

Republic of Yemen

Ministry of Education & Scientific Research

Council of Academic Accreditation & Quality Assurance of

Higher Education (CAQA)



Faculty of Dentistry

Department of Basic Dental Science

Program of Dental technology

Course Specification of

Maintenance & safety in dental technology

Course Code. (09.21.919)

2025



T4: This Template is Developed and Approved by CAQA-Yemen, 2023

Prepared by:

Dr. Ammar Sharafadeen

Reviewed by:

Dr. -----

Head of the Department:

Quality Unit:

Dean

I. General Information:

1.	Course Title:	Maintenance & safety in dental technology			
2.	Course Code:	09.21.919			
3.	Course Type:	Major course			
4.	Credit Hours: 4	Credit Hours	Theory Contact Hours		Practical Contact Hours
			Lecture	Tutorial/Seminar	Lab Clinical
		3	2	2	-- --
5.	Level/ Semester at which this Course is offered:	Level 2 / Semester 2			
6.	Pre –Requisite (if any):	None			
7.	Co –Requisite (if any):	None			
8.	Program (s) in which the Course is Offered:	Bachelor of Dental Technology			
9.	Language of Teaching the Course:	English			
10.	Location of Teaching the Course:	Faculty of Dentistry, 21 September University for Medical & Applied Scienc			
11.	Prepared by:	Dr. Ammar Sharafadeen			
12.	Date and Number of Approval by Council:	2025			

II. Course Description:

This 3 credit hour course (theoretical) is designed to Examination of the principles of dental laboratory management. Includes, infection control guidelines and procedures, Occupational Safety and Health Administration (OSHA) regulations for dental laboratories, post exposure plan, legal and ethical aspects of the industry, National Association of Dental Laboratories, and establishing a dental laboratory. Dealing with the dental laboratory equipment's.

III. Course Description:

III. Course Intended Learning Outcomes (CILOs) : Upon successful completion of the course, students will be able to:		Referenced PILOs		
A. Knowledge and Understanding:		I, P or M/A		
a1	Understand the scope and significance of dentistry.		A1	
a2	Describe the historical evolution of dentistry		A2	
a3	Identify various dental disciplines and their roles			
B. Intellectual Skills:				
b1	Analyze dental case studies		B1	
b2	Evaluate treatment options based on patient needs.		B2	
b3	Synthesize information from various dental sources.			
C. Professional and Practical Skills:				
c1	Demonstrate basic dental examination techniques.		C1	
c2	Apply preventive care strategies		C2	
c3	Communicate effectively with patients			
D. Transferable Skills:				
d1	Work collaboratively in a team.		D1	
d2	Present information clearly and effectively.		D2	
d3	Manage time and prioritize tasks efficiently			
I= Introduced, P=Practiced or M/A= Mastered/Advanced				

IV. Alignment of Course Intended Learning Outcomes

(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:

Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
a1 Understand the scope and significance of dentistry.	- Interactive lectures - Seminars - Discussion - Self-learning	- Written and oral examination - Quizzes
a2 Describe the historical evolution of dentistry.	- Interactive lectures - Seminars - Discussion - Self-learning	- Written and oral examination - Quizzes
a3 Identify various dental disciplines and their roles.	- Interactive lectures - Seminars - Discussion - Self-learning	- Presentation - Written and oral examination - Quizzes

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

Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
b1 Understand the scope and significance of dentistry	- Interactive lectures - Seminars - Discussion - Self-learning	- Quizzes - Written Exam - Final Oral Exam - Final Practical Exam
b2 Describe the historical evolution of dentistry.	- Interactive lectures - Seminars - Discussion - Self-learning	- Quizzes - Written Exam - Final Oral Exam - Final Practical Exam
b3 Identify various dental disciplines and their roles.	- Interactive lectures - Seminars - Discussion - Self-learning	- Quizzes - Written Exam - Final Oral Exam - Final Practical Exam

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

Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
c1	Demonstrate basic dental examination techniques.	- Practical session - Training - CBL - PBL	- Final Clinical Exam - Final Practical Exam
c2	Apply preventive care strategies.	- Practical session - Training - CBL - PBL	- Final Clinical Exam - Final Practical Exam
c3	Communicate effectively with patients.	- Practical session - Training - CBL - PBL	- Final Clinical Exam - Final Practical Exam

