



NUMS
NATIONAL UNIVERSITY
OF MEDICAL SCIENCES

**CURRICULUM
FOR
OPERATIVE DENTISTRY
(2023)**

**National University of Medical Sciences
Pakistan**

1. Context / Preamble

Operative dentistry is a specialty within dentistry that deals with the that phase of dentistry concerned with restoration of parts of the teeth that are defective through disease, trauma, or abnormal development to a state of normal function, health, and esthetics, including preventive, diagnostic, biological, mechanical, and therapeutic techniques, as well as material and instrument science and applications in all age groups. It also includes the field of endodontics related to prevention and treatment of pulpal and periapical diseases.

This undergraduate Operative dentistry curriculum is designed to train Bachelor of Dental Surgery (BDS) students to provide restorative and endodontic services in the practice of general dentistry. This mainly involves diagnosis and management of dental caries and management by different type of restorations and it also deals with diagnosis and management of teeth with pulpal and peri- apical diseases. They would also be able to manage Dental trauma.

Operative dentistry is a major subject of final professional BDS examination and carries a total of 300 marks.

2. Mission: The mission of this course is to familiarize BDS students with the basic knowledge, skills and attitudes for safe practice of operative dentistry and endodontic procedures in dental clinics.

3. Competencies: The following generic competencies apply to this operative dentistry course:

- Critical Thinking
- Problem Solving
- Communication Skills
- Professionalism
- Procedural Skills

4. Learning Outcomes: Specific Learning outcome of each course is attached as Annex A

5. Implementation of the curriculum:

6. Overview:

a. The Operative dentistry is divided into three main blocks with 23 different themes taught sequentially as given below:

1) Operative dentistry

- a) Radiology & Radiography
 - i. Periapical Bitewing
 - ii. Occlusal
 - iii. OPG
- b) Restorative materials

- i. Amalgam Applied Chemistry
- ii. Mercury hazards & hygiene
- iii. Composite resins Applied Chemistry, Acid etching, Enamel & Dentine bonding, Restoration of Class III & IV Posterior Composite Veneers
- iv. Cements Ca(OH)_2 Glass Ionomers Zinc Phosphates Zinc Oxide Eugenol and others
- c) Discoloration of teeth
- d) Inlays and Onlays
- e) Restoration of Pulpless teeth (Post and Core)
- f) Pin Retained restorations
- g) Bleaching - Internal - External
- h) Veneers Porcelain. Composite Metal
- i) Restorative / Gingival Interface
- j) Management of medically compromised patients with special reference to HIV and Hepatitis Implant supported restorations Occlusion

2) Paedodontics

- a. Child management in dental practice
- b. Prevention of Dental Disease
 - i. Prenatal Counseling
 - ii. Oral prophylaxis
 - iii. Fluoride administration
 - iv. Dietary management
 - v. Diet counseling
 - vi. Home care
- c. The Acid etch Technique in caries prevention
- d. Pit & Fissure Sealants & Preventive resin restorations
- e. Radiology
- f. Problem of Pain & Sedation
- g. Periodontal disease in children
- h. Injury to the primary & permanent teeth
- i. Pulp therapy for the primary & young permanent teeth-Apexification - Apexogenesis
- j. Restorative dentistry for the primary dentition
- k. Anesthesia
 - a) Rampant caries
 - b) Fluorides
 - c) Treatment of handicapped children

3) Endodontics

- a. Diagnostic Procedures. - History - Clinical examination - Therapeutics
- b. Clinical Classification of pulpal & periapical disease - Reversible pulpitis. - Irreversible pulpitis. - Acute apical periodontitis. - Acute apical abscess - Chronic apical periodontitis
- c. Local Anesthesia
- d. Instruments
- e. Internal Morphology & Access opening
- f. Pulpectomy – diagnostic & working length, cleaning filing, shaping
- g. Bio-mechanical canal preparation etc.
- h. Irrigants & intra canal medicaments
- i. Root canal sealers & obturation.
- j. Failures in endodontics
- k. Surgical Endodontics & Re-treatment
- l. Endo – perio lesions
- m. Internal, external resorption
- n. Radiographic Analysis.
- o. Dental emergency
- p. Sterilization and asepsis
- q. Traumatic injuries - Crown fracture - Root fracture - Displacement - Avulsion
- 4) The theory component is covered by three lectures per week in fourth (Final) year.
- 5) Implementation of curriculum is at the discretion of institute. Clerkships/ clinical rotations for 08 weeks' may be followed
- 6) During their clinical rotation, students in small groups learn through practical chair side demonstrations of the techniques of
 - a. local anesthesia administration
 - b. Class 1, Class II cavity preparation, condensation, burnishing and finishing of Amalgam restorations
 - c. Cavity preparations, placement, finishing and polishing of Class III, Class IV and Class V cavities with composite restorations
 - d. They then perform Class I, Class II Amalgam restorations and Class III, IV and V composite restorations
 - e. They also perform 05 cases of endodontic therapy on extracted teeth.

