

## In the Name of God

### Section I:

**Title: Endodontics**

**Degree: Master of Science in Clinical Dentistry (M.Sc.)**

### Introduction

Endodontics or root canal therapy/treatment is a clinical specialty in dentistry. By obtaining the necessary knowledge and observational, practical and behavioral skills during the course of studies, the graduates of endodontics can prevent, diagnose and treat pulp and periapical diseased timely.

### Definition

The main subjects and services provided by the graduates of the program consist of: a. diagnosis b. prevention c. treatment d. consulting e. education f. research g. managing h. self-learning

- a) **The Role in Diagnosis:** Communication with patients and accompanying persons, accurate examination, getting the medical history of patients, requesting necessary para-clinical tests, taking diagnostic measures, consulting if necessary, proper diagnoses and treatment planning.
- b) **The Role in Prevention:** Recognition of predisposing factors of pulp and periapical diseases and applying the methods to face these factors.
- c) **The Role in Treatment:** Submitting information into patient's medical record, performing the appropriate treatment, if needed, and follow-up.
- d) **The Role in Consultation:** Giving specialist advice to patients and colleagues.
- e) **The Role in Education:** Educating patients with and colleagues and teaching in universities of the country.
- f) **The Role in Research:** Identification of existing problems, proposing a hypothesis for resolving these problems, presenting the proposal and conducting research, gathering results and proposing practical solutions to resolve the problem.
- g) **The Role in Management:** The ability of planning, leading, participating and supervising an educational-therapeutic team.
- h) **The Role in Self-Learning:** The ability to access to latest information and use scientific resources in internet, the ability of screening methodological information using "evidence-based endodontics", and the ability to use and apply updated information in current treatments.

### The Aim of the Course

The aim of this program is to train endodontic specialists according to global standards and based on domestic needs. Graduates of this major will be able to provide the public with the best preventive-therapeutic services. Furthermore, they will have the competency to move in the direction of extending borders of science and research in this field.

### General Competencies

Effective communication with patients, accurate examinations, proper application of paraclinical tests, familiarity with modern science and technology, accurate diagnosis and appropriate treatment planning, proposing appropriate preventive and therapeutic strategies, conducting research with the aim of solving existing problems, educating patients, companions and colleagues, and management and executive participation in the health team.

### **Specific Competencies and Skills (Special Qualifications)**

Carrying out accurate diagnostic tests, proper access cavity preparation in all teeth, root canal preparing in straight and curved root canals using hand and rotary systems, obturation of straight and curved root canals, retreatment in single and multi-rooted teeth, apical surgery with the application of retrograde materials in single and multi-root teeth, vital pulp therapy, apexogenesis, apexification by placing an apical plug, revitalization of necrotic teeth with open apices, treatment of traumatized teeth, single unit dental implants and bleaching of non-vital teeth.

### **Professionalism and Ethical Expectations from Graduates:**

It is expected that graduates:

- a) **In the Area of Altruism:** Preferring the patient's interests to their own, observance of justice while working with different patients, considering all physical, psychological, social and belief-related aspects of patients while treating them, spending enough time in all phases of patient care, paying attention to patients' demands and discomforts, observance of the patients' bill of rights.
- b) **In the Area of Dutifulness and Responsibility:** Have enough commitment to do their tasks, answer patients' questions, provide patients and their accompaniers with information regarding the patient's status in the most appropriate way, avoid unnecessary interferences with colleagues' work and interact with the health team members, ask patients' permission for examining and taking any diagnostic-therapeutic measures, and instructing patients properly regarding prevention, appearance of side effects, disease reoccurrence and improvement of life quality.
- c) **In the Area of Honor and Honesty:** Be truthful, honest and confident and respect patient's privacy.
- d) **In the Area of Respecting Others:** Respect patients' conventions, traditions and habits, respect patient as a human being, respect patients' time and observe order and regularity, respect patients' accompaniers, colleagues and therapeutic team members, and have an appearance appropriate to professional prestige.
- e) **In the Area of Professional Career:** Accept critique, know their scientific limitations, ask for advice and help if needed, improve their knowledge and skills constantly, do diagnostic-therapeutic measures according to available facilities and scientific achievements, and observe the standards of completing medical record and reporting.

### **The Terms and Conditions of Admission to the Course**

Applicant's documents, including his/her DDS/BDS degree, CV, Recommendation, etc will be reviewed by the faculty members of endodontics department. Based on the documents, the applicant will be accepted for either an interview or a three month evaluation period to be an observer in Endodontics department. If he/she could successfully pass the interview/evaluation period, he/she will be accepted to continue as a M.Sc. student.

### **Educational Strategies, Methods and Techniques**

The following educational strategies are considered in endodontics:

Learner-centered education, learning based on problem solving, integration of basic and clinical sciences, evidence-based learning, lifelong community-oriented education, and systematic education.

### **Student Assessment**

A variety of assessment methods including theoretical exam, DOPS, OSCE, Seminar presentation, portfolio, etc, depending on the course, is implemented.

## **Number and Type of Credits and Tables of the Courses**

The Endodontics MSc program is a 3 year full time program in accordance with the regulations of the Council of Dental and Specialty Educations.

## **The Educational System**

The educational system of the Endodontic MSc program is semestrial. Theoretical, practical and workshop courses are set in three areas of basic sciences, related sciences and specialty sciences.

## **Course Structure**

The course structure of the Endodontic MSc program consisting of common and specialized basic science, related science and specialty science courses is as follows:

### **Basic Science Courses**

These courses are considered to be the infrastructure of related science and specialty science courses and their aim is to remind, update, expand and deepen the topics that are presented in this MSc program.

Overall basic science courses consist of 13 units presented as common and specialty science courses. Common basic science courses are those that are presented simultaneously and in the same learning environment for all specialty fields of dentistry; whereas, specialty basic science courses are those that are presented with and as specialty courses.

### **Related Science Courses**

These courses discuss the scientific relationship with other specialty fields of dentistry and teach knowledge, creativity and making correct decisions to residents so that they can participate in team work attempts to provide comprehensive care for patients by recognizing abilities, priorities, limitations and new developments in science.

These courses consist of one unit in a joint program with different educational departments.

### **Specialty Science Courses**

Specialty science courses are aimed to enhance and deepen the level of knowledge, create belief and high quality skills in the field of the specialty of Endodontics and consist of 95 units in this field. These courses will be delivered and led by faculty members.

The total number of specialized courses in the field of Endodontics is 109 units.

