

DEN5405C: Preclinical Operative Dentistry I/Biomaterials

Spring 2021

Course Description:

This is the first course in a series of three courses that introduces fundamental concepts of operative dentistry emphasizing biomaterials science and its clinical application. Minimally invasive dentistry principles, direct and indirect restorative materials/ technique and ergonomics will be introduced focusing on development of psychomotor skills, self-assessment, and clinical judgment.

I. General Information

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Course Credits: 4

Semester: Spring

Office Hours: Mondays (am for Orange and pm for Blue)

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Prerequisite course: DEN5404C: Dental Anatomy and Stomatognathics

II. Course Goals

This course is the first in a series of three courses, which are designed to provide the student with sufficient knowledge in the Operative Dentistry. The restorative treatment of Class I, III, and V carious lesions using resin-based composite will be particularly emphasized, and based on the concepts of minimally invasive dentistry.

This course also includes an introduction course to dental biomaterials, which is designed to teach some material properties principles and definitions, polymeric materials including dental adhesives, and composites. Since Operative Dentistry and Biomaterials contribute to a major portion of the general practice of dentistry, it is important to concentrate now on developing excellent clinical skills and efficiency to provide optimal patient care. Such skill and efficiency are essential components for a successful practice.

Finally, this course will also include an introduction to the ergonomic techniques designed to prevent the occurrence of musculoskeletal injury during the practice of dentistry.

III. Course Overview

Direct instruction (lectures) and simulation labs are utilized in this course to introduce fundamental concepts related to Operative dentistry.

Successful completion of this course is required to progress to DEN6407C: Preclinical Operative II. It is a required pre-requisite.

IV. Course Outline

1. Introduction to Operative Dentistry
2. Dental Instruments
3. Fundamentals in Tooth Preparation
4. Principles of Adhesion to Enamel and Dentin
5. Resin Based Composite: Composition and Handling
6. Resin Based Composite: Finishing and Polishing Techniques
7. Light curing
8. Isolation of the Operating Field
9. Class V Composite Restorations
10. Class III Composite Restorations
11. Class I Composite Restorations
12. Dental Biomaterials
 - a. General introduction to dental biomaterials
 - b. Polymeric materials, dental adhesive, composite and RMGI
 - c. Liners and base materials for pulp capping
13. Ergonomics: Patient, Operator, and Assistant Positioning
14. Direct and Indirect Pulp Capping

V. Course Material

Required textbooks:

Textbooks can be purchased in the Health Science Center bookstore on the ground floor next to the Post Office.

1. "Summitt's Fundamentals of Operative Dentistry - A Contemporary Approach" by Hilton TJ et al, 4th ed., 2013.
2. "Phillips' Science of Dental Materials" by Kenneth J. Anusavice; H. Ralph Rawls; Chiayi Shen.; 12th ed., Elsevier, 2012.
3. "Pulp-Dentin Biology in Restorative Dentistry" by Ivar A. Mjor, Quintessence books, 2002.

Other Resources:

Operative Dentistry Lectures and Handouts will be posted in Canvas.

Dental biomaterials Lectures and Reading Materials will be posted on [E-learning](https://elearning.ufl.edu): <https://elearning.ufl.edu>/Dental Lib Guide: <http://guides.uflib.ufl.edu/dental>

VI. Course Objectives

The material in this course will be presented in lecture, web-based, laboratory, and self-study format. You will demonstrate competency in the knowledge of the following and the ability to apply this knowledge to the practice of dentistry:

1. Dental Instruments

- Describe the indications and reasons for using both rotary and hand instruments in cavity preparations
- Explain the instrument classification and use, instrument grasps, and Black's formula
- Describe the sharpening and care of hand instruments
- Describe rotary cutting instruments in reference to the following: design features and construction, shapes, sizes, numbering, functional characteristics, care, and maintenance

2. Isolation of the Operating Field

- Describe the rationale for using the rubber dam
- Demonstrate the proper placement and use of the rubber dam, clamps, gingival retractor and frame to achieve field isolation