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

Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
d1	Work collaboratively in a team.	- Seminars - Discussion - Self-Learning - Presentation	- Homework - Research
d2	Present information clearly and effectively.	- Seminars - Discussion - Self-Learning - Presentation	- Homework - Research
d3	Manage time and prioritize tasks efficiently	- Seminars - Discussion - Self-Learning - Presentation	- Homework - Research

V. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Introduction, Safety Principles, Classification of Dental Appliances	- Introduction to the course and its importance in dental technology. * - Safety Management: Basic principles of general and occupational safety. - Classification of dental equipment and devices: Classification according to the nature of the work and the source of the hazard (heating, pressure/air, rotating, materials handling).	1	2	a1 d3, b2, c2
2	Infection control and prevention of cross-contamination (biosafety)	- Infection Control: Laboratory infection control guidelines and procedures. - Risk Management: Safe handling protocols for dental impressions and molds received from clinics. Avoid cross-contamination.	1	2	a1, a2, b1,b2, b3, d1, d2
3	Occupational Safety and Health	- Occupational Safety and Health Administration (OSHA) regulations and their role in	1	2	a1, a2, b1,b2, b3,

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
	(OSHA) Regulations and Personal Protective Equipment	- dental laboratories - Protection: Proper use of personal protective equipment (PPE). - Post-exposure plan.			d1, d2
4	Chemical Risk Management and MSDS (Chemical Safety)	- Risk Management: Safe Handling of Hazardous Chemicals in the Laboratory - Reading and Understanding Safety Data Sheets (MSDS) and Interpreting Warning Labels	1	2	a1, a2, b1,b2, b3, d1, d2
5	Eliminating acute hazards and ensuring optimal handling of equipment (Mechanical Safety)	- Safe and proper disposal of sharp tools and hazardous materials - Optimal equipment handling: Daily inspection and verification procedures before starting work.	1	2	a1, a2, b1,b2, b3, d1, d2
6	Principles and foundations of maintenance, its types, and equipment management	- The concept of preventive and corrective maintenance. - Maintenance records and periodic inspection schedules for equipment.	1	2	a1, a2, b1,b2, b3, d1, d2
7	Basic equipment maintenance	- Maintenance of heating equipment, furnaces, vacuum and pressure equipment, and grinding and turning equipment.	1	2	a1, a2, b1,b2, b3, d1, d2
8	Maintenance	- Porcelain kilns: Calibration, monitoring of separation	1	2	a1, a2, b1,b2, b3,

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
	of heating equipment and ovens	temperature, and changing of heating coils. - Metal casting equipment: Inspection of rotating mechanisms and temperature control.			d1, d2
9	Midterm exam		1	2	All
10	Maintenance of vacuum and pressure equipment	- Vacuum Formers: Vacuum pump inspection and heater maintenance. - Air Compressors: Filter maintenance, dehumidification, and pressure check. * Sandblasting Equipment: Nozzle inspection and material tank cleaning.	1	2	a1, a2, b1,b2, b3, d1, d2
11	Maintenance of grinding and turning equipment	- Micromotor and dental handpieces: Daily and weekly lubrication procedures. - Maintenance and replacement of filters and motors of dust extraction equipment in workstations.	1	2	a1, a2, b1,b2, b3, d1, d2
12	Electrical Safety	- Ensure a low-resistance path for excess or leaking electrical current to reach ground, preventing static electricity buildup on the device and protecting users. - Regularly use electrical safety analyzers to check leakage	1	2	a1, a2, b1,b2, b3, d1, d2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		current and grounding resistance of medical devices. - Ensure all power cords and sockets are intact and undamaged, and use surge protectors to protect sensitive equipment (such as porcelain ovens and computers).			
13	Cleaning and Sterilization/Disinfection	- Disinfection: Kills most pathogenic microorganisms (not necessarily spores). Used to disinfect work surfaces and dental trays received from the clinic. - Sterilization: Kills all forms of microbial life, including spores. Used to sterilize surgical instruments or certain laboratory instruments that penetrate tissue.	1	2	a1, a2, b1,b2, b3, d1, d2
14	Lubrication and greasing	- Reducing Friction: Lubricating moving parts reduces friction, extending the life of the device and decreasing energy consumption. - Target Devices: Dental Handpieces: These must be lubricated daily or according to the manufacturer's recommendations due to their high rotational speed. Micromotors: These require periodic lubrication to ensure smooth and precise rotation. - Materials Used: Use specialized	1	2	a1, a2, b1,b2, b3, d1, d2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		lubricants and oils approved by the device manufacturer to avoid damage caused by chemical reactions.			
15	Work environment quality	- Planning the placement of equipment and providing comfortable and safe workspaces. - The importance of cleanliness and order in the laboratory as part of occupational safety.	1	2	
16	Final Theoretical Exam		1	2	c 4
Number of Weeks /and Units Per Semester			16	32	

