sc. Chemical & Petrochemical Engineering is a four-year degree program comprising of eight semesters. The total number of courses offered is 54 (inclusive of Design Project) with total 150 credit hours.

The curriculum of this program is clearly structured and is composed on the courses in following discipline:

1 Basic Sciences courses

2 Humanities courses

3 Management sciences courses

4 Interdisciplinary courses

5 Chemical Engineering courses

4.1.1. Study plan

The non-engineering courses has around 32% weight age while the remaining is for engineering courses.

The Engineering domain includes Engineering fundamentals, breadth and depth, and elective courses. A comprehensive Final Year Project is also part of the curriculum.

The Non -Engineering domain contains courses on communication, ethical and moral responsibilities, mathematics, physics, pure and applied chemistry and management sciences.

Table 4-1Summary of study plan

Domain	**Knowledge Area**	**Total Courses**	**Total Credits**	**% Overall**
Non-Engineering	Humanities	7	16	32%
	Management Sciences	2	5	
	Natural Sciences	7	24	

	Sub Total	16	45	
Engineering	Computing	4	9	68%
	Engineering Foundation	9	32	
	Major Based Core	12	41	
	Inter-Disciplinary Engineering	3	4	
	Senior Design Project	2	6	
	Industrial Training	0	0	
	Sub Total	30	93	
	Grand total	54	150	100

Table ٤-٢ Breakup of courses

Knowledge Area	**Subject area**	**S. No.**	**Course**	**Theory**	**Lab.**	**Cr. H**	**Tot. courses**	**Tot. crodets**	**% area**	**% overall**
Non-engineering										
Humanities	English	1	English-1	2	0	2	3	16	40 %	33 %
		2	English-2	2	0	2				
		3	English-3	2	0	2				
	Social Science	4	Human rights	2	0	2	2			
		5	Engineering Economics	2	0	2				
	Culture	6	rthics	2	0	2	1			
Natural	physics	7	physics	3	1	4	1	4	10	

Sciences									%	
	Mathematics	8	Mathematics-I	3	0	3	4	12	30 %	
		9	Mathematics-II	3	0	3				
		10	Mathematics-III	3	0	3				
		11	Mathematics-IV	3	0	3				
	Chemistry	12	Chemistry-I	3	1	4	2	8	20 %	
		13	Chemistry-II	3	1	4				
						Total	13	40	100 %	
Engineering Domain										
Computing	Fundamentals & Programming	14	Computer & Computation	2	1	3	1	3	4 %	67 %
Engineering Foundation	Engineering Foundation	15	Chemical engineering -I	4	0	4	9	33	49 %	
		16	Chemical engineering -II	4	0	4				
		17	Thermidynamics-I	4	0	4				
		18	Thermidynamics-II	4	0	4				
		19	Fluid Mechanics-I	3	1	4				
		20	Fluid Mechanics-II	3	1	4				

		21	Heat Transfer-I	3	1	4				
		22	Heat Transfer-II	3	1	4				
		23	Mass Transfer	3	0	3				
Major Based Core	Major Based Core (Bread Th)	24	Reactor design	3	0	3	5	12	17 %	
		25	Process control	2	1	3				
		26	Equipment design	2	0	2				
		27	Engineering materials	2	0	2				
		28	Chemical industries	2	0	2				
	Major Based Core (Depth)	29	Industrial safty	2	0	2	5	11	17 %	
		30	Transport phenomena	3	0	3				
		31	modeling	2	0	2				
		32	Numerical analysis	2	0	2				
		33	Water treatment	2	0	2				
Inter-disciplinary Engineeri		34	Engineering drawing	0	2	2	2	4	6 %	

n g Breadth										
		35	Worksh op practise	0	2	2				
Chemical Engineeri n g Project		36	Project design I	0	2	2	2	4	6 %	
			Project design II	0	2	2				
						Total	24	67	10 0 %	

4.3. Alignment with PEOs

The program educational objectives are what the program aspires its students to achieve within 4 years of graduation. While this cannot be directly measured by the institution, the program does map the program educational objectives to the student outcomes as discussed in Criterion 3(Table 3.2). The rationale is that if all course and student outcomes are achieved, graduates of the program are prepared for the program educational objectives. Table 4.2 provides a sample of courses that support the program educational objectives to help demonstrate this relationship.

Table 4.2. Relationship between program educational objectives, student outcomes, and sample courses in the program that meet both.

PEOs	**Student Outcome**	**Sample of Related Courses**
1. Preparing and qualifying engineers	1,2,4,5,7	Fluid flow, Equipment design, Reactor design
2. scientific production	2,3,5	Transport phenomena, project design
3. cultural links with local and Arab universities	4	Ethics, project design

4.1 4 Attainment of GOs

Each course is covered by sufficient numbers of CLO. Every course is linked with PLO through CLO and PLO mapping which is indicated in course profile. The Blooms taxonomy domains for all the CLOs are also defined in terms of affective, cognitive and psychomotor domain with respective learning level. Mapping of courses with PLOs is given in PEC Annexure-D.