3. Prevention, Diagnosis and Treatment of Class I, III and V carious lesions

- Demonstrate the ability to prepare and restore teeth with composite resins
- Describe the pulp-dentin reactions to dental caries and to cavity preparations
- Demonstrate the ability to perform a direct and indirect pulp capping

4. Dental Biomaterials

- Discuss the structure of materials and explain how inter atomic bonds influence physical/mechanical properties of dental materials
- Discuss bonding mechanism in terms of joining two chemically different materials, such as resin to enamel and resin to dentin
- Familiarize with polymers used in dentistry, identify different polymerization mechanisms and discuss their characteristic behaviors
- Explain how the molecular structure of polymers affects their properties such as glass transition temperature and hydrophobicity
- Define composites, identify components of dental composites and explain how each component affects the properties of a dental composite
- Explain how light-curing procedures affect the quality of the final composite and how errors introduced during this process can affect the clinical outcome
- Discuss the mechanism behind enamel and dentin etching and how deviations from the optimal technique affect enamel and dentin bonding Discuss the environment of oral cavity and its influence in the longevity of a resin-based composite restoration
- Discuss mechanisms of failure and fracture of dental composite restoration
- Discuss the different techniques for direct and indirect pulp capping

5. Ergonomics

- Describe the correct positioning of the operator, the patient and the chairside assistant for accomplishing clinical procedures in any give segment of the oral cavity
- Demonstrate the lighting technique that will allow for optimum visibility in either the maxillary or mandibular arches, and describe these techniques
- During a preclinical operative procedure, perform the entire procedure efficiently by using the principles outlined in the module

VII. Course Competencies

This course teaches the following competencies in the ["Competencies for the New Dental Graduate"](#).

Domain VI: Patient Care - A. Assessment, Diagnosis, and Treatment

12: Patient Assessment, Diagnosis, Treatment Planning and Informed Consent: Provide oral health care within the scope of general dentistry to include patient assessment, diagnosis, comprehensive treatment planning, prognosis, and informed consent.

Domain VI: Patient Care - B. Establishment and Maintenance of Oral Health

17: Provide oral health care within the scope of general dentistry to include restoration of teeth.

20: Provide oral health care within the scope of general dentistry to include periodontal therapy.

23: Provide oral health care within the scope of general dentistry to include malocclusion and space management.

VIII. Evaluation

Evaluation of student performance will consist of:

- 1) Didactic testing in the form of written quizzes and exams
- 2) Psychomotor exams

Written Quizzes and Examinations. Quizzes related to the Operative Dentistry portion of this course are to be expected. Quizzes will cover the assigned reading for the day plus any material related to the current topic which has been previously covered in lecture or in the laboratory. There is a minimum of ten and a maximum of fifteen quizzes scheduled during the lecture/simlab sessions of this course. The quiz with the lowest score will be dropped from each student's accumulated quiz total when determining course final grades. If a student misses a class for any reason, that quiz will be the one dropped.

There are a total of two written examinations. The first written exam will cover all course material given up to the respective exam date. The second written exam will be cumulative including all course material given up to the date of the second exam. All quizzes and written examinations will selectively use questions of the multiple choice, T/F, matching, or short answer type.

Psychomotor Examinations. Eight psychomotor exams are scheduled in this course. Each of these competency exams will require a preparation of a tooth or a restoration of a tooth using resin-based composite (4 preparations and 4 restorations). These exams will be evaluated to determine if psychomotor competency has been achieved and the scores of these exams will be included in determining the final course grade. Completing assigned daily routines makes one eligible to take the assigned psychomotor examination.

The grade of the psychomotor exam will be determined by the 4 point scale determined by the **Department of Restorative Dental Science**. Student performance is evaluated by an orderly decision-making process. Procedural items are scored 4, 3, 2, or 1 against defined criteria.