B. Practical Aspect (Lab/Clinical) (if any):

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Laboratory Setup and General Safety Inspection	1	2	C1,c2
2	Infection Control & Decontamination Protocol	1	2	C1,c2
3	Chemical Hazard Communication & MSDS Reading	1	2	C1,c2
4	Personal Protective Equipment (PPE) Application & Disposal	1	2	C1,c2
5	Safe Disposal of Sharps and Hazardous Waste	1	2	C1,c2
6	Basic Electrical Safety Check-up (Grounding & Fuses)	1	2	C1,c2
7	Introduction to Maintenance Types and Documentation	1	2	C1,c2
8	Preventive Maintenance of Dental Lathes and Suction	1	2	C1,c2

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
	Units			
9	Operation and Calibration of Porcelain Furnaces	1	2	C1,c2
10	Lubrication and Cleaning of High-Speed Handpieces	1	2	C1,c2
11	Air Compressor Maintenance (Draining & Filter Replacement)	1	2	C1,c2
12	Troubleshooting and Minor Repair: Casting Machine	1	2	C1,c2
13	Emergency Response and First Aid in the Lab	1	2	C1,c2
14	Final Practical Evaluation and Laboratory Sign-off	1	2	C1,c2
Number of Weeks /and Units Per Semester		14	28	

C. Tutorial Aspect (if any):

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Analysis of Lab Design & Safety Standards	1	2	C1,c2
2	Disinfection Protocols Case Studies	1	2	C1,c2
3	Chemical Safety & SDS Interpretation	1	2	C1,c2
4	Technical Criteria for PPE Selection	1	2	C1,c2
5	Waste Management Classification	1	2	C1,c2
6	Principles of Electrical Safety in Medical Gear	1	2	C1,c2
7	Documentation & Maintenance Log Design	1	2	C1,c2
8	Mechanics of Lathes & Suction Systems	1	2	C1,c2
9	Thermodynamics of Porcelain Furnaces	1	2	C1,c2
10	Lubrication Chemistry & Tool Longevity	1	2	C1,c2
11	Compressed Air Systems Engineering	1	2	C1,c2

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
12	Troubleshooting Logic & Failure Analysis	1	2	C1,c2
13	Emergency Response Planning	1	2	C1,c2
14	Laboratory Accreditation & Quality Audit	1	2	C1,c2
Number of Weeks /and Units Per Semester		14	28	

VI. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Assignment 1: Presentation+ participation	6-9	15	a1, a2, b1,b2, b3, d1, d2
2	Assignment 2: Group work	Throughout the Semester	10	a1, a2, b1,b2, b3, d1, d2
3	Assignment 3:			
Total				

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	Quiz	4	5	5%	a1, a2, b1,b2, b3, d1, d2
2	Assignment	9	5	5%	a1, a2, b1,b2, b3, d1, d2
3	Written test	7	10	10%	a1, a2, b1,b2, b3, d1, d2

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
4	Midterm examination	7	20	20%	a1, a2, b1,b2, b3, d1, d2
5	Final exam theory	14	60	60%	a1, a2, b1,b2, b3, d1, d2
Total			100	100%	

