



42. Course Specification of Industrial Safety

I. Course Identification and General Information:						
1.	Course Title:	Industrial Safety				
2.	Course Code & Number:	PME345				
3.	Credit hours:	Credit Hours				Total
		Th.	Tu	Pr.	Tr.	
		2	2	-	-	3
4.	Study level/ semester at which this course is offered:	Fourth year- First Semester				
5.	Pre –requisite (if any):	NA				
6.	Co –requisite (if any):	None				
7.	Program (s) in which the course is offered:	BSc. Power Engineering and Electrical Machines				
8.	Language of teaching the course:	English				
9.	Location of teaching the course:	Electrical Engineering Department/Faculty of Engineering				
10.	Prepared By:	Prof. Dr. Eng. Omar H. Al-Sakaf				
11.	Date of Approval					

II. Course Description:
<p>This course enhances safety awareness of students towards potential hazards in the workplace and provides useful practical knowledge for workplace safety which is mandated by national and international standards. Students will identify, evaluate and control potential hazards to prevent or mitigate harm or damage to people, property, or the environment. Emphasis is placed on main causes of industrial accidents and protection, risk management and accident prevention, automated systems and robot safety as well as safety management systems.</p>

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III. Course Intended Learning Outcomes (CILOs)		Referenced PILOs
a1	Define workplace safety and health hazards and ways to control them.	A2, A3, A4
a2	Identify accident and injury information with respect to valid safety standards, state laws and regulations and where and how to get additional safety information.	
b1	Analyze the causes and consequences of industrial accidents.	B1, B4
b2	Deal with national and international applicable safety standards.	
c1	Conduct a job safety analysis and perform an appropriate accident investigation.	C1, C2
c2	Design a safety and health program.	
d1	Acquire problem solving and design skills using computer applications and Internet for extracting information related to field of study and for preparing and presenting reports.	D1, D2, D3, D4, D5
d2	Employ soft skills, including teamwork, presentation and communication skills.	

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1 Define workplace safety and health hazards and ways to control them.	<ul style="list-style-type: none"> ▪ Lectures, ▪ Demonstrations, ▪ Interactive class discussion, ▪ Tutorials 	<ul style="list-style-type: none"> ▪ Assignments, ▪ Oral Presentations, ▪ Quizzes, ▪ Tests, ▪ Written Exams
a2 Identify accident and injury information with respect to valid safety standards, state laws and regulations and where and how to get additional safety information.		

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

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Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 Analyze the causes and consequences of industrial safety accidents.	<ul style="list-style-type: none"> ▪ Lectures, ▪ Demonstrations, ▪ Interactive class discussion, ▪ Tutorials 	<ul style="list-style-type: none"> ▪ Assignments, ▪ Oral Presentations, ▪ Quizzes, ▪ Tests, ▪ Written Exams
b2 Deal with national and international applicable safety standards.		

(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 Conduct a job safety analysis and perform an appropriate accident investigation.	<ul style="list-style-type: none"> ▪ Lectures, ▪ Demonstrations, ▪ Interactive class discussion, 	<ul style="list-style-type: none"> ▪ Assignments, ▪ Oral Presentations, ▪ Quizzes, ▪ Tests, ▪ Written Exams
c2 Design a safety and health program		

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1 Acquire problem solving and design skills using computer applications and Internet for extracting information related to field of study and for preparing and presenting reports.	<ul style="list-style-type: none"> ▪ Demonstrations, ▪ Interactive class discussion. 	<ul style="list-style-type: none"> ▪ Assignments, ▪ Oral Presentations.
d2 Employ soft skills, including teamwork, presentation and communication skills.		

IV. Course Content:

A – Theoretical Aspect:

