

Department of Science of Dental Materials



Study Guide
2nd Year BDS

College of Dentistry
Sharif Medical & Dental College,
Lahore



PREFACE

Study guides can make a major contribution to learning. They are sometimes likened to a tutor sitting on the student's shoulder-available 24 hours a day to advise the student what he/she should be doing at any stage in their study. Study guides are different from textbooks. They apprise the student at the beginning of an academic session about the course outline, the teaching methodology to be followed throughout the year, learning objectives of each academic activity and the assessment methodology to be followed in an academic session.

At SMDC we follow the traditional annual academic schedule in which the subject of Science of Dental Materials is taught in the second academic year of a dental student. Keeping in view the mission of UHS, Lahore and vision of our institute we have designed a training program which is intensive and at the same time interesting for the young minds. This guide includes details about various teaching activities which are to take place throughout the academic year along with the time allocation of each. A list of lectures to be conducted in this session with names of the instructors is attached. Broad learning outcomes of every section of the course accompanied by specific learning objectives are included. A complete list of practical work to be carried out in the laboratory is part of this document. Details of various assessment and testing methodologies are included and marks distribution for the subject in the 2nd Professional examinations have been given.

Names and email contacts of faculty have also been mentioned to foster better interaction between the teacher and the taught. A list of prescribed text and reference books forms part of this study guide. Since this document is the first of its kind we intend to improve upon it in light of the student-feedback every year.

For now, happy reading!

Dr. H.M. Owais

BDS, M.Phil

Assistant Professor & HOD

Science of Dental Materials

SMDC, Lahore



VISION & MISSION OF UHS

Qualitative and Quantitative Revolution in Medical Education and Research through Evolution and there by improve Health Care delivery to Populace.

UHS shall be innovative global center of excellence in learning and research, supporting a community of scholars and professionals committed to serving society, promoting the development of students to reach their true potential in becoming competent, ethical, caring, and inquiring health professionals for the benefit of the country and the wider world.

MISSION OF SMDC

Sharif Medical & Dental College is dedicated to best serve the nation through preservation and dissemination of advanced knowledge and educating the students by latest trends in learning and research reaching levels pars excellence.

The Institution is committed to provide standardized quality medical education to its students by inculcating professional knowledge, skills and responsibilities in them with the aim of:

- Preparing them as modern physicians having initiative to act as future leaders in their respective fields and becoming lifelong learners.
- Encouraging the spirit of critical thinking through research and publication.
- Building up an understanding of the ethical values compatible with our religion, culture and social norms.
- Developing a sense of being responsible citizens of the society possessing professional competence and instilling in them the values of hard work and dedication thus preparing them to be accountable to the stakeholders and the state.

The Institution is devoted to keep abreast its faculty with the latest trends in Medical Education encompassing teaching/learning methodologies, assessment tools, research opportunities and professionalism to facilitate their professional development, competencies and commitment towards continues learning.

Our patient-centered mission is achieved by outstanding medical care & services in professional practice with due emphasis and focus on our local health needs.

Our mission further elaborate upon establishing academic and research facilities in areas of local demand under global gold standards and leading advancement in research, education & patient care.

VISION OF SMDC

To be recognized for the provision of a safe and functional environment conducive to collaborative teaching & learning, comfortable working atmosphere, and conducting world class research through professionalism and excellence.



LIST OF CONTENTS

Sr. No	Topic	Page No's
01	PLANNED TEACHING ACTIVITIES	1
02	TRAINING PROGRAM FOR LECTURES	2
03	LIST OF LECTURES & LEARNING OBJECTIVES	5
04	LIST OF PRACTICALS	12
05	ASSESSMENT PLAN	14
06	STAFF CONTACTS	15
07	PRESCRIBED TEXT BOOKS & REFERENCES	16



PLANNED TEACHING ACTIVITIES

PMC has allocated 325 hours of teaching in the subject of Science of Dental Materials for the BDS course. In order to meet this requirement following teaching modules have been planned. These modules have been carefully designed to impart core knowledge of Science of Dental Materials in a manner that an undergraduate student can grasp the subject fully and is adequately prepared for university examinations.

Lectures:

A total of 161 lectures are planned for the entire year. The lectures will be conducted by the assistant professor and demonstrators. The lectures will be interactive and students should actively participate in them to clear their doubts. The students are required to take notes of the lectures and study the topic with the help of prescribed text books in light of the learning objectives of the topic enunciated by the teacher at the beginning of each lecture.