### Common Basic Science

Code	Course	Units				Hours				prerequisite
		Theoretical	Practical	Workshop	total	Theoretical	Practical	Workshop	total	
1	Medical Education(1)	-	-	1	1	-	-	51	51	-
2	Medical Education(2)	-	-	2	2	-	-	102	102	-
3	Research methodology & EBD	-	-	2	2	-	-	102	102	-
4	Clinical photography	-	-	1	1	-	-	52	52	-
5	Medical emergencies	-	-	0.5	0.5	-	-	24	24	-
6	Medical Regulation and Ethics	-	-	1	1	-	-	51	51	-
7	Infection Control & Patient's Safety	-	-	1	1	-	-	51	51	-
8	Clinical Management and Governance	-	-	1	1	-	-	51	51	-
total		-	-	9.5	9.5	-	-	483	483	-

### Specialized Basic Science

Code	Course	Units				Hours				prerequisite
		Theoretical	Practical	Workshop	total	Theoretical	Practical	Workshop	total	
9	Oral Pathology	0.5	-	-	0.5	9	-	-	9	-
10	Immunology and Oral Microbiology	0.5	-	-	0.5	9	-	-	9	-
11	Applicable Head and Neck Anatomy	-	0.5	-	0.5	-	17	-	17	-
12	Oral and Maxilofacial Histology & Embryology	0.5	-	-	0.5	9	-	-	9	-
13	Biomaterials	0.5	-	-	0.5	9	-	-	9	-
14	Pharmacology	0.5	-	-	0.5	9	-	-	9	-
15	Oral Physiology and Biology	0.5	-	-	0.5	9	-	-	9	-
total		3	0.5	-	3.5	54	17	-	71	-

### Related Sciences

Code	Course	Units				Hours				prerequisite
		Theoretical	Practical	Workshop	total	Theoretical	Practical	Workshop	total	
16	Interdepartmental Seminars( periodontics- pediatrics)	0.5	-	-	0.5	9	-	-	9	
17	Interdepartmental Seminars(restorative- prosthodontics)	0.5	-	-	0.5	9	-	-	9	
total		1	-	-	1	18	-	-	18	

### Specialty Siences

Code	Course	Units				Hours				prerequisite
		Theoretical	Practical	Workshop	total	Theoretical	Practical	Workshop	total	
18	Case presentation 1	1.5			1.5	26			26	
19	Case presentation 2	1.5			1.5	26			26	
20	Case presentation 3	1.5			1.5	26			26	
21	Case presentation 4	1.5			1.5	26			26	
22	Evidence based Endodontics	1			1	17			17	
23	Theoretical Endodontics 1	6			6	102			102	
24	Theoretical Endodontics 2	6			6	102			102	
25	Theoretical Endodontics 3	6			6	102			102	
26	Theoretical Endodontics 4	6			6	102			102	
27	Theoretical	6			6	102			102	

	Endodontics5								
28	Theoretical Endodontics6	12			12	204			204
29	Practical Endodontics1		6		6		204		204
30	Practical Endodontics2		6		6		204		204
31	Practical Endodontics3		6		6		204		204
32	Practical Endodontics4		6		6		204		204
33	Practical Endodontics5		6		6		204		204
34	Thesis 1			2	2		102		102
35	Thesis2			2	2		102		102
36	Thesis3		2		2		68		68
37	Thesis4			2	2		102		102
38	Thesis5			2	2		102		102
39	Journal Club1	1.5			1.5	26			26
40	Journal Club2	1.5			1.5	26			26
41	Journal Club3	1.5			1.5	26			26
42	Journal Club4	1.5			1.5	26			26
Total		55	32	8	95	939	1088	408	2435

## Ethical Issues

The graduates should,

- Observe the Patient's Bill of Rights<sup>1</sup> when working with the patients.
- Strictly observe Biosafety and Patient Safety Rules\* concerning the patients, personnel and workplace.
- Observe the Rulebook for Dress Code<sup>2</sup>.
- Strictly observe the Regulations of Working with the Laboratory Animals<sup>3</sup>.
- Carefully preserve resources and equipment.
- Truly respect faculty members, the staff, classmates and other students and work for creating an intimate and respectful atmosphere.
- Observe social and professional ethical considerations in criticism.

1, 2 and 3 are contained in the Enclosures.

\* Biosafety and Patient Safety Rules will be set out by the Educational Departments and will be available to the students.

## Section II

**Unit Title:** Medical Education (1)

**Unit Code:** 1

**Number and type of unit:** 1 workshop unit

**Educational hours within the course duration:** 51h

**Prerequisite:** none

### **Aims:**

The aim of the Medical Education (1) and (2) units is for the residents to obtain the necessary ability to take part in the education and evaluation of theoretical, workshop, preclinical and clinical courses in their specialty field.

### **Subtitles**

1. The role of the faculty members in the field of education
2. Principles of teaching-learning
3. Types of learning
4. Skills regarding the process of teaching
5. Characteristics and duties of faculty
6. Lesson plan
7. Educational aims
8. Principles of preparing educational contents
9. Speech
10. The text of questions and answers
11. Small group education
12. Different methods of group training
13. Roll fulfillment and simulation
14. Clinical education
15. Educational aids
16. Smart boards
17. Powerpoint preparation



**Unit title:** Medical Education (2)

**Unit code:** 2

**Number and type of unit:** 2 workshop units

**Educational hours within the course duration:** 102h

**Prerequisite:** none

**Aims:**

The aim of the Medical Education (1) and (2) units is for the residents to obtain the necessary ability to take part in the education and evaluation of theoretical, workshop, preclinical and clinical courses in their specialty field.

**Subtitles**

1. Specific lesson plans
2. Student evaluation and its methods
3. Multiple-choice questions
4. Descriptive questions
5. Level classification of exam questions
6. Evaluation
7. Dops design
8. OSCE exams
9. Oral exam
10. Question analysis
11. Plan evaluation
12. Course planning
13. Log book
14. Port folio
15. Perspectives based on learning ability
16. Standard patent
17. Integration in education

**Unit title:** Research methodology and EBD

**Unit code:** 3

**Number and type of unit:** 2 workshop units

**Educational hours within the course duration:** 102h

**Prerequisite:** none

**Aims:**

Acquisition of knowledge and familiarity with the methods of research in the field of education and skill acquirement in order to publish the results of research.