VIII. Learning Resources:
Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.
1- Required Textbook(s) (maximum two):
1- Miller, C. H., & Palenik, C. J. (2022). <i>Infection Control and Management of Hazardous Materials for the Dental Team</i>. Elsevier Health Sciences. (The most comprehensive textbook in the field). 2- U.S. Air Force. (2018). <i>Dental Laboratory Technology: Pamphlet 47-103, Vol 1 & 2</i>. (Available as a public domain manual; it is incredibly detailed on lab equipment care). 3- Valachi, B. (2008). <i>Practice Dentistry Pain-Free: Evidence-Based Strategies for Preventing Pain and Extending Your Career</i>. (Essential for understanding posture and lab bench setup)
2- Essential References:
1- Gurney, H. W. <i>Dental Equipment Repair and Technology</i>. (Focuses on the mechanical aspects of handpieces, compressors, and lathes). 2- Centers for Disease Control and Prevention (CDC). <i>Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care</i> 3- Organization for Safety, Asepsis and Prevention (OSAP). <i>Interactions Between the Dental</i>

Office and the Dental Laboratory (Guideline Series).

- 4- Beuer, F., et al. Digital Dentistry: A Step-by-Step Guide and Case Reports. (Excellent for maintenance protocols of CAD/CAM and 3D printing equipment).
- 5- ADA (American Dental Association). Technical Report No. 136: Laboratory-Coordinated Infection Control.

3- Electronic Materials and Web Sites etc.:

Websites:

- 1- <http://www.ada.org>
- 2- <http://www.osha.org>
- 3-

Journals:

IX. Course Policies: (Based on the Uniform Students' By law (2007))

1	Class Attendance: Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	Tardiness: A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	Exam Attendance/Punctuality: No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	Assignments & Projects: Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	Cheating: Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If

	it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	Forgery and Impersonation: Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	Other policies: The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

Faculty of Dentistry

Department of Basic Dental Science

Program of dental technology

Course Specification of

Maintenance & safety in dental technology

Course Code. (09.21.919)

I. Information about Faculty Member Responsible for the Course:						
Name of Faculty Member:	Dr. Ammar Sharafadeen			Office Hours		
Location & Telephone No.:	775207752					
E-mail:	dr.ammar.ali2018@gmail.com			SAT	SUN	MON TUE WED THU

2025/2026

II. Course Identification and General Information:					
Course Title:	Maintenance & safety in dental technology				
Course Code:	09.21.919				
Course Type:	Major course				
Credit Hours: 4	Credit Hours	Theory Contact Hours	Practical Contact Hours		
		Lecture	Tutorial/Seminar	Lab	Clinical
	3	2	2	--	--
Level/ Semester at which this Course is offered:	Level 2 / Semester 2				
Pre –Requisite (if any):	None				
Co –Requisite (if any):	None				
Program (s) in which the Course is Offered:	Bachelor of Dental Technology				
Language of Teaching the Course:	English				
Location of Teaching the Course:	Faculty of Dentistry, 21 September University for Medical & Applied Scienc				
Prepared by:	Dr. Ammar Sharafadeen				
Date and Number of Approval by	2025				

Council:

III. Course Description:

This 3 credit hour course (theoretical) is designed to Examination of the principles of dental laboratory management. Includes, infection control guidelines and procedures, Occupational Safety and Health Administration (OSHA) regulations for dental laboratories, post exposure plan, legal and ethical aspects of the industry, National Association of Dental Laboratories, and establishing a dental laboratory. Dealing with the dental laboratory equipment's.

IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

A. Knowledge and Understanding:

- a1 Understand the scope and significance of dentistry.
- a2 Describe the historical evolution of dentistry
- a3 Identify various dental disciplines and their roles

B. Intellectual Skills:

- b1 Analyze dental case studies
- b2 Evaluate treatment options based on patient needs.
- b3 Synthesize information from various dental sources.

C. Professional and Practical Skills:

- c1 Demonstrate basic dental examination techniques.