Practical classes:

Two practical classes have been planned per week. It will comprise of supervised manipulation of Dental Materials, dispensing of materials, various forms of wire manipulation and the intended use of the materials being taught in the lectures.

The class will be divided into 02 batches to conduct the practicals effectively and one batch will be entertained once a week for these sessions. Practical will be conducted by demonstrators under an active supervision of senior instructors. Students are required to enter their work in their practical note books and get them checked by the instructors regularly.

Tutorials:

One tutorial class per week is proposed throughout the academic session. The class will be divided into 02 batches. Topics for the tutorial will be notified at least one week before the class. Two instructors, one senior and one junior, will be deputed for every batch on rotation basis. A pre-tutorial quiz or test will be held before tutorial discussion so that the students come prepared for the topic. During this interactive session the students must clear their concepts regarding the topic by actively engaging with their respective teachers.



TRAINING PROGRAM FOR LECTURES

GENERAL

The subject of science of dental materials at undergraduate level enables the students to recognize the clinical, technical and scientific rationale for the use of materials in clinical dental practice. The course curriculum is designed to introduce dental materials science to students and facilitate their study of physical and chemical properties that are related to selection of these products by the dentist and to identify characteristics of materials that affect their biological safety. The practical component of the course involves hands-on experience of the materials and their manipulation in the laboratory.

SECTION I: GENERAL CLASSES AND PROPERTIES OF DENTAL MATERIALS

Sr. No	Title of Lecture	Instructors
1	Classification and overview of different preventive and restorative materials	Dr. Owais Nasim
2	Structure of matter and principles of adhesion	
3	Physical and chemical properties related to material sciences	
4	Surface chemistry	Dr. Tahreem Zahid
5	Biocompatibility	Dr. Amna Rajpoot

SECTION II: DIRECT RESTORATIVE MATERIALS

Sr. No	Title of Lecture	Instructors
1	Introduction to direct restorative materials	Dr. Owais Nasim
2	Dental amalgams: History, composition, classification, properties and setting mechanism	
3	Dental amalgams: Manipulation + factors affecting	
4	Dental amalgams: Biocompatibility	Dr. Amna Rajpoot
5	Dental amalgams: Recent advancements	Dr. Tahreem Zahid
6	Dental cement: An Introduction	Dr. Owais Nasim
7	Dental cements: Recent advancements	
8	Luting agents, bases and liners	Dr. Tahreem
10	GIC: Types and clinical applications	
11.	GIC: ART, sandwich technique and biocompatibility	Dr. Amna Rajpoot
12	Polymerization in dentistry	Dr. Owais Nasim
13	Types of dental composites	
14	Dental composites: Clinical applications and recent advancements	
15	Dental composites: Biocompatibility	Dr. Amna Rajpoot
16	Dental composites: Finishing and polishing	
17	Dental composites: Clinical manipulation	Dr. Tahreem Zahid
18	Usefulness of composite in the sandwich technique	
19	Dentine and enamel bonding: Concept, definitions and rationale	Dr. Owais Nasim
20	Bonding agents: Recent advancements	
21	Bonding agents: Biocompatibility and biodegradation	
22	Bonding agents: Recent advancements	Dr. Tahreem Zahid

SECTION III: INDIRECT RESTORATIVE MATERIALS

Sr. No	Title of Lecture	Instructors
1	Introduction to the concept of indirect restorative materials	Dr. Owais Nasim
2	Definition, ISO classification and properties of denture base materials	
3	Polymerization, chemical composition, manipulation and fabrication of denture base materials	
4	Clinical applications and laboratory care of denture base materials	Dr. Tahreem Zahid
5	Biocompatibility of denture base materials	Dr. Amna Rajpoot
6	Finishing and polishing of denture base materials	
7	Concept of relining and rebasing materials	Dr. Tahreem Zahid
8	Clinical indications and manipulation of relining and rebasing materials	
9	Biocompatibility issues associated with relining and rebasing	Dr. Amna Rajpoot
10	Tissue conditioner	Dr. Amna Rajpoot
11	Types of dental ceramics	Dr. Owais Nasim
12	Fabrication and strengthening of various types of ceramics	
13	Metal-ceramic restorations	
14	All-ceramic restorations	
15	Types of metal alloys used in dentistry	Dr. Owais Nasim
16	Types, processing and clinical applications of wrought, stainless steel, base, noble and high noble alloy	
17	Casting and fabrication of metal prosthesis	
18	Titanium and its alloys	Dr. Amna Rajpoot
19	Understanding alloy phase diagrams	Dr. Owais Nasim
20	Introduction to orthodontic wires	
21	Introduction to soldering, brazing and welding	Dr. Tahreem Zahid
22	Soldering, welding and brazing: components and heat sources	
22	Osseointegration + dental implants	Dr. Amna Rajpoot