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Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact Hours
1.	The Work Environment and Its Relation to the Safety and Occupational Health Requirements	a1, a2, b1, b2, c1, c2, d1, d2	<ul style="list-style-type: none"> ▪ Facilities and Workstations ▪ Maintenance of Plant Facilities ▪ Industrial Sanitation and Personnel Facilities ▪ Occupational Health Services ▪ National and International Safety Codes and Standards 	1	2
2.	Workplace Exposures and Personal Protective Equipment	a1, a2, b1, b2, c1, c2, d1, d2	<ul style="list-style-type: none"> ▪ Main Causes of Industrial Accidents and Protection ▪ Personal Protective Equipment: Function, Types, Selection 	1	2
3.	Material Handling Safety	a1, a2, b1, b2, c1, c2, d1, d2	<ul style="list-style-type: none"> ▪ Types of Material Handling (Manual, Mechanized, Automated) ▪ Accidents and Injuries ▪ Preventive Measures to Reduce Accidents 	1	2
4.	Electrical Safety	a1, a2, b1, b2, c1, c2, d1, d2	<ul style="list-style-type: none"> ▪ Potential Hazards of Electricity ▪ Forms of Electrical Hazards ▪ Forms of Electric Shock and Protection ▪ Protective Strategies Against Electrical Hazards 	2	4
5.	Chemical Safety	a1, a2, b1, b2, c1, c2, d1, d2	<ul style="list-style-type: none"> ▪ Classification of Chemicals and Labeling ▪ Chemical Accidents ▪ Preventive Measures 	1	2

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			<ul style="list-style-type: none"> ▪ The International Program on Chemical Safety 		
6.	Machine Safety	a1, a2, b1, b2, c1, c2, d1, d2	<ul style="list-style-type: none"> ▪ Potential Hazards of Machines ▪ Methods of Safeguarding ▪ Lockout and Tagout 	1	2
7.	Fire Safety	a1, a2, b1, b2, c1, c2, d1, d2	<ul style="list-style-type: none"> ▪ Fire Triangle ▪ Common Fire Hazards ▪ Fire Protection ▪ Fire Prevention ▪ Evacuation ▪ Fire Fighting 	2	4
8.	Industrial Automation and Robots Safety	a1, a2, b1, b2, c1, c2, d1, d2	<ul style="list-style-type: none"> ▪ Elements of Automation Safety Systems ▪ Programmable Automation Controllers ▪ Safety Communication Networks ▪ Hazards Associated with Robots ▪ Safety Requirements for Working with Robots 	2	4
9.	Risk Management	a1, a2, b1, b2, c1, c2, d1, d2	<ul style="list-style-type: none"> ▪ Risk Management Cycle ▪ Hazard Identification ▪ Job Safety Analysis ▪ Risk Assessment ▪ Risk Control ▪ Accident Investigation 	2	4
10.	Safety Management Systems	a1, a2, b1, b2, c1, c2, d1, d2	<ul style="list-style-type: none"> ▪ Concepts and components of a health and safety management system ▪ Development of OHSAS18001 and accreditation ▪ Safety Auditing 	1	2
Number of Weeks /and Units Per Semester				14	28

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B – Tutorial (Assignments and presentations, discussion and analysis of case studies and mini projects)				
Order	Topics	Number of Weeks	Contact Hours	Learning Outcomes
1.	Tools, techniques and, how-to's to establish organization-wide safety training and support programs.	6	12	b1, b2, c1, c2, d1, d2
2.	How to identify and eliminate safety hazards, health threats, and other workplace dangers.	4	8	
3.	Promote a safe and healthy work environment in accordance with valid standards and requirements.	4	8	
Number of Weeks /and Units Per Semester			14/28	

V. Teaching Strategies of the Course:
<ul style="list-style-type: none"> • Lectures • Interactive class discussion • Demonstration – Safety Video Clips, Internet Search for Safety Resources, Safety Exhibition • Tutorials • Field Visits

VI. Assignments:				
No	Assignments	Aligned CILOS(symbols)	Week Due	Mark
1.	Homework.	b1, b2, c1, c2, d1, d2	1 - 14	22.5
2.	Assignments to assess ability to solve problems and analyze results independently.			
3.	Presentations.			
4.	Mini Projects - Scientific Research Work.			
	Total			22.5

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VII. Schedule of Assessment Tasks for Students During the Semester:					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Assignments.	1-13	22.5	15%	b1, b2, c1, c2, d1, d2
2.	Mid-Term Exam.	8	22.5	15%	
3.	Final Exam	16	105	70%	
Total			150	100%	