7. Resources:

To be filled by each Institute

8. Facilities:

To be filled by each Institute

9. Course Administration:

To be filled by each Institute

10. Students Assessment:

- a. Minimum attendance of 75% is a requirement to appear in university professional examination.
- b. Students are expected to perform 250 fillings of teeth as recommended by PM&DC during their clinical duty in 4th Year BDS and successfully complete practical exercises and assignments.
- c. Continuous formative evaluation is conducted during the academic year comprising of 5 theory tests, and 2 clinical assessment tests (Pre-annual and Annual). The results are communicated to students through notice board. Feedback is provided after each evaluation.
- b. The weighting of internal assessment is 20% in 4th professional BDS Examination
- c. There will be two mid-term & term examinations followed by a pre-Annual and annual examinations each year.
- d. The structure of the paper of all the term examinations and pre-annual will be the same as that for annual examination though syllabus will be different.
- e. The structure of Mid-term exam will be half of the term exam.
- f. The syllabus for mid-term & term examinations will be announced by the department at least 02 weeks prior to examination.
- g. Pre-annual examination will be from whole syllabus.
- h. The date sheet for mid-term, term and pre-annual examinations will be published by Examination branch while the examinations will be conducted by respective department. The result will be submitted to examination branch for incorporation in internal assessment.
- i. The University shall take the 4th professional Examination at the end of the academic year. Annual Theory will be of 100 marks & Practical Examination will be of 200 marks. The pass score shall be 50% in theory and practical separately. However, in clinical subjects, student should pass in clinical exams / OSCE (with 50% marks) and unobserved stations (with 50% marks) separately
- j. **Log book**
Each student is expected to maintain record of practical work in log book. Safe keeping (make copies) of the log book is the responsibility of each student. The log book must be submitted to the Operative dentistry department at the end of the academic year.

11. Communication of Information to Students: All information communicated to students through Notice boards.

12. Learning Resources

Recommended Textbooks

- The Art & Science of Operative Dentistry by Sturdevant
- Pickards Manual of Operative Dentistry by EAM Kidd
- Paediatric Dentistry by Welbury
- Pathway of the Pulp by Cohen
- Fundamentals of Operative Dentistry by Schwartz
- Essentials of Dental Radiography & Radiology by Frickwhaite

Topic/theme	Course Content	Learning Outcomes At the end of each module, student will be able to:		Instructional Strategies	%
		Knowledge	Skills		
Dental Caries	<ul style="list-style-type: none"> Dental caries and its types Causes of dental caries Diagnosis and treatment planning for dental carious lesions Fundamentals of tooth preparation 	<ul style="list-style-type: none"> Define dental caries and its different types To enlist different methods of diagnosing dental caries and to practice all the tests of diagnosis competently Discuss fundamentals and classification of tooth preparations for dental caries 	<ul style="list-style-type: none"> Identify dental caries practice all steps for cavity preparations competently 	Lecture/Self-directed learning/Assignment	
Amalgam	Amalgam <ul style="list-style-type: none"> Applied Chemistry Mercury hazards and Hygiene Restoration of Class I and II Complex Amalgam restorations Pin retained restorations 	<ul style="list-style-type: none"> Explain the physical and chemical properties, manipulation, finishing and polishing and resolution of errors related to amalgam restorations Discuss the physical properties of dentinal pins and to enlist the steps used for preparation of complex amalgam restoration 		Lecture/Case-based learning	
Composites	-Composites <ul style="list-style-type: none"> Applied chemistry Acid etching Enamel and dentine bonding Restoration of Class III and Class IV Composite Veneers 	<ul style="list-style-type: none"> Explain the physical and chemical properties, manipulation, finishing and polishing and resolution of errors related to amalgam restorations Differentiate types of dentin bonding agents used and the physical and chemical properties of 		Lectures; Case-based learning/Chair-side learning	