SECTION IV: AUXILIARY DENTAL MATERIALS

Sr. No	Title of Lecture	Instructors
1	Types of gypsum products	Dr. Owais Nasim
2	Manipulation, setting reactions and disinfection of gypsum products	
3	Classification of impression materials	
4	An ideal impression material	
5	Classification, characteristics and applications of elastic impression	

	materials	
6	Classification, characteristics and applications of non-elastic impression materials	
7	Comparison between elastic and non-elastic	Dr. Amna Rajpoot
8	Manipulation and disinfection of impression materials	Dr. Tahreem Zahid
9	Introduction to dental waxes	Dr. Owais Nasim
10	Applications of dental waxes with reference to tooth setup	
11	Casting investments	Dr. Tahreem Zahid
12	Abrasive materials used in dentistry	Dr. Amna Rajpoot
13	Separating media	Dr. Tahreem Zahid
14	Air abrasion in dentistry	Dr. Amna Rajpoot
15	Lasers in dentistry	Dr. Tahreem Zahid

SECTION V PREVENTIVE DENTAL MATERIALS

Sr. No	Title of Lecture	Instructors
1	Preventive dental materials: <ul style="list-style-type: none"> • dentifrices and mouthwashes • fluoride agents • pit and fissure sealants 	Dr. Amna Rajpoot

SECTION VI ENDODONTIC MATERIALS

Sr. No	Title of Lecture	Instructors
1	Materials used in Endodontic dentistry	Dr. Tahreem Zahid

LIST OF LECTURES & LEARNING OBJECTIVES

INTRODUCTION

The subject of science of dental materials at undergraduate level enables the students to recognize the clinical, technical and scientific rationale for the use of materials in clinical dental practice. The course curriculum is designed to introduce dental materials science to students and facilitate their study of physical and chemical properties that are related to selection of these products by the dentist and to identify characteristics of materials that affect their biological safety. The practical component of the course involves hands-on experience of the materials and their manipulation in the laboratory.

SECTION I: GENERAL CLASSES AND PROPERTIES OF DENTAL MATERIALS

This section introduces students to the general classification and brief overview of different types of preventive and restorative materials used in dentistry. It illustrates the terms and tenets involved in describing the clinical behavior of these materials based on their physical, chemical and mechanical properties. It also highlights the knowledge of appreciation of certain biological considerations for use of dental materials in oral cavity and hazards associated with them.

Objectives: The section has the objectives to provide basic background knowledge regarding structure of matter and to provide a comprehensive account of relationship between general properties of dental materials and their clinical performance. Another aspect of importance is the potential of this information to predict clinical performance under biological limitations and to allow the students to develop a critical understanding of the factors that determine the safe and correct use of materials in dentistry.

Sr. No.	Title of lectures with learning objectives
1	<p><u>Classification and overview of different preventive and restorative materials</u> By the end of a unit, students will be able to: Understand basic classification of dental materials i.e. metals, ceramics, polymers and composites.</p>
2	<p><u>Structure of matter and principles of adhesion</u> By the end of a unit, students will be able to: Describe the structure of matter and explain the principles of adhesion among dental materials</p>
3	<p><u>Physical and chemical properties related to material sciences</u> By the end of a unit, students will be able to: Demonstrate knowledge of the fundamental biological, chemical and physical principles that make the foundation of the clinical behavior and application of dental materials</p>
4	<p><u>Surface chemistry</u> By the end of a unit, students will be able to: Understand the principles involving surface interaction of dental materials in biological environment</p>
5	<p><u>Biocompatibility</u> By the end of a unit, students will be able to: Demonstrate knowledge of the range of biological consideration regarding the selection and performance of dental materials for clinical applications. Understand the knowledge of safety, biocompatibility and biomechanics as they relate to the correct clinical use of dental materials.</p>

SECTION II: DIRECT RESTORATIVE MATERIALS

This section familiarizes students with a number of key themes and subjects regarding different types of direct restorative materials used in dentistry. It is designed to provide detailed information regarding historical background, types, properties, biological consideration, clinical applications, limitations and selection criteria of direct restorative materials.