- c2 Apply preventive care strategies

- c3 Communicate effectively with patients

D. Transferable Skills:

- d1 Work collaboratively in a team.
- d2 Present information clearly and effectively.
- d3 Manage time and prioritize tasks efficiently

I= Introduced, P=Practiced or M/A= Mastered/Advanced

V. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	Introduction, Safety Principles, Classification of Dental Appliances	- Introduction to the course and its importance in dental technology. * Safety Management: Basic principles of general and occupational safety. - Classification of dental equipment and devices: Classification according to the nature of the work and the source of the hazard (heating, pressure/air, rotating, materials handling).	1	2
2	Infection control and prevention of cross-contamination (biosafety)	- Infection Control: Laboratory infection control guidelines and procedures. - Risk Management: Safe handling protocols for dental impressions and molds received from clinics. Avoid cross-contamination.	1	2
3	Occupational Safety and Health (OSHA) Regulations and Personal Protective Equipment	- Occupational Safety and Health Administration (OSHA) regulations and their role in dental laboratories - Protection: Proper use of personal protective equipment (PPE). - Post-exposure plan.	1	2
4	Chemical Risk Management and MSDS (Chemical Safety)	- Risk Management: Safe Handling of Hazardous Chemicals in the Laboratory - Reading and Understanding Safety Data Sheets (MSDS) and Interpreting Warning Labels	1	2
5	Eliminating acute hazards and ensuring optimal handling of	- Safe and proper disposal of sharp tools and hazardous materials - Optimal equipment handling: Daily inspection and verification procedures	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
	equipment (Mechanical Safety)	before starting work.		
6	Principles and foundations of maintenance, its types, and equipment management	- The concept of preventive and corrective maintenance. - Maintenance records and periodic inspection schedules for equipment.	1	2
7	Basic equipment maintenance	- Maintenance of heating equipment, furnaces, vacuum and pressure equipment, and grinding and turning equipment.	1	2
8	Maintenance of heating equipment and ovens	- Porcelain kilns: Calibration, monitoring of separation temperature, and changing of heating coils. - Metal casting equipment: Inspection of rotating mechanisms and temperature control.	1	2
9	Midterm exam		1	2
10	Maintenance of vacuum and pressure equipment	- Vacuum Formers: Vacuum pump inspection and heater maintenance. - Air Compressors: Filter maintenance, dehumidification, and pressure check. * Sandblasting Equipment: Nozzle inspection and material tank cleaning.	1	2
11	Maintenance of grinding and	- Micromotor and dental handpieces: Daily and weekly lubrication procedures.	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
	turning equipment	- Maintenance and replacement of filters and motors of dust extraction equipment in workstations.		
12	Electrical Safety	- Ensure a low-resistance path for excess or leaking electrical current to reach ground, preventing static electricity buildup on the device and protecting users. - Regularly use electrical safety analyzers to check leakage current and grounding resistance of medical devices. - Ensure all power cords and sockets are intact and undamaged, and use surge protectors to protect sensitive equipment (such as porcelain ovens and computers).	1	2
13	Cleaning and Sterilization/Disinfection	- Disinfection: Kills most pathogenic microorganisms (not necessarily spores). Used to disinfect work surfaces and dental trays received from the clinic. - Sterilization: Kills all forms of microbial life, including spores. Used to sterilize surgical instruments or certain laboratory instruments that penetrate tissue.	1	2
14	Lubrication and greasing	- Reducing Friction: Lubricating moving parts reduces friction, extending the life of the device and decreasing energy consumption. - Target Devices: Dental Handpieces: These must be lubricated daily or according to the manufacturer's recommendations due to their high	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		rotational speed. Micromotors: These require periodic lubrication to ensure smooth and precise rotation. - Materials Used: Use specialized lubricants and oils approved by the device manufacturer to avoid damage caused by chemical reactions.		
15	Work environment quality	- Planning the placement of equipment and providing comfortable and safe workspaces. - The importance of cleanliness and order in the laboratory as part of occupational safety.	1	2
16	Final Theoretical Exam		1	2
Number of Weeks /and Units Per Semester			16	32

B. Practical Aspect (Lab/Clinical) (if any):

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Laboratory Setup and General Safety Inspection	1	2	C1,c2
2	Infection Control & Decontamination Protocol	1	2	C1,c2
3	Chemical Hazard Communication & MSDS Reading	1	2	C1,c2
4	Personal Protective Equipment (PPE) Application & Disposal	1	2	C1,c2
5	Safe Disposal of Sharps and Hazardous Waste	1	2	C1,c2
6	Basic Electrical Safety Check-up (Grounding & Fuses)	1	2	C1,c2
7	Introduction to Maintenance Types and Documentation	1	2	C1,c2