- A 4 indicates that the criteria was met at an Ideal level
- A 3 indicates that the criteria was met at an clinical acceptable level
- A 2 indicates that modifications are necessary to achieve an clinical acceptable level
- A 1 indicates that the outcome was deemed to be at an unacceptable level

For each criterion an evaluative modifier (+) can be assigned to a 1, 2, or 3 grade to indicate that the student identified an error prior to faculty evaluation. Proper terminology and specific locations of all errors must be noted by the student in writing. General non-specific statements will not justify a (+) modifier.

A "1" or "1+" score on any of the criteria on a psychomotor exam will result in an automatic failing grade. The percentage assigned is 65% or the actual score, whichever is lower, when a score of 1 is given. The percentage assigned is 70% or the actual score, whichever is lower, when a score of 1+ is given.

Points are calculated as follows:

- 4 = 4 points
- 3+ = 3.25 points
- 3 = 3 points
- 2+ = 2.25 points
- 2 = 2 points
- 1+ = 0.25 point
- 1 = 0 points

In order to pass a psychomotor exam, the student must have a final grade of 72% or above. Also, the student should pass at least 5 of the 8 examinations to pass the course successfully. Moreover, the student should pass at least 50% of the preparation (at least 2 preparation examinations) and 50% of the restoration psychomotor examinations (at least 2 restoration examinations) to pass the course. If the student does not achieve a final psychomotor grade of 72% or does not pass the minimum required psychomotor examinations, the student will remediate the psychomotor portion of the course. See information below about the remediation process.

Students who fail a psychomotor exam will have to reassess at the end of the course. The reassessment will not affect the final course grade, but will be administered by the course director if he/she feels additional information can be garnered from this experience.

RDS Psychomotor Grade Scale

RDS Grade Scale		Assigned Psychomotor Exam Grade	
	%	Points	%
A	95-100	4.0	100
		3.9	98
		3.8	96
A-	90-94.99	3.7	94
		3.6	92
B+	86-89.99	3.5	91
		3.4	89
B	82-85.99	3.3	87
		3.2	85
B-	80-81.99	3.1	83
		3.0	81
C+	74-79.99	2.9	79
		2.8	77
C	72-73.99	2.7	75
		2.6	73
		2.5	72
E	<72	2.4	71
		2.3	70
		2.2	69
		2.1	68
		2.0	67
		1.9	65
		1.8	62
		1.7	58
		1.6	55
		1.5	51
		1.4	48
		1.3	44
		1.2	41
		1.1	37
		1.0	34
		0.9	30
0.8	27		
0.7	23		
0.6	20		
0.5	16		
0.4	13		
0.3	9		
0.2	6		
0.1	2		
0.0	0		

Daily Laboratory Exercises. Daily work will be critiqued by the student first and then by the faculty. Although these daily evaluations will not be counted for grades, they are intended to teach the student to critique his/her work and learn the performance criteria used to evaluate competency and how this would translate into grades in a psychomotor exam situation.

Assigning Grades. The final grade will be determined based on the following didactic and psychomotor components:

1. Didactic component - 45% (30% written exams + 15% quizzes)

- Exam 1: Operative & Biomaterials - 15%
- Exam 2: Operative & Biomaterials - 15%
- Quizzes/Assignments: 15%

2. Psychomotor component - 55% (psychomotor exams)

- Exam 1: Class V Preparation - 6.875%
- Exam 2: Class V Composite Restoration - 6.875%
- Exam 3: Class III Preparation - 6.875%
- Exam 4: Class III Composite Restoration - 6.875%
- Exam 5: Class I mandibular Preparation - 6.875%
- Exam 6: Class I mandibular Composite Restoration - 6.875%
- Exam 7: Class I maxillary Preparation - 6.875%
- Exam 8: Class I maxillary Composite Restoration - 6.875%

Final Grade - 100%

***In order to pass this course, the student must have a final grade of 72% or above. However, the didactic and psychomotor components must be passed independent of one another with a 72% or above. In addition, if the student did not pass 5 of the 8 psychomotor examinations being at least 2 of them a preparation examination and 2 of them a restoration examination, this will lead to course failure and the student will have to remediate each failed psychomotor procedure at the end of the course. The grades for each component will be calculated based on the percentages given for each exam as listed above.**

Attendance, Adherence to the Dress Code and Professional Conduct are Mandatory. The following adjustments will be made to the final course grades:

Attendance

- 5% will be deducted from the final grade for each lecture or lab missed without an excused absence.
- 5% will be deducted from the final grade for every three unexcused instances of tardiness.
- 5 % will be deducted from the final grade if the routine sheet is not returned complete by the date established by the course director.