Objectives: The objectives of this section are to allow students to develop scientific knowledge, understanding and competence in the area of direct restorative materials. Based on the information regarding their clinical behavior and selection criteria students will be able to grasp the scientific rationale for use of these materials for their clinical applications, to differentiate between the various types of direct restorative materials and their respective properties and to understand the risks, hazards technological advancements and current trends in direct restorative materials.

Sr. No.	Title of lectures with learning objectives
1	<p><u>Dental amalgam</u> By the end of a unit, students will be able to: Describe the history, composition and classification of dental amalgams. Understand the setting mechanism of different types of dental amalgams. Understand and explain the properties of dental amalgams. Understand and demonstrate clinical manipulation and factors affecting the properties of dental amalgams. Understand the issues related to amalgam hygiene in clinical practice. Explain the biocompatibility issues relating to dental amalgams Identify recent advancements in dental amalgams</p>
2	<p><u>Dental cements</u> By the end of a unit, students will be able to: Understand the objectives and basic terminologies related to dental cements. Understand the general requirements, types and properties of different dental cements. Understand and explain the setting mechanism of different dental cements. Understand and explain the properties, advantages and disadvantages of different dental cements. Understand and describe the clinical applications of different dental cements. Understand the concept of bases and liners for different clinical applications. Describe luting agents, types and their properties Understand the use of temporary restorative materials, properties and their uses. Demonstrate techniques for handling and manipulation of various dental cements. Explain chemistry and setting reactions Describe mechanism of adhesion to tooth structure and role of water Enlist clinical manipulation steps of GICs Describe Fluoride release and biocompatibility of GICs Define Atraumatic Restorative Technique (ART) and its uses Define and explain the sandwich technique and its utility</p>
3	<p><u>Dental Polymers:</u> By the end of a unit, students will be able to: Define polymerization and different types of polymerization techniques used in dentistry Enlist various types of polymeric dental materials Describe various steps and principles of polymerization. Explain the physical and chemical changes that occur during polymerization.</p>

4	<p><u>Restorative resin composite</u> By the end of a unit, students will be able to: Describe the history and classification of restorative composites. Understand and describe the properties of different components of restorative composites. Understand the characteristics and clinical applications for composite restorative materials. Understand and explain different modifications in relation to restorative composites. Understand finishing and polishing procedures for restorative composites. Understand the biocompatibility issue related to restorative composites. Understand the recent advancements in restorative composites. Demonstrate clinical manipulation of restorative composites Indications and usefulness of the sandwich technique</p>
5	<p><u>Denting bonding agents and adhesive dentistry</u> By the end of a unit, students will be able to Understand the concept of bonding and adhesion in dentistry. Define enamel and dentine bonding. Understand the significance and rationale behind enamel and dentine bonding. Understand various types and generations of bonding agents. Understand the significance of biodegradation of restorative resins. Understand and explore recent advancements in dentin bonding agents</p>

SECTION III: INDIRECT RESTORATIVE MATERIALS

This section covers detailed information regarding the physical, chemical, and biological properties, manipulation and handling characteristics of indirect restorative materials used in dentistry. This includes detailed study of scientific and clinical properties of materials such as dental acrylic resins, dental ceramics and metals used in restorative dentistry.

Objectives: The objectives of this section are to allow students to develop scientific knowledge, understanding and competence in the area of direct restorative materials. Based on the information regarding their clinical behavior and selection criteria students will be able to grasp the scientific rationale for use of these materials for their clinical applications. Students will be able to learn the selection criteria, risks, hazards, technological advances and current trends regarding indirect restorative materials.

Sr. No.	Title of lectures with learning objectives
1.	<p><u>Denture base acrylic resins</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the definition of denture base materials. • Enlist denture base materials according to the ISO classification and explain their respective properties. • Understand the ideal properties and types of denture base materials. • Understand the chemical composition of denture base materials. • Understand the various procedures involved in the fabrication of denture base materials. • Understand and discuss clinical application, manipulation, processing, and care of dentures for laboratory processed prosthetic resins. • Understand -and describe biocompatibility issues associated with denture base materials. • Describe various methods of polymerization of denture base materials.