**Subtitles**

	<b>Content</b>	<b>Method of learning-teaching</b>	<b>Duration (hours)</b>
1	Principles of research and evidence-based dentistry and designing questions in evidence-based dentistry	Problem oriented lecture	3
2	A review of the scientific resources	Problem oriented lecture	3
3	Search engines and important and practical sites in dentistry	Workshop	6
4	Familiarity with resource management softwares for all types of studies in dentistry	Practical	9
5	Types of studies in dentistry	Interactive lectures	3
6	Descriptive studies	Lecture, discussion in small groups	3
7	Indicators of health and disease measurement	Problem oriented lecture	3
8	Indicators of measuring corelation	Problem oriented lecture	3
9	Principles of analytical-observational studies	Lecture	3
10	Interventional studies	Problem oriented lecture	3
11	Review studies	Lecture	3
12	Evaluation of diagnostic tests	Problem oriented lecture	3
13	Errors and causation	Problem oriented lecture	3
14	Principles of descriptive statistics	Problem oriented lecture	6
15	Estimation and hypothesis testing	Problem oriented lecture	6
16	Critical evaluation	Lecture	3
17	Prioritization and topic selection and proposal	Lecture, discussion in small groups	3
18	Objectives, hypothesis and variables and research management and ethics	Lecture, discussion in small groups	3
19	Methods of data collection and questionnaires	Lecture, discussion in small groups	3

20	Sampling and sample size calculation	Lecture, discussion in small groups	3
21	Research Errors - Bias	Problem oriented lecture	3
22	Interactions and research errors - confounding	Problem oriented lecture	3
23	Special considerations in cohort studies and case-control studies	Lecture, discussion in small groups	3
24	Special considerations in interventional studies	Lecture, discussion in small groups	3
25	Special considerations in evaluating diagnostic tests	Lecture, discussion in small groups	3
26	Qualitative studies	Problem oriented lecture	3
27	Familiarity with statistical tests used in dentistry	Problem oriented lecture	6

**Unit title:** Clinical photography \*

**Unit code:** 4

**Number and type of unit:** 1 workshop unit

**Educational hours within the course duration:** 51h

**Prerequisite:** none

**Aims:**

Familiarity with types of cameras and taking specialized photographs from dental patients and storing them.

**Minimum skills expected:**

The resident must be continuously proficient regarding the steps needed in emergencies and must apply them on standardized patient. For this purpose, a flowchart of emergency treatments must be displayed by residents.

**Subtitles**

	<b>Content</b>	<b>Method of learning-teaching</b>	<b>Duration (hours)</b>
1	Familiarity with types of standard and proper cameras and learning how to use cameras and a fulcrum	Workshop	1
2	Familiarity with a types of retractors, mirrors and how to use them	Workshop	1
3	Portrait and profile photography	Workshop	1
4	Intra-oral and extra-oral photography	Workshop	1
5	Taking photographs from radiographs and casts	Workshop	1
6	Familiarity with 3 dimensional pictures and how to prepare them	Workshop	1
7	Familiarity with the resolution of possible problems established during the workshop and group photography	Workshop	1
8	Executing standard photographs and their analysis	Workshop	3
9	Taking 3 dimensional graphs and analyzing them	Workshop	3
10	Superimposing photographs and radiographs	Workshop	1
11	Familiarity with storage of images (two-dimensional and three-dimensional)	Workshop	1
12	Familiarity with softwares related to photography and editing pictures	Workshop	1
13	Power point slide presentaion	Workshop	1

**Main reference:**

Mastering Digital Dental Photography, 2006 Ed.

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\*This is an optional course

**Unit title:** Medical emergencies

**Unit code:** 5

**Number and type of unit:** 0.5 workshop unit

**Educational hours within the course duration:** 24h

**Prerequisite:** none

**Aims:**

Skill acquisition in the diagnosis and treatment of common medical emergencies in dental clinics in Skill Labs and learning on training models

**Subtitles**

1. How to obtain medical history and its role in the prevention and diagnosis of emergencies and examinations
  2. Equipment and facilities in emergencies
  3. Common emergencies and their management, including hypersensitivity reactions, respiratory problems and changes in the level of consciousness
  4. CPR
  5. Circulation – Airway- Breathing techniques
  6. Application of drugs in medical emergencies
  7. Practical skills in medical emergencies (injection, serum therapy ...)
  8. Familiarity with emergency materials and facilities in the department and shared facilities in the school
- It is recommended that sessions be held as 3h workshop sessions and this course be taught by Oral and Maxillofacial Surgeons (which can be organized in collaboration with the Department of Emergency Medicine)

**Unit title:** Medical Regulation and Ethics

**Unit code:** 6

**Number and type of unit:** 1 workshop unit

**Educational hours within the course duration:** 51h

**Prerequisite:** none

**Aims:**

Empowering residents in morality theories, their professional obligations towards the society and the legal rights of patients and colleagues. During this course the recognition skills of residents regarding ethical issues and their analysis is strengthened so that they can make the best decisions considering ethical and legal regulations in educational and research environments as faculty members and researchers and during service delivery as a therapist.

**Subtitles**

	Content	Method of learning-teaching	Duration (hours)
1	General and practical ethics and professionalism	Workshop	1
2	Altruism, respect, job sublimity and justice	Workshop	1
3	Honor and honesty, conscientiousness	Workshop	1
4	History and moral philosophy, and the four principles of bioethics	Workshop	1
5	Ideologies and moral theories	Workshop	1
6	Diagnostic tools in ethical decision making	Workshop	1
7	Informed consent, acquittal and determination of substitute decision-making capacity	Workshop	1
8	Confidentiality and speaking the truth	Workshop	1
9	The relationship of dentist with other members of the health	Workshop	1
10	Principles of office management, medical documentation, communication of dentists with patients	Workshop	1
11	Familiarity with the medical council, dental regulations, responsibility, medical malpractice and errors, atonement	Workshop	1
12	Understanding the implications of certification, and the rules of court	Workshop	1

	proceedings		
13	Conflict of interest	Workshop	1
14	Ethics in educational environments	Workshop	1
15	Islamic jurisprudence traditions and its relation to ethics in dentistry	Workshop	1
16	Challenges in medical ethics	Workshop	1
17	Integrated case presentation	Case presentation and literature review	1

\*each session is equivalent to 3 educational hours.

**References:**

1. Clinical ethics: an overview of the application of ethics in treatment, compilation of William Dender
2. Professional ethics in health and therapeutic services, Mohamad Mahdi Esfehni, Office of research of Iran University of Medical Sciences, 1372
3. Ethics in medical research, compilation of Treror Smith
4. Ethics for physicians, Dr Seyyed Ziaeddin Tabei, Isfehan University of Medical Sciences, 1380



**Unit title:** Infection Control & Patient's Safety

**Unit code:** 7

**Number and type of unit:** 1 workshop unit

**Educational hours within the course duration:** 51h

**Prerequisite:** none

**Aims:**

For residents to understand and perform methods and skills of patient safety in dental clinics and hospitals.