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
8	Preventive Maintenance of Dental Lathes and Suction Units	1	2	C1,c2
9	Operation and Calibration of Porcelain Furnaces	1	2	C1,c2
10	Lubrication and Cleaning of High-Speed Handpieces	1	2	C1,c2
11	Air Compressor Maintenance (Draining & Filter Replacement)	1	2	C1,c2
12	Troubleshooting and Minor Repair: Casting Machine	1	2	C1,c2
13	Emergency Response and First Aid in the Lab	1	2	C1,c2
14	Final Practical Evaluation and Laboratory Sign-off	1	2	C1,c2
Number of Weeks /and Units Per Semester		14	28	

C. Tutorial Aspect (if any):

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Analysis of Lab Design & Safety Standards	1	2	C1,c2
2	Disinfection Protocols Case Studies	1	2	C1,c2
3	Chemical Safety & SDS Interpretation	1	2	C1,c2
4	Technical Criteria for PPE Selection	1	2	C1,c2
5	Waste Management Classification	1	2	C1,c2
6	Principles of Electrical Safety in Medical Gear	1	2	C1,c2
7	Documentation & Maintenance Log Design	1	2	C1,c2
8	Mechanics of Lathes & Suction Systems	1	2	C1,c2
9	Thermodynamics of Porcelain Furnaces	1	2	C1,c2
10	Lubrication Chemistry & Tool Longevity	1	2	C1,c2

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
11	Compressed Air Systems Engineering	1	2	C1,c2
12	Troubleshooting Logic & Failure Analysis	1	2	C1,c2
13	Emergency Response Planning	1	2	C1,c2
14	Laboratory Accreditation & Quality Audit	1	2	C1,c2
Number of Weeks /and Units Per Semester		14	28	

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	Introduction, Safety Principles, Classification of Dental Appliances	- Introduction to the course and its importance in dental technology. * Safety Management: Basic principles of general and occupational safety. - Classification of dental equipment and devices: Classification according to the nature of the work and the source of the hazard (heating, pressure/air, rotating, materials handling).	1	2
2	Infection control and prevention of cross-contamination (biosafety)	- Infection Control: Laboratory infection control guidelines and procedures. - Risk Management: Safe handling protocols for dental impressions and molds received from clinics. Avoid cross-contamination.	1	2
3	Occupational Safety and Health (OSHA) Regulations and Personal Protective Equipment	- Occupational Safety and Health Administration (OSHA) regulations and their role in dental laboratories - Protection: Proper use of personal protective equipment (PPE). - Post-exposure plan.	1	2
4	Chemical Risk Management	- Risk Management: Safe Handling of Hazardous Chemicals in the	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
	and MSDS (Chemical Safety)	Laboratory - - Reading and Understanding Safety Data Sheets (MSDS) and Interpreting Warning Labels		
5	Eliminating acute hazards and ensuring optimal handling of equipment (Mechanical Safety)	- Safe and proper disposal of sharp tools and hazardous materials - Optimal equipment handling: Daily inspection and verification procedures before starting work.	1	2
6	Principles and foundations of maintenance, its types, and equipment management	- The concept of preventive and corrective maintenance. - Maintenance records and periodic inspection schedules for equipment.	1	2
7	Basic equipment maintenance	- Maintenance of heating equipment, furnaces, vacuum and pressure equipment, and grinding and turning equipment.	1	2
8	Maintenance of heating equipment and ovens	- Porcelain kilns: Calibration, monitoring of separation temperature, and changing of heating coils. - Metal casting equipment: Inspection of rotating mechanisms and temperature control.	1	2
9	Midterm exam		1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
10	Maintenance of vacuum and pressure equipment	- Vacuum Formers: Vacuum pump inspection and heater maintenance. - Air Compressors: Filter maintenance, dehumidification, and pressure check. * Sandblasting Equipment: Nozzle inspection and material tank cleaning.	1	2
11	Maintenance of grinding and turning equipment	- Micromotor and dental handpieces: Daily and weekly lubrication procedures. - Maintenance and replacement of filters and motors of dust extraction equipment in workstations.	1	2
12	Electrical Safety	- Ensure a low-resistance path for excess or leaking electrical current to reach ground, preventing static electricity buildup on the device and protecting users. - Regularly use electrical safety analyzers to check leakage current and grounding resistance of medical devices. - Ensure all power cords and sockets are intact and undamaged, and use surge protectors to protect sensitive equipment (such as porcelain ovens and computers).	1	2
13	Cleaning and Sterilization/Disinfection	- Disinfection: Kills most pathogenic microorganisms (not necessarily spores). Used to disinfect work surfaces and dental trays received from the clinic. - Sterilization: Kills all forms of microbial life, including spores. Used to sterilize surgical instruments or certain	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		laboratory instruments that penetrate tissue.		
14	Lubrication and greasing	- Reducing Friction: Lubricating moving parts reduces friction, extending the life of the device and decreasing energy consumption. - Target Devices: Dental Handpieces: These must be lubricated daily or according to the manufacturer's recommendations due to their high rotational speed. Micromotors: These require periodic lubrication to ensure smooth and precise rotation. - Materials Used: Use specialized lubricants and oils approved by the device manufacturer to avoid damage caused by chemical reactions.	1	2
15	Work environment quality	- Planning the placement of equipment and providing comfortable and safe workspaces. - The importance of cleanliness and order in the laboratory as part of occupational safety.	1	2
16	Final Theoretical Exam		1	2
Number of Weeks /and Units Per Semester			16	32