2.	<p><u>Denture relining and rebasing materials</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand relining and rebasing procedures for dentures. • Describe various types of relining and rebasing dental materials. • Describe manipulation and properties of relining and rebasing materials. • Understand biocompatibility issues associated with relining and rebasing materials in dentistry.
3.	<p><u>Tissue conditioners</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the definition tissue conditioners. • Understand various types of tissue conditioners used in dentistry • Understand the steps of clinical manipulation of tissue conditioners
4.	<p><u>Dental ceramics</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the basic chemistry of ceramics. • Understand the composition and classification of different dental ceramics systems. • Understand general procedures involved in fabrication of dental ceramics. • Understand the concept of metal ceramic bonding. • Understand metal ceramic restorations, their uses and properties. • Understand all ceramic restoration, their uses and properties. • Describe methods of strengthening ceramics.
5.	<p><u>Metals used in dentistry</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand different types of metals and alloys used in fabrication of dental prosthesis. • Understand the basic concepts related to processing and solidification of dental alloys. • Understand the alloy phase diagrams. • Explain the types, processing and clinical applications of high noble and noble metal alloys • Explain the types, processing and clinical applications of base metal alloys. • Explain the casting procedures for metal alloys. • Explain the types, processing and clinical applications of wrought metal alloys. • Explain the types, processing and clinical applications of stainless steel in dentistry • Explain the casting procedure for Titanium and its alloys. • Describe the properties and composition of various Orthodontic wires
6.	<p><u>Soldering and welding</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the objectives and uses of soldering and welding in dentistry • Understand the differences between soldering, brazing and welding • Describe the components of dental solders and welding • Understand different heat sources for soldering and welding • Understand welding and its types.
7.	<p><u>Dental implants</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Describe the history of implants in dentistry. • Define osseointegration and its factors affecting it. • Explain different types of implants used in dentistry. • Understand materials used for dental implants

SECTION IV: AUXILIARY DENTAL MATERIALS

This section provides information regarding variety of auxiliary dental materials used in dentistry. Auxiliary dental materials include a range of materials that are involved in the fabrication of different dental prosthesis but that do not become part of the prosthesis.

Objectives: The objectives of this section are to develop knowledge regarding basic features of auxiliary dental materials used in clinical and laboratory procedures. It involves the study of composition, properties, manipulation of auxiliary dental materials and the manner in which they interact with the environment in which they are applied.

Sr. No.	Title of lectures with learning objectives
1.	<p><u>Gypsum products</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the properties, types, uses, and manipulation of gypsum products • Understand the method of manufacturing and properties of gypsum products used in dentistry. • Understand the setting reactions of different types of dental gypsum products • Understand the manipulation factors that affect the setting time and physical and mechanical properties of gypsum products. • Understand and demonstrate the methods used for the disinfection of dental gypsum models and study casts. • Understand and demonstrate the proper mixing technique of dental gypsum used for preparing study models and casts.
2.	<p><u>Impression materials</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Enlist the properties, composition and uses of impression materials used in dentistry • Understand the significance of impression and impression materials in dentistry. • Understand the general requirements for an ideal impression material • Explain the techniques used for the disinfection of each type of impression material • Understand the classification, characteristics and properties of elastic and non-elastic impression materials. • Compare the properties and clinical application of different types of impression materials. • Understand and demonstrate proper technique for mixing, handling and disinfection of the elastic and non-elastic impression materials
3.	<p><u>Dental waxes</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the classification and types of waxes used in dentistry. • Discuss the composition, properties and application of different types of dental waxes. • Understand and demonstrate manipulation of different types of dental waxes. • Demonstrate setup of teeth in wax pattern developed on articulated upper and lower gypsum casts.