**Subtitles**

1. Patient safety
2. The importance of human factors in patient safety.
3. Understanding complex and effective systems in patient care and safety
4. Establishment and use of effective teams
5. Lessons from past mistakes to avoid future risks
6. Recognition and management of health risks
7. Ways to improve quality in order to improve safety
8. Increasing communications between patients, staff, and supervisors
9. Care, prevention and infection control
10. Immunity and safety in infectious diseases
11. Increase and improvement of drug safety
12. Microbiology of common infectious diseases in dentistry and their transmission
13. \* Participation in educational departments and implementing given trainings

In teamwork each resident discusses related issues.

\*This section is evaluated by faculty members in 5 integrated sessions during the resident's clinical interventions in the department while implementing given trainings. Additional clinical training is also presented. It is expected that the trained issues become institutionalized in residents and in future semesters faculty members monitor it and affect it in their evaluation.

**Reference:**

Patient Safety Curriculum Guide, Multi-professional Edition, World Health Organization Publications, available in the following website:

[http://whqlibdoc.who.int/publications/2011/9789241501958\\_eng.pdf](http://whqlibdoc.who.int/publications/2011/9789241501958_eng.pdf)

**Unit title:** Clinical Management and Governance

**Unit code:** 8

**Number and type of unit:** 1 workshop unit

**Educational hours within the course duration:** 51h

**Prerequisite:** none

**Aims:**

Understanding the models and tools of management of service quality, needs of service excellence, patient safety, management and evaluation exert, believing the need to improve the quality of oral health services through the establishment of models and tools for quality management including models of clinical service governance.

Minimum practical skills expected:

It is expected that in the end of this course residents demonstrate management of clinical services while providing oral health care and in higher semesters demonstrate it automatically.

**Subtitles**

	Content	Method of learning-teaching	Duration (hours)
1	Quality and methods for its improvement	Workshop	1
2	Management of the quality of oral health care	Workshop	1
3	Governance of clinical services and its prerequisites	Workshop	1
4	Models and tools of quality management	Workshop	1
5	Patient safety	Workshop	1
6	Clinical efficacy	Workshop	1
7	Concepts of clinical efficacy and evidence based dentistry and clinical audit	Workshop	1
8	Interaction with patients, concomitant and community	Workshop	1
9	Education, training and managing staff	Workshop	1
*10	Improvement of the quality of services of the specialty	Workshop	5
*11	Evaluating the substantiation and performance of clinical governance concepts in the specialty	Workshop	3

\*These items are during the service provision in the specialty field but in these sessions required trainings regarding clinical service governance are provided by faculty members.

Management of this course is up to the vice dean of post-graduate educations. Evaluation of this program is done by assessing it from the perspective of students and faculty and the rate of achievement of the specific aims, with should be performed by the head of the department and the results and suggestions and strategies regarding the improvement of the implementation of the program should be provided to the board of post-graduate educations.

**Unit title:** Oral pathology

**Unit code:** 9

**Number and type of unit:** 0.5 theoretical units

**Educational hours within the course duration:** 9h

**Prerequisite:** none

**Subtitles**

1. Preparation and staining microscopic samples
2. Histopathology of tissue repair (cellular growth, fibrosis and healing)
3. Common reactive lesions in the oral cavity
4. Neoplastic lesions of the oral cavity ( primary, metastatic)
5. Inflammatory lesions of the oral cavity (infectious and non-infectious)
6. Developmental lesions of the oral cavity
7. Interpretation of microscopic smears of the oral mucosa

**Unit title:** Immunology and Oral Microbiology

**Unit code:** 10

**Number and type of unit:** 0.5 theoretical units

**Educational hours within the course duration:** 9h

**Prerequisite:** none

**Subtitles**

1. General concepts of immunology including: Components of the immune system, innate and acquired immune systems, humeral and cellular immunity, complement system, regulation of immune responses, hypersensitivity, autoimmunity, ...
2. Immunology of the oral cavity and saliva
3. Immune reactions in the dental pulp and periapical tissues
4. Immunologic responses to bone loss and periodontal disease
5. Immunologic responses to dental plaque and carries
6. Drug allergies and their relationship with the immune system
7. Oral microbial flora
8. Micro-organisms of the dental plaque
9. Micro-organisms related to periodontal diseases
10. Micro-organisms related to diseases of the dental pulp and periapical tissues
11. Micro-organisms related to common oral infections and dental abscesses
12. Practical acquaintance with methods of identifying the aforementioned micro-organisms
13. Discussion about topics of the residents' interest in this specialty area

**Unit title:** Applicable Head and Neck Anatomy

**Unit code:** 11

**Number and type of unit:** 0.5 practical units

**Educational hours within the course duration:** 17h

**Prerequisite:** none

### **Subtitles**

1. The oral cavity
2. Muscles of the mouth and peri-oral region
3. The infra-alveolar region
4. The infra-lingual region
5. Pharyngeal region
6. The nose
7. Alveolar and para-nasal sinuses
8. Salivary glands
9. Skin and facial expression muscles
10. Major and minor masticatory muscles
11. TMJ
12. Orbital cavity
13. Lymph nodes and lymphatic drainage
14. Sensory and motor nerves of the oral and maxillofacial region
15. Important veins of the oral and maxillofacial region
16. Fascial spaces

**Unit title:** Oral and Maxillofacial Histology & Embryology

**Unit code:** 12

**Number and type of unit:** 0.5 theoretical units

**Educational hours within the course duration:** 9h

**Prerequisite:** none

**Subtitles**

1. Histology and embryology of oral and maxillofacial soft and hard tissues
2. Development and growth of the tooth bud
3. Development and growth of anatomical structures such as the sinuses, bone and joints
4. Development and growth of the neural system
5. Common oral and maxillofacial anomalies such as cleft lip and palate and common syndromes
6. Discussion about topics of the residents' interest in this specialty area

**Unit title:** Dental biomaterials

**Unit code:** 13

**Number and type of unit:** 0.5 theoretical units

**Educational hours within the course duration:** 9h

**Prerequisite:** none

**Subtitles**

1. History and biomaterial classification
2. Types of biomaterials with tissue or synthetic origins
3. Structure and properties of ceramics with emphasis on hydroxyapatite ceramics, Bioglass, MTA and CEM Cement
4. Structure and properties of metals with emphasis on their function such as titanium in the body and surface properties of implants
5. Structure and properties of polymers (composites, sutures,..) with emphasis on their function in the body
6. Testing biomaterials:
  - Type of culture
  - Tissue implantation
  - Sampling for microscopic evaluation
  - Evaluation of live tissue-material interactions