		Dentin Bonding agents(DBA) <ul style="list-style-type: none"> Explain different techniques used to prepare for direct composite veneers and to identify the cause of failure of direct veneer 			
Veneers	-Veneers Porcelain Metal	Describe different techniques of preparation and clinical methods related to finishing, polishing and cementation of Direct and indirect veneers		Lectures	
Pin Retained restorations	-Inlays and Onlays -Crowns	<ul style="list-style-type: none"> Describe the physical properties , manipulation, finishing and polishing resolution of errors related to amalgam restorations 		Lectures; Clinical demonstration	
CAD and CAM	-CAD and CAM -Occlusion - Restoration of Pulpless teeth(Post and Core) -Cements <ul style="list-style-type: none"> Ca(OH)₂ Glass Ionomers Zinc Phosphates Zinc oxide Eugenol and others 	<ul style="list-style-type: none"> Describe the physical properties of different ingots used in Indirect veneers, onlays and inlays Enlist the steps of construction of restorations in CAD and CAM Enlist the clinical steps related to try in, finishing, polishing and cementation of CAD and CAM constructed 		Lecture; case-based learning/chair-side learning/clinical demonstration	

	-Restorative/Gingival interface	<p>veneers, inlays and onlays</p> <ul style="list-style-type: none"> • Enlist different restorations used for endodontically treated teeth • Describe the different types of endopost used, the physical properties and method of preparation, cementation and core build up • Define biological width and list the factors effecting the health of biologic width 			
Radiology and Radiography	<p>-Periapical</p> <p>-Bitewing</p> <p>-Occlusal</p> <p>OPG</p>	<ul style="list-style-type: none"> • Discuss basic principles, interpretation, clinical techniques for performing peri apical radiographs and to interpret the errors and how to rectify the errors in peri apical radiographs • To interpret OPG radiographs for diagnosis 		Lecture; case-based learning/chair-side learning/clinical demonstration	
Management of medically compromised patients with special reference to HIV and hepatitis	Management of medically compromised patients with special reference to HIV and hepatitis	<ul style="list-style-type: none"> • Identify the factors related to medically compromised patients and the necessary pre requisites for handling the patients before performing any operative procedures 		Lecture; Skill lab/ demonstration	

Occlusion	Occlusion	<ul style="list-style-type: none"> Recall different terminologies used in occlusion Describe different procedures used for taking occlusal relationships necessary for constructing restoration 		Lecture; case-based learning/chair-side learning/clinical demonstration	
Discoloration of teth	Discoloration of teeth	<ul style="list-style-type: none"> Identify different types of discoloration of teeth Describe the different techniques used for treating discolored teeth 		Lecture; case-based learning/chair-side learning/clinical demonstration	
Bleaching	<ul style="list-style-type: none"> Bleaching Internal External 	<ul style="list-style-type: none"> Explain different types of bleaching techniques To list the steps for performing different types of bleaching 			
Clinical classification of pulpal and periodontal disease	<ul style="list-style-type: none"> Reversible Pulpitis Irreversible Pulpitis Acute apical periodontitis Chronic apical periodontitis Acute Alveolar abscess Chronic alveolar abscess Focal sclerosingosteitis 	<ul style="list-style-type: none"> Identify the different clinical signs and symptoms of different pulpal disease Interpret peri apical radiographs related to the pulpal diseases and to diagnose 		Lecture; case-based learning	
Diagnosis & Treatment planning	<ul style="list-style-type: none"> Diagnosis & Treatment planning Diagnostic procedures 	<ul style="list-style-type: none"> Diagnose pulpal and peri apical diseases by combining the clinical 		Lecture; case-based learning	