4.	<p><u>Casting investments and casting procedures</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Define and explain investment materials used in dentistry. • Understand different types of investment materials used in dentistry. • Understand the composition, setting reaction and properties of gypsum bond investment. • Understand the composition, setting reaction and properties of phosphate bonded investment. • Understand the composition, setting reaction and properties of Silica bonded investment. • Understand and compare properties and clinical applications of different types of investments. • Understand the steps and methods involved in casting procedures.
5.	<p><u>Finishing and polishing materials</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the objectives for finishing and polishing of dental restorations and prosthesis. • Understand the classification, composition, properties of abrasives and clinical applications for finishing and polishing materials. • Understand the principles of finishing and polishing of dental materials. • Understand different types of cutting and abrasive instruments. • Describe biological hazards associated with dental abrasion and polishing
6.	<p><u>Separating media</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the rationale behind the use of separating media in dentistry • Describe and identify various types of separating media used in dentistry, including their composition, mechanism of action and properties • Understand and demonstrate the steps involved in manipulation of separating media. • Understand the techniques for application of a separating media
7.	<p><u>Air Abrasion Technology in Dentistry</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Define air abrasion technology. • Enlist the uses of air abrasion in different fields of dentistry
8.	<p><u>Lasers in Dentistry</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Describe the basic principle behind the usage of lasers in dentistry. • Enlist the uses of lasers in dentistry. • Biocompatibility issues related to lasers in dentistry

SECTION V PREVENTIVE DENTAL MATERIALS

The section deals with the introduction and knowledge of various preventive materials used in dentistry. It describes different types of preventive dental materials associated with mechanical tooth cleaning, plaque control, fluorides, and fissure sealants.

Objectives: This section aims to introduce students to basic preventive dental materials used in clinical dentistry involves the study of composition, properties, manipulation of preventive dental materials and the criteria for proper selection for their clinical application.

Sr. No.	Title of lectures with learning objectives
1.	<p><u>Dentifrices</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the types, composition and purpose of dentifrices and mouthwashes.
2.	<p><u>Fluoride agents</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand and identify different types of fluoride agents, their mode of action and application.
3.	<p><u>Pit and fissure sealants</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the composition, properties, manipulation and clinical application of pit and fissure sealants

SECTION VI ENDODONTIC MATERIALS

The section focuses on the material used in endodontics that are used to irrigate and disinfect, obturate and seal the root canal system during endodontic treatment

Objectives: The section introduces students to different types of endodontic materials classified according to their intended clinical uses. It involves the study of composition, properties and mode of application of various disinfectants, lubricants, sealants and obturating materials used in endodontics

Sr. No.	Title of lectures with learning objectives
1.	<p><u>Endodontics</u> By the end of a unit, students will be able to:</p> <ul style="list-style-type: none"> • Define endodontics and materials used. • Describe different types of endodontic materials. • Enlist steps for performing endodontic procedures. • Identify surgical endodontic materials and procedures

LIST OF PRACTICALS

The practical component covers the manipulative and applied aspects of dental material science.

Objectives: The laboratory practical component serves to familiarize students with the range of materials used in dentistry. It involves hands on experience with the materials so that students can understand issues related to dispensing, handling, manipulation and practical application of dental materials.

Sr. No.	Lab procedures with learning objectives
1	<p><u>Introduction to laboratory equipment</u> Learning Objectives:</p> <ul style="list-style-type: none"> • To help identify and familiarize with instruments and equipment required for handling and manipulation of different dental materials in laboratory
2	<p><u>Gypsum products</u> Learning Objectives:</p> <ul style="list-style-type: none"> • To identify different types of gypsum products • To demonstrate the correct dispensing ratio of different gypsum products • To demonstrate the correct mixing technique for gypsum products • To make plaster slab to learn about the accurate initial and final setting time • Manipulation of Soft Plaster (Slabs # 2 & Model Teeth)
3	<p><u>Impression materials</u> Learning Objectives:</p> <ul style="list-style-type: none"> • To identify different types of impression materials. • To demonstrate the correct dispensing, manipulation and application of: <ol style="list-style-type: none"> 1. Alginate 2. ZnO-eugenol paste 3. Impression compound 4. Elastomeric impression materials • To practice loading impression tray with the material and taking impressions on hard plaster casts
4	<p><u>Dental waxes</u> Learning Objectives:</p> <ul style="list-style-type: none"> • To identify different types of dental waxes. • To demonstrate the manipulation and application of different: <ol style="list-style-type: none"> 1. Pattern waxes 2. Processing waxes 3. Impression waxes • Demonstrate setup of teeth in wax pattern developed on articulated upper and lower gypsum casts. • To familiarize students with the melting ranges of commonly employed dental waxes. • To demonstrate and explain the process of de-waxing for the production of an acrylic denture and its significance.
5	<p><u>Acrylic resins</u> Learning Objectives:</p> <ul style="list-style-type: none"> • To demonstrate the correct dispensing, manipulation and application of self-cure and heat-cure dental acrylic resin. • To learn about the various points where acrylic defects can be encountered with basic tips of preventing and correcting the pertinent errors
6	<p><u>Dental amalgam</u> Learning Objectives:</p> <ul style="list-style-type: none"> • To demonstrate the correct dispensing, trituration and application of dental amalgam