**Unit title:** Pharmacology

**Unit code:** 14

**Number and type of unit:** 0.5 theoretical units

**Educational hours within the course duration:** 9h

**Prerequisite:** none

**Subtitles**

1. General overview
  - Mechanisms of absorption, excretion and effects of drugs on the body
  - Side effects of drugs (toxic effects, idiosyncrasies, hypersensitivity...)
  - Drug interactions
  - Drug prescription during pregnancy and lactation
2. Principles of drug prescription
3. Analgesics and their pharmacology
4. Pharmacology of steroid and non-steroid anti-inflammatory drugs
5. Antibiotic classification and mechanism of action (antimicrobial, antifungal and antiviral)
6. Antihistamine
7. Local anesthetics
8. Drugs affecting the central and automatic nervous system
9. General anesthetics
10. Drugs affecting saliva
11. Immunosuppressants for treatment of non-neoplastic diseases

**Unit title:** Oral Physiology and Biology

**Unit code:** 15

**Number and type of unit:** 0.5 theoretical units

**Educational hours within the course duration:** 9h

**Prerequisite:** none

**Subtitles**

1. Formation and mineralization of dental tissues
2. Chemical composition of dental tissues
3. Physiology of the enamel, dentine, pulp, cementum and bone
4. Physiology of the oral mucosa, saliva, taste buds and lymph nodes
5. Physiology of the TMJ and associated muscles
6. Physiology of pain and controlling it
7. Physiology of oral functions (mastication, Ingestion, speaking and breathing)
8. Physiology of eruption and resorption of teeth
9. Mechanisms of bone resorption and remodeling
10. Mechanism of muscle reflexes
11. Role of nutrition, age and hormones on oral and dental structures
12. Biology of plaque formation and its properties and prevention

**Unit title:** Interdepartmental Seminars (periodontics-pediatrics)

**Unit code:** 16

**Number and type of unit:** 0.5 theoretical units

**Educational hours within the course duration:** 9h

**Prerequisite:** none

**Subtitles**

Determined by faculty members.

**Unit title:** Interdepartmental Seminars (prosthodontics-restorative dentistry)

**Unit code:** 17

**Number and type of unit:** 0.5 theoretical units

**Educational hours within the course duration:** 9h

**Prerequisite:** none

**Subtitles**

Determined by faculty members.

**Unit title:** Case presentation 1-4

**Unit code:** 18-21

**Number and type of unit:** 6 theoretical units (1.5 theoretical units in each semester)

**Educational hours within the course duration:** 102h

**Prerequisite:** none

**Subtitles**

Determined by faculty members.

**Unit title:** Evidence based Endodontics

**Unit code:** 22

**Number and type of unit:** 1 theoretical unit

**Educational hours within the course duration:** 17h

**Prerequisite:** none

**Subtitles**

1. Status of evidence based endodontics
2. Data resources in endodontics
3. Access to endodontic evidence during patient care
4. Endodontic research appraisal
5. Standardizing interventions in endodontics
6. Clinical outcomes of endodontic treatments and their measurement
7. Back draws of evidence based endodontics

**Unit title:** Theoretical Endodontics1

**Unit code:** 23

**Number and type of unit:** 6 theoretical units

**Educational hours within the course duration:** 102h

**Prerequisite:** none

**Title:** Philosophy and History of endodontic

**Subtitles:**

1. History of Endodontics and its advancement
2. Materials, instruments and treatment methods in the past
3. The philosophy and major aims of Endodontic treatments
4. Focal infection and hallow tube theories and research in this area

**Title:** Embryology, histology and biology of the pulp and periapical

**Subtitles:**

1. Development of the tooth bud
2. Embryology and development of hard and soft tissues of the tooth
3. Embryology and development of supporting tissues of teeth
4. Histology of the enamel, dentine and pulp
5. Histology of the supporting tissues of teeth
6. Biology of the hard tissues of the tooth
7. Biology of the pulp and supporting tissues of teeth
8. Mechanism of action of odontoblasts under normal conditions and under the influence of various stimuli
9. Mechanism of action of vessels and nerves and pulpal components under normal conditions
10. Mechanism of action of vessels and nerves and cellular components of the supporting tissues of teeth

**Title:** Pulpal and periapical diseases

**Subtitles:**

1. Different causative factors of pulpal disease
2. Different causative factors of periapical disease
3. Classification of pulpal diseases
4. Classification of periapical diseases
5. Pulp and periapical defense mechanisms
6. Vascular and cellular response to pulp and periapical stimuli
7. Response of the odontoblasts to different conditions
8. Development of pulpal diseases
9. Development of periapical diseases
10. Histopathology of the pulp and periapical tissues in disease
11. Differential diagnosis of lesions in the supporting tissues of the tooth with odontogenic and non-odontogenic origins

**Title:** Principles of diagnosis, treatment planning and patient selection

**Subtitles:**

1. Oral and dental examinations

2. Diagnostic testing
3. Tooth evaluation:
  - Radiologic: the length and shape of the root, condition of root canals, resorption and calcification
  - The position of the tooth in the jaw
  - Restorability of the tooth crown
  - Periodontal status
4. The skills, experience and facilities of the operator
5. Treatment plan
  - Emergency treatments
  - Common treatments:
    - o Endodontic treatments
    - o Surgical treatments
    - o Additional treatments (trauma, open apex, ...)
    - o Consultation with other departments
    - o Prognosis

**Title:** Systemic diseases

**Subtitles:**

1. Anatomy of the alveolar process
2. Enzyme activity and effect of hormones in bone remodeling
3. Factors affecting the formation of the bone matrix and the role of hormones and vitamins in it
4. Classification of bone diseases and their differential diagnosis with each other and with odontogenic lesions
5. Bone manifestations of metabolic and hematopoietic diseases in the jaw
6. Alveolar cysts and common tumoral lesions, radiologic manifestations and their diagnosis
7. Infection of facial spaces
8. Factors affecting bone loss (enzymes, hormones and immunologic factors)
9. Root resorption related to local and systemic factors
10. Systemic and granulomatous lesions of the jaw and their differential diagnosis

**Title:** Radiography and improved imaging techniques

**Subtitles:**

- 1- History of radiography in endodontics
- 2- Physics of radiation and safety considerations
- 3- Applications of radiography in endodontics
- 4- Different imaging techniques
- 5- New techniques and equipments in radiology
- 6- Important points for obtaining perfect radiographs
- 7- Interpretation of radiographic images

**Title:** Anatomy of root canal

**Subtitles:**

- 1- Morphology and Anatomy of access cavity in anterior and posterior teeth.
- 2- Numbers of root canals in different teeth in normal conditions
- 3- Ramifications and additional canal in different teeth.