4.1.5 Prerequisite Structure

NO.	Code	Course title	credits	Hours/ week			Perquisite
				Theo.	Prac.	Tut.	
1	CHME 101	Principle of chemical Eng. I	3	3	0	1	None
2	CHME 102	Organic chemistry	3	2	2	0	None
3	CHME 103	Work shop	1	0	3	0	
4	CHME104	Computer programing	2	1	2	0	
5	CHME105	Eng. Drawing & auto cad	2	1	3	0	
6	CHME 201	Principle of chemical Eng. II	2	2	0	1	CHME 101
7	CHME 202	Principle of chemical Eng. III	3	3	0	1	CHME 201
8	CHME 203	Fluid mechanics I	3	3	0	1	None
9	CHME 204	Physical chemistryI	3	2	2	0	None
10	CHME 205	Physical chemistryII	3	2	2	0	CHME 204
11	CHME 206	Engineering materials	3	2	2	0	None
12	CHME 207	Analytical chemistry	3	2	2	0	None
13	CHME 208	Fluid mechanics II	3	2	2	1	CHME 203
14	CHME 209	Properties of petroleum & natural gas	3	2	2	0	None
15	CHME 210	Chemical industries	2	2	0	0	None
16	CHME 301	Thermodynamics I	3	3	0	1	CHME 205
17	CHME 304	Mass transferI	2	2	0	1	None
18	CHME 305	Mass transferII	2	2	0	1	CHME 304
19	CHME 306	Thermodynamic II	3	2	2	1	CHME 301
20	CHME 307	petrochemical industries	2	2	0	0	None
21	CHME 308	Reactor design I	3	3	0	1	CHME 202
22	CHME 309	Heat transfer I	3	3	0	1	None
23	CHME 310	Reactor design II	3	3	0	1	CHME 308

24	**CHME 311**	**Heat transfer II**	**3**	**2**	**2**	**1**	**CHME 309**
25	**CHME 312**	**Environmental Eng.**	**2**	**2**	**0**	**0**	**None**
26	**CHME 313**	**Eng. Economy**	**2**	**2**	**0**	**1**	**None**
27	**CHME 401**	**Unit operations I**	**3**	**3**	**0**	**1**	**CHME 305**
28	**CHME 402**	**Unit operations II**	**3**	**2**	**2**	**1**	**CHME 401**
29	**CHME 403**	**Equipment design I**	**2**	**2**	**0**	**1**	**CHME 305 & CHME 311**
30	**CHME 404**	**Equipment design II**	**2**	**2**	**0**	**1**	**CHME 403**
31	**CHME 405**	**Process controlI**	**2**	**2**	**0**	**1**	**Eng 202**
32	**CHME 406**	**Process controlII**	**3**	**2**	**2**	**1**	**CHME 405**
33	**CHME 407**	**Petroleum refining Eng. I**	**3**	**3**	**0**	**1**	**None**
34	**CHME 408**	**Petroleum refining Eng. II**	**3**	**3**	**0**	**1**	**CHME 407**
35	**CHME 409**	**Industrial safety**	**2**	**2**	**0**	**0**	**None**
36	**CHME 410**	**Modeling and simulation for chemical Eng.**	**3**	**2**	**2**	**0**	**CHME 303& Eng 202**
37	**CHME411**	**Engineering project I**	**2**	**0**	**4**	**0**	**Level 3**
38	**CHME412**	**Engineering project II**	**2**	**0**	**4**	**0**	**CHME411**
			97	**78**	**40**	**22**	
				140			

4.1.5 Subject area requirements

Table 4.1 shows the requirements for the program.

4.1.6 Teaching and Learning Strategies

Teaching method is considered as most integral part of the teaching / lesson plan. At the start of semester, faculty members select an appropriate teaching method according to the learning level and desired outcomes. The teaching methods include presentations, lectures, videos, assignments, complex engineering problems.

The method may vary depending on nature of the subject and CLOs. The samples of the course profile for few courses are attached as Appendix.

4.3 Relating CLOs to GOs

This can be revealed as presented in course syllabus at appendix.

4.1.2. Semester Wise Distribution of Courses

course distribution is given in table 4-3 .