No.	Tasks/ Experiments	Number of Weeks	Contact Hours
1	Laboratory Setup and General Safety Inspection	1	2
2	Infection Control & Decontamination Protocol	1	2
3	Chemical Hazard Communication & MSDS Reading	1	2
4	Personal Protective Equipment (PPE) Application & Disposal	1	2

No.	Tasks/ Experiments	Number of Weeks	Contact Hours
5	Safe Disposal of Sharps and Hazardous Waste	1	2
6	Basic Electrical Safety Check-up (Grounding & Fuses)	1	2
7	Introduction to Maintenance Types and Documentation	1	2
8	Preventive Maintenance of Dental Lathes and Suction Units	1	2
9	Operation and Calibration of Porcelain Furnaces	1	2
10	Lubrication and Cleaning of High-Speed Handpieces	1	2
11	Air Compressor Maintenance (Draining & Filter Replacement)	1	2
12	Troubleshooting and Minor Repair: Casting Machine	1	2
13	Emergency Response and First Aid in the Lab	1	2
14	Final Practical Evaluation and Laboratory Sign-off	1	2
Number of Weeks /and Units Per Semester		14	28
No.	Tasks/ Experiments	Number of Weeks	Contact Hours
1	Laboratory Setup and General Safety Inspection	1	2
2	Infection Control & Decontamination Protocol	1	2
3	Chemical Hazard Communication & MSDS Reading	1	2
4	Personal Protective Equipment (PPE) Application & Disposal	1	2
5	Safe Disposal of Sharps and Hazardous Waste	1	2
6	Basic Electrical Safety Check-up (Grounding & Fuses)	1	2
7	Introduction to Maintenance Types and Documentation	1	2
8	Preventive Maintenance of Dental Lathes and Suction Units	1	2
9	Operation and Calibration of Porcelain Furnaces	1	2

No.	Tasks/ Experiments	Number of Weeks	Contact Hours
10	Lubrication and Cleaning of High-Speed Handpieces	1	2
11	Air Compressor Maintenance (Draining & Filter Replacement)	1	2
12	Troubleshooting and Minor Repair: Casting Machine	1	2
13	Emergency Response and First Aid in the Lab	1	2
14	Final Practical Evaluation and Laboratory Sign-off	1	2
Number of Weeks /and Units Per Semester		14	28

No.	Tutorial	Number of Weeks	Contact Hours
1	Analysis of Lab Design & Safety Standards	1	2
2	Disinfection Protocols Case Studies	1	2
3	Chemical Safety & SDS Interpretation	1	2
4	Technical Criteria for PPE Selection	1	2
5	Waste Management Classification	1	2
6	Principles of Electrical Safety in Medical Gear	1	2
7	Documentation & Maintenance Log Design	1	2
8	Mechanics of Lathes & Suction Systems	1	2
9	Thermodynamics of Porcelain Furnaces	1	2
10	Lubrication Chemistry & Tool Longevity	1	2
11	Compressed Air Systems Engineering	1	2
12	Troubleshooting Logic & Failure Analysis	1	2
13	Emergency Response Planning	1	2
14	Laboratory Accreditation & Quality Audit	1	2
Number of Weeks /and Units Per Semester		14	28

VI. Teaching Strategies of the Course:

خطأ! لم يتم العثور على مصدر المرجع.