Adherence to the Dress Code. Students must adhere to the dress code as spelled out in the Pre-doctoral Student Handbook and Clinic Procedure Manual while enrolled in any course in the Division of Operative Dentistry. It is applicable at ALL times including, lectures, exams, quizzes, and laboratory sessions. Failure to comply with the dress code will result in a reduction in your final course grade as follows:

- **1st Offense** - You will be asked to leave the class and warned

- **2nd Offense** - You will be asked to leave the class and a 5% reduction in your final course percentage will be imposed
- **3rd Offense** - You will be asked to leave the class and a 10% reduction in your final course percentage will be imposed
- **4th Offense** - You will be asked to leave the class and a 15% reduction in your final course percentage will be imposed
- **5th Offense** - You will be issued an "E" grade in the course

Professional Conduct. The College of Dentistry expects all dental students to be professionals in their dealings with patients, colleagues, faculty and staff. Behavior of a dental student reflects on a student's qualification and potential to become a competent dentist. In addition, for each lecture and laboratory session, students are expected to: be prepared, complete the self-evaluation forms, follow all guidelines and instructions (which includes dress code, use of iPods, headphones, etc.), and put forth an excellent effort (stays the entire session, works diligently during the lab session, etc.). Any student professional misconduct observed during lectures, exams, quizzes, and laboratory sessions will result in an **Academic Variance Form** (see *Pre-doctoral Student Handbook*), and **5 points will be deducted from the final course grade for each academic variance issued.**

The grades for the final written exam and psychomotor exam as well as the final grades will not be posted in Canvas until 70% of students have completed the end of course and faculty evaluations.

Remediation. Students failing the course will be awarded an "E" grade, referred to the Student Performance Evaluation Committee (SPEC), and automatically placed on academic probation.

The student must meet with the course director to develop a remediation plan within one week of the notification of the failing final grade. The remediation activities are at the discretion of the course director. Faculty are available to assist students as they prepare for this examination, but the responsibility for learning the material resides with the student. The time, place, content, and passing grade of the remediation program will be individualized for each student and arranged by the course director. The highest grade attainable in a remediated course is a "D". Students failing to satisfactorily complete the remediation program will maintain the "E" grade and be referred to SPEC for consideration for dismissal or retracting. For more information refer to the Administrative Practices Section K: Remediation.

Please note that if the course director determines that the student failed the coursework to such an extent that remedial activities would be inadequate to attain an acceptable level of academic achievement in the course material, the course director can elect not to provide remediation

Important: There will be no make-up quizzes. Most course directors will have one quiz that can be dropped.

Missed written or psychomotor examinations will require a doctor's note, and if excused,

- The written make-up exam will be a written essay examination,
- The psychomotor make-up exam will be similar to the scheduled examination but may include different teeth and/or surfaces.

The make-up examination must be scheduled within 2 business days of the missed exam or the student's return to school. The highest attainable grade on a missed exam is an 85%.

IX. Administrative Practices

Administrative practices for all UFCD courses are universally applied. Exceptions to or deviations from these practices are stated in the individual syllabi by the course director. When not individually stated in the syllabus, course administrative practices default to those identified under "Course Policies" on the DMD Student Website:

<https://dental.ufl.edu/education/dmd-program/course-policies/>

X. Grade Scale

DEN5405C Grade Scale

Method	Letter Grade
Scale	100
Tolerance	0.5 (Final letter grades within this range will be rounded up.)
A	95 - 100
A-	90 -95
B+	86 -90
B	82 -86
B-	80 -82
C+	74 -80
C	72 -74
E	0 - 72