- 4- Lateral canals and their location for different teeth.
- 5- Pulpal changes (calcification and other abnormal conditions)
- 6- Anatomical role of roots and root canals in prognosis
- 7- Radiographic interpretation of the anatomy and morphology of teeth
- 8- Morphology and location of root canal orifices
- 9- Thickness of root canal wall in different zones especially the danger zone

**Unit title:** Theoretical Endodontics 2

**Unit code:** 24

**Number and type of unit:** Six theoretical units

**Educational hours within the course duration:** 102 h

**Title:** Instruments and equipment for root canal preparation

**Subtitles:**

- 1) Hand instruments: files, drills, explorer... According to their composition, shape and applications
- 2) Vibrational instruments for cleaning & shaping the root canal space: sonic, ultrasonic instruments, according to their composition, shape and applications
- 3) Rotary instruments: gates-glidden, peeso-reamer, drills and modern systems according to their composition, shape and applications
- 4) Rubber dam for tooth isolation
- 5) Apex finders
- 6) Another relevant devices

**Title:** Access cavity preparation, cleaning and shaping of the root canal system

**Subtitles:**

- 1) Access cavity preparation :
  - Objectives
  - Armamentaria
  - Access cavity preparation in anterior & posterior teeth
  - Errors in access cavity preparation
- 2) Canal preparation :
  - Objectives
  - Biological and mechanical principles of root canal preparation
  - Methods of working length determination
  - Step back technique for root canal preparation
  - Alternative techniques for root canal preparation
  - Canal preparation techniques in curved canal
  - Rotary Techniques

**Title:** Irrigants and intracanal medicaments

**Subtitles:**

- 1- Objectives of irrigant application
- 2- Properties of an ideal irrigant
- 3- Types of irrigants
- 4- Comparison of the properties of different irrigants.

**Title:** Devices, materials and techniques of root canal obturation

**Subtitles:**

- 10- Obturation devices (manual, electrical,...)
- 11- Obturation materials (gutta-percha, sealers,...)
- 12- Objectives of root canal obturation
- 13- Biologic and mechanical principles of root canal obturation
- 14- Various techniques of root canal obturation (lateral condensation, vertical compaction,...)
- 15- Radiographic criteria for evaluation of obturation

16- Importance of obturation of lateral canals.

**Title:** Local anesthesia

**Subtitles:**

- 1- Chemical composition of local anesthesia
- 2- Mechanisms of action for anesthetics
- 3- Vasoconstrictor compositions associated with local anesthetics and their applications
- 4- Factors influencing failure of local anesthesia
- 5- Techniques of local anesthesia in different teeth
- 6- Alternative techniques (GowGates ... )
- 7- Supplemental techniques (intra-osseous, intra-pulpal, ...)
- 8- Toxic doses of local anesthetics, allergic reactions and their management

**Unit title:** Theoretical Endodontics (3)

**Unit code:** 25

**Number and type of unit:** Six theoretical units

**Educational hours within the course duration:** 102 h

**Title:** Pharmacology in Endodontics

**Subtitles:**

- 1- Drugs used for the management of anxiety in endodontics
- 2- Drugs used for the management of pain in endodontics
- 3- NSAID, Antipyretics
- 4- Narcotic Analgesics
- 5- Drugs used for infection control such as Antibiotic
- 6- Mechanism of action of anti-anxiety, analgesics and antibiotics
- 7- Metabolism and side effects of drugs used in endodontics
- 8- Preventive & treatment doses of drugs in different conditions
- 9- Drugs interactions

**Title:** Microbiology of root canals & sterilization:

**Subtitles:**

- 1- History of root canal bacteriology.
- 2- Evaluation of effective bacteria in the production of caries, pulp & periodontal disease.
- 3- New methods of sample preparation & bacterial culture and obstacles in their clinical use
- 4- Aerobic, anaerobic, facultative bacteria in the root canal and their growth and mechanism of activity
- 5- Bacteria in existing in the periodontal space and their mechanism of activity.
- 6- The role of pathogens in the production of facial space infections and their management

**Title:** Pulp & periapical reaction to irritants:

**Subtitles:**

- 1- Classification of etiologic factors of pulp and periapical disease
- 2- Bacterial role of in the pathogenesis of pulp & periapical disease
- 3- Role of operative, periodontics, orthodontics and ... procedures in te pathogenesis of pulp & periapical disease
- 4 Role of trauma from operative treatment, orthodontic treatment, surgery and occlusion in the pathogenesis of pulp & periapical diseases.
- 5 Role of endodontic treatment (preparation and obturation) in pathogenesis of periodontal diseases.
- 6 Inflammatory and degenerative reactions of the pulp to irritants.
- 7 Periapical inflammatory reactions to irritants ( destructive, reparative )
- 8 Pulpal reactions to systemic disease.
- 9 Pulpal reactions to radiotherapy and drugs used for treatment of systemic disease.

**Title:** Procedural accidents:

**Subtitles:**

- 1- Access cavity preparation mishaps including incorrect gouging, perforations, inadequate access and their management.

- 2- Canal preparation mishaps including ledge formation, perforation, inadequate access to the root canal, file fracture and their management
- 3- Obturation mishaps including under filling, over filling ,root fracture and their management
- 4- Post space preparation for restorative treatments and its management.
- 5- Possible accidents such as swallowing of objects during treatment, hypochlorite accident, emphysema and their management.

**Title:** Traumatic injuries

**Subtitles:**

- 1- Etiology, epidemiology and classification of dental traumatic injuries.
- 2- Diagnostic methods for the effects of trauma on teeth.
- 3- Emergency regarding traumatized teeth.
- 4- Interpretation of radiographic images for diagnosis and treatment planning of traumatized teeth.
- 5- Diagnosis and treatment planning in traumatized teeth with open apices.
- 6- Diagnosis and treatment planning in traumatized teeth without root fracture.
- 7- Diagnosis and treatment planning in traumatized teeth with root fracture.
- 8- Diagnosis and treatment planning in traumatized teeth with alveolar fracture.
- 9- Diagnosis and treatment planning in luxative injuries and avulsed teeth.

**Unit title:** Theoretical Endodontics (4)

**Unit code:** 26

**Number and type of unit:** six theoretical units

**Educational hours within the course duration:** 102 h

**Title:** Root Resorption

**Subtitles:**

- 1- Classification of root resorption considering etiologic factors.
- 2- Radiologic diagnosis of external & internal resorption.
- 3- Mechanism of resorption and the role of osteoclasts and chemical mediators in resorption.
- 4- Treatment methods of root resorption.
- 5- Treatment prognosis of different types of root resorption.