Table ٤-٣ Semester Wise Distribution for Chemical& Petrochemical Engineering Courses

المرحله الاولى

الفصل الاول

No.	Code	الماده الدراسيه	الاعتمادات	الساعه/الاسبوع		
				نظري	عملي	تمارين
1	UR101	اللغه الانكليزيه (١)	3	3	0	0
3	CR111	رياضيات(١)	3	3	0	1
4	UR104	حقوق الانسان	1	1	0	0
5	CR113	كيمياء عامه	3	3	0	0
6	CR114	فيزياء	3	3	0	0
7	CR115	مختبر فيزياء(١)	1	0	3	0
8	CR116	الحاسوب	3	2	3	1
9	UR103	مبادئ الهندسه الكيمياويه(١)	3	3	0	1
10	CR 117	مختبر كيمياء.	1	0	3	0
الكلي			**21**	**15**	**9**	**2**
				26		

المرحله الاولى(الفصل الثاني)

No.	Code	الماده	الاعتمادات	ساعه/الاسبوع		
				النظري	العملي	التمارين.
1	UR102	اللغه الانكليزيه(٢)	3	3	0	0
2	CR122	رياضيات (٢)	3	3	0	1

3	CR124	فيزياء(٢)	3	3	0	0
4	CR125	مختبر فيزياء (٢)	1	0	3	0
5	CR112	رسم هندسي	2	2	0	0
6	CHE123	كيمياء عضويه	3	2	2	0
7	CHE114	ورش هندسيه	1	0	3	0
8	CHE111	مبادئ الهندسه الكيمياويه(٢)	3	3	0	1
الكلي			**21**	**17**	**11**	**3**
				31		

المرحله الثانيه

الفصل الاول

No.	Code	الماده	الاعتمادات	ساعه/الاسبوع		
				النظري	العملي	التمارين
1	UR105	الديمقراطيه	1	1	0	0
2	CR121	رياضيات(٣)	2	1	2	0
3	CHE223	كيمياء فيزياويه	3	2	2	0
4	CHE124	مبادئ الهندسه الكيمياويه	3	3	0	1
5	CHE113	ميكانيك	2	2	0	1
6	CHE214	انتقال الموائع	3	3	0	1
7	CHE212	اللغه العربيه	3	3	0	0
الكلي			**21**	**19**	**4**	**5**
				28		

المرحله الثانيه الفصل الثاني

No.	Code	الماده	الاعتمادات	ساعه/الاسبوع		
				نظري	عملي	تمارين
1	CHE221	رياضيات	3	3	0	1

2	CHE221	المواد الهندسيه	3	2	2	1
3	CHE212	كيمياء تحليليه	3	2	2	0
4	CHE223	تكنلوجيا الصناعات الكيمياويه	2	2	0	1
5	CHE225	انتقال الموائع(٢)	3	2	2	1
6	CHE225	انتقال الكتله	3	3	0	1
7	CHE226	ديناميك الحراره	3	2	2	1
الكلي			**21**	**18**	**6**	**5**
				29		

لمرحله الثالثه

االفصل الاول

No.	Code	الماده	الاعتمادات	ساعه/الاسبوع		
				النظري	العملي.	التمارين
1	CHE311	انتقال الحراره	3	3	0	1
2	CHE312	هندسه مواد مركبه	3	3	0	0
3	CHE313	وحدات صناعيه(١)	3	3	0	0
4	CHE314	تصميم المفاعل(١)	3	3	0	1
5	CHE315	تكنلوجيا الصناعات البتروكيمياويه(١)	2	2	0	0
6	CR123	الاحصاء الهندسي	3	3	0	1
7	CR122	خواص المشتقات النفطيه والغاز	3	3	0	1
Total			**21**	**20**	**2**	**3**
				25		

المرحله الثالثه/الفصل الثاني

No.	Code	Course Title	Credits	Hours / Week		
				Theo.	Prac.	Tut.

1	CHE321	انتقال الحراره(٢)	3	2	2	1
2	CHE322	معالجه مياه	2	2	0	0
3	CHE323	تكنلوجيا الصناعات البتروكيمياويه(٢)	3	3	0	0
4	CHE324	وحدات صناعيه(٢)	4	3	3	1
5	CHE325	تصميم المفاعل(٢)	3	3	0	1
6	CHE326	الاقتصاد الهندسي	3	3	0	1
7	CHE327	تكنلوجيا الغاز الطبيعي	2	2	0	0
الكلي			**20**	**18**	**5**	**3**
				26		

المرحله الرابعه

الفصل الاول

No.	Code	الماده	الاعتمادات	ساعه/الاسبوع		
				.النظري	.العملي	.التمارين
1	CHE411	هندسه البترول(١)	3	3	0	1
2	CHE412	السيطره على العمليات	3	2	2	1
3	CHE413	تصميم المعدات	3	2	2	0
4	CHE414	ظواهر الانتقال	3	3	0	1
5	CR413	هندسه التلوث	2	2	0	0
6	CHE416	تصميم مشروع(١)	2	0	4	0
الكلي			**19**	**14**	**11**	**3**
				26		

المرحله الرابعه

الفصل الثاني

No.	Code	الماده	الاعتمادات	ساعه/الاسبوع

				النظري.	العملي.	تمارين.
1	CHE421	هندسه البترول(٢)	3	3	0	1
2	CHE422	سلامه الموقع	2	2	0	0
3	CHE423	هندسه التاكل	2	2	0	1
4	CHE424	تكنلوجيا العوامل المساعده	2	2	0	0
5	CHE425	النمذجه	3	2	3	0
6	CHE426	تصميم المشروع(٢)	3	0	6	0
7	UR106	المهارات الهندسيه والاخلاق	3	3	0	0
الكلي			**18**	**14**	**9**	**2**
				25		