	<ul style="list-style-type: none"> History and Clinical examination Radiographic analysis 	<p>and radiographical examination</p> <ul style="list-style-type: none"> To prepare treatment plan in a sequential manner and according to the problem list 			
Non-odontogenic diseases mimicking pulpal and periodontal diseases	-Non- odontogenic diseases mimicking pulpal and periodontal diseases	<ul style="list-style-type: none"> list the different non odontogenic diseases mimicking pulpal and peri apical diseases list the differentiating features that help in diagnosing the non odontogenic diseases 		Lecture; case-based learning	
	-Endo-perio lesions	<ul style="list-style-type: none"> Recall different types and clinical features of endoperiolesion diagnose endoperio lesions on the basis of signs and symptoms and radiographic interpretation 			
	-Resorption Internal External	<ul style="list-style-type: none"> list different types and clinical features of resorption Differentiate internal and external resorption on the basis of clinical and radiographic evaluation Prepare treatment plan and recognize the prognostic value according to the type of resorption 			
Therapeutics	Therapeutics	<ul style="list-style-type: none"> List the physical and chemical properties of 		Lecture; case-based learning	

	<p>-Non- surgical endodontics</p> <p>-Non- Surgical Re – treatment</p> <p>-Surgical endodontics</p> <p>-Dental Emergency</p> <p>-Geriatric endodontics</p>	<p>the materials used in non surgical endodontics</p> <ul style="list-style-type: none"> • List the different guidelines and steps of preparing access cavity • Enlist the different guidelines and steps involved in chemo mechanical instrumentation • Describe the biomechanics of the different instruments used in non- surgical endodontics • List the different surgical flaps performed for apicectomy • Discuss the steps or guidelines for performing surgical apicectomy and retrograde restorations • Diagnose different dental traumatic injuries and to enlist different steps or guidelines for managing such injuries • Identify variations in root morphology related to geriatric patients and to manage such variations according to the recommended guidelines for access cavities and instrumentations in sclerosed or narrow canals 			
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Sterilization and asepsis	Sterilization and asepsis	Enlist the recommended guidelines for sterilization of dental operatories and dental instruments		Lecture; case-based learning	
Traumatic emergencies	<ul style="list-style-type: none"> - Crown fractures - Root fractures - Displacement - Avulsion 	Diagnose different dental traumatic injuries and to enlist different steps or guidelines for managing such injuries		Lecture; case-based learning	
Child management in Dental Practice	Child management in Dental Practice	Describe different non pharmacological behavior management modalities		Lecture; case-based learning	
Clinical diagnosis of Padiatric dental diseases	<p>Clinical diagnosis of Padiatric dental diseases</p> <p>Early childhood disease</p> <ul style="list-style-type: none"> -Rampant Caries -Fluorosis -Congenital dental anamolies 	Differentiate the clinical features of pulpal and peri radicular diseases of primary teeth		Lecture; case-based learning	
Prevention of Dental Diseases	<p>Prevention of Dental Diseases</p> <ul style="list-style-type: none"> - Prenatal counseling - Oral Prophylaxis - Fluoride Administration - Dietary Management - Diet counselling - Home care - Acid etch technique in caries prevention 	List the preventive protocols and different preventive modalities		Lecture; case-based learning	

	- Pit and fissure sealants and preventive resin restorations				
Treatment modalities	<p>Treatment modalities</p> <p>-Restorative dentistry for primary dentition</p> <ul style="list-style-type: none"> • Composite • Compomers • Glass ionomer • Amalgam • Stainless steel crowns <p>-Vital and Non Vital Pulp therapy for the primary and young permanent teeth</p> <ul style="list-style-type: none"> • Apexification • Apexogenesis • Pulpotomy • Pulpectomy 	<ul style="list-style-type: none"> • list indications, contra indications and different steps involved in vital pulp therapies, pulpectomy • Recall the physical and chemical properties of restorations used in pediatric dentistry • Describe the Halls technique for stainless steel crowns and the steps for preparation of teeth related to this technique 	Practice all types of restorations on deciduous teeth	Lecture; case-based learning	
Radiology	Radiology	interpret OPG , Bite wing and periapical radiographs	Practice bite wing and peri apical radiographs	Lecture; case-based learning	
Injury to primary and permanent teeth	Injury to primary and permanent teeth	<ul style="list-style-type: none"> • Diagnose different types of dental injuries to primary and permanent dentition 	practice different splinting techniques used to stabilize teeth undergoing trauma	Lecture; case-based learning	
Anesthesia and sedation	Anesthesia and sedation	<ul style="list-style-type: none"> • List indications, contra indications and the pharmacokinetics of conscious sedation and general anesthesia 		Lecture; case-based learning	