**Title:** Vital Pulp Therapy

**Subtitles:**

- 1- Structure of the vital pulp
- 2- Repair ability of the pulp
- 3- Production of reparative dentin
- 4- Different techniques to stimulate reparative dentin production
- 5- Direct pulp cap
- 6- Indirect pulp cap
- 7- Pulpotomy
- 8- Indication of vital pulp therapy
- 9- Materials used in vital pulp therapy
- 10-Evaluation criteria for treatment success
- 11-Clinical procedures of treatment
- 12-Sterilization
- 13-Hemostasis
- 14-Final restoration
- 15 - Follow up

**Title:** Immunology and Inflammation in Endodontics

**Subtitles:**

- 1- Role of blood-vessel reactions in acute & chronic inflammation
- 2- Role of cellular reactions in acute & chronic inflammation
- 3- Role of chemical mediators in acute & chronic inflammation
- 4- The immune system
- 5- Hypersensitivity reaction
- 6- Chronic inflammatory process
- 7- Tissue reparative processes following injuries
- 8- Clinical applications of pulp & periapical inflammatory reactions

**Title:** Emergencies in Endodontics

**Subtitles:**

- 1- Chemical mediators involved in emergencies with pulp & periapical origin
- 2- Diagnosis and treatment of acute pulpitis, abscess and acute apical periodontitis
- 3- Prevention, diagnosis and treatment the flare ups
- 4- Local and systemic factors influencing flare ups

5- Effect of flare ups on the prognosis of treatment

**Title:** Bleaching of root canal treated teeth

**Subtitles:**

- 1- Factors influencing discoloration in vital and non-vital teeth
- 2- Current techniques for tooth bleaching
- 3- Effect of chemical bleaching materials on periodontal tissues
- 4- Prognosis of tooth bleaching

**Unit title:** Theoretical Endodontics (5)

**Unit code:** 27

**Number and type of unit:** six theoretical units

**Educational hours within the course duration;** 102 h

**Title:** Modern Endodontics

**Subtitles:**

- 1- Laser in endodontic diagnosis & treatments
- 2- Role of microscope in endodontic treatment
- 3- Different systems of apexlocators
- 4- Different systems of rotary files
- 5- Different systems of root canal obturation
- 6- New system for imaging
- 7- Other systems and new devices in endodontic treatment

**Title:** Non – Surgical Retreatment

**Subtitles:**

Recognition of retreatment

- 1- Diagnosis & factors effecting it
- 2- Treatment planing (endodontics, surgery & other treatments)
- 3- Reasons of failure (incomplete obturation, file fracture,... )
- 4- Treatment methods (retrieving fractured instrument from the root canal, ... )
- 5- Effective factors on prognosis (tooth anatomy, skills, ... )
- 6- Materials, devices and equipments and their proper application.

**Title:** Success & Failure

**Subtitles:**

- 1- Clinical and histologic criteria of success
- 2- Effective factors on success & prognosis
- 3- Criteria considered in patient follow up
- 4- Radiographic interpretation in treatment evaluation
- 5- Factors involved in failure (tooth related, patient related, practitioner related)

**Title:** Endodontic Surgery and Principles of Microsurgery

**Subtitles:**

1. Indication & contraindication of endodontic surgery.
2. Treatment objectives of endodontic surgery.
3. Techniques & procedures of endodontic surgery.
4. Pre and post-surgical instructions.
5. Tissue repair after endodontic surgery.
6. Retro-filling materials and their indications.

**Title:** Restoration of root canal treated teeth.

**Subtitles:**

1. Alteration of the structure of root canal treated teeth
2. Resistance to fracture in root canal treated teeth.
3. Esthetic alteration in root canal treated teeth.
4. Methods and materials used for crown restoration of root canal treated tooth.



5. Preoperative endodontic evaluations.
6. Desirable treatment planning.
7. Post space preparation.
8. Post placement.
9. Adhesive methods.
10. Partial restorations
11. Full crown methods.
12. Preparation of tooth for full crown.

**Title:** Repair of periapical lesions.

**Subtitles:**

1. Clinical and radiologic signs of repair of periapical lesions.
2. Histopathology of repair of periapical lesions.
3. Role of fibroblasts, osteoblast, cementoblasts and macrophages in periapical repair
4. Repair of periapical tissues following canal preparation.
5. The effect of restorative materials on tissue repair
6. The effect of occlusion on tissue repair
7. The effect of systemic factors on tissue repair
8. Stages of hard and soft tissue repair after endodontic surgery

**Unit title:** Theoretical Endodontics (6)

**Unit code:** 28

**Number and type of unit:** Twelve theoretical units

**Educational hours within the course duration:** 204 h

**Title:** Pain and Management of Pain

**Subtitles:**

- 1- Terminology of pain
- 2- Physiologic mechanisms of pain creation and transmittion
- 3- Factors causing pain (chemical mediators,...)
- 4- Odontogenic pains and their relation with pulp and periapical diseases.
- 5- Non odontogenic pains (vascular, muscular, ...)
- 6- Pain management and factors effecting it
- 7- Drugs used for pain management, their indications

**Title:** Non –Odontogenic Pain

**Subtitles:**

- 1- Neurophysiology of pain
- 2- Path ways of acute pain
- 3- Referral pain
- 4- Trigeminal system
- 5- Chronic pain
- 6- Behavioral factors
- 7- Pain measurement
- 8- Classification of head and neck pain
- 9- Pain with extra cranial origin
  
- 10-Pain with intra cranial origin
- 11- Neurovascular pain
- 12- Neuropathic pain
- 13- Casualgic pain
- 14- Muscular pain
- 15- Pain with unknown origin

**Title:** Treatment of patients with anxiety

**Subtitles:**

- 1- Fear & tension
- 2- Control of anxious and fearful patients
- 3- Non drug control of anxiety & fear
- 4- Drug management of anxiety & fear
- 5- Inhalation sedation
- 6- Oral sedation
- 7- IV sedation
- 8- IM sedation
- 9- Nasal sedation
- 10-General anesthesia

**Title:** Tooth Cracks and Root Fractures

**Subtitles:**

- 1- Properties of cracks
- 2- Etiology of cracks
- 3- Signs & symptoms of cracks
- 4- Prevention & treatment of cracks
- 5- Diagnosis of root fractures
- 6- Etiology of root fractures
- 7- Treatment of root fractures

**Title:** Immediate Tooth Implants

**Subtitles:**

- 1- Application of implants in dentistry
- 2- Types of implants
- 3- Diagnosis & treatment plan
- 4- Preparation of alveolar process
- 5- Immediate implant
- 6- Endodontic lesions and success of implants