Chapter 5 Continuous Improvement (Criterion-4)

5.1 Achievement of Graduate Outcomes

5.1.1 Assessment Processes

Data collection is the most important part of the continuous quality improvement process. The assessment processes include both direct and indirect measures of outcome achievement, and it is carried out throughout the semester in the form of evaluation of quizzes, assignments, presentations, class projects, mid-term exams and final exam at the end of each semester. This data is used for assessment of CLOs. Additional data in the form ofexit surveys, employers‟‟feedback, alumni feedback and other stakeholder‟‟s feedback is added to evaluate the attainment of PEOs after the completion of program of studies.

5.1.2 Frequency of Assessment Processes

The results of CLOs assessment for all the courses of the program when available after 4 years are used to evaluate the achievement of PLOs. However partial evaluation of achievement of PLOs can be made after every semester based upon courses conducted so far.

5.1.3 Expected level of attainment

Direct assessments are employed in our assessment process to better evaluate (in comparison to indirect assessment methods) whether students graduating from the program have attained the Student Outcomes.

(1) An ability to apply knowledge of mathematics, science, and engineering

This is addressed in our program through the Student Outcomes. All mathematics, science and engineering courses must be passed with a grade of pass or better in order meet pre-requisite requirements and move forward in the curriculum.

(2) An ability to design and conduct experiments, as well as to analyze and interpret data

This is addressed in our program through Student Outcomes. To assess the extent to which our students have attained the ability to design and conduct experiments as well as to analyze and interpret data, we evaluate laboratory report and examination scores.

(3) An ability to design a system, component, or process to meet desired needs

This is addressed in our program through the Student Outcomes. To assess the extent to which our students have attained the ability to design a system, we evaluate performance on homework and projects in courses oriented toward design including (Design I, II), which is the capstone design course in the curriculum.

(4) An ability to function on multidisciplinary teams

This is addressed in our program through the Student Outcomes. To assess the extent to which students graduating from our program have attained these abilities, we evaluate individuals based on student work, student assessment of group members, and faculty observation.

(5) An ability to identify, formulate, and solve engineering problems

This is addressed in our program through the Student Outcomes. To assess the extent to which our students have attained the ability to identify, formulate and solve engineering problems, we evaluate performance on homework, examinations in courses oriented toward problem-solving.

(6) An understanding of professional and ethical responsibility

This is addressed in our program through the Student Outcome. To assess the extent to which students graduating from our program have attained an understanding of professional and ethical responsibility, we evaluate performance on homework, examinations in ethic courses.

(7) An ability to use the techniques, skills, and modern engineering tools

This is addressed in our program through Student Outcome. To assess the extent to which our students have attained this outcome, we evaluate performance on examinations, projects and lab reports focused on specific engineering techniques and tools.

5.1.4 Results of Evaluation and Analysis

Table 3: Average of Overall ABET Outcomes 2018 - 2019

The Average of Overall Outcomes (First Semester)							
ABET Outcomes	1	2	3	4	5	6	7
Level One	72.44	63.39	57.87	53.66	51.23	44.47	50.76
Level Two	67.66	59.55	69.64	51.09	55.34	60.69	47.84
Level Three	59.72	49.99	50.86	59.56	56.67	68.74	49.72
Level Four	61.62	51.52	58.65	60.47	73.54	48.86	45.62
Average	65.36	56.11	59.25	56.16	59.19	55.69	48.48
The Average of Overall Outcomes (Second Semester)							
Level One	59.27	44.58	47.45	51.32	53.45	48.54	50.46
Level Two	53.38	49.49	52.25	51.06	69.25	60.33	45.57
Level Three	43.53	57.14	77.15	53.44	57.58	55.35	47.45
Level Four	66.64	58.71	79.99	46.93	58.15	62.48	49.37
Average	55.70	52.48	64.21	50.69	59.61	56.61	48.21

5.1.5 Documentation

All electronic documents, Excel spreadsheets, and similar items related to assessing student outcomes as described in this section are stored in subfolder located in the departmental folder.

5.2 Actions for Continuous Improvement

5.2.1 Systematic data utilization

There are two distinct routes for identifying actions that will improve the program. In the first case, an individual instructor may choose to modify his/her course content based on experience, assessments of student learning, class performance on specific assignments, or data from the Direct Assessment Document for a course. Modifications of this type are

documented to the extent possible, including through the use of an optional Closing-the-Loop Document which instructors complete and upload to the appropriate subfolder in the departmental folder.

5.2.2 Re-assessment of Changes Results

Section 5.1 presented earlier describe the processes used for obtaining and evaluating direct and indirect outcome assessments.