VIII. Learning Resources:
1- Required Textbook
Omar Al-Sakaf, (2016), 'Introduction to Industrial Safety', 1 st Edition, Sana'a, Yemen.
2- Essential References.
<ol style="list-style-type: none"> 1. C. Ray Asfahl & David W. Rieske (2010). Industrial Safety and Health Management, 6th Edition. Prentice Hall: Upper Saddle River. ISBN-13:978-0-13-236871-1. 2. David L. Goetsch, (2000), The Safety and Health Handbook, Prentice Hall. 3. Encyclopedia of Occupational Health and Safety. International Labor Office. Comprehensive reference work; source of practical information, 2010, www.ilo.org. 4. Yemen Occupational Safety and Health Manual (Arabic), 1st Edition, 1999. 5. National Occupational Health and Safety Legislations in the Republic of Yemen (Arabic), First Edition, 2001. 6. U.S. Department of Labor, OSHA Safety and Health Standards 29 CFR1910, 2010. 7. Hagan, Philip E., Montgomery, John F., O'Reilly, James T., 2009, Accident Prevention Manual for Business & Industry; Administration & Programs, 13th Edition. Itasca, Illinois; National Safety Council. ISBN: 978-0-87912-280-5E. 8. Height, Joel M., 2008, The Safety Professionals Handbook; Technical Applications. Des Plaines Illinois; American Society of Safety Engineers. ISBN: 978-1-885581.
3- Electronic Materials and Web Sites etc.
<ul style="list-style-type: none"> • Video clips. • Links to information resources.

IX. Course Policies:	
1.	Class Attendance:

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	A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic
2.	Tardy: For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	Exam Attendance/Punctuality: A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam-
4.	Assignments & Projects: The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time-
5.	Cheating: For cheating in exam, a student will be considered as failure . In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty-
6.	Plagiarism: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	Other policies: - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

Reviewed By	<u>Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat</u> <u>President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi</u> <u>Name of Reviewer from the Department: Asst. Prof. Dr. Adel Ahmed Al-Shakiri</u>
	<u>Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa</u> <u>Assoc. Prof. Dr. Ahmed Mujahed</u>

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Sana'a University
Faculty of Engineering
Department: Electrical Engineering
Title of the Program: Electrical Power and Machines Engineering



	<u>Asst. Prof. Dr. Munasar Alsubri</u>
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42. Course Plan of Industrial Safety

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member	Prof. Dr. Eng. Omar H. Al-Sakaf	Office Hours					
Location & Telephone No.	Faculty of Engineering Mobile: 733772328/773332328	SAT	SUN	MON	TUE	WED	THU
E-mail	oalsakaf@gmail.com oalsakaf@yahoo.com		08:00 - 12:00				

II. Course Identification and General Information:						
1.	Course Title:	Industrial Safety				
2.	Course Number & Code:	PME345				
3.	Credit hours:	Credit Hours				Total
		Th.	Tu.	Pr.	Tr.	
		2	2	-	-	3
4.	Study level/year at which this course is offered:	Fourth year- First Semester				
5.	Pre –requisite (if any):	General Engineering Knowledge				
6.	Co –requisite (if any):	None				
7.	Program (s) in which the course is offered	BSc. Power Engineering				
8.	Language of teaching the course:	English				
9.	System of Study:	Regular				
10.	Mode of delivery:	Face-to-Face				
11.	Location of teaching the course:	Electrical Engineering Department/Faculty of Engineering				

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III. Course Description:

This course enhances safety awareness of students towards potential hazards in the workplace and provides useful practical knowledge for workplace safety which is mandated by national and international standards. Students will identify, evaluate and control potential hazards to prevent or mitigate harm or damage to people, property, or the environment. Emphasis is placed on main causes of industrial accidents and protection, risk management and accident prevention, automated systems and robot safety as well as safety management systems.

IV. Intended Learning Outcomes (ILOs) of the Course:

1. Define workplace safety and health hazards and ways to control them.
2. Identify accident and injury information with respect to valid safety standards, state laws and regulations and where and how to get additional safety information.
3. Analyze the causes and consequences of industrial accidents.
4. Deal with national and international applicable safety standards.
5. Conduct a job safety analysis and perform an appropriate accident investigation.
6. Design a safety and health program.
7. Acquire problem solving and design skills using computer applications and Internet for extracting information related to field of study and for preparing and presenting reports.
8. Employ soft skills, including teamwork, presentation and communication skills.