**Title:** Endodontics-related sciences

**Subtitles:**

- 1- Diagnosis the endo – perio lesions
- 2- Classification of endo- perio diseases
- 3- Treatment plan of endo- perio diseases & prognosis of treatment
- 4- Effect of periodontal diseases and treatments on the dental pulp
- 5- Pulpal protection during restorative treatments.
- 6- Pulpal irritation during restorative treatments.
- 7- Effect of orthodontic treatment on pulpal nerves and vessels, root cementum & periodontium
- 8- Endodontic management of teeth with open apices

**Unit title:** Practical Endodontics (1)

**Unit code:** 29

**Number and type of unit:** six practical units

**Educational hours within the course duration:** 204 h

Minimal treatment requirements for this lesson that should be done in the preclinic:

Row	Skill	Minimal requirements
1	Access cavity preparation in anterior, premolar and molar teeth.	5 cases for each
2	Canal preparation in anterior, premolar and molars (straight & curved roots) with different methods	5 cases for each
3	Canal obturation using different methods	5 cases for each
4	Apical play placement in teeth with simulated root resorption	3 cases
5	Bleaching in extracted teeth	2 cases
6	Forced eruption	1 cases
7	Splinting	1 cases
8	Retreatment in extracted teeth	5 cases for each
9	Endodontic microsurgery	10 cases

Application of apex locator, digital radiography, rotary systems, obturation systems, laser and modern equipment with clinical application will be taught on acrylic blocks extracted human teeth or human skull and live or dead animal jaws.

**Unit title:** Practical Endodontics (2)

**Unit code:** 30

**Number and type of unit:** Six practical units

**Educational hours within the course duration:** 204 h

**Minimal requirement:**

Row	Skills	Minimal requirement
1	Patient selection, diagnosis and chart completion	20 cases
2	Root canal treatment of teeth with a single root canal	20 cases
3	Root canal treatment of teeth with two root canals	20 cases
4	Root canal treatment of first molar teeth	20 cases
5	Root canal treatment of second molar teeth	20 cases

**Unit title:** Practical Endodontics (3)

**Unit code:** 31

**Number and type of unit:** six practical units

**Educational hours within the course duration:** 204 h

**Minimal requirement:**

Row	Skills	Minimal requirements
1	RCT of third molars	5 cases
2	RCT of anterior teeth with 2 root canals	5 cases
3	RCT of premolars with additional root canals	5 cases
4	RCT of molar teeth with additional root canals	10 cases
5	Retreatment of teeth with a single root canal	5 cases
6	Retreatment of teeth with two root canals	10 cases
7	Treatment of vital pulps (closed Apex)	5 cases
8	Endodontic management of teeth with open apices(apical plug)	5 cases
9	Apexogenesis	5 cases
10	Endodontic management in teeth with internal resorption	5 cases
11	Endodontic management in teeth with external resorption	5 cases
12	Management of traumatized teeth	10 cases
13	Bleaching of root canal treated teeth	2 cases
14	Forced eruption	2 cases
15	Treatment of endo-perio cases	5 cases

**Unit title:** Practical Endodontics (4)

**Unit code:** 32

**Number and type of unit:** Six practical units

**Educational hours within the course duration:** 204 h

**Minimal requirement:**

Row	Skills	Minimal requirements
1	Retreatment of molars	20 cases
2	Root canal treatment of teeth with severe curvatures	20 cases
3	Root canal treatment of teeth with calcification	15 cases
4	Root canal treatment through crowns	5 cases
5	Periradicular surgery of single rooted teeth	5 cases
6	Periradicular surgery of multi-rooted teeth	5 cases
7	Tooth regeneration	2 cases
8	Retreatment of teeth with two root canals	5 cases

**Unit title:** Practical Endodontics (5)

**Unit code:** 33

**Number and type of unit:** Six practical units

**Educational hours within the course duration:** 204 h

**Minimal requirement:**

Row	Skills	Minimal requirements
1	Procedural mishaps	20 cases
2	Endodontic treatment of primary single and multi-rooted teeth	2 cases
3	Surgical treatment of external root resorption	2 cases
4	Replantation	5 cases
5	Fresh socket implant	5 cases
6	Follow up of treated teeth	40 cases
7	Root canal treatment of third molars	5 cases
8	Retreatment of molars	20 cases
9	Periradicular surgery of single rooted teeth	10 cases
10	Periradicular surgery of multi – rooted teeth	5 cases



**Unit title:** Thesis (1) to (5)

**Unit code:** 33-38

**Number and type of unit:** Ten practical-workshop units

**Educational hours within the course duration:** 476 h

**Thesis (1) - Aim:** Selection of research subject with in the area of specialty.

This course is held in two work shop units and must be taken to account in the educational program. The research subject will be chosen with the assistance of the relevant supervisor throughout the work shop sessions. Field research must be done out of work shop time and the outcome of it must be presented during the work shop sessions. The resident must have gathered his/her documents to present the proposal by the end of the semester. The proposal must be preregistered in the research council and the evidence suggesting that the resident has passed the course by the dead line must be handed to postgraduate director.

**Thesis (2)- Aim:** Registration of research subject.

This course is held in two work shop units and the resident must participate in sessions held in collaboration with statistical consultant and/or statistic experts or epidemiologists. The resident must complete his/her proposal by the end of the semester and must register it in the relevant site. Meetings must also be held with the supervising professor during these sessions.

**Thesis (3)- Aim:** Performing the research.

This course is held in two practical and must be taken to account in the educational program. The time and manner of performance of this unit is up to the supervisor and can be organized in continuous or interrupted sessions. The supervisor must inform the postgraduate director of the department about the progress so that other educational programs can be coordinated. If the research requires more time than one semester, the measures that must be taken during that semester should be confirmed by the supervisor.

**Thesis (4)- Aim :** Writing the thesis and relevant article.

It is a two unit work shop course must be taken to account in the educational program. The resident should statistically analyze data, extract the results and write the thesis under the supervision of the supervisor and statistical consultant. The resident is obliged to write and submit at least one paper to a valid journal. If the research is to be done in more than one semester, the resident must analyze and extract the primary results.

**Thesis (5)- Aim:** Defense of thesis

This is a two unit work shop course that should be considered in the educational program. The resident must complete the thesis, present his findings and defend the thesis.

Notice: It is apparent that all researches may not follow this sequence and timing and may require more time. It is possible to extend the performance to reschedule the dead line only with the confirmation of the vice dean of research.

**Unit title:** Journal Club (1) to (4)

**Unit code:** 39-42

**Number and type of unit:** Nine theoretical units (1.5 units per semester)

**Educational hours within the course duration:** 153 h

**Titles:**

According to the enactments of the specialty board of endodontic