	<ul style="list-style-type: none"> To demonstrate hand mixing and mechanical mixing of dental amalgam
7	<p><u>Dental cements</u> Learning Objectives:</p> <ul style="list-style-type: none"> To identify different types of dental cements. To demonstrate the correct dispensing, mixing and application of: <ol style="list-style-type: none"> Zinc phosphate cement Zinc oxide eugenol cement Glass ionomer cement Calcium hydroxide cement
8	<p><u>Restorative composite resins</u> Learning Objectives:</p> <ul style="list-style-type: none"> To identify and familiarize with the armamentarium used for composite restorations i.e. <ol style="list-style-type: none"> Visible light cure unit Acid etching gel Bonding agent Restorative composite
9	<p><u>Metals and alloys</u> Learning Objectives:</p> <ul style="list-style-type: none"> To identify different indirect metallic restorations To identify different orthodontic wire used in dentistry To hone dexterity and reflexes required for accurate wire bending through wire bending exercises comprising of shaping out 26 English Alphabets using SS wire of various thickness. To demonstrate and enlighten the manufacture of C-Clasp, ball-ended clasp and Adam's clasp
10	<p><u>Dental ceramics</u> Learning Objectives:</p> <ul style="list-style-type: none"> To identify different ceramic restorations
11	<p><u>Investment materials</u> Learning Objectives:</p> <ul style="list-style-type: none"> To identify different types of investment materials
12	<p><u>Endodontic materials</u> Learning Objectives:</p> <ul style="list-style-type: none"> To identify different endodontic materials used in dentistry
13	<p><u>Finishing and polishing materials</u> Learning Objectives:</p> <ul style="list-style-type: none"> To identify different abrasives used in finishing and polishing procedures



ASSESSMENT PLAN

Following modes of assessment are planned for 2nd year BDS class in the subject of Science of Dental Materials. This plan has been designed keeping in view the university curriculum and hopefully will facilitate the students in preparing for 2nd professional examinations in the subject.

Chapter Tests:

These will be conducted at the completion of every chapter. The test will comprise of MCQs and SEQs on the pattern of university examinations. A preparatory time of at least 10 days shall be given prior to these tests. Each test will be followed by viva voce, for which the class will be divided into smaller batches.

OSPE Tests:

In order to prepare the students for practical examinations at least two OSPE tests will be conducted on the pattern of university examinations.

Term Tests:

Two term tests shall be conducted in coordination with other subjects. This will comprise of theory, practical and viva segments and a sizeable portion of the total course will be included in each of them.

Pre-annual Exam:

This will be undertaken in coordination with other departments, exactly following the format of university professional examinations. It will comprise of MCQs, SEQs, OSPE and Viva voce.

Internal Assessment:

Internal assessment will be calculated out of 20 on the basis of all these tests that will be conducted throughout the year.



STAFF CONTACTS

Sr. No	Name	Email Address
01	Dr. H.M.Owais Nasim	owaisnasim@gmail.com
02	Dr. Amna Rajpoot	aamnaamir533@gmail.com
03	Dr. Tahreem Zahid	tahreemzahidch@gmail.com



PRESCRIBED TEXT BOOKS & REFERENCES

PRESCRIBED TEXTBOOKS:

- McCabe, John F., and Angus WG Walls, eds. Applied dental materials. John Wiley & Sons, 2013.
- A. Rusavice. Kenneth J., Chiayi Shen, and H. Ralph Rawls. Phillips' science of dental materials. Elsevier Health Sciences, 2013. 12th Edition.
- Powers, John M., and Ronald L. Sakaguchi. Craig's restorative dental materials 13/e. Elsevier India, 2006.

REFERENCE BOOKS

- Darvell, Brian William. Materials science for dentistry. Elsevier, 2009
- Advanced Dental Biomaterials, 1st Edition, Elsevier, 2019