Table example of Improvements made to the Program

Course	**Curricular or Program Change**	**Rationale for Change**	**Impact of Change**
ChE1	Added material on advanced processes in engineering	To increase student proficiency in not only conventional, but also advanced processes	Students are better prepared for future positions in graduate school
ChE2	Modified course delivery to be co-taught	To increase practice in core competency area	Provides time for feedback and increased enrollments.

Chapter 6 Students (Criterion-4)

6.1 Student Admission

Admissions are based on secondary school level. The process of admission is discussed below:

6.1.2 Admission Criteria

University of Anbar is a public sector University. All seats are allocated as per the Admission Policy as approved by the Syndicate of the University. The admissions are offered to Chemical & Petrochemical Engineering program on the basis of available seats.

6.1.3 Annual Intake

Maximum number of intake students in Chemical & Petrochemical Engineering program is 30-40. This pertains to theory class of one section.

Table ٥-١ Student Admissions

No.	Intake batch	Total student enrolled	No. of section(s)
1.	2018	37	1
2.	2019	33	1
3.	2020	31	1
4.	2021	44	1

6.1.4 Admission on Migration Basis

Admission on migration shall be allowed in relevant discipline under extra ordinary circumstances subject to availability of seat(s) is in relevant discipline. Applicant must have passed First Year of studies completely in the institution where he/she was initially admitted. Admissions are only offered in Second Year .

Student admitted on migration basis are given exemption in all such courses of First Year which he/she has passed during study in previous institution. However, he/she shall be required to register and pass all such courses of the discipline in which he/she is offered admission which he/she has not studied in previous institution.

6.2 Academic and Career Guidance to Students (Student Counseling)

A faculty members are assigned as the student advisors for the students. The students are encouraged to freely consult the advisor for academic and career counseling. Every faculty member of the university is required to engage in advising students as a shared responsibility to help them identify and pursue their academic goals, actively participate in extracurricular activities, and to take advantage of emerging career opportunities in their respective domains.

6.3 Students' Workload, Class Sizes and Completi**on of Courses**

6.3.1. Net Instructional Hours

A course credit hour defined as one contact hour per week (if a course is 3 credit hours, means 3 contact hours per week for 15 weeks). One laboratory credit hour shall be three hours of practical lab work per week for fifteen weeks.

6.3.2. Student Academic Load

The courses for each Semester along with their credit hours for theory and practical are notified in the prospectus. In Chemical& Petrochemical engineering program, 5-6 courses are offered in each semester of 14-19 credit hours.

6.3.3. Class Size

Theory classes consist of a single section. Maximum no. of students per workstation is 3.

6.3.4. Course Completion

A 3-credit theory course includes minimum 45 lectures in a semester. Instructors are required to submit a course teaching / lesson plan in first week of each semester, to the students.

6.3.5. Semester Academic Load

There are total of 8 semesters in the curriculum of chemical engineering program, around 6 courses per semester. Academic load in a semester is in the range of 15-19 credit hours.

6.3.6. Completion of Courses

Head of department ensures completion of courses as per schedule.

Chapter 7 Faculty (Criterion-6)

7.1. Academic Staff

Academic Staff includes local and foreign qualified PhDs, Masters and Bachelors in Chemical Engineering. One of the faculty is associated with local PhD program.

7.2. Strength and Competencies

The department has a wide range of experts in the area of Chemical Engineering. Department not only supports its academic staff to acquire higher education and skills but also motivate them to actively participate in research work.

7.2.1. Full Time Dedicated Faculty

There are ten full time dedicated faculty members working in Chemical & Petrochemical Engineering Department currently. Their details are given in the table below.

7.2.2. Shared Faculty

Chemical & Petrochemical Engineering Department appoints highly qualified faculty for non-engineering courses. Their details are given in [PEC-Annexure J].

7.2.3. Academic structure

The department has appropriate number of faculty members of various professional levels to run the program. There is no bar on the number of positions to encourage promotion of deserving candidates. The number of PhDs is 6. The number of MSc /Master of Engineering qualified faculty is 04.

7.2.4. Faculty Workload and Student-Teacher Ratio

Total enrolled students presently are 124. Full time dedicated engineering faculty is 10 along with 3 teaching associates having a student-teacher ratio of 12.4:1. Details of credit hours assigned to the faculty for the year 2020 is given below.

Faculty Workload

No.	Name	Degree	Last semester load			current semester load		
			Credit hours		Co. titles	Credit hours		Co. Titles
			TH	PR		TH	PR	
1.	Hamad khalifa	PhD	4	3	chemicstry	4	3	chemicstry
2.	Mustafa barzan	PhD	10	4	Heat,fluid	8	4	Heat,fluid

3.	Hamed ahmed	PhD	4	-	Chemical prin.	-	-	-
4.	Diyar ahmed	PhD	6	2	Thermo,static	8	2	Thermo,math
5.	Suha mohamd	PhD	8	-	Reactor,composit	9	-	Reactor,modeling
6.	Sufyan fadhil	PhD	14	-	Che.principle,phenomena,ch.industry	4	-	Ch. industry
7.	Omer mustafa	PhD	6	-	Equip.design,environment	6	1	Mass,water
8.	Khalid awad	MS	8	-	Math,statis	8	-	Math,economic
9.	Khalid hamed	MS	6	-	Chemistry,english	6	-	english
10.	Suha mehsdi	MS	6	6	Petro. Indus,computer	6	6	Petro inds, material
11.	Bdoor muhson	MS	6	-	Unit operation	6	-	Unit operation
12.	Yaser rajeb	MS	-	-	-	2	-	ethics

7.3. Outcome Based Education (OBE) Training

Some of the senior faculty members have got trainings on Outcome Based Education (OBE) system, its objectives, and the Outcome Based Assessment (OBA) at different workshops, seminars.

As a result, a faculty member now have sound understanding of PEOs, PLOs and CLOs as per OBE system. The trainings held for the OBE system online with support from university of Purdue,2021.

Chapter 8 Administrative Support (Criterion-7)

8.1 Leadership and Administrative Services

Dr. Omer Mustafa, has leadership and management responsibility for the Department including the undergraduate programs. In particular, Dr. Omer is responsible for assigning and managing faculty workload including service and teaching responsibilities, organization of the Committees.

8.2 Faculty support

8.2.1 Faculty recruitment

Requests for the hiring of new faculty are made in preceding the academic year of the search process. The chair makes requests to the Dean of the college, who then transmits requests to the university. Decisions on whether to approve hiring are made prior to the beginning of the academic year. Once approved, a departmental search committee is convened and develops an advertisement and recruitment strategy as well as hiring plan.

8.2.2 Faculty Retention and promotion

The Chemical Engineering faculty has been very stable. It is rare for a faculty member to leave the department, except through retirement. The strong retention rate seems to be the result of hiring faculty that are attracted to the small size, the emphasis on undergraduate teaching. The small size allows for close interactions and support among faculty, close contact between students and faculty, and a sense that the faculty have a strong input to the direction of the program.

8.2.3 Faculty development support

University supports faculty who are eligible to receive sabbatical leaves to conduct research, scholarly and creative activity, instructional improvement or faculty retraining. Any full-time faculty member, including lecturers, is eligible for a sabbatical leave if (s)he has served full-time for five years at the Academy. The sabbatical leaves may occur in either the fall or the spring semester at full-pay or at half-pay for both the fall and spring semester**.**

8.3 Technical & Administrative Staff Support

Currently, the Laboratory & Simulator Technician is the school's technical support. This person maintains and upgrades laboratory equipment, and purchases supplies for instructional laboratories.

8.3.1 Staff Size and Qualification

Table ٨-١ List of technical staff

Name	Qualification	Designation
Eng. Azalarab	BSc (Chemical eng.)	Lab Engineer
Eng. Osama ali	MSc (Che. Eng)	Lab engineer
Eng. Abo abaida al-rawi	BSc (petroleum eng.)	Lab engineer
Eng. Abdulla Ganim	BSc (Che. Eng)	Lab engineer

8.3.2 Staff Recruitment and Retention

the Department hires undergraduate student workers to aid in routine office related activities. This level of staffing is sufficient to meet program needs. Also, department offers opportunities to complete post graduate studies(MSc and PhD) for skilled engineers.

8.3.3 Staff Development and Promotion

Staff members receive training as needed or as requested. In some cases, such as when new software is rolled-out campus-wide, staff are required to attend training prior to using the new system. In other cases, staff members may request training through the Performance Management Process. In either situation, university staff with expertise in the appropriate area leads training. Training may occur through workshops or via online training programs.

Chapter 9 Financial support (Criterion-8)

9.1. General

Funds for University of Anbar are provided by Iraqi Government . Which cover salaries, maintenance, laboratories, library etc. Additional funds for development are provided as per Government priorities.

9.2. Financial Support to Faculty

University of Anbar is a public institution which provide faculty development program for higher education, skills development, on-job training, and miscellaneous development programs funded by government.

9.2.1. Faculty Pay and Allowances Packages

Faculty pay is in accordance with the financial ministry pay scale . All the allowances and benefits are offered as per Government rules. Details for pay scales are shown in Table9-1:

Table ٩-1University of Anbar pay scales for faculty and support staff

Designation	***Pay scale grade***
Professor	*1-2*
Ass. Professor	*3-4*
Lecturer	*4-5*
Ass. Lecturer	*6*
Lab engineer	*7*

9.3. Financial Resources

Adequate financial resources are available for maintenance of well-equipped laboratories, latest apparatus, computer facilities with support staff, and day to day support of the department.

Summary of financial resources and University Budget is provided in following Table 9-2.

Table ٨-٢ University of Anbar***Budget (millions of ID)***

No.	**Source of incom**	**Fiscal year 2020-2021**
1.	Recurring University Budget	100
2.	Department of Chemical &Petrochemical Engineering Recurring Budget	10
3.	University Development Budget	4
4.	Tuition Fees and Others	2
5.	Self-Finance	5

Chapter 10 Facilities (Criterion-9)

10.1 Introduction

The Chemical& Petrochemical Engineering Department has wide connectivity and access of Wi-Fi network. The department has the facilities and infrastructure to support new trends in learning. All conference rooms, laboratories and classrooms provide support for learning. The department has the following facilities exclusively dedicated to undergraduate students.

10.2. Teaching and Learning Facilities

10.2.1. Lecture Halls

The department of Chemical & Petrochemical Engineering has proper teaching and learning facilities which include classrooms, and well- equipped labs.

Table 10-1Class Room and Office Available

Item	Available
Classroom	4
Labs	3
Faculty office	2

10.2.2. Central Libraries

University of Anbar has one Central Library having more than one thousand Engineering books.

10.3. Laboratories and Workshops

There are a number of laboratories having all the necessary facilities and equipment to carryout experiment by the students.

laboratories and workshop in the Department of Chemical & Petrochemical Engineering is given below:

- Heat Transfer/Lab
- Fluid Mechanics Lab
- Computer Lab
- Chemical Thermodynamics Engineering Lab

- Applied Chemistry
- Workshop
- Drawing Lab.

Appendices

Appendix A: COURSE SYLLABI

1. *Course number and name:* CHE123 Principles of Chemical Engineering (I)
2. *Credits and contact hours*: 4 unit, 4 contact hour/week
3. *Instructor's or course coordinator's name:* Sufyan Fadhil
4. *Text book, title, author, and year:* David M. Himmelblau, James B. Reggs, "Basic Principles and Calculations in Chemical Engineering", Seven Edition, Prentice Hall, 2004.
5. *Specific course information;*
   a. *Brief description of the content of the course (catalog description)*
      Overall, this course will provide an introduction to the principles and calculation techniques used in the field of Chemical Engineering as well as provide an exposure of the various areas and facets of current Chemical Engineering research.
   b. *Prerequisites:* None
   c. *Required, elective, or selected elective (as per Table 5-1):* Required
6. *Specific goals for the course:*

a. Convert quantities/equations from one set of units to another.
b. Estimate process variables including fluid density, flow rates, chemical composition of mixtures (mass fractions, mole fractions, and concentrations), pressure, and temperature.
c. Write and solve material balance equations for single-unit and multiple-unit reactive/nonreactive processes.
d. Understand the significance of the recycle, bypass, and purge streams and solve material balance equations for processes that have such streams.

7. Brief list of topics to be covered:

a. Introduction, Dimensions, Units, and Their Conversion.
b. Choosing a Basis, Temperature, Pressure and Its Units
c. Introduction to Material Balances, Open and Closed Systems, Single component system
d. The Chemical Reaction Equation and Stoichiometry
e. Processes Involving a multi Reaction, recycle, bypass and purge

1. *Course number and name:* CHE124 Transport Phenomena
2. *Credits and contact hours*: 3 unit, 3 contact hour/week
3. *Instructor's or course coordinator's name:* Sufyan Fadhil
4. *Text book, title, author, and year:* Bird, Steweert, Lightfoot, "Transport phenomena", Ssecond Edition, 2002.
5. *Specific course information;*
   a. *Brief description of the content of the course (catalog description)*
      Introduction and basics concepts of transport phenomena, momentum balance, energy balance and mass balance.
   b. *Prerequisites:* None
   c. *Required, elective, or selected elective (as per Table 5-1):* elective
6. *Specific goals for the course:*
   a. The ability to apply chemical engineering methodology.
   b. The ability to apply fundamental engineering knowledge to interpret experimental results.
   c. The ability to choose and apply mathematical and numerical methods for solving transport phenomena problems
   d. The ability to use experimental results to gather information for engineering designs.

7. Brief list of topics to be covered:

a. Introduction of transport phenomena, Newton's law of viscosity, Molecular Theory of the viscosity of gases at low density

b. Shell momentum Balance and boundary conditions, Flow of a falling film, flow through a circular tube

c. Fourier's law of heat conduction, shell energy balance and boundary conditions

d. Fick's law of binary diffusion ,temperature and pressure dependence of diffusivities

1. *Course number and name:* CHE133 Fluid Mechanics-I
2. *Credits and contact hours*: 4 unit, 4 contact hour/week
3. *Instructor's or course coordinator's name:* Mustafa B. Al-hadeethi
4. *Text book, title, author, and year:* Fundamentals of fluid mechanics by Dr. Mustafa B. Al-hadithi.
5. *Specific course information;*
   a. *Brief description of the content of the course (catalog description)*
      This course cover all major aspects of fluid mechanics , including fundamental concepts in fluid mechanics, pressure distribution in fluids, hydrostatic forces on plane and curved surfaces, manometer measurements, buoyancy and stability of floating body, basic concept of fluid flow, dynamics of fluid flow, applications of momentum theorem and applications of energy equation.
   b. *Prerequisites:* None
   c. *Required, elective, or selected elective (as per Table 5-1):* Required
6. *Specific goals for the course:*
   a. Provide a thorough understanding and practical applications fluid mechanics problems analysis for determinate the solution.
   b. Testing and examine fluid mechanics under different load conditions to find the solution behavior.
7. *Brief list of topics to be covered:*
   a. Definitions of Stress on Fluid and Continuum
   b. Fundamental equation of fluid static and Applications
   c. Stream line, path lines, one, two and three dimensional flow
   d. Conservation of energy, Bernoulli's equation, Applications

APPENDIX B – FACULTY VITAE

1. Name : Sufyan Fadhil
2. Education :
   Ph.D., Chemical Engineering, University of Baghdad, 2015
   M.S., Chemical Engineering, University of Technology, Baghdad, 2010
   B.S., Chemical Engineering, University of Technology, Baghdad, 2005.

3. Academic experience
   University of Anbar, Ramadi, Chemical & Petrochemical Engineering Department
   Lecturer, 2016-Present, Full-time
4. Non-academic experience
   Al-Rashid firm for food industries
   Chemical engineer, 2006-2006, Full-time
5. Certifications or professional registrations
6. Current membership in professional organizations
   Iraqi society of engineers
7. Honors and awards
8. Service activities (within and outside of the institution)
   - ABET Assessment Committee member: 2020
   - Faculty scientific Committee Member: 2019
9. Briefly list the most important publications and presentations from the past five years –title, co-authors if any, where published and/or presented, date of publication or presentation:
   - **Sufuan Fadhil (2021)."** Nanofiltration membranes for toxic lead removal-contribution of various mass transfer mechanisms on membrane performance". Indian chemical engineer.
   - Sufyan Fadhil, Marino, T.,Hassan F. Makki,Qusay F. Alsalhy , Blefari, S., Macedonio, F., Giorno, L., Enrico Drioli, , Alberto Figoli.*(2019)."* Seawater desalination using PVDF-HFP membrane in DCMD process: Assessment of operating condition by Response Surface Method". *Chemical Engineering Communications*. Vol 2. 237-246.

10. Briefly list the most recent professional development activities:
    - Faculty development workshop, University of Purdue, US,2021

- National accreditation assessor workshop, Iraqi ministry of higher eduction,2021

APPENDIX C – EQUIPMENT

A comprehensive list of the equipment available in the Mechanical Engineering program was presented in the discussion of the following Criterion 6 in the discussion of the Laboratories and Manufacturing Spaces.

APPENDIX D – INSTITUTIONAL SUMMARY

1. The Institution
   a. Name and address of the institution
      University of Anbar, ramadi, Iraq
   b. Name and title of the chief executive officer of the institution
      Moshtaq T. Al-nada
      President, University of Anbar
   c. Name and title of the person submitting the Self-Assessment Report
      Ameer Abdulrahman
      Dean, College of Engineering

2. Type of Control

University of Anbar is a state public institution. The system is the responsibility of President Moshtaq Al-nada and is governed the university board.

3. Credit Unit

At University of Anbar, one semester unit represents one class hour or three laboratory hours. One academic year is 30 weeks of classes, exclusive of final examinations.

4. Tables

Table D-1. Program Enrollment and Degree Data

	Academic year		Enrollment year				Total undergrad	Total grad	Degree awarded		
			1st	2nd	3rd	4th			BSc	MS	PhD
Current year	2020-2021	FT								0	0
		PT	0	0	0	0	0				
1 year prior to current year	2019-2020	FT								0	0
		PT	0	0	0	0	0				
2 year prior to current year	2018-2019	FT								0	0
		PT	0	0	0	0	0				
3 year prior to current year	2017-2018	FT								0	0
		PT	0	0	0	0	0				
4 year prior to current year	2016-2017	FT								0	0
		PT	0	0	0	0	0	0			

Table D-2. Personnel

Chemical & Petrochemical engineering

Year: 2021

	Head count		Full Time Equivalent
	FT	PT	FTE
Administrative			
Faculty (permanent)	10	4	12
Other Faculty (excluding student Assistants)			
Student Teaching Assistants			
Technicians/Specialists			
Office/Clerical Employees			
Others			

(1)Data on this table should be for the term immediately preceding the visit.

(2) Persons holding joint administrative/faculty positions or other combined assignments should be allocated to each category according to the fraction of the appointment assigned to that category.

(3)For faculty members, 1 FTE equals what your institution defines as a full-time load.

(4)For student teaching assistants, 1 FTE equals 20 hours per week of work (or service). For undergraduate and graduate students, 1 FTE equals 15 semester credit-hours per term of institutional course work, meaning all courses - science, humanities and social sciences, etc.

(5)Specify any other category considered appropriate, or leave blank.