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V. Course Content:				
A – Theoretical Aspect:				
Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1.	The Work Environment and Its Relation to the Safety and Occupational Health Requirements	<ul style="list-style-type: none"> ▪ Facilities and Workstations ▪ Maintenance of Plant Facilities ▪ Industrial Sanitation and Personnel Facilities ▪ Occupational Health Services ▪ National and International Safety Codes and Standards 	1 st	2
2.	Workplace Exposures and Personal Protective Equipment	<ul style="list-style-type: none"> ▪ Main Causes of Industrial Accidents and Protection ▪ Personal Protective Equipment: Function, Types, Selection 	2 nd	2
3.	Material Handling Safety	<ul style="list-style-type: none"> ▪ Types of Material Handling (Manual, Mechanized, Automated) ▪ Accidents and Injuries ▪ Preventive Measures to Reduce Accidents 	3 rd	2
4.	Electrical Safety	<ul style="list-style-type: none"> ▪ Potential Hazards of Electricity ▪ Forms of Electrical Hazards ▪ Forms of Electric Shock and Protection ▪ Protective Strategies Against Electrical Hazards 	4 th ,5 th	4
5.	Chemical Safety	<ul style="list-style-type: none"> ▪ Classification of Chemicals and Labeling ▪ Chemical Accidents ▪ Preventive Measures ▪ The International Program on Chemical Safety 	6 th	2
6.	Machine Safety	<ul style="list-style-type: none"> ▪ Potential Hazards of Machines 	7 th	2

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		<ul style="list-style-type: none"> ▪ Methods of Safeguarding ▪ Lockout and Tagout 		
7.	Midterm Exam	▪	8 th	2
8.	Fire Safety	<ul style="list-style-type: none"> ▪ Fire Triangle ▪ Common Fire Hazards ▪ Fire Protection ▪ Fire Prevention ▪ Evacuation ▪ Fire Fighting 	9 th ,10 th	4
9.	Industrial Automation and Robots Safety	<ul style="list-style-type: none"> ▪ Elements of Automation Safety Systems ▪ Programmable Automation Controllers ▪ Safety Communication Networks ▪ Hazards Associated with Robots ▪ Safety Requirements for Working with Robots 	11 th ,12 th	4
10.	Risk Management	<ul style="list-style-type: none"> ▪ Risk Management Cycle ▪ Hazard Identification ▪ Job Safety Analysis ▪ Risk Assessment ▪ Risk Control ▪ Accident Investigation 	13 th ,14 th	4
11.	Safety Management Systems	<ul style="list-style-type: none"> ▪ Concepts and components of a health and safety management system ▪ Development of OHSAS18001 and accreditation ▪ Safety Auditing 	15 th	2
12.	Final Exam		16 th	2
Number of Weeks /and Units Per Semester			16	32

B – Tutorial

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(Assignments and presentations, discussion and analysis of case studies and mini projects)

Order	Topics	Number of Weeks	Contact Hours	Learning Outcomes
1.	Tools, techniques and, how-to's to establish organization-wide safety training and support programs.	1 st ,2 nd ,3 rd ,4 th ,5 th ,6 th	12	b1, b2, c1, c2, d1, d2
2.	How to identify and eliminate safety hazards, health threats, and other workplace dangers.	7 th ,8 th ,9 th ,10 th	8	
3.	Promote a safe and healthy work environment in accordance with valid standards and requirements.	11 th ,12 th ,13 th ,14 th	8	
Number of Weeks /and Units Per Semester			14/28	

VI. Teaching Strategies of the Course:	
<ul style="list-style-type: none"> • Lectures • Interactive class discussion • Demonstration – Safety Video Clips, Internet Search for Safety Resources, Safety Exhibition • Tutorials • Field Visits 	

VII. Assignments:				
No	Assignments	Aligned CILOS(symbols)	Week Due	Mark
1.	Homework.	b1, b2, c1, c2, d1, d2	1 - 14	22.5
2.	Assignments to assess ability to solve problems and analyze results independently.			
3.	Presentations.			
4.	Mini Projects - Scientific Research Work.			
Total				22.5

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VIII. Schedule of Assessment Tasks for Students During the Semester:				
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1.	Assignments.	1-13	22.5	15%
2.	Mid-Term Exam.	8	22.5	15%
3.	Final Exam	16	105	70%
Total			150	100%

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1- Required Textbook
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3- Electronic Materials and Web Sites etc.
<ul style="list-style-type: none"> • Video clips. • Links to information resources.

X. Course Policies:	
1.	Class Attendance:

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2.	Tardy: For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
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4.	Assignments & Projects: The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time-
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Sana'a University
Faculty of Engineering
Department: Electrical Engineering
Title of the Program: Electrical Power and Machines Engineering



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