VII. Assessment Methods of the Course:

خطأ! لم يتم العثور على مصدر المرجع.

VIII. Assignments:

No.	Assignments	Week Due	Mark
1	Assignment 1: Presentation+ participation	6-9	15
2	Assignment 2: Group work	Throughout the Semester	10
3	Assignment 3:		
Total			

IX. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Quiz	4	5	5%
2	Assignment	9	5	5%
3	Written test	7	10	10%
4	Midterm examination	7	20	20%
5	Final exam theory	14	60	60%
Total			100	100%

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Quiz	4	5	5%
2	Assignment	9	5	5%
3	Written test	7	10	10%

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
4	Midterm examination	7	20	20%
5	Final exam theory	14	60	60%
Total	100	100%		

- Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.

1- Required Textbook(s) (maximum two):

- 4- Miller, C. H., & Palenik, C. J. (2022). *Infection Control and Management of Hazardous Materials for the Dental Team*. Elsevier Health Sciences. (The most comprehensive textbook in the field).
- 5- U.S. Air Force. (2018). *Dental Laboratory Technology: Pamphlet 47-103, Vol 1 & 2*. (Available as a public domain manual; it is incredibly detailed on lab equipment care).
- 6- Valachi, B. (2008). *Practice Dentistry Pain-Free: Evidence-Based Strategies for Preventing Pain and Extending Your Career*. (Essential for understanding posture and lab bench setup)

2- Essential References:

- 6- Gurney, H. W. *Dental Equipment Repair and Technology*. (Focuses on the mechanical aspects of handpieces, compressors, and lathes).
- 7- Centers for Disease Control and Prevention (CDC). *Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care*
- 8- Organization for Safety, Asepsis and Prevention (OSAP). *Interactions Between the Dental Office and the Dental Laboratory (Guideline Series)*.
- 9- Beuer, F., et al. *Digital Dentistry: A Step-by-Step Guide and Case Reports*. (Excellent for maintenance protocols of CAD/CAM and 3D printing equipment).
- 10- ADA (American Dental Association). *Technical Report No. 136: Laboratory-Coordinated Infection Control*.

3- Electronic Materials and Web Sites etc.:

Websites:

- 4- <http://www.ada.org>
- 5- <http://www.osha.org>
- 6-

Journals:

VIII. Learning Resources:

- Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.

1- Required Textbook(s) (maximum two):

- 7- Miller, C. H., & Palenik, C. J. (2022). *Infection Control and Management of Hazardous Materials for the Dental Team*. Elsevier Health Sciences. (The most comprehensive textbook in the field).
- 8- U.S. Air Force. (2018). *Dental Laboratory Technology: Pamphlet 47-103, Vol 1 & 2*. (Available as a public domain manual; it is incredibly detailed on lab equipment care).
- 9- Valachi, B. (2008). *Practice Dentistry Pain-Free: Evidence-Based Strategies for Preventing Pain and Extending Your Career*. (Essential for understanding posture and lab bench setup)

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- 15- ADA (American Dental Association). *Technical Report No. 136: Laboratory-Coordinated Infection Control*.

3- Electronic Materials and Web Sites etc.:

Websites:

- 7- <http://www.ada.org>
- 8- <http://www.osha.org>
- 9-

Journals:

XI. Course Policies: (Based on the Uniform Students' Bylaw (2007))

Class Attendance:

- 1 Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.

Tardiness:

- 2 A student will be considered late if he/she is not in class after 10 minutes of the start time of class.

Exam Attendance/Punctuality:

- 3 No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.

4	Assignments & Projects: Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	Cheating: Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	Forgery and Impersonation: Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	Other